FREIGHT AND MODE SHARE FORECASTS
A Review of "The Future of Freight"

March 2006

National Transport Commission

Prepared by

Maunsell Australia Pty Ltd

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REPORT OUTLINE

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Abstract:	In February 2005 the Australasian Railway Assocation released "The Future of Freight", a report prepared for them by Port Jackson Partners to review road access charging and other aspects of road and rail intermodal competition. The NTC wished to understand reasons for the differences between freight growth and mode share forecasts compared to other forecasts and to obtain a level of certainty for these forecasts. The review has found that the report presents a significant amount of information and analysis, but there are some aspects that can be developed further.
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FOREWORD

The National Transport Commission (NTC) was set up by all governments—Commonwealth, States and Territories—to progress national land transport reforms. We work in close partnership with the road and rail transport industries and government agencies. Our mandate is to progress regulatory and operational reform for road, rail and intermodal transport in order to deliver and sustain uniform or nationally consistent outcomes.

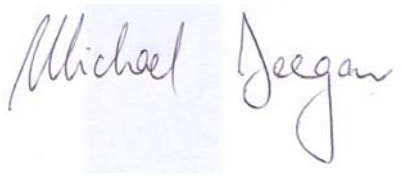
In examining projected increases in the land transport freight task to 2020, as part of the its Twice the Task project, the NTC observed that most freight forecasts were fairly consistent, with the exception of those presented by the Australasian Railways Association (ARA) in its report *The Future of Freight*. This report had been prepared for the ARA by Port Jackson Partners and was released in 2005. Rail freight forecasts presented in the report were considerably different to those produced by other organisations and reported in the NTC paper *Improving the Regulatory Framework for Transport Productivity in Australia*, and supporting consultant report, *Twice the Task: A Review of Australia's Freight Transport Task.*

The NTC engaged Maunsell Australia Pty Ltd to review *The Future of Freight*, so that the NTC was better informed and better understood the issues involved. The review found that there is reason to question some of the conclusions reached.

The NTC is publishing the review in the interests of informing a considered public policy discussion on the economics of rail and road freight transport in Australia. This review should not be confused with the NTC's recent proposals for a Third Heavy Vehicle Pricing Determination, which were focussed on cost recovery of heavy vehicle road use. The NTC has not formed any views on the validity of the conclusions of *The Future of Freight*, simply to say that it believes that the issues concerned are significant enough to warrant careful and informed discussion. This need is heightened by the initiation by the Council of Australian Governments (COAG) of an inquiry into land freight infrastructure pricing by the Productivity Commission.

The NTC notes that further work is underway on freight demand forecasts, particularly through the North/South corridor study, and this can be expected to make a valuable contribution to the public policy discussion.

It is in this light that this report has been published. The NTC is not seeking any formal response or comments on the review—it is merely making it available for information.



Michael Deegan
Acting Chairman

Freight and Mode Share Forecasts

A review of "The Future of Freight"

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Executive Summary

Introduction

In February 2005 the Australasian Railway Association released "The Future of Freight", a report prepared for them by Port Jackson Partners (PJP) to review road access charging and other aspects of road and rail intermodal competition. This paper is a review of aspects of the PJP report and a related report published by the Business Council of Australia titled "Infrastructure Action Plan for Future Prosperity" which draws closely on the PJP report. Maunsell Australia Pty Ltd (Maunsell) undertook this review at the request of the National Transport Commission (NTC).

The National Transport Commission (NTC) is currently undertaking a major study of the implications of forecast growth in Australia's freight task over the next 15 years titled "Twice the Task". The PJP report raises a number of issues that are relevant to this work, particularly freight growth and mode share forecasts which have implications for the future relative road and rail freight tasks. In particular the PJP freight growth and mode share forecasts appear to be higher for a number of corridors. The NTC wished to understand the reasons for the differences and the level of certainty in the PJP report's forecasts.

It is clear that the PJP report has involved a large amount of information and analysis. Importantly rail operators appear to have been helpful in providing PJP with data on above rail costs, which are often difficult to obtain. The approach of analysing costs on a corridor-by-corridor basis, which PJP have done for the most part, is essential for accurate comparison of economic costs even though it involves much more effort than working with broad averages. There are aspects where the analysis can be developed further in future, and where some assumptions need to be verified as they are important to the results but overall the PJP report is a very useful contribution to the debate on future road and rail access charges and potential rail reforms. Importantly the report provides an alternative view to the majority of forecasts of freight growth and future mode shares.

Overview

We have examined most of the analysis in the PJP report in as much depth as possible based on the information provided. PJP appear to have used optimistic (high) forecasts of freight growth and rail mode share and to have made conservative (low) estimates of a number of aspects of rail costs. The possible magnitude of difference that might be obtained with different estimates has been quantified for some aspects. Collectively these amount to enough to question the PJP report's conclusion that total economic costs of rail are lower than road in the north-south corridors. The PJP report concluded that rail's cost advantage on these routes was only small in any case. This may give rise to some questions about their rail mode share forecasts.

Also it is considered that road economic costs cannot be determined precisely and the higher road costs determined by PJP may not be any more "economically efficient" than the costs determined using the NTC cost allocation system.

From our experience, and the available evidence, it is considered that service quality differences between road and rail are much more important than price in determining changes in mode share. The PJP report considers the need for rail service quality improvements but devotes most of its effort to analysis and criticism of the current heavy vehicle pricing system. It suggests that investment in infrastructure is required to deliver rail service quality improvements, and that the key barrier to this is the current heavy vehicle pricing system.

Freight growth and mode share

The PJP report's assumed growth rate of 4.5% per annum for total inter-capital city non-bulk freight, along with the higher initial freight estimate, results in 24% more total freight in 2014 than projected by the BTRE.

The rail mode share assumed by the PJP report for some corridors is higher than assumed by ARTC, most noticeably in the Melbourne-Brisbane corridor where the PJP report's 53% rail mode share results in 38% more rail freight in 2014 than ARTC's 33% rail mode share forecast.

Compared with BTRE forecasts for total freight growth, and with ARTC forecasts for mode share, it is considered that the PJP report's forecasts of total additional volume on rail in 2014 due to rail reform may be considerably overstated by (by approximately 8.0 billion NTK).

The combined effect of applying high growth and high rail mode share assumptions is significant. If lower growth and mode share assumptions (more in line with other estimates) are used:

- The total economic benefits of the proposed policy changes would be much less;
- The unit cost of rail freight would be higher because fixed costs would be spread over a smaller volume, hence rail would be less competitive with road than the report indicates.

Above road and rail costs

It is considered that the PJP report presents very low above-rail operating costs and that these costs might reasonably be estimated to be higher by approximately $5/'000 NTK - $10/'000 NTK. However, even after adjusting for this, rail has an advantage compared with road transport in above-road and rail costs on all of the corridors.

Below road and rail costs

A number of questions can be raised about the PJP report's estimates of below road and rail costs. These are discussed in the following paragraphs.

Below-road operating/maintenance unit costs are based on a weighted average of truck types using NTC 1998 truck-type data, whereas above-road operating costs are based on an efficient B-Double operation (likely interstate fleet in 2014). Using the B-Double below-road cost results in a below-road unit cost that is $2/'000 NTK less than the weighted average of all trucks and $2/'000 NTK - $4/'000 NTK less than the below rail cost on the North South corridors.

Below-rail costs were analysed on a corridor-by-corridor basis but below-road operating/ maintenance costs were based on NTC national average expenditure using 1998 road use data (below-road capital costs analysed on corridor by corridor basis but separate corridor results not reported). If data was available for corridor-by-corridor analysis of below-road operating costs the unit costs per NTK may be lower on North South corridors where traffic volumes are higher, and pavement standards are higher, as there are considerable economies of scale in pavement design.

On the main north – south inter-capital city corridors, the unit road costs may be considerably less than estimated by PJP (concrete pavements – lower maintenance – less ESAL effect, divided carriageways – lower than average accident externality, higher truck volumes – fixed costs shared over more VKT, etc), especially by 2014 when main corridors are all dual carriageway.

There is no economic basis for preferring PCU-km (as preferred by PJP) to VKT (as used by NTC) for the non-separable and fixed portion of below-road separable operating/ maintenance costs. Both approaches give results that are between standalone (ceiling) and incremental (floor) costs and hence both can be considered economically "efficient". Using PCU-km results in approximately $2.5/000 NTK higher unit costs than the current NTC approach based on vehicle-km.

Heavy vehicle below-road costs would only fail to reflect economic costs if light vehicles were paying for some costs that are solely attributable to trucks. That is, the approach to below-road non-separable costs does not impact on estimates of economic costs.

It is questionable whether the difference in forecast truck PCU numbers between the "business-as-usual" and the optimised rail case would save any capital expenditure on the north-south inter-capital road corridors (Government has committed to completing the Hume and Pacific highways to dual carriageways regardless). Overall traffic growth (which is dominated by light vehicle numbers) means that, at best, the expenditure would only be deferred by two-three years.

Future truck numbers for the below-road capital cost analysis are based on 20 tonnes net per truck whereas efficient B-Doubles by 2014 would be expected to operate with higher average load. The above-road analysis has assumed 38 tonnes which would almost halve the truck PCU-km and hence the proportion of capital costs allocated to heavy vehicles. The effect of this assumption has not been quantified.

The PJP report has assumed below-rail cost reductions for the NSW rail network based on private sector comparisons that may not be applicable, and synergy benefits that involve some of the same cost allocation ambiguities as road non-separable costs.

Externality costs

It is considered that the PJP report has used higher than appropriate externality values (particularly for accidents and greenhouse gas emissions). Based on more appropriate unit values the difference between road and rail is likely to be closer to $3/'000 NTK than the $6/'000 NTK derived in the PJP report.

Externalities due to B-doubles operating on rural sections of divided carriageway inter-capital highways are likely to be much lower than average. Such roads are safer than average and fuel consumption and hence greenhouse gas emissions are likely to be minimised. Furthermore B-Doubles generally have a better safety record than other heavy vehicles.

Road and rail access charges

It is important to make a distinction between below-road/rail economic costs and the access charges actually paid by above road/rail operators. Ideally charges would match costs in both road and rail, however practicality and limited available charging instruments (fuel and registration) mean that some averaging is required in the road sector; competitive considerations by ARTC also result in rail track access charges being set below economic costs.

If mechanisms can be found to increase charges paid by the largest, most highly utilised trucks, any competitive gains for above-rail operators may be negated if ARTC increases rail access charges. PJP suggests that rail access charges should be capped to prevent this but capping rail charges could undermine below-rail investment incentives for ARTC and would open rail to the same criticism as the PJP report directs at road access charges, i.e. that charges do not cover full economic costs.

The PJP report advocates consideration of mass-distance charging to improve the alignment between costs and charges. This could be worth further investigation to determine whether benefits are sufficient to outweigh administration and enforcement costs.

Service level factors

The PJP report also considers improvements in rail service levels on the main corridors. Recently announced ARTC plans provide backing for these. It is considered that these will be much more important in achieving the projected rail mode share than the generally small adjustments to relative charges likely on interstate corridors. Consultation with freight customers by Maunsell over many years makes it clear that there are many reasons why they prefer road transport and while cost is a factor in their choice, service issues including transit time, reliability, delivery time slot, handling risks, flexibility etc are often more important especially for intermodal freight. ARTC is correct to focus on improving service levels and increasing the number of trains that can be operated at the times that are required by customers.

The PJP report has not assumed any productivity improvements or service level improvements for road transport. However completing Brisbane-Sydney and Sydney-Melbourne divided carriageway freeways should reduce road transit times and improve reliability (costs for this have been included in road capital costs but not the corresponding benefit). Another potential road productivity improvement is that AusLink is providing for considerable bridge strengthening and upgrading on the national network. This will increase the opportunities for B-Doubles to provide door-to-door transport between more locations and to operate at higher masses over a wider network.

Conclusions

The PJP report has adopted forecasts for inter-capital non bulk freight growth and rail mode share that are higher than forecasts by BTRE, ARTC and others. This makes rail freight unit costs appear lower and the economic benefits of rail appear greater than would be the case with the lower forecasts.

The estimates of rail costs in the PJP report also appear low in terms of a number of other factors and it is considered that higher rail costs could reasonably be assumed. The possible magnitude of the difference that might reasonably be adopted has been quantified for some aspects. Collectively these amount to enough to question the PJP report's conclusion that total economic costs of rail are necessarily lower than road in the north-south corridors. It is considered that service quality differences door-to-door between road and rail are much more important than price in determining changes in mode share. In the east-west corridor there is a more clear cut case that economic costs of rail are lower than road and this is reflected in the higher mode share that rail captures already.

It is likely that the higher PJP mode share forecasts are partly a product of their proposed improvements in service levels. The PJP report considers that this is contingent on increased investment which may only occur if the perceived policy distortion of underpricing road freight is addressed.

The PJP contains an extensive range of information and a comprehensive and detailed analysis. Some issues are discussed in several places in the report and considerable effort is required to gain a full understanding of the analysis that has been undertaken. Also, analysis inputs and supporting calculations are generally not provided, making detailed review difficult particularly in the case of rail costs. Within the time allocated for this review, and without access to PJP's detailed analysis it is possible that some items and explanations may have been overlooked or misunderstood.

1.0 Introduction

1.1 Background

The Australasian Railway Association Inc (ARA) is concerned that there are inconsistencies between the access charge regimes for road and rail freight transport and that these distort modal competition in favour of road transport. In order to quantify this, the ARA commissioned Port Jackson Partners (PJP) to critically review the structure of road access charging and other aspects of road and rail intermodal competition. The results of this review are contained in the report "The Future of Freight" (the PJP report) that was released in February 2005.

The National Transport Commission (NTC) is currently undertaking a major study of the implications of forecast growth in Australia's freight task over the next 15 years titled "Twice the Task". The PJP report raises a number of issues that are relevant to this work, particularly freight growth and mode share forecasts which have implications for the future relative road and rail freight tasks. In particular the PJP freight growth and mode share forecasts appear to be higher for a number of corridors. The NTC wished to understand the reasons for the differences and the level of certainty in the PJP report's forecasts.

Therefore the NTC requested Maunsell Australia Pty Ltd (Maunsell) to undertake a critical review of the PJP report and a related report published by the Business Council of Australia titled "Infrastructure Action Plan for Future Prosperity" which draws closely on the PJP report.

