2006

Freight transport cost recovery in Australia

Philip Laird
University of Wollongong, plaird@uow.edu.au

Freight transport cost recovery in Australia

Abstract

Introduction: Recent rail and road freight tasks in Australia are indicated in Table 1. The income from rail freight services in 2002-03 was noted by the Australasian Railway Association (ARA - 2004) as $3 billion (hire and reward earnings plus the market value of ancillary freight operations). The hire and reward road freight industry income for 1999-2000 was about $18.2 billion (Australian Trucking Association, 2004).

Disciplines

Physical Sciences and Mathematics

Publication Details

Laird, P. G. (2006). Freight transport cost recovery in Australia. Australasian Transport Research Forum (pp. 1-13). Perth, WA: Planning and Transport Research Centre (PATREC).

Freight Transport Cost Recovery in Australia

Philip Laird
University of Wollongong

1 Introduction

Recent rail and road freight tasks in Australia are indicated in Table 1. The income from rail freight services in 2002-03 was noted by the Australasian Railway Association (ARA - 2004) as $3 billion (hire and reward earnings plus the market value of ancillary freight operations). The hire and reward road freight industry income for 1999-2000 was about $18.2 billion (Australian Trucking Association, 2004).

In the nine years from 1994-95 to 2003-04, iron ore and coal rail freight increased some 57 per cent to 118 billion tonne kilometres (btkm), the interstate rail freight task increased 59 per cent to 27 btkm (with most growth occurring on the East-West corridor) and the remaining

Table 1 Australian suface freight tasks *(and tonnages)*

	Billion tonne kilometres				*(million tonnes)*
	1994-95	1998-99	2002-03	2003-04	*2003-04*
Rail					
'Govt.' rail *	62	67	41±	43±	*(162)*
Non-Govt. **	48	60±	117±	125±	*(432)*
Coal	28	33±	44	46	*(239)*
Iron Ore	47	50±	66	72	*(220)*
Other Intrastate	18	24±	21	23	*(119)*
Interstate	17	20±	26	27	*(16)*
Total	**110**	**127** ±	**158**	**168**	*(594)*
Road					
B-Doubles	9	19	35	38.2	-
Road trains	15	20	19	25.2	-
Interstate	26	30 ±	37 ±	-	-
Articulated trucks	89	99	116	121.3	*769*
Total road	**119**	**127**	**153**	**157.7**	***1696***
Sea (domestic)			**117**	**121**	**53**

* Includes former State and Federal Government operated systems in 1994-95, Queensland Rail (QR) only in 2002-03 and 2003-04
** Excludes Government operated systems, all except QR in 2002-03 and 2003-04
Note: coal and iron ore includes relatively small domestic movements, also data caveats

References include: For rail, Steering Committee on National Performance Monitoring (1996), Bureau of Transport and Regional Economics (BTRE - 1999), various Annual Reports, ARA (2005a) and some estimates (indicated by ±). For road, Australian Bureau of Statistics (ABS - 2004, 2005) Note that total road includes light commercial vehicles (6.6 btkm in 2003-04) and rigid trucks (27.8 btkm in 2003-04). For sea BTRE (2006a).

rail freight task increased 28 per cent to 23 btkm. During the nine years to 2003-04, the articulated road freight task increased about 36 per cent to 121 btkm, with a four plus fold increase in the B-Double freight task.

Obtaining accurate and up to date land freight data in Australia is of concern. McDonell (1980, Vol. IV, p1/3) noted there were serious data deficiencies affecting the road freight industry. Some 19 years later, the Productivity Commission (1999, p8) noted that *"There is a lack of up-to-date transport data in Australia, impeding public debate and sound policy formation".* The Australian Transport Council (2004) proposed a national data framework. Despite some recent efforts to improve the provision of comprehensive and up to date transport data, the BTRE (2006b, page 58) noted, as did Meyrick (2006), ongoing land freight data deficiencies. In addition, information on domestic air freight was discontinued due to data difficulties (BTRE, 2005a, p14).

2 The New Zealand situation

As per Australia, there is a shortage of land freight data in New Zealand. The New Zealand rail freight task in 2002-03 was noted as 3853 million tonne km (TranzRail Holdings, 2003), thereafter being conspicuous by its absence in subsequent Toll NZ annual reports. The New Zealand road freight task was noted (Bolland et al, 2005) in 2002 in a range from 12.9 to 15.8 billion tonne-km (about 14 bktm). New Zealand has had in successful use, since 1978, a system of mass-distance pricing for heavy trucks. These charges for the heavier articulated trucks hauling long distances are appreciably higher levels than the combined annual registration charges and fuel road user charges that apply in Australia.

A Surface Transport Costs and Charges (STCC) study was commissioned by the New Zealand Ministry of Transport (2005). The study provided data on the costs and charges during 2001-02 for the movement of freight and passengers for road and rail with a view to answer to the question "What are the costs of land transport and who is paying them?"

Vehicle operating costs were estimated at about $17 billion, including the cost to maintain and operate the network at some $895m and a capital return on infrastructure (recoverable) at $750m. The STCC study included estimates for various external costs, including additional costs of road accidents not met by insurance etc ($670m) and $111m for environmental costs (including greenhouse gases costed at $25 per tonne of CO_2 e). The user and related charges were $2.63 billion including Fuel Excise Duty of $1079m and Road User Charges from heavy vehicles at $584m. The allocation of external costs includes $8.5m for rail freight.