1.2 Scope

The scope of work for this review of the PJP report was to:

- Analyse the forecast freight growth and modal share forecasts on various corridors;
- Critically review the underpinning assumptions on which the PJP report is based; specifically that:
  - rail has operating and capital cost advantages over road transport and if this is so are there corridor related limits to which this would apply;
  - rail requires a reduced level of capital investment to meet forecasts in freight increases;
  - rail imposes lower externality costs than road transport; and that
  - road transport vehicles are under charged for road access.
- Analyse the calculations that have been made to support the conclusions reached in the report;
- Analyse the extent to which other conclusions in the report are dependent on structural reform in the rail industry and provide an opinion on whether these reforms are likely or achievable;
- Analyse the extent to which freight transport is consigned on the basis of transport costs alone and identify other factors in the modal decision making process that may have been not fully addressed in the PJP report;
- In the light of the above, analyse the manner in which road access charges are determined and provide a discussion on any deficiencies in the current system; and
- Comment on the degree to which the current access charging regimes for both modes may affect the modal freight share or the viability road or rail transport over particular corridor lengths in both a north-south and east-west split.

1.3 Review limitation

The PJP report is a 117 page document containing an extensive range of information and a comprehensive and detailed analysis. Some issues are discussed in several places in the report and considerable effort is required to gain a full understanding of the analysis that has been undertaken. Also, analysis inputs and supporting calculations are generally not provided, making critical review difficult particularly in the case of rail costs. Within the time allocated for this review, and without access to PJP's detailed analysis it is possible that some items and explanations may have been overlooked or misunderstood.

2.0 Freight forecasts and mode share

2.1 Choice of corridors

The PJP report has based its analysis on seven corridors that include three north-south corridors, and four east-west corridors. It is noted that the corridors analysed by PJP are different from the seven corridors for which BTRE provided road/rail mode share freight forecasts in BTRE Information Sheet 22. BTRE is currently updating Information Sheet 22 and the data presented in this section uses the latest BTRE draft estimates and forecasts.

Table 2.1 shows a concordance between the PJP corridors and the corridors for which BTRE provided freight forecasts. Freight volumes are in million tonnes and billion net tonne-km per annum.

Table 2.1: Concordance of BTRE and PJP corridors

PJP Corridor	BTRE Corridor	Distance (km)	BTRE Forecast 2014 freight (Million Tpa)	BTRE Forecast 2014 freight (Billion NTK pa)
	Canberra-Sydney	315	3.0	0.9
Melbourne-Adelaide	Melbourne-Adelaide	740	6.7	5.0
Melbourne-Sydney	Melbourne-Sydney	930	15.0	13.6
Sydney-Brisbane	Sydney-Brisbane	1000	9.9	10.1
	Sydney-Adelaide	1550	2.7	3.9
Melbourne-Brisbane	Melbourne-Brisbane	1850	5.2	9.1
Sydney-Perth				
Melbourne-Perth	Eastern Capitals-Perth	3400	6.3	21.7
Adelaide-Perth				

Source of BTRE data: BTRE Information Sheet 22 - Freight Between Australian Cities 1972 – 2001, including 2005 unpublished update

2.2 Freight forecasts

Table 2.2 shows a comparison between the freight forecasts used in the PJP report (refer page 112 of PJP report) and the BTRE freight forecasts summarised in Table 2.1

The PJP total non-bulk NTK estimates for 2014 in Table 2.2 are approximately 20% higher than the BTRE forecasts. The PJP figures are based on a growth rate of **4.5%** per annum in total (road and rail) inter-capital non-bulk freight on all corridors and a higher initial freight volume. The BTRE freight forecasts represent growth rates of 3.2% – 3.9% per annum for total inter-capital non-bulk freight in the different corridors except the Melbourne-Brisbane corridor where the BTRE forecast is for growth averaging 4.3% over the 10 years.

The AusLink White Paper predicts that domestic non-bulk freight will grow at 3.4% per annum between 2000 and 2020 and notes that this is slightly lower than the projections cited in the AusLink Green Paper. Inter-capital non-bulk freight is expected to grow slightly faster. The White Paper notes that non-bulk freight trends are characterised by a continuing increase in the dominance of road, both in total and interstate traffic.

Table 2.2: BTRE Inter-capital city non-bulk freight forecasts compared with PJP forecasts (million NTK)

	2004			2014			Growth
	Rail	Road	Total	Rail	Road	Total	rate pa
BTRE forecasts							
North South							
Canberra Sydney	-	650	650	-	920	920	3.5%
Melbourne Sydney	990	8,310	9,300	990	12,580	13,570	3.9%
Sydney Brisbane	890	5,940	6,830	890	9,120	10,010	3.9%
Melbourne Brisbane	2,120	3,840	5,960	3,320	5,780	9,100	4.3%
North South subtotal	4,000	18,740	22,740	5,200	28,400	33,600	4.0%
East West							
Melbourne Adelaide	530	3,130	3,660	530	4,480	5,010	3.2%
Sydney Adelaide	520	2,290	2,810	520	3,360	3,880	3.3%
Eastern Capitals Perth	8,810	3,640	12,450	12,400	5,120	17,520	3.5%
East West subtotal	9,860	9,060	18,920	13,450	12,960	26,410	3.4%
Total BTRE	13,860	27,800	41,660	18,650	41,360	60,010	3.7%
mode share	33%	67%		31%	69%		
PJP "business as usual" forecasts (page 112)	16,000	30,000	47,000	22,000	51,000	73,000	4.5%
mode share	34%	64%		30%	70%		
PJP forecast compared to BTRE forecast	15%	8%	13%	18%	23%	22%	

Source: BTRE Information Sheet 22 - Freight Between Australian Cities 1972 – 2001, including 2005 unpublished update

Note: BTRE figures exclude sea freight proportion

The PJP report notes on page 48 that in broad terms its analysis has adopted the corridor-by-corridor market growth estimates of the BTRE which are in line with other forecasting bodies. On page 103 it notes that its analysis reflects assumed growth over the next ten years in the overall inter-capital city freight task reflecting a BTRE judgement that the average annual growth in demand will be 4.5% per annum. These statements appear inconsistent with the PJP and BTRE growth rates noted above which are somewhat different. The difference appears to be that the PJP report has adopted the historic relationship observed by BTRE that inter-capital non-bulk freight flows have grown on average at 1.3 to 1.5 times the growth rate of the economy as a whole, but has then applied this multiplier to its own (higher) economic growth projections.

The PJP report notes that its projection of an overall 4.5% pa average growth rate in the inter-capital city freight market can either come from assuming Australia's economic growth will be 3% pa, which is lower than recent trends, and assuming that the freight task will grow at 1.5 times GDP growth; or assuming Australia's growth will be 3.4%, which is more reflective of recent trends, and assuming that the freight task grows at 1.3 times that of the economy. This appears reasonable based on past growth rates, however government forecasts are for economic growth to slow in the medium to longer term. It appears that BTRE has based its freight forecasts on Treasury forecasts that GDP growth will average 2.7% pa over the period 2000-2020.

As part of our review we asked BTRE to review and confirm its forecasts for inter-capital non-bulk freight. We were advised that the BTRE will soon be releasing updated freight forecasts and were provided with a draft of the new forecasts. For some corridors these have increased slightly from the forecasts of total inter-capital freight presented in Information Sheet 22 and rail mode share forecasts are now higher for some corridors. Based on these forecasts the BTRE calculated a forecast weighted average growth rate in road and rail NTK of 3.7% pa for the inter-capital corridors analysed in the PJP report for the period 2004 to 2014. When sea freight is included the weighted average total is 3.8% pa for the same period.

The 2005 ARTC North South Investment Strategy assumes underlying market growth of 3.5% per annum.

Table 2.2 also shows that the PJP report estimates that the total NTK in 2004 was approximately 13% higher than estimated by BTRE. The BTRE advised that this difference could possibly due to the PJP report including freight carried between intermediate origins and destinations on the corridors whereas the BTRE estimates only include freight travelling the entire distance between the specified capital cities (and not beyond either).

Freight forecasts prepared by Apelbaum and Associates were also obtained for this review. These indicate an existing road freight task approximately 20% greater than estimated by BTRE but very similar overall future growth rates to those forecast by BTRE. Estimates of existing rail freight are likely to be more consistent because better data was available until recently.

On the basis of these comparisons it appears that no other forecasters are expecting underlying growth in total inter-capital non-bulk traffic to be as high as the PJP report's assumption of 4.5% per annum. PJP's growth rate results in 22% more total inter-capital non-bulk freight in 2014 than projected by the BTRE. About half of this is due to the higher growth rate and half to the higher initial freight estimate.

2.3 Mode share forecasts

Expected mode shares are discussed on pages 48 - 53 of the PJP report. Exhibit 28 on page 52 (reproduced below) shows the projected rail mode share after the PJP report's proposed rail reform.

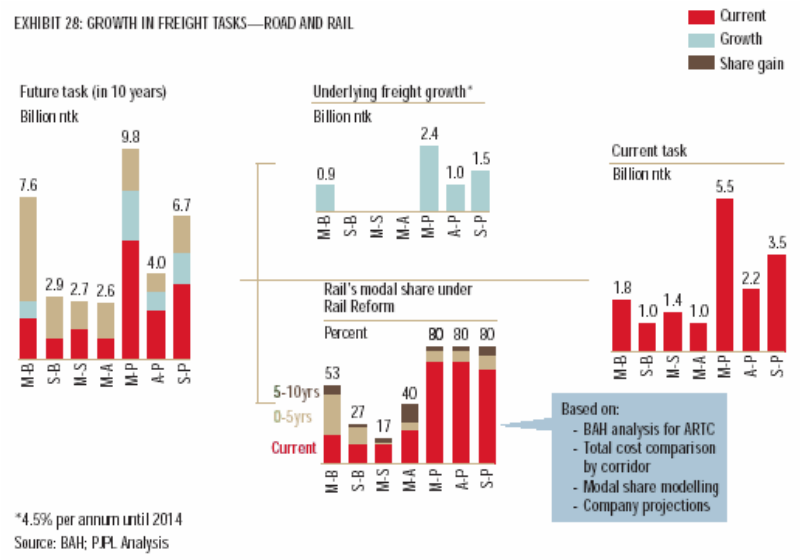


Table 2.3 shows a comparison of the PJP report projected mode shares with other recent forecasts.

Table 2.3: Comparison of mode share forecasts

Corridor	Rail mode share (%)				
	Existing		Forecast 2014/15		
	BTRE (2005)	ARTC (2001, 2005)	ARTC Audit Scenario S_O (2001)	PJP Report (2005)	ARTC North-South Strategy (2005)
Mel - Bris	36	21	35	53	33
Syd - Bris	13	19	30	27	30
Mel - Syd	11	11	20	17	17
Mel - Ade	14	21	24	40	
Mel - Per	71	70	74	80	
Ade - Per	71			80	
Syd - Per	71	65	73	80	

Note: ARTC existing mode shares are sourced from the 2001 ARTC Audit report and the June 2005 ARTC North/South Investment Strategy industry briefing

The BTRE mode share estimate is considerably higher than the ARTC's estimate for the Melbourne-Brisbane corridor but lower for the Sydney-Brisbane and Melbourne-Adelaide corridors. These large discrepancies in relation to the existing freight task make it difficult to draw definitive conclusions.

North-South corridors

Table 2.3 shows that the PJP report mode share forecasts for north-south corridors are reasonably consistent with the forecasts in the 2001 ARTC Network Audit and the ARTC's recently announced North South Investment Strategy except for the Melbourne-Brisbane corridor. The PJP report forecast rail mode share for this route is 53%, which is much higher than the 33% that the ARTC is forecasting following its planned north-south upgrading over the next five years (although it is noted that BTRE estimates that rail mode share in this corridor is already higher than 33%). The next few paragraphs concentrate on this issue because the Melbourne-Brisbane route accounts for 34% of the PJP report's total forecast growth in rail NTK due to rail reform.

The 2001 ARTC Network Audit considered that the proposed Melbourne-Brisbane inland railway operating with 1,800m double stack trains would only achieve a mode share of 54% so it may be difficult for the existing corridor to capture 53% with limited capital expenditure.

In terms of actual volumes the PJP report forecasts that rail freight on the corridor will grow from 1.8 billion NTK in 2004 to 7.6 billion NTK in 2014 which is a **322%** increase or about 15% per annum.

As shown in Table 2.2 the BTRE freight forecasts show Melbourne-Brisbane rail freight increasing from 2.1 billion NTK in 2004 to 3.3 billion NTK in 2014 (based on a "business-as-usual" scenario) which is a **56%** increase (and actually represents a small increase in rail mode share). This is similar to the PJP report's estimate of 50% growth from 1.8 billion NTK to 2.7 billion NTK in a "business-as-usual" scenario. It is interesting that the PJP freight estimates are actually lower than BTRE's for both 2004 and 2014 in the "business-as-usual scenario".

The ARTC North South Strategy forecasts that the Melbourne-Brisbane corridor freight task will increase from 5.26 billion GTK in 2005, to 11.57 billion GTK in 2015 which is a **120%** increase over the ten years or 8.2% per annum.

There is an unexplained discrepancy between the above NTK and GTK figures that cannot be reconciled. Normally NTK would be expected to be more than 50% of GTK so it appears that one or more of these amounts may be incorrect.

BTRE forecasts are that total (road and rail) Melbourne-Brisbane non-bulk freight will amount to 9.1 billion NTK in 2014. Based on this, the PJP forecast of 7.6 billion NTK on rail in this corridor would equate to an **83% rail mode share**. The PJP forecast mode share is only 53% because it has assumed stronger growth in total freight and hence more total freight in 2014 as discussed earlier.

Applying a 53% mode share to the BTRE total freight would give a rail task of 4.8 billion NTK, or 2.8 billion NTK (37%) less than the PJP forecast. Applying the ARTC forecast 2015 mode share of 33% to the BTRE total freight would give a rail task of 3.0 billion NTK which is similar to BTRE's forecast of 3.3 billion NTK in 2014.

More detailed analysis would be required to test the feasibility of a 53% rail mode share and such a high 2014 rail freight volume as assumed by PJP but from the above comparisons it appears optimistic. The ARTC North South Investment Strategy notes that improving the Sydney – Brisbane route any further than they have proposed would require very costly deviations and passing lanes.

It is even possible that the Melbourne – Brisbane inland route may be a better investment but this was estimated to cost $1.5 billion in 2001. Adding capital costs of this magnitude to below-rail costs on either route for this corridor would make rail less economic than road.

It appears that there is a limit to the additional capacity that can be provided at reasonable cost on the Melbourne-Brisbane route and that the ARTC investment strategy is seeking to invest up to this limit. If this is the case then the PJP report's forecasts for the rail freight task on this corridor appear to be overly optimistic, in terms of both mode share and total freight. We note that the Department of Transport and Regional Services is currently conducting optimum rail investment on the north-south corridor is currently being investigated by the.

East West corridors

On the east-west routes to/from Perth the forecast mode share is 80% compared with existing mode shares of 65 – 70%. Sea freight plays a role in this market, particularly for repositioning empty containers. It is not clear if PJP's forecast is for mode share of land transport modes or all modes. If PJP is projecting 80% of all freight then this may be slightly high. In "Freight between Australian Cities" the BTRE forecasts sea freight's mode share to rise to slightly over 20% by 2020, road transport mode share to decrease to slightly over 20% and rail to be slightly less than 60%.

A rail mode share of 80% is 5 percentage points more than the ARTC Audit projections and would appear to require rail to win substantial mode share from both road and sea transport. Given that rail already has a cost advantage compared to road in this corridor and has already won most price sensitive freight the remaining road traffic is likely to be more difficult to win.

2.4 Conclusion on growth and mode share

The growth rate of 4.5% per annum that has been adopted in the PJP report for total inter-capital non-bulk freight, along with the slightly higher initial freight estimate, results in 22% more total freight in 2014 than projected by the BTRE.

The rail mode share assumed by the PJP report for some corridors is higher than assumed by ARTC, most noticeably in the Melbourne-Brisbane corridor where the PJP report's 53% rail mode share results in 38% more rail freight in 2014 than ARTC's 33% rail mode share forecast.

Discrepancies between some numbers make conclusions uncertain but based on BTRE forecasts for total freight growth and ARTC forecasts for mode share it is considered that the PJP report's forecasts of total additional volume on rail in 2014 due to rail reform may be overstated by over 100% (approximately 8.0 billion NTK).

The combined effect of applying high growth and high rail mode share assumptions is significant. If lower growth and mode share assumptions (more in line with other estimates) are used:

- The total economic benefits of the proposed policy changes would be much less;
- The unit cost of rail freight would be higher because fixed costs would be spread over a smaller volume, hence rail would be less competitive with road than the report indicates.

The overall freight growth rates are independent of assumptions about rail reform, rail investment and higher road prices, however rail mode share is dependent on relative competitiveness and price of rail. It is likely that PJP's higher forecast rail mode shares reflect the impacts of more rail investment and higher road prices as discussed in their report. Later sections in this review consider the appropriateness and likelihood of the proposed changes.

3.0 Above road and rail costs

3.1 Introduction

This section reviews the assumptions and calculations that underpin the PJP report's conclusion that "efficient rail" is a considerably lower cost freight transport mode than road on all inter-capital corridors, in terms of economic costs. Their conclusions on these costs are significant to the argument that a higher rail task might eventuate.

The PJP report analysed above road/rail and below road/rail operating and capital costs separately and this review follows the same format. The PJP analysis is covered in various places in their report and there are some inconsistencies in the analysis between the different sections. An example is the use of B-Doubles as the basis for determining efficient above-road costs but not below-road costs, as discussed below.

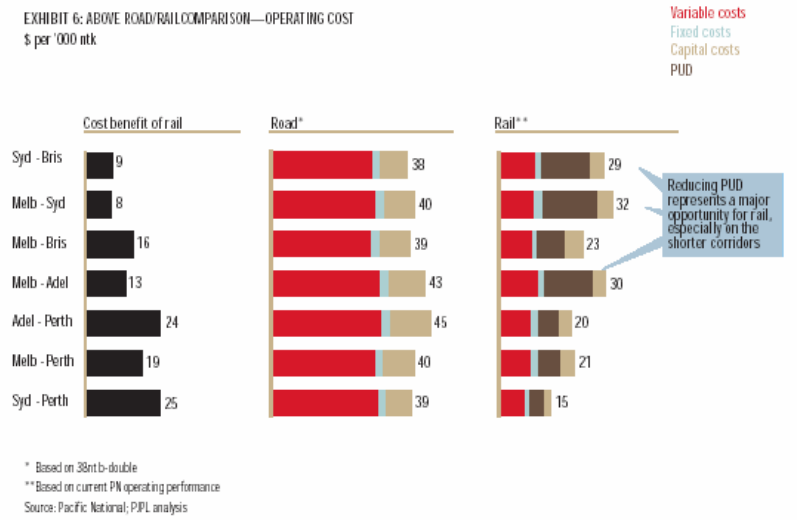
3.2 Road costs based on B-Doubles

The PJP report has based its comparison of above-road and rail costs on efficient road and efficient rail scenarios. Road cost analysis has been based on a B Double truck operating at 100% utilisation (38 tonnes payload). The PJP report notes that "a 38 net tonne B-Double, while more efficient than the average inter-capital city truck today, reflects the more likely type of truck that will be used to meet future inter-capital transport demand". This is considered a reasonable assumption for road transport. Industry economics and competition make it likely that by 2014 almost all new trucks acquired for inter-capital freight will be B-Doubles. The 100% utilisation assumption may be difficult to actually achieve. Even with advances in information systems and logistics there are likely to be times when a full backload cannot be achieved. Allowing for some inefficient running would result in higher above-road unit costs than calculated by PJP. On the other hand, by 2014 there is potential for higher payloads and/or larger configurations to operate.

However, the overall road versus rail analysis is inconsistent because below-road costs have been analysed using a weighted average of truck types based on road use data from the 1998 report for the NTC Second Heavy Vehicle Charges Determination. This causes below-road unit costs to be higher than they would be if the below road analysis had also been based on 38 net tonne B-Doubles being used for the interstate freight task.

3.3 Above road operating and capital cost

Above road operating and capital costs are discussed on page 16 -18, and 73 - 76 of the PJP Report. Exhibit 6 on page 16 shows total above road operating cost by corridor, as follows:



It should be noted that this graph includes above road/rail capital costs as well as operating costs so the totals for road and rail for each corridor are actually the total above-road operating and capital costs rather than just operating cost as indicated by the Exhibit title.

Further detail of the items included in variable and fixed costs are provided in Exhibit A1.3 on page 76 in Appendix 1 of the PJP Report. Notable features of Exhibit A1.3 are that it includes fuel cost and registration and a long distance multiplier on labour costs in the derivation of above-road operating cost. These are discussed below.

Exclusion of access fees from above road/rail costs

The second paragraph of page 73 of the PJP report notes that "Access fees for both road and rail were not included as part of the above road/rail operating costs, as these represent a transfer price within the value chain of each industry, rather than an actual cost". PJP's analysis has sought to derive the actual below road/rail costs on the basis of economic costs. Access fees are a means by which some or all of these costs are recovered from users.

It is considered that this is an appropriate approach. It would be double counting to include the below road/rail economic costs and then also include the access fees that recover these costs in the above road/rail operating costs. The extent to which road and rail access fees accurately reflect below road/rail economic costs is a separate issue discussed later.

However, Exhibit A1.3 on page 76 of the PJP report appears to indicate that fuel and registration costs have been included in above road costs. These items should be excluded from the above road costs as they cover national heavy vehicle charges components, i.e. road access fees. In other words 20 cents per litre (approximately 20%) of fuel costs and all of registration costs should be excluded from above-road costs.

The NTC heavy vehicle charges equate to about $5.4/'000 NTK for the 38 net tonne B-Double reference vehicle adopted by the PJP report (approx $4.00 fuel excise charge and $1.40 registration charge)[1]. Either the PJP analysis has excluded this cost and the above-road operating costs are correct, or PJP's above-road cost estimates are overstated by this amount. The PJP report does not contain sufficient detail to determine whether national charges have been included or excluded in the above-road operating costs.

[1] Based on 1998 NTC Second Determination Report and 2003 SMVU Road Use Data

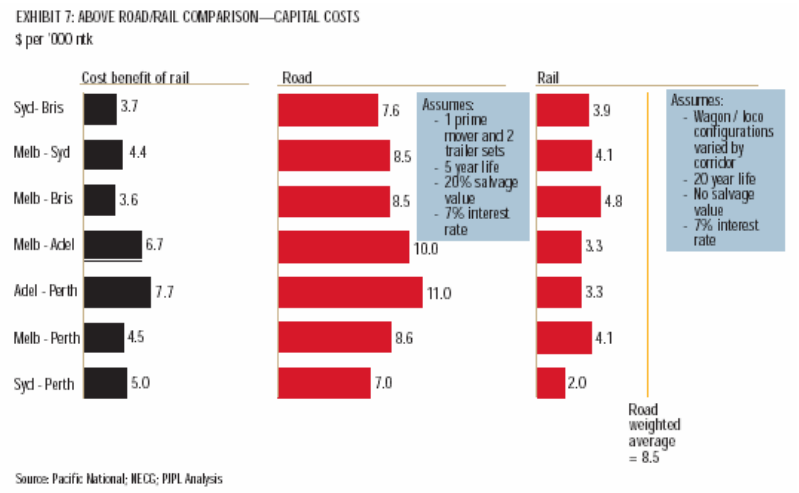
Variation of above road cost by corridor

It is not clear how the above-road cost per NTK has been varied for different corridors. It appears from Exhibit 6 that both variable costs and capital costs differ by corridor.

The only cost component in Exhibit A1.3 that appears to provide an explanation for the variation in above-road variable costs is the long distance multiplier on labour costs. This would be expected to cause higher costs per NTK for longer distance routes but the actual costs by corridor show no such pattern. The highest variable costs per NTK are on Melbourne - Adelaide and Adelaide – Perth (approximately $31/'000 NTK), whereas Melbourne - Perth and Melbourne - Brisbane appear to have some of the lowest variable costs per NTK (approximately $28/'000 NTK). Operating practices such as driver/vehicle swaps at halfway towns make it difficult to determine the appropriate multiplier.

Fuel costs represent approximately half of variable costs and it could be that fuel costs are higher at towns on longer distance corridors, however again this is not reflected in the actual variable cost variations. The variable cost per NTK is less for Melbourne – Perth than it is for either Melbourne – Adelaide or Adelaide – Perth.

Exhibit 7 on page 18 of the PJP report separates out the figures for above-road capital costs as follows:



It can be seen that the above-road capital costs per NTK also vary for different corridors (from $7/'000 NTK on the Sydney – Perth corridor to $11/'000 NTK on the Adelaide – Perth corridor). The PJP report does not provide an explanation for these variations. It is common for B-Doubles to swap to a road train configuration on the Adelaide – Perth corridor which results in a lower cost per NTK.

Exhibit 7 also shows that PJP's analysis of road costs has assumed a five year life and 20% salvage value for prime movers and trailers. The current average fleet age is considerably higher than this. Nevertheless, a five year life for long distance work is reasonable. Equipment will gradually transfer to other short-haul work, although 20% salvage value after 5 years may still be on the low side. This is unlikely to significantly affect conclusions.

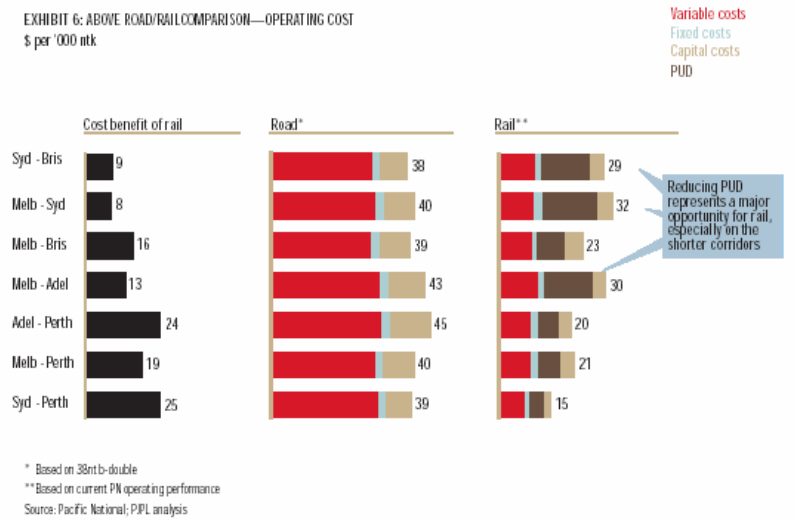
Assessment

Notwithstanding the uncertainties about the derivation of the above-road costs it is considered, based on Maunsell's experience, that the estimates for the different corridors shown in Exhibit 6 are less than current road transport rates. This is likely to be because they are based on an efficient operation of a B-Double operating at 100% utilisation in both directions. This is an ideal that is probably seldom achieved in practice at present but which it might be assumed that industry will seek to achieve in the longer term (PJP's analysis year is 2014). Also it is possible that because the figures are estimates of economic costs they do not include profits and taxes, although this is not clear from the report.

3.4 Above rail operating and capital cost

Above-rail operating and capital costs are discussed on page 16 -19, and 73 - 77 of the PJP Report.

Exhibit 6 on page 16 shows total above rail operating and capital cost by corridor, as follows:



The following table shows the estimated values of the cost components shown in Exhibit 6 for selected corridors. The capital recovery values were obtained from Exhibit 7 on page 18 of the PJP report. Other values were scaled from Exhibit 6.

Table 3.1: Above rail costs ($ per thousand NTK)

	Syd Bris	Melb Syd	Melb Bris	Melb Adel	Syd Perth
Above rail (based on PN from PJP)					
Variable op cost	10	9	9	10	8
Fixed op cost	2	3	2	2	1
Capital recovery	4	4	5	3	2
Pick up and delivery	14	16	8	14	4
Total	29	32	23	30	15
Total linehaul excluding PUD	15	16	15	16	11

Exhibit A1.4 on page 76 of the PJP report indicates that the linehaul costs include lifting costs for two lifts per container, i.e. a lift at each end of journey. Apart from the return of and return on assets employed (7%, 20 year life, no salvage value) it is assumed that these are economic costs based on "efficient" trains and do not include profit or tax (Pacific National recently reported a profit representing approximately 12% of revenue).

Assessment of above-rail linehaul costs

The total above-rail linehaul costs, excluding pick-up and delivery, in Table 3.1 are approximately $15/'000 NTK (1.5 cents/NTK) for north-south routes and $11/'000 NTK (1.1 cents/NTK) for long distance east-west routes. These linehaul costs appear low in Maunsell's experience, particularly if they include terminal costs and container lifting costs as indicated in the PJP report. It is possible that, as with the above-road costs, these costs represent anticipated future more efficient trains and operating practices, which would be a reasonable approach but this is not made clear and the basis of the lower costs is not explained.

The 2001 ARTC Network Audit reported rail linehaul costs (excluding PUD) of $34/'000 NTK for Melbourne – Sydney and $24/'000 NTK for Sydney – Perth. Even assuming substantial efficiency improvements it seems unlikely that costs could be reduced from these levels to the levels assumed in the PJP analysis.

ATC 2004 (vol 3) page 203 states that

> *In comparing the aggregation of [above rail] costs for particular train services, it is apparent that total above rail costs are influenced substantially by the nature of operations, including the spatial characteristics of each rail corridor. On a cost per net tonne kilometre ($/NTK) basis, the lowest above rail costs in Australia are incurred by bulk ore train services. It is understood that such best practice costs are in the order of $0.01/NTK ($10/000 NTK).* ***The nature of inter-modal freight train services is such that above-rail costs as low as bulk ore operations could not be achieved****.*

ATC 2004 (vol 3) also notes that "generally it can be expected that the capital cost of a new diesel powered locomotive is likely to be in the range $4.5m to $6m" and "the purchase price of a typical container-carrying wagon is approximately $150,000". These are consistent with Maunsell's recent experience.

The PJP analysis has used a locomotive cost of $4m and wagon cost of $2m (page 77 of PJP report). The locomotive cost is considered $1m too low. The $2m for wagon cost is too low if it refers to a whole train but too high if it is for a single wagon.

Higher locomotive or wagon cost estimates would add $2/'000 NTK at most to the capital recovery costs in Table 3.1 so the conclusions are not particularly sensitive to this factor on its own.

It is assumed that, similarly to the analysis of above-road truck operating costs, the PJP analysis of above-rail operating costs is based on efficient trains operating at 100% utilisation in both directions as is expected to be achieved by 2014. Also it is assumed that the estimates only reflect above-rail economic costs and do not include profits, taxes or track access charges.

Nevertheless, based on the extract from ATC 2004 and Maunsell's judgement it is considered that economic costs of efficient above-rail operating costs for intermodal freight trains might reasonably be estimated to be $5/'000 NTK to $10/'000 NTK higher than PJP's estimates for each corridor.

Pick up and delivery

Table 3.2 shows analysis of the pick-up and delivery costs in Table 3.1. The cost per thousand NTK was adjusted for the corridor distance and then converted to an amount per pick-up or delivery based on a net 20 tonne truck. These amounts are considered appropriate for an average 40-50km round trip in the relevant cities.

Table 3.2: Pick up and delivery costs

	Syd Bris	Melb Syd	Melb Bris	Melb Adel	Syd Perth
Pick up and delivery ($/'000 NTK)	14	16	8	14	4
Distance (km)	1000	930	1850	740	3400
PUD $/tonne	13.74	14.52	14.18	10.52	13.78
Total PUD for say 20 tonne load ($)	275	290	284	210	276
PUD at each end for 20 tonne load - half total PUD ($)	137	145	142	105	138

Exhibit 6 of the PJP report notes that reducing PUD represents a major opportunity for rail, especially on the shorter corridors and later the report states that PUD costs are likely to reduce (by up to 20%) as commercial operators develop better integrated solutions. PUD is clearly a substantial cost for rail but it is difficult to see how this cost could be significantly reduced. Relocating customers adjacent to intermodal terminals or reducing urban road congestion might help at the margin but metropolitan distribution is very competitive and unlikely to have substantial scope for cost reduction.

3.5 Comparison of above-road/rail costs

Overall it is considered that both above-road and above-rail costs in the PJP report represent very "efficient" operations.

Table 3.3: Overall comparison of above road/rail cost ($/000 NTK)

	Syd Bris	Melb Syd	Melb Bris	Melb Adel	Syd Perth
Total above-rail cost from PJP	29	32	23	30	15
Add $5/000 NTK	5	5	5	5	5
Total adjusted above-rail cost	34	37	28	35	20
total above-road cost	38	40	39	43	39
Cost advantage of rail over road	4	3	11	8	19

Table 3.3 shows that even if above-rail linehaul costs are increased by $5/'000 NTK they are still below above-road costs on all corridors. This is not unexpected. In straight above-rail cost terms rail has an advantage over road. Road is able to compete due to better service quality (transit time, reliability, availability, flexibility) and the below road/rail advantages discussed in the following sections.

4.0 Basis of below-road costs

4.1 Introduction

The PJP report does not make a clear distinction between its discussions about costs and charges. The relevant issue for the discussion about below-road and rail costs is economic costs. Whether current road access charges match these costs in every case is a separate matter which is discussed in following sections.

4.2 Joint and common costs

Both road and rail infrastructure have joint and common costs. This makes it difficult to unequivocally attribute a substantial proportion of the costs to particular vehicle types and therefore to determine precise economic costs for individual vehicle types. In such situations analysts determine standalone costs and avoidable costs respectively being the cost of providing the transport network for a particular task alone, and the incremental costs of providing for the particular task if the network is already to be provided for all other traffic. In the case of road there is a very large range between these two costs, even for inter-capital freight.

According to the ATC there are similar difficulties with determining precise below-rail costs (ATC 2004 Vol 3):

> *A railway operation could be characterised as a multi-product firm, since a single rail system usually carries both passengers and freight, provides services between a wide range of origins and destinations, and the different types of freight have differing priority levels and handling characteristics. As a result, many components of costs are shared by different traffic tasks and there is no unambiguous way to allocate them. For example, how are track capital and fixed operating costs to be allocated between passenger and freight trains? For freight travelling between different origin– destination pairs that share a single length of track for part of their journey, should the track capital and fixed operating costs be allocated on the basis of gross tonne kilometres, net tonne-kilometres, train kilometres, or wagon kilometres? The same applies to allocating system overheads across traffics.* ***For accounting purposes, choices have to be made, but these inevitably involve an element of arbitrariness. The cost of carrying a particular traffic with all costs allocated using such arbitrary rules is called the fully distributed cost****.*

The ATC report states that avoidable cost should be used in financial and economic evaluations of proposals that involve adding or subtracting services or traffic. The avoidable costs are estimated as the economic value of the resources saved by eliminating the service.

Conclusions based on the above include:

- Both road and rail infrastructure involve substantial shared costs;
- In such situations economic efficiency requires that each vehicle or freight type covers its avoidable costs;
- For long run economic efficiency all traffic collectively should cover total costs including shared costs.

There are various ways to allocate/recover the shared costs of which the generally agreed most economically efficient approach is Ramsey pricing. Under Ramsey pricing the difference between avoidable and total costs is recovered from different users in proportion to the inverse of their elasticity of demand. It has been shown that under certain circumstances this results in the most economically efficient outcome, as it does not distort the pattern of demand.

Two issues with Ramsey pricing are that it is difficult to apply to roads (elasticity of demand is difficult to measure and highly situation specific, and different prices for many different situations would be impractical), and car use may well be more inelastic than inter-capital truck use leading to an even larger proportion of shared costs being attributed to light vehicles (and a lower share to trucks) than at present. Roads provide access and mobility benefits to private car drivers that they value highly and are willing to pay for.

Other more practical approaches for allocating shared costs (including those used by PJP) are generally accounting or equity based approaches. So long as avoidable costs are covered for each vehicle type it can be said that these approaches result in economically efficient costs but **it cannot be said that the costs determined using any of these approaches necessarily represents more economically efficient costs than other approaches**.

The PJP report argues that its estimates of below-road costs represent economic costs, and because they at least cover avoidable costs this is correct. However the same can be said about the NTC cost allocation results. The differences between the PJP and NTC below-road costs are mostly due to different allocations of shared costs.

4.3 Cost allocation issues

The PJP report refers to cost allocation as an equity approach and contrasts this with the engineering and econometric methods which it refers to as scientific approaches. However, cost allocation is actually more of an accounting approach with an economic underpinning in that all users are allocated at least the avoidable road infrastructure related costs directly attributable to their road use. It is not clear that the other methods such as engineering or econometric referred to in the PJP report would result in any higher costs estimates for heavy vehicles and, if they did, it would just as likely be due to value judgements in their application that could equally be applied to the cost allocation approach. They are also likely to be more complex to apply.

Pages 90 and 93 of the PJP report note that both the engineering and econometric methods are likely to result in the marginal cost of road use being less than average cost. The report does not state how the shortfall should be allocated if at all but this requires the same non-economic judgements as for cost allocation.

The approaches may not be mutually exclusive in any case. For example the econometric approach has found its way into existing cost allocation systems in at least two ways. The fourth power law that is the basis for using ESAL-km to allocate pavement construction and rehabilitation costs is the result of analysis of historical datasets of the impact of traffic on costs. Considerable analysis of historical datasets was undertaken for NTC by ARRB to determine allocation parameters and separable cost proportions for the first and second heavy vehicle charges determinations and this has been revisited for the third determination.

The cost allocation methodology used by NTC is widely used internationally. However there are variations in the categorisation of separable and non separable costs and in the parameters used to allocate some costs. As highlighted by PJP on page 93 Australia is at the less aggressive end of the range in the proportion of total costs that it attributes to heavy vehicles – however it is understood that this is partly a reflection of where the NTC charges have evolved from and that at each Determination it has been a matter of achieving as much as possible within the constraints of all governments agreeing. It may also reflect differences between Australia's road network and those of other countries. Also as discussed above these differences in the proportion of total costs attributed to heavy vehicles do not mean that the NTC cost allocation does not derive "economically efficient" costs.

Further, when the discussion on pages 92 – 95 is studied in detail it appears that the other methods and countries mainly result in higher estimates of truck costs because they use PCU instead of VKT to allocate non separable costs, and some include externalities. On page 95 the report notes that the application of the "indirect" engineering approach with Swedish data resulted in exactly the same truck/car cost ratio and percent share of costs to cars and trucks as the NTC cost allocation, and a marginal road wear cost due to trucks of less than half the NTC value.

The other approaches that obtain higher costs for trucks include the so called "road damage externality" which is the higher vehicle operating costs that all other road users will experience due to the road now being a little rougher due to the truck having passed over it. It could be argued that this is a valid externality but actually including it in heavy vehicle charges could be like saying that people should pay each other to sit next to each other in a bus or plane because their proximity decreases each others' comfort.

While there may be room within the existing NTC cost allocation attribution parameters and shares to increase the proportion of costs allocated to heavy vehicles (mainly capacity improvement related costs) the overall cost allocation approach is sound and common international practice. We are not aware of governments in other countries using the alternative methods discussed in the PJP report for actual heavy charges (although these may be used in some European countries).

Having raised the other methods PJP still adopts cost allocation to derive its estimates of economic costs. In Section 2.3 on page 19 the PJP report notes:

> *There is some debate about the most appropriate methodology for determining the impact of heavy vehicle traffic on road maintenance expenditure. To summarise, the NTC and BTRE have drawn different conclusions on this issue.* ***While the NTC methodology likely significantly underestimates the impact of heavy vehicles on road expenditure, the empirical research and emerging overseas evidence suggests the BTRE's estimates may also underestimate the level of road costs attributable to the heavier and longer travelling trucks****. Nonetheless, for the purposes of Exhibit 8 we have used the BTRE's cost allocation methodology.*

The PJP report discusses this comparison further on pages 32 and 77 – 80 where it provides a comparison of NTC and BTRE methods and estimates. However the report does not provide any real evidence in support of the statement highlighted in bold above.

On page 78 the PJP report states that "the split between separable and non-separable components for each cost category was based on the NTC's assumptions except for routine maintenance and reseals. The NSW and Victorian benchmarks (rather than Australia wide benchmarks) were used for these two categories". It is not clear why the PJP report preferred a different approach for these two categories.

On page 78 the PJP report states that they used the following measures of road use to allocate costs:

Separable costs

- ESAL-km for routine maintenance, resurfacing, and rehabilitation
- GVM-km for bridge maintenance and construction
- PCU-km for all other categories

Non –separable costs

- GVM-kms for bridge construction
- PCU-km for all other categories.

The PJP report states that the cost drivers chosen for the **separable** components were largely in line with the NTC's allocation procedures used in the Second Determination, the only difference being the use of ESAL-km rather than GVM-km for pavement related costs. NTC actually only uses GVM-km for routine and periodic pavement maintenance costs and uses ESAL-km for pavement construction and rehabilitation.

There is a greater difference between the cost drivers adopted by PJP and NTC to allocate **non-separable** costs. Page 33 and Appendix 2 of the PJP report note that PCU-km was adopted as the cost allocation parameter for **non-separable** costs rather than Vehicle-km used by NTC. This represents a significant difference because a large proportion of costs are non-separable. Using PCU-km rather than Vehicle-km allocates a significantly greater proportion of these costs to trucks. The statement in the PJP report that PCUs are "more closely representative of the impact of different vehicle types on the need to incur non-separable costs" may be partially valid for some capacity related capital costs but is not the case for non-separable operating costs such as mowing verges, inspecting roads, maintaining signs and guardrails etc. In any case it is considered that there is no economic efficiency basis for preferring one of these approaches to the other for non-separable costs.

It can be argued that Vehicle-km is more appropriate for allocating some costs (although this argument is not based on economic efficiency). Examples are expenditure on road signs and markings which assists the driver and is completely unrelated to vehicle size, and safety expenditure which may even be more attributable to light vehicles than a vehicle-km basis due to higher average occupancies of light vehicles. The NTC identifies some of these costs as separable costs, rather than non-separable, and allocates them by vehicle-km in the case of safety related costs and PCU-km in the case of traffic flow related costs. The PJP report does not use Vehicle-km to allocate any costs.

On page79 the PJP report notes that NTK were derived from GVM-km using a ratio of 0.57 net tonnes per gross tonne. This might be representative of freight operations at the time of the Second Determination but in a freight task dominated by 9-axle B-Doubles (PJP's assumption for 2014) the net tonnes to gross tones ratio should be higher (which would mean fewer trucks and less road wear for a given freight task).

5.0 Below-road operating and capital costs

5.1 Operating costs

Below-road operating costs are discussed on page 18 -19, 21-22, 31 – 34, 77 – 80, and 89 - 95 of the PJP Report.

The left side of Exhibit 8 shows the PJP report's assessment of below road operating costs for different vehicle types.

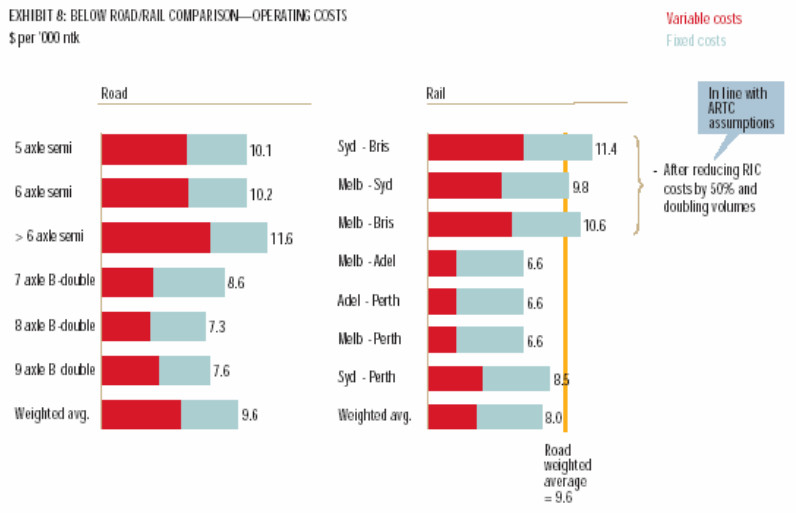


Exhibit 8 shows that the PJP have analysed the below-road costs for various truck types and then calculated a weighted average of $9.6/'000 NTK for comparison with below-rail costs.

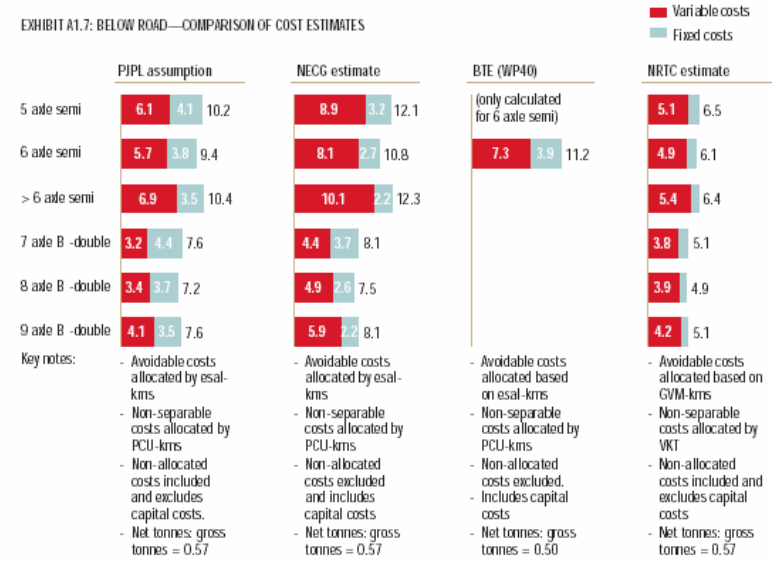
However, the above-road analysis was based on the freight task being performed by 38 net-tonne B-Doubles. It would have been more appropriate for PJP to have used a consistent basis for comparison between above and below-road/rail costs. Either the analysis should be based on "efficient rail" and "efficient road" in 2014 for both above and below-road/rail, or it should be based on current road and rail performance and costs. Using either of these approaches consistently would probably have given results that were more favourable to road.

The PJP report does not state the basis for calculation of the road weighted average but it is assumed that it was based on road use proportions from the NTC 1998 Second Determination report which used 1997 road use data (The PJP reports says that road expenditure and road use data is drawn from this report). Six-axle semi-trailers comprised approx 45% of the truck ESAL-km in 1997 (BTRE WP40).

The proportion of B-Doubles undertaking the inter-capital freight task has increased considerably since 1997. Data from the 2003 SMVU shows that the strongest recent truck growth has been 9 axle B-doubles. By 2014 B-Doubles are likely to perform most of the inter-capital road freight task. This supports using the below-road cost estimate of $7.6/'000 NTK for a 9 axle B-Double in Exhibit 8 as the basis for comparison with below-rail costs rather than the $9.6/'000 weighted average that has been used.

Exhibit A1.7 on page 80 of the PJP report shows that use of PCU-km to allocate non-separable costs and the separable portion of most other fixed costs has caused the fixed cost portion of below-road cost estimates for heavy vehicles to be approximately three times the fixed cost amounts determined using NTC's Vehicle-km parameter, albeit still only $3.5/'000 NTK - $4.4/'000 NTK.

Exhibit A1.7 shows below-road operating cost estimates derived by PJP, NECG, BTRE, and NTC.



Points to note about Exhibit A1.7 include:

Although Exhibit A1.7 is intended to show a comparison of road operating costs, the NECG and BTRE estimates **include capital costs** – if these were excluded as they are from PJP and NTC estimates these estimates would also be lower. The PJP Report analyses capital costs separately.

PJP has allocated avoidable costs based on ESA-km. NTC allocates avoidable costs based on all of vehicle-km, PCU-km, GVM-km, and ESA-km, rather than only GVM-km as indicated by Exhibit A1.7. Non-allocated costs should not be included as they either recovered elsewhere or are not relevant to heavy vehicles (eg kerbing, footpaths, bike paths).

The variable costs portions of PJP's estimates for B-Doubles (the relevant vehicle configuration for inter-capital road rail comparison in 2014) are below the corresponding NTC estimates. It appears that total PJP below-road operating cost estimates are higher than NTC's largely because they used PCU-km rather than Vehicle-km to allocate most fixed costs and as noted previously neither of these parameters results in more economically efficient costs than the other.

Even with the different cost allocation parameters, the PJP report's estimates of below-road operating costs due to B-Doubles are only about $2.5/'000 NTK (0.25 cents/NTK) more than the corresponding NTC estimates (eg PJP $7.6/'000 NTK versus NTC $5.1/'000 NTK for a 9-axle B-Double). This difference is equivalent to less than 5% of estimated total road freight costs and less than 10% of PJP's estimated $25.7/'000 NTK cost advantage of rail compared with road so it is not a significant contributor to either.

Below-road operating cost allocation appears to have been based on total expenditure and total road use rather than corridor-by-corridor analysis as has been done for rail. Main road corridors (eg Melbourne – Sydney) are likely to have economies of scale. Ideally a separate road cost allocation should be undertaken for each inter-capital corridor and this would be expected to result in lower road freight unit costs per NTK for north-south routes where traffic volumes are higher, and pavement standards are higher, as there are considerable economies of scale in pavement design. During development of the Third Determination the NTC estimated road wear costs per ESA-km to be approximately 33% less on inter-capital and rural highways than on the overall road network.

5.2 Below-road capital costs

PJP have done a detailed corridor-by-corridor analysis of future below-road capital investment requirements. This approach appears appropriate for an analysis like this.

PJP have adopted PCU-km as the allocation parameter for all investments in new road capacity on the basis that investments in new capacity are driven primarily by considerations of congestion easing. PJP used PCU parameters of 1.0 and 3.5 for cars and inter-capital freight trucks respectively.

The NTC approach divides asset extension/improvement costs into separable and non-separable components and uses a mix of vehicle-km, PCU-km, and ESA-km allocation parameters.

The NTC categorises 55% of new pavement costs as non-separable (allocated by vehicle-km) and 45% as separable (allocated by ESA-km). Bridge construction costs are 85% non-separable (vehicle-km) and 15% separable (PCU-km). All other costs including land acquisition, earthworks, and other extension/improvement expenditure are considered to be 90% non-separable (vehicle-km) and 10% separable (PCU-km). Given that pavement costs are a relatively small proportion of overall capital costs the NTC approach is likely to result in approximately 85% - 90% of costs being categorised as non-separable and hence being allocated by vehicle-km.

There may be capital costs that, while non-separable, might still be equally appropriately allocated based on a parameter other than vehicle-km that allocates a greater proportion of costs to heavy vehicles. It could be argued that PCU-km may be an appropriate basis for allocating a proportion of asset extension/improvement related non-separable costs where these relate to congestion easing.

Allocating all capital costs using PCU-km, as done by PJP, without differentiating separable and non-separable costs or the different types of capital expenditure – not all relate to congestion easing – could be considered a somewhat blunt approach, and result in an overly high proportion of capital costs falling on heavy vehicles. However categorising 85% - 90% of capital costs as non-separable and allocating this by vehicle-km, as done by NTC, could also be considered somewhat blunt and result in an unduly small proportion of capital costs being allocated to heavy vehicles. Nevertheless, the allocation of non-separable costs is an equity rather than an economic issue and as noted previously the choice of parameter does not make the resulting costs under either approach any more or less economically efficient.

6.0 Below-rail operating and capital cost

6.1 Operating costs

Below-rail operating costs are discussed on page 18 - 21, 29, 45, 62, 81 – 82, and 84 of the PJP Report.

It should be noted that these are PJP's estimates of efficient **economic costs**. In the same way as the PJP report considers that there is a mismatch between road economic costs and access charges there is not necessarily a match between these economic costs and the actual access charges paid by rail operators – This is discussed in a later section.

Exhibit 8 shows the PJP report's assessment of below rail operating costs for different corridors.

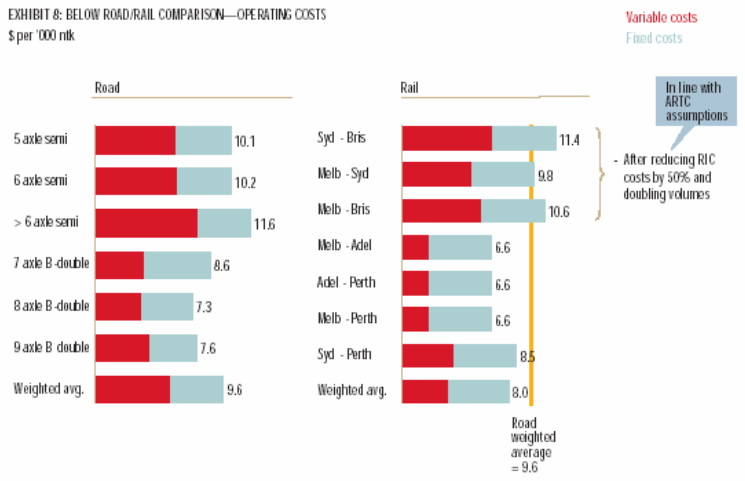


Exhibit 8 shows the weighted average below-rail operating cost being $8/'000 NTK (which is $1.6/'000 NTK less than the weighted average for road) but in Exhibit 4 below-rail operating cost is shown as $6.6/'000 NTK – the reason for this difference is not explained.

Based on the below-road 9 axle B-Double cost of $7.6/'000 NTK in Exhibit 8 compared with the average below-rail operating cost for north-south corridors of approximately $10.5/'000 NTK the rail cost is actually $2.9/'000 NTK more than road. This is using the PJP preferred BTRE road cost allocation rather than the NTC parameters and also the north-south rail costs based on RIC costs being reduced by 50% and rail volumes doubled. All of these assumptions are favourable to rail.

Page 19 of the PJP report states that:

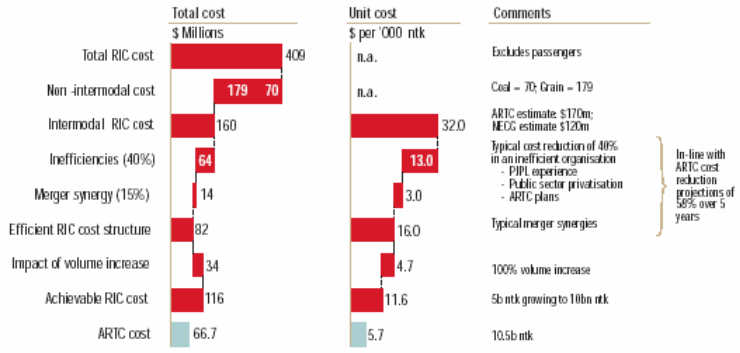
> *"Taking into account planned changes to below rail operating costs on the North South corridor it can be concluded that rail will have, on average, a small but meaningful cost advantage over road in terms of the annual operating and maintenance costs for the track or road infrastructure (see Exhibit 8). This advantage is significant on the East West corridor where the track is generally in better overall condition (for example, due to the concrete sleepering upgrade in the 1990s) and is an inherently easier environment from a track maintenance perspective (drier, more level terrain) compared to the North South corridor".*

However, as noted above, based on below-road costs due to 9-axle B-Doubles (using PJP's preferred cost allocation and assuming that the costs allocated to B-Doubles per NTK would not change materially if more of the interstate freight task is performed by B-Doubles by 2014) rail appears to have a $2.9/'000 NTK cost disadvantage to road in terms of below road/rail operating and maintenance costs on the North South routes. If RIC costs cannot be reduced by 50% or rail volumes doubled, or if PJP's road cost allocation is judged to have allocated too much non-separable cost to trucks then the cost disadvantage of rail would be greater.

The PJP analysis in the case of east-west routes is based on actual below-rail costs which indicate that rail does have a cost advantage in below-rail operating costs on that route. This is considered reasonable even allowing for PJP's alternative road cost allocation because it could be argued that (using a corridor specific road cost allocation) trucks would be allocated most of the costs for the Adelaide-Perth highway based on the assumption that they would represent a higher than normal proportion of total traffic on that route.

Exhibit 9 in the PJP report shows the derivation of the projected reduced below-rail operation cost for the north-south rail lines. ARTC's cost reduction projections are based on operational changes and some capital programs specified by the ARTC within its overall merger plan.

EXHIBIT 9: BELOW RAIL OPERATING COST REDUCTION POTENTIAL



Source: ARTC 2002 Annual report; 'Independent Review of RIC Metropolitan Maintenance Funding' (Oct 2002); PIPL analysis

A point to note about Exhibit 9 is that below-rail costs attributed to intermodal traffic are $160M pa out of a total of $409M. It is understood that at one stage the NSW approach was to make coal traffic pay 100% of standalone (ceiling) cost for the rail lines it used and that other traffic only had to cover incremental costs. If there is some shared use of interstate tracks, and if it is still the case that RIC cost allocation and charging allocates "non separable" costs mainly to coal and possibly grain traffic, then the intermodal cost could represent overly favourable treatment of intermodal rail traffic. A balanced allocation of costs might result in the starting figure for intermodal related costs being more than $160M. Whether or not this is actually the case could not be ascertained during this investigation. If rail track charges are to be compared with road use charges it is important to have a similar level of understanding of the relationships between use and expenditure for rail as there is for roads.

The PJP report (on page 21) discusses the following reasons why it considers the operating cost reductions on the NSW network to be realisable:

- ARTC viability depends on the savings being achieved.
- The projected reductions accord with industry experience.
- Even after the cost reductions, the NSW unit costs will be approximately double the current ARTC unit costs on east-west routes.

Without having access to the details of how ARTC expects to achieve the cost reductions and the analysis undertaken by PJP it is not possible to provide a detailed consideration of the achievability of these cost reductions. However the following points are noted:

- It is possible that some assumptions and projections were pushed to the "optimistic" end of the range of possibilities in the assessment of the case for the takeover of the NSW track by ARTC.
- PJP assumes cost reductions of 40% from applying private sector performance improvement programmes to organisations that that have not had such a programme for many years, especially in public sector organisations. It can be difficult for a government owned organisation that is not operating in a competitive market where performance can be compared with other firms to achieve the same cost reductions as private sector firms operating in competitive markets. Political pressure from government owners may cause staff numbers not to be cut as aggressively as they might be by a private firm subject to competition. It is noted in the RIC 2004 Annual Report that the majority of front line infrastructure and maintenance and train control staff will continue to be employees of NSW, and will be seconded to work for the ARTC. The Tripartite Agreement states that ARTC will second employees from SRA/RIC in accordance with the Labour Services Agreement. The 40% savings from applying private sector performance improvement programmes may be difficult to achieve under arrangements such as these.
- Rather than calculating the merger synergies as 15% of total efficient intermodal costs ($14.4M pa) it could be more appropriate to investigate actual likely cost reduction based on current corporate centre costs. Also, as noted earlier, it is possible that corporate centre costs may not be currently allocated proportionately between different traffic types, in which case there may be doubt whether the synergy benefit could be considered a reduction in below-rail economic costs of intermodal traffic.

Exhibit 9 shows that the intermodal related below-rail operating costs of $160M pa equate to a cost of $32/'000 NTK, and that this is assumed to reduce to $11.6/'000 NTK after the cost reductions and volume increase. PJP notes that this is still approximately twice the unit cost on the east-west routes but that this is due to more favourable terrain and climate etc.

Without the doubling of volume the unit cost is estimated at $16/'000NTK, indicating a relatively high level of fixed costs that do not vary with use.

The fact that ARTC already operates the east-west routes at unit costs of approximately half the projected efficient NSW costs provides support to the projected cost reductions being achieved because it gives ARTC existing experience to benchmark against.

However achieving the doubling of freight volume that reduces the unit cost from $16/'000 NTK to $11.6/'000 NTK may be more difficult. This was discussed in Section 2.3.

Other risks to achievement of these targets include:

- Union opposition to cost saving initiatives; and
- Current high workload for rail contractors causing increased prices.

Page 47 of the PJP report notes that improved vertical coordination between above-rail operator and below-rail track provider has been modelled by applying a 10% efficiency to both above and below-rail operating costs. It notes that the modelling did not need to assume how this was achieved and where specifically it would impact on the cost structure. The assumption of benefits from improved vertical coordination may be valid but it could equally be applied to road. For example building more high quality roads with rigid concrete pavements and gentle curves and gradients would reduce truck rolling resistance and operating costs. It could be argued that under an "Intelligent Access" model road providers and road transport operators could achieve similar reductions in total road system costs by devising optimum combinations of road infrastructure and truck configurations for each inter-capital corridor.

7.0 Externality costs

7.1 PJP Report estimates

PJP's derivation of externality values used in its analysis is covered on pages 84 to 88 of the PJP report. Road externalities are summarised in Exhibit A1.12 in the PJP report.

EXHIBIT A1.12: EXTERNALITY ASSUMPTIONS—ROAD
$ per '000 ntk

Externality Measure		BAH*	NRTC	Bureau Transp. Econ (1999)	Qld Transport	Bus Industry Confederation	Range used Low	Medium	High
Noise Pollution	Rural	0.03			0.03		0.03	0.25	0.50
	Metro	0.06		1.32	0.06	2.10	0.06	1.00	1.32
				0.34					
Air Pollution	Rural	0.00					0.00	0.00	0.00
	Metro	1.10		1.20	1.10	2.10	1.10	1.15	1.2
				0.10					
Greenhouse Gases**		1.60		not calculated	1.70	3.20	1.40	1.55	1.70
Congestion/ Enforcement cost	Rural	0.00				not calculated	0.00	0.40	0.80
	Metro	0.90			0.90	not calculated	0.80	0.85	0.90
				0.80					
Accident costs	Rural	3.20			7.00		3.20	5.10	7.00
	Metro	3.20			7.00		3.20	5.10	7.00
				3.20					
Totals	Rural	4.8			8.7	3.2	4.6	7.3	10.0
	Metro	6.9			10.8	7.4	6.8	9.3	12.1
	Total		12.8	5.8					

* Booz Allen & Hamilton — figures from the Interstate Rail Network Audit, 2001
** Qld Transport assume $25/t of CO_2; Bus Industry Confederation assume $40/t of CO_2
Source: Laird P., Land freight external costs in Queensland, 2002; Bureau of Transport and Regional Economics, Working Paper 40: Competitive neutrality between road and rail, 1999

PJP used the values in the Medium column of the above table in their analysis.

The PJP report notes that particular attention was paid to the road greenhouse and accident externalities as these are the most significant externality cost items for inter-capital corridors and contribute the majority of the $6/'000 NTK difference between road and rail.

In rural areas, which account for the majority of inter-capital freight distance, the accident externality value contributes 70% of the total externality costs and greenhouse gas contributes 21% of externality costs. Noise and congestion are small contributors in these locations.

7.2 Review of PJP values

7.2.1 Accident costs

For accident externality values the PJP report used the methodology used by the BTRE in Working Paper 40 (Competitive neutrality between road and rail) but with updated accident cost data (Refer page 87 of PJP report).

The PJP report has based accident numbers on the freight task being carried out by 6-axle semi-trailers. This is consistent with the BTRE methodology and was probably appropriate at the time the competitive neutrality study was undertaken in 1999. However, it is inconsistent with the PJP report's analysis of likely above-road operating costs, which assumes that by 2014 the freight task will mainly be performed using B-Doubles. Basing the analysis on B-Doubles would result in fewer vehicles and hence lower accident costs being attributed to heavy trucks.

The PJP report has factored up the calculated accident externality costs per km by 20% based on ATSB data showing that articulated truck crashes occur disproportionately on roads with speed limits greater than 100kph. On this basis it is assumed that crash costs per truck kilometre on inter-capital highways (eg Pacific Highway) are 20% higher than the national average. This assumption could be questionable because the below-road capital cost estimates in the PJP report have included costs to upgrade the Pacific Hwy and others to divided carriageway high standard roads. Accident rates on upgraded inter-capital highways are likely to be lower than average.

In Exhibit A1.12 it can be seen that the PJP accident externality "Low" value has been based on the BTRE figure of $3.2/'000 NTK. The source of the BTRE value, Working Paper 40, shows that this is the estimated total accident cost and that the external component is only half the total cost or $1.6/'000km. However the PJP "Medium" value of $5.1/'000 NTK, which was used in the analysis, is correctly just an external component. Page 87 of the PJP report shows that estimated total costs were factored down by 50% in calculating this value. As noted by the PJP report, the BTRE value is based on outdated 1993 accident unit values and accident cost estimates, particularly for fatal accidents, have since been increased substantially, so an updated estimate of the externality value was clearly necessary.

It is noted that the BTRE estimate that externalities represent half of total accident costs is not the lowest in the literature. For example Meyrick (1994) argues that a magnitude below 20% is necessary to avoid double counting. Recent work for the Ministry of Transport in New Zealand as part of the Surface Transport Costs and Charges Study (unpublished) estimated that the external component is approximately one third of off-peak urban marginal accident costs (rural proportions not available).

The definition of what is an accident/safety externality and who is responsible for it is extremely complex and subject to different viewpoints. Before such costs are included in charges people are likely to contest:

- the magnitude of accident costs;
- average versus marginal costs;
- the proportion that are internal/external;
- the objective of including them in charges; and,
- the efficiency/fairness of any inevitable averaging of the charge across road users.

The last two points are important considerations. A uniform charge across all truck users would be a very blunt signal for reducing unsafe behaviour. It would also be open to challenge on grounds that most trucks are not involved in accidents and not all of those who are involved are at fault. According to the Australian Transport Safety Bureau, articulated truck drivers have been assessed by coroners as being fully or partially responsible for the crash in only about 20 – 25 per cent of multiple-vehicle crashes.

There could be arguments that charges should take into account the different safety performance of different highways. For example should accident externality charges be the same on an inter-capital highway that is a high quality divided carriageway with no history of multi-vehicle truck accidents as on a two-lane highway which has experienced head on accidents between trucks and cars? Should charges reflect which types of vehicle or drivers are the main instigators of the accidents? If many accidents are due to drink-driving or speeding should charges be higher for people who drink driver or speed? How can this be determined in advance?

In conclusion, the PJP externality cost estimate of $5.1/000 NTK may be 20 - 50% too high because calculated costs have been factored up by 20% with questionable justification, and the estimate is based on the forecast inter-capital freight task being performed by 6-axle semi-trailers with 19 tonne payloads whereas B-Doubles carrying heavier payloads are likely to play a much greater role in future.

7.2.2 Greenhouse gas emissions

In the case of greenhouse gases, the recently released AusLink appraisal guidelines specify a cost based on a value of $10/tonne, which appears to have been accepted as the appropriate value to use in Australia based on costs of abatement. This is also consistent with the upper bound of the cost to government of abatement purchased under round 1 of the Australian Government's Greenhouse Gas Abatement Programme.

The PJP estimates appear to reflect higher carbon values than $10/tonne. Using a value of $10/tonne of carbon equates to 1.1 cents/litre. Using a fuel usage value of 0.0265 litres per NTK (BTRE Working Paper 40, p.61) gives a greenhouse cost of $0.29/'000 NTK – in contrast to the $1.55/'000 NTK Medium value adopted by PJP. The recently released ATC AusLink appraisal guidelines give a greenhouse gas externality value for heavy vehicles of $0.77/'000 NTK also based on $10 per tonne, or about half the PJP report value.

Transport is the third largest greenhouse emitting sector in the Australian economy, behind electricity and agriculture. Any recommendation to charge for greenhouse emissions in (one part of) the transport sector should be a whole of government and whole of economy issue. It would be unusual for one particular industry to be singled out for imposition of externality charges particularly when these do not actually reflect direct financial costs to society (unlike road wear costs).

Although the PJP greenhouse gas externality value may be too high the actual magnitude of this difference is only $1.2/'000 NTK at most, which is only about 2% of the estimated total road freight costs in the PJP report. Therefore this is not a big factor in the economic cost advantage of rail over road derived in the PJP report.

7.3 Overall assessment of externality values

It is considered that:

- The PJP report's accident externality cost estimate of $5.1/'000 NTK may be 20% - 50% too high because calculated costs have been factored up by 20% with questionable justification, and the estimate is based on the forecast inter-capital freight task being performed by 6-axle semi-trailers with 19 tonne payloads
- the PJP report's greenhouse gas externality value of $1.55/'000 NTK may be $0.8/'000 NTK to $1.2/'000 NTK too high
- Noise and congestion externality values should probably be zero for rural inter-capital highways rather than the higher values used by PJP
- Accident and environmental economic costs for road freight are higher than rail but based on more appropriate unit values the difference between road and rail is likely to be closer to $3/'000 NTK than the $6/'000 NTK derived in the PJP report.

8.0 Road and rail access charges

8.1 Determination of road access charges

The NTC Heavy Vehicle Charges Determinations set charges to fully recover the average of the most recent two years' actual and the next year's budgeted expenditure on road construction and maintenance (all indexed). Under the PAYGO approach, new road capital expenditure is effectively written off in the year of investment and, equally, past investment is regarded as having been written off in those earlier years. Under this interpretation, PAYGO can be shown to incorporate a return on past capital expenditure. This is discussed further in the NTC's Third Heavy Vehicle Pricing Determination Technical Report.

Parameters such as vehicle-km, PCU-m, and GVM-km are adopted for attributing road construction and maintenance expenditure costs across vehicle classes. Costs are allocated based on average utilisation (payload and annual kilometres) of vehicles within each vehicle class. The disadvantage of this is that it means that trucks that travel greater annual distances and carry higher loads than the average for their vehicle class will be allocated less than their correct share of costs. However, overall each vehicle class is allocated the correct total costs. Divergences between costs occasioned and costs recovered within vehicle classes could be reduced by having a greater number of more tightly defined vehicle classes but any more than at present may become administratively impractical/costly and difficult to enforce. The NTC has estimated (July 2003 Third Determination Issues Paper) that for B-Doubles the within-class averaging amounts to a subsidy of approximately $3,000 per annum from the most lightly used vehicles to those travelling the greatest annual distances. This equates to approximately $0.5/'000 NTK for the most highly utilised vehicles.

The final step is to match allocated costs with charging instruments. A disadvantage of the existing system is that at present the only instruments available to NTC are diesel tax and annual vehicle registration fees. The need for diesel tax to be a uniform amount per litre, combined with differences in fuel efficiency, results in lighter trucks paying more than their allocated costs overall and heavier vehicles paying slightly less than their allocated costs. However in total across almost all vehicle classes diesel tax and registration fees are set at levels that over-recover total costs so light vehicles do not cross-subsidise heavy vehicles to any significant extent. The only class of vehicles that systematically under-recovers its costs at present is B-Doubles which recover relatively less of their costs via the fuel charge than other vehicles due to their fuel efficiency.

It is understood that changes being considered for the 3rd Determination will result in a higher attribution of costs to heavy vehicles and possibly a reduction of the within class effect noted above. These revisions will not entirely correct for the subsidisation within classes, however as discussed in Section 4.0 this problem cannot be shown to result in a lack of competitive neutrality between road and rail as long as charges are set at a level that ensures all vehicles at least cover their avoidable costs.

Recognising the limitations of the existing charging mechanisms, the PJP Report favours the introduction of some form of mass – distance charging. This would enable charges for individual vehicles to be matched more closely to their utilisation. It is understood that the NTC is investigating the possibility of introducing mass – distance charging as part of the 4th Determination and this has the potential to reduce the disadvantages discussed above.

Some economists argue that road charges should include a financial return on the capital invested in roads. In other words in addition to providing the funds to undertake capital improvements (via PAYGO), road charges should include a profit over and above this reflecting the economic cost of the resources invested in the improvement. It is argued that this would result in a treatment that is more consistent with other commercialised industries including rail.

There are various theoretical and practical difficulties with this. One is that roads are effectively funded by "equity" provided directly by road users rather than financed by equity and debt by a separate commercial investor. This could be different if roads were commercialised. Another issue is determining an appropriate valuation for existing assets. Additionally the "missing" financial return is effectively capitalised into the value of properties and businesses connected to roads so incorporating a financial rate of return in road charges could result in a corresponding drop in property and business values. Another issue is that a commercial provider does not normally expect to obtain their profit as a uniform mark up on all costs for all users – different prices are charged to different users based on their willingness to pay. Commercialised road operators might find it more profitable to recover most of any financial return from light vehicles rather than lose freight traffic mode share to rail. Note that this is only a very brief consideration of some of the issues raised by proposals to include an explicit financial return on capital in road charges.

The lack of a financial return on investment may result in road access charges being lower than if roads were provided and managed within a commercial structure however this does not necessarily mean that road transport vehicles are undercharged as long as their charges cover their avoidable costs. Nor does it necessarily mean that the playing field is uneven between road and rail because it appears that ARTC sets rail access charges relative to road charges based on achieving as level a playing field as possible.

8.2 Effect of current access charge regimes

It would appear that the below-rail cost estimates are ultimately commercially based rather than being set to reflect full economic costs. As noted by the BTRE, the asset values in ARTC's accounts reflect the revenue those assets can generate in a market where prices are largely set by road and sea freight rates, not necessarily the upfront opportunity cost of those assets. (This point is discussed in BTRE WP 57, p.16). This means that if road charges increase, to better reflect resources used, rail charges should also increase to an extent, for the same reason, reducing the differential between the two, and hence reducing any mode share gains by rail.

The AusLink White Paper includes the following:

> *"In determining the appropriate access charges for the network, the Australian Rail Track Corporation ideally needs to balance long-term growth in rail traffic and access revenue against short-term revenue results.*
>
> *The Australian Rail Track Corporation operates in an environment that requires access charges to be set* ***so that they are competitive when compared with charges in the more efficient road sector****. It is clear that the access fees the corporation is able to charge are adequate to maintain the existing rail system. However, they do not provide the necessary revenue to undertake the large capital investment that is essential for rail to play its proper role in carrying out Australia's transport task.* [This issue/concern was identified by ACCC in its decision on the ARTC Access Undertaking]
>
> *Additional strategic investment is required to enable rail to enhance its capacity through critical capital works. These could include track realignments and upgrading signalling and communication systems that will enable rail to be competitive and commercially sustainable. The Australian Government, through AusLink, is committed to boosting the Australian Rail Track Corporation's investment in rail to allow several key projects to proceed. The additional Government investment in rail will make a critical difference - particularly to the effectiveness of the east-coast/ north-south rail line between Melbourne, Sydney and Brisbane.*
>
> *In the five-year period the Australian Rail Track Corporation will invest $872 million in the national rail network. This funding commitment is part of the agreement with the Australian and New South Wales Governments to lease the New South Wales interstate track. It will also invest the additional $450 million provided by the Australian Government in the interstate track between Sydney and Brisbane to substantially improve freight services."*

This makes it clear that the existing road versus rail mode shares are not the result of road charges not reflecting economic costs. Rail charges are set to win a certain mode share and arguably also do not cover all economic costs. In particular rail charges do not include a **return on** and **return of** the capital investment contributed by the Australian Government. At least road charges are set to recover a **return of** capital investment across all road users (via the PAYGO approach).

If it was shown that road charges should be increased to cover full economic costs and a set of charging instruments were developed that achieved this on all corridors what would rail's response be? It would most likely increase track access charges so that they more closely matched rail's economic costs including return of capital.

The PJP report recognises this issue and discusses it on page 45 – 47. It suggests that one solution is to realign road and rail access regimes so that full cost recovery is used for both. Under this approach road pricing would also be set to include a return on sunk capital. Rail access fees can then increase to their maximum (ceiling) levels with no scope for further increases as above rail operators increase their profits. However, as discussed earlier, such an approach involves a number of difficulties.

The PJP report's alternative and preferred approach is for access fees to be capped via long term (say 15 year) access agreements so that above rail investors can invest with certainty. This has been assumed in the modelling. However this approach could expose rail to the same criticism as the PJP report directs at road access charges, i.e. that track access charges would not cover full economic costs.

The PJP Report considers that differences between current road and rail access pricing policies result in potential above-rail investments being foregone due to uncertainty about future increases in rail access charges. They suggest that capping access charges would overcome this uncertainty.

However, as noted above, rail access charges for the track owned or leased by ARTC currently appear to be well below the full economic cost of providing services. Capping rail access charges at current levels, therefore, may undermine below-rail investment incentives and compromise the sustainability of the network. It may also impede ARTC's ability to deliver its part of the PJP report's proposed improved vertical coordination.

Changing the cost allocation and increasing heavy vehicle charges (possibly for policy rather than economic reasons) would increase access charges for all trucks on all roads – transport costs will increase in areas and corridors that do not have a competing rail alternative and hence would reduce viability of businesses and primary producers in such areas. This may not be relevant in the determination of overall economic road costs but is likely to be a policy consideration in reflecting these in heavy vehicle charges.

The PJP Report proposes that mechanisms should be developed to address inconsistencies in funding decision-making criteria between road and rail infrastructure. The Australian Transport Council has recently released a comprehensive set of transport infrastructure planning guidelines for infrastructure investment decision-making in Australia including AusLink. The guidelines have been developed to ensure neutrality between transport modes, proponents and construction and non-construction solutions, in assessing the broad range of potential projects to be considered for AusLink funding submissions.

9.0 Service Levels

9.1 Service level factors

This section discusses the extent to which freight transport is consigned on the basis of transport costs alone and identifies other factors in the modal decision making process that may have been not fully addressed in the PJP report.

The 2001 ARTC Interstate Network Audit report (and appendices) contains a detailed analysis of the influence of non-price factors on mode share. Rail's competitiveness is influenced by the overall package of price and service characteristics. The ARTC Audit report concludes that price is the primary factor but service level factors are important as follows:

- ***Transit time:***
  - Transit time is factored into overall delivery times to customers.
- ***Reliability:***
  - Freight forwarders factor reliability risk into their decisions.
  - Reliability impacts on pick-up and delivery costs (i.e. trucks waiting longer than expected bear additional cost).
  - Reliability is a critical factor as operators want to work to tight time windows.
  - Rail is perceived as less reliable than road – when a train gets delayed the impact is much greater.
- ***Service availability:***
  - Pushing back cut off times after 6.00pm would help shift tonnes to rail.
  - Rail services need to be scheduled to best utilise pickup and delivery resources.
  - Preference for goods to arrive before opening of business and shipped out after close of business.

Experience on other studies by Maunsell supports these findings. Consultation for a number of projects seeking to achieve freight modal shift from road to rail have identified considerable scepticism about the suitability of rail to provide a sufficiently flexible and reliable door-to-door service.

From Maunsell's experience, other factors for preferring road transport included:

- the reduced risk of damage to goods that are sent by truck direct from factory to customer rather than double handled to/from trains;
- the greater flexibility in terms of timing, route, and size of task due to road transport being a large number of smaller independent units which can be individually retimed or rerouted or even cancelled without affecting other freight;
- much simpler logistics hence fewer opportunities for things to go wrong; and,
- the ability to relocate or change the nature of the logistics chain in response to customer needs.

A particularly significant factor is service availability. Graphs in the 2001 ARTC Network Audit report show the consequences of inconvenient rail freight cut off times that are necessitated by longer door-to-door rail transit times on the proportion of freight that rail can even contest.

In the Melbourne-Sydney corridor the rail cut off time in order to achieve next morning delivery (in 2001) was 3.30pm, yet only 50% of road freight in the corridor is available for despatch at this time. The most popular hour for despatching freight in this corridor was 7.00 – 8.00pm.

In the Sydney Brisbane corridor the rail cut off time was 11.30am, yet only 25% of road freight in the corridor is available for despatch at this time. The most popular hours for despatching freight in this corridor by road were 7.00 – 9.00pm.

The percentages of freight for which rail cut off times actually suit customer preferences are higher on other longer routes where overnight delivery is not possible in any case. This contributes to rail's higher mode share on these routes.

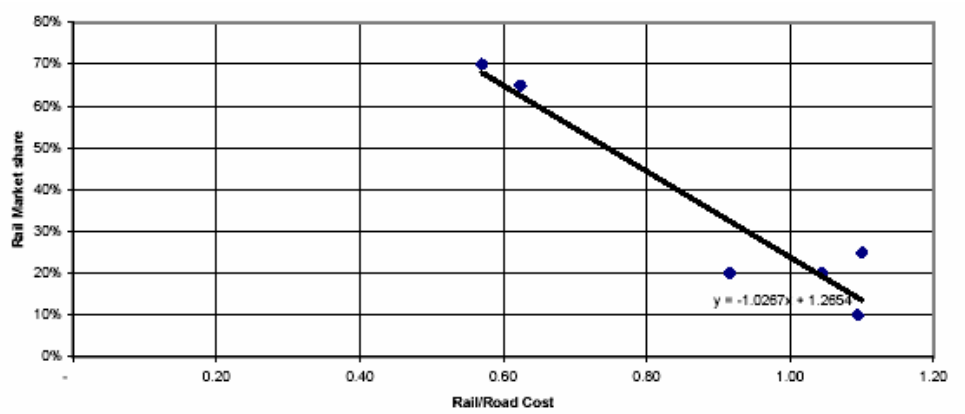
For a number of industries the need to marshal all products for despatch at exactly the same time on a single rail service presents a significant additional barrier to the use of rail. With road transport each truck can be despatched as it is loaded.

The ARTC Audit found that rail's service level in terms of reliability is particularly poor compared with road. In the north-south corridors only about 50% of rail freight arrives within 15 minutes of scheduled time (or earlier). Five percent of freight in these corridors arrives more than three hours late. This is a significant disadvantage in an increasingly "just-in-time" business environment. By contrast it is estimated that 95% of road freight is delivered on time.

9.2 Effect on mode share

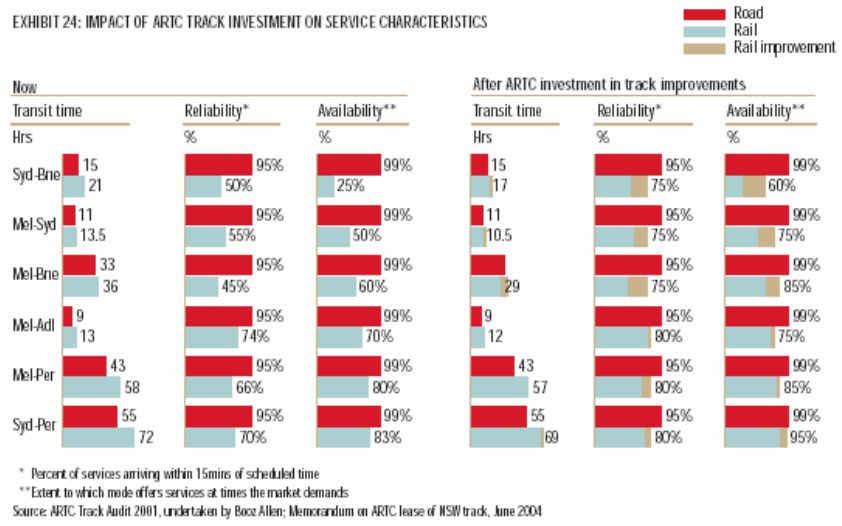
The ARTC Network Audit final report page 38 shows the market share for different corridors versus the differential between rail price and road price. This is shown in Figure 9.1 with a line fitted by Transport SA. This shows that when rail and road rates are equal rail's mode share averages only about 25%. Based on this analysis, even when rail freight is priced at 40% less than road freight (Rail/Road cost ratio of 0.60) road freight still wins approximately 30% of freight due to its superior service levels. This emphasises how important non-price factors are in determining freight mode share.

Figure 9.1: Road and rail rates and market share



Source: Transport SA Economic Analysis of South East Rail Network Project (from ARTC Network Audit by BAH)

These factors are also discussed in the PJP report. Exhibit 24 on page 46 of the PJP report shows the following changes in service levels anticipated following the ARTC investment in track improvements based on the 2001 ARTC Audit and the 2004 Tripartite agreement for upgrading the RIC network, and additional investment identified by PJP.



The PJP report on page 47 notes that rail service performance levels (transit time, reliability, and availability) on the north-south corridors are a major constraint to rail achieving greater modal shares. PJP noted that the reason for this poor performance lay largely with the under maintained NSW section of the north-south track and inherent problems such as the passage through the Sydney metropolitan commuter network.

The PJP report says that their analysis drew on the ARTC Network Audit but that they concluded that $1 billion of investment was needed on the north-south network, double the investment identified in the ARTC Audit.

It should be noted that the ARTC Audit report also considered more expensive investment scenarios including investment of up to $1.9 billion but found that the additional investment over $0.5 billion was not economically viable. The ARTC Audit report estimated that the $1.9 billion investment scenario (which is double what the PJP report proposes) would reduce rail costs by a maximum of 9%. Based on Figure 9.1 rail mode share would only increase by about 10 percentage points if rail costs were reduced by 9%. Clearly, in order to achieve higher rail mode shares the investments also need to significantly improve rail service levels so that effectively the line in Figure 9.1 is moved upwards (and flattened).

In ARTC's North South Investment Strategy announced in June 2005 some of the forecast transit times have been reduced even further than the times assumed by PJP and shown in Exhibit 24. ARTC is now forecasting that Sydney-Brisbane trains will achieve transit times of 15.5 hours instead of 17 hours, and Melbourne-Brisbane trains will achieve times of 26.2 hours instead of 29 hours. Projected transit times for Melbourne-Sydney have increased slightly from 10.5 hours to 10.7 hours for 1,500m trains and 11.5 hours for 1,800 m trains. These are still adequate for next morning delivery.

In the light of the above discussion it is considered that these projected service improvements are much more critical to achieving the projected mode share gains than likely level of changes in costs/prices. Considering the investigation that has gone into the ARTC North South Investment Strategy and the nature of works proposed, it seems reasonable that rail could achieve these service levels and reach the mode shares projected by ARTC.

However as noted in Section 2.3, the PJP report has assumed that rail mode share will be 20 percentage points higher on the Melbourne Brisbane corridor than is projected by ARTC even though the PJP report has assumed a longer transit time.

The PJP report notes that their modelling assumes that rail operators will significantly improve their customer service in terms of offering different service and price offerings to suit customers' individual circumstances rather than just offering a "vanilla" product. Part of the difference may be due to this, however it is considered that this is something that rail operators can and should be doing regardless of any other issues discussed in the PJP report and it is questionable whether this should be claimed as a benefit of the proposed "rail reforms" in the report. Providing flexible services tailored to particular customer requirements is one of the main reasons why road transport has gradually won business from rail in the last two – three decades.

Based on the above evidence and discussion it is considered that, while non-price influences on modal choice have been considered by the PJP report, the mode share gain that PJP have attributed to planned improvements in these characteristics may be too high in the Melbourne – Brisbane corridor, and possibly also on the east west routes.

Not achieving the projected mode share on Melbourne-Brisbane would result in below-rail unit costs on this corridor being higher than estimated in PJP's calculations.

10.0 Rail Industry Structural Reform

10.1 Dependence on rail industry structural reform

Page 1 of the PJP report notes that in relation to inter-capital city freight "efficient rail" is the lowest cost land transport mode and consequently should capture a far higher modal share than is observed currently. The report suggests that a number of important changes are needed to achieve this outcome:

- A level playing field between rail and road to ensure efficient choices between modes and greater certainty for investment
- Rail needs to accelerate its internal industry reforms; specifically:
  - ARTC must ensure it quickly captures the expected operational cost savings by bringing NSW track under its management
  - Above-rail operators must overcome their legacy or poor customer service
  - Track owners and train operators must quickly achieve improved vertical coordination.

While most of the PJP report concentrates on the first of these two dot points the analysis conducted by Maunsell for this review indicates that the cost factors may not be as significant as argued by PJP and that the rail industry reforms detailed under the second dot point are more critical to rail gaining greater mode share.

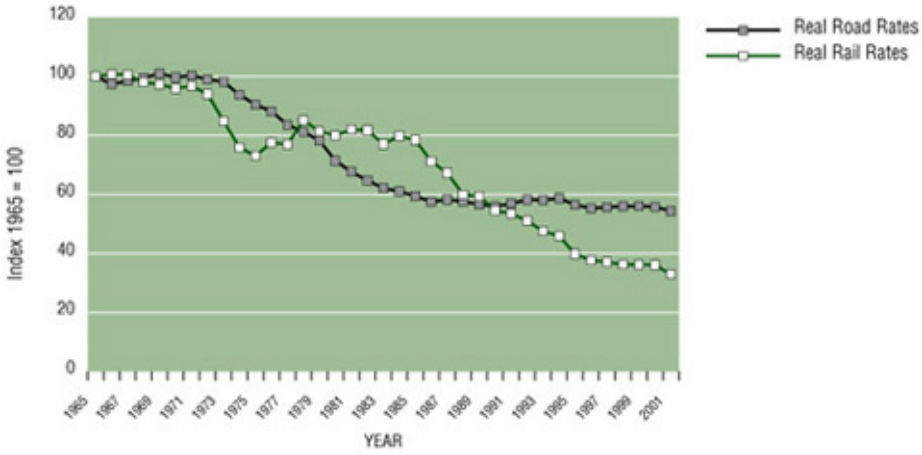
The AusLink White Paper, in its discussion of the future freight task, notes that non-bulk freight is expected to increase at a significantly higher rate than overall traffic and that this higher growth is related to:

- continued economic growth;
- the ongoing shift to just in time delivery as a replacement for point of sale inventory;
- increased specialisation of production, making manufacturing in particular more transport-intensive;
- increased differentiation of consumer tastes making retailing more transport-intensive;
- the concentration of warehousing resulting in more and longer trips; and,
- increased use of freight services as their prices continue to fall in real terms.

The White Paper states that non-bulk freight trends are characterised by a continuing increase in the dominance of road, both in total and interstate traffic. This reflects road transport's advantage in catering for door-to-door movements and just-in-time delivery arrangements.

Figure 10.1 is a copy of Figure 3 from the AusLink Green Paper which shows that road freight rates have hardly changed over the last 20 years in real terms but during the same period rail freight rates have halved in real terms. This shows that rail has had to reduce price to offset its inability to match road transport in offering the types of services that customers increasingly require, and rail has still lost mode share.

Figure 10.1: Real freight rates – road and rail 1965 - 2001



Source: AusLink Green Paper

Based on these trends it appears unlikely that any increase in real road prices, even of the magnitude that PJP consider appropriate, will have any significant on-going effect on rail mode share. The evidence emphasises the need for rail to reform its own offering so that it can better meet present day freight transport requirements and avoid having to cut prices to retain business.

The PJP report discusses required rail industry internal reforms on page 62. Apart from the requirement for ARTC to deliver planned efficiencies on the NSW track network, the most significant points are made under the heading that above-rail operators must overcome a legacy of uneven customer service.

On page 62 the PJP report notes that:

> *"Customer interviews reveal that rail freight has a legacy of poor customer service experiences that needs to be overcome. Many customers would prefer to use the cheaper rail transport but feel prevented by service levels that they perceive do not meet their needs. This situation has arisen in part because of:*
>
> - *The previous separate State-based rail freight operations, with no single point of accountability to customers*
> - *Public ownership that can be seen to lack the intensity of commercial focus that can come with private ownership*
> - *Other factors described in this chapter that have held back rail*
>
> *In general terms rail must improve its service offering in ways that appeal to specific customers so that its lower cost structure can be translated into higher volumes. This could involve making investments in sidings equipment or in containers, and offering transit time and price/service arrangements that are better suited to customer needs."*

More discussion on these points is provided on pages 48 and 50 of the PJP report.

> *"The PJP modelling assumes that rail operators do significantly improve their customer service relative to past performance. Indeed, rail freight operators are increasingly doing so.*
>
> *To maintain its current share rail already offers significant price discounts of up to 30% compared with road. These discounts, in effect, compensate for rail's less flexible service levels.*

The 'shock' to the status quo, therefore, is the combination of service level improvements from the $1 billion investment in rail, service innovations by operators and lower below rail operating costs (from ARTC taking over management of the NSW network); which in turn drives unit cost reductions as modal shift drives increasing economies of scale; working together in a 'virtuous circle'.

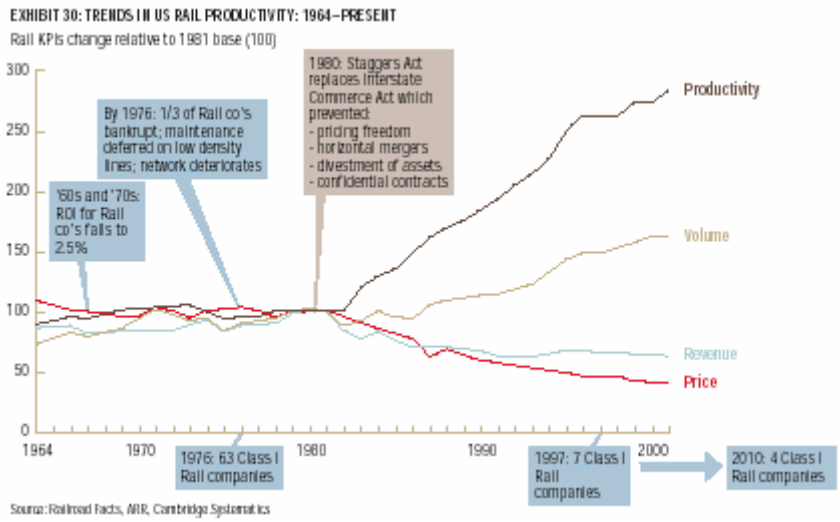
Our modal share projections therefore reflect the fact that larger shifts in service levels can be expected to drive larger changes in modal share, as well as the relationship between rail's discount to road prices and modal share."

These points have been quoted here (with some abbreviation) because they indicate that the service level improvements, and hence mode share gains, and hence unit cost reductions adopted in the PJP report are dependent on reform by both track owners and above-rail operators and the interaction between them.

10.2 Likelihood of rail reform

What is the likelihood of the rail industry achieving the required reforms, and if it does will this actually deliver the rail mode share gains and unit cost reductions predicted in the PJP report?

The PJP report includes Exhibit 30, reproduced below, to support the projected gains from reform. This shows the gains following major rail reform in the USA. The PJP report appears to be implying that similar gains should be achievable following the structural reforms proposed in the report. However the rail industry in Australia has already been undergoing structural reform for almost as long as the USA. Reforms to date in Australia may have already achieved most of the gains observed in the USA. For example, as noted earlier in this section, real rail rates have already declined by 50% in Australia and productivity has increased considerably with restructuring and privatisation over the last ten years.



Present ownership and recent performance suggest that most of the internal structural reforms discussed in the PJP report are likely to occur over time.

However, whether these will deliver the mode share and rail unit cost outcomes anticipated by the PJP report is open to question.

Reform is unlikely to significantly change rail's inherent disadvantages compared with road in terms of catering for door-to-door movements and just in time delivery requirements, which have contributed to the increasing road mode share.

Considerable structural reform has already taken place in the rail industry so some of the productivity gains observed elsewhere have already occurred.

It is considered that the rail service level disadvantages discussed in this section, rather than "incorrect" road charges, are likely to be the main cause of declining rail freight mode shares.

11.0 Other issues

The PJP report analysis has based the assessment of economic costs for rail on a time frame in which rail will be operating at the maximum capacity of the infrastructure without expensive additional capacity improvements. On the other hand the road system will have new four-lane highways connecting Brisbane to Melbourne via Sydney with ample spare capacity for further growth over most of its length, particularly at the times of day (night) that much inter-capital road transport operates.

Therefore if say 2020 rather than 2014 had been selected as the year for comparison, the additional costs to accommodate freight growth on road may be relatively minor whereas additional costs for rail may result in rail costs being even higher than road on north-south corridors.

It is considered that, even if all of the cost estimates in the PJP report were to be confirmed, the economic benefits of the proposed reforms, discussed on page 54 of the PJP report, have been overstated by a factor of two. This is because the benefit has been determined by multiplying the volume of freight diverted from road to rail by the total estimated cost saving. The correct approach in such situations is to apply the "rule of half". This ensures that the non-quantified but real service level disadvantages of rail are taken into account. For some customers the cost savings from switching their business to rail will be almost offset by reliability and other service level disadvantages. The average benefit across all diverted customers is usually taken as half the apparent cost saving to account for this.

12.0 References

Australian Bureau of Statistics (29 July 2004) Table 9220.0.55.001*Rail Freight Movements*

Australian Rail Track Corporation (4 June 2004) *Memorandum between the Commonwealth of Australia, the State of NSW and the ARTC in relation to the lease of the NSW interstate and Hunter Valley Rail Assets to ARTC and associated agreements*

Australian Rail Track Corporation (2005) ARTC's North/South Investment Strategy, Industry Briefing Presentation, 1 June 2005, Australian Rail Track Corporation

Australian Transport Council (November 2004) *National Guidelines for Transport System Management in Australia* (Rail costs and Externality values)

Australian Competition & Consumer Commission (May 2002) *Decision on ARTC Access Undertaking*

Department of Transport and Regional Services (2003) *AusLink Green Paper*

Department of Transport and Regional Services (2004) *Auslink White paper*

Booz Allen & Hamilton (2001) *Interstate Rail Network Audit, Summary Report*, for Australian Rail Track Corporation

Bureau of Transport and Regional Economics (1999) Working paper 40 *Competitive Neutrality*

Bureau of Transport and Regional Economics (September 2003) Information sheet 22 *Freight between Australian Cities 1972 – 2001*

Bureau of Transport and Regional Economics (2003) Working Paper 57 *Land Transport Infrastructure Pricing*

Bureau of Transport and Regional Economics BTRE (2003) Report 109 *Rail Infrastructure Pricing: Principles and Practice*

Bureau of Transport and Regional Economics BTRE (June 2005) *Australian Transport statistics*

Business Council of Australia (March 2005) *Infrastructure Action Plan for future prosperity*

Maunsell Australia (2003) *Double Stack Access in South Eastern Australia, Phase 1 Report, Short Listing of Viable Routes*, for Department of Infrastructure and Department of Transport and Regional Services

Meyrick S, 'Objectives of Road Pricing', in J. Cox (ed), *Refocusing Road Reform*, Business Council of Australia, Melbourne 1994

Ministry of Transport New Zealand (March 2005) *Surface transport costs and charges*

National Road Transport Commission (September 1998) *Updating heavy vehicle charges: technical report*

National Road Transport Commission (July 2003) *Third Heavy Vehicle Road Pricing Determination Issues Paper*

National Transport Commission, (October 2005), *Third Heavy Vehicle Pricing Determination Technical Paper*

Port Jackson Partners Ltd (2005) *The Future of Freight* for Australasian Railway Association Inc.

Productivity Commission (August 1999) *Progress in Rail Reform*

Rail Infrastructure Corporation NSW (29 October 2004) *2003-04 Annual Report*