Unit rates of externalities were given (page 155). It was found that the national rail network had environmental costs of 0.8 cents per net tonne kilometre (c/ntkm) with short run marginal costs of 8.2 c/ntkm. By comparison, road freight had external costs of 2.9 c/ntkm (including environmental, accidents and congestion), with an overall short run marginal cost of 12.7 c/ntkm.

A sub section (5.5 The viability of the rail sector) of the summary of the STCC study in regards to freight is of interest and follows.

"*At the time of the analysis in 2001-2002, the STCC shows that the rail network as a whole was not financially viable, with a total annual shortfall of $95 million per annum. The total system revenue ($406 million) is sufficient to allow for rolling-stock replacement (at similar standards to the existing), but it can cover only a small proportion of the capital charge on recoverable infrastructure assets ($130 million per annum) which will need to be renewed in* *the medium/long term. Revenues do not cover the cost of upgrading, improving or expanding the rail infrastructure.*

"*In order to compete with road freight, there has been downward pressure on prices for rail. The average rate charged by Tranz Rail fell from 12.5c/ntkm in 1993 to 10c/ntkm in 2000 – a nominal fall of 20%. At the same time, TranzRail was required to generate rate of return on infrastructure to investors.*

"The total cost analysis shows that rail freight users pay on average 82% of the costs they impose on society compared with trucks who pay on average only 56% of their costs. While it is recognised that the recovery rate for trucks on specific roads will vary widely within the total, so will rail on specific lines. Much of the truck activity included within this 56% takes place within urban areas and is not capable of movement by rail.

"These initial findings suggest however, that if the prices paid by commercial vehicles to use the roading network were raised to cover more of the costs they generate, this could support a shift of suitable traffic to rail which in turn, would be likely to increase the overall financial viability of rail. The alternative to such a policy, given the Government's stated intention to retain the rail network, is long term and continuing subsidies to the rail network."

3 Rail freight subsidies in Australia

Over the years, some but not all rail freight has benefited from Government subsidies. Rail freight's financial situation deteriorated during the 1970s. Although reform was underway during the 1980s (notably with Australian National, Westrail and Queensland Rail), rail systems in Australia had an annual freight deficit of about $525m in 1989-90 (Industry Commission, 1991 noting one quarter of aggregate rail deficits of some $2.2 billion). Of this amount, over $300m was due to losses in interstate rail freight with valuable work in this area undertaken during the 1980s by the Inter-State Commission (ISC - 1986, 1987, 1990). By the mid 1990s, the aggregate rail freight loss had been reduced to the order of $200m (Bureau of Industry Economics, 1995).

In 1998-99, Queensland Rail, Freight Corp (NSW rail) and Westrail showed combined freight operating profits of $224m. This profit far outweighed ongoing National Rail losses that year (reduced from over $300m a year to a small profit in 2000-01), but not Community Service Obligation (CSO) payments towards the haulage of some intrastate rail freight. Here, freight CSO explicit payments for 1997-98 included $90m for NSW, $6.5m for Victoria, and $158.8m for Queensland (Productivity Commission, 1999).

The NSW Ministry of Transport (2005, p44 and 45) notes CSO payments of $357m in 2003-04 for the Rail Infrastructure Corporation for track maintenance of lines not leased by the Australian Rail Track Corporation (ARTC). This includes Sydney track used by passenger trains. There was also some $5.7 to ARTC for the lease and operation of the non-suburban rail lines and $3.8m as a rail freight CSO (for the haulage of petroleum fuel by rail over the Blue Mountains). These amounts were respectively $133m, $4.8m and $1.6m in 2004-05. In addition, on 19 April 2005 the NSW Minister for Transport announced an additional $13m for grain lines to ensure the maintenance of eleven lines to service the next harvest and beyond.

Queensland Rail (QR - 2005, p58) noted a Transport Service Contract (TSC) and CSO funding where QR is contracted by Government to provide the following service outputs: Citytrain, parts of Traveltrain, some freight services, and Network Infrastructure (for agreed rail infrastructure network standards and capacity). Queensland Transport (2006) notes, a regional TSC for *"… ensuring certainty in the provision of scheduled general freight train services to western and rural centres of Queensland"* but not directly subsidising for example freight trains operating on the North Coast Line and Mt Isa Line. In 2003-04 this payment amounted to $19.1m *"…and is additional to government funding of the non-commercial parts of QR's infrastructure totalling $262 million part of which pays for the maintenance of rail infrastructure in regional Queensland."* Such track is used by freight and passenger trains.

Thus, payments made in 2003-04 by the governments of New South Wales and Queensland for freight CSOs amounted to about $23m. It is not possible to say how much of the $625m provided by these governments for track CSOs that year is attributable to rail freight. In other states, there has been little or no payment for either freight CSO's or to support track used for intrastate rail freight. However, with the notable exception of Western Australia, where the track was upgraded prior to its long term lease as part of the sale of Westrail in 2000, much of the intrastate track in the three states of Victoria, South Australia and Tasmania has reached a point where it is need of government assistance to prevent closure. In the case of Tasmania, the Federal Government has offered a conditional $78m package with some State Government support. However, appreciably more than this amount will be needed to rehabilitate the Victorian rail network supporting rail freight.

In the case of interstate track, in 2003-04, the ARTC received $100.4m in access revenue for its South Australian owned and Victorian leased standard gauge track; and, in 2004-05 with the inclusion of NSW interstate mainline track from 5 September 2004, access revenue was $238.7m (ARTC, 2005, p44). However, this revenue was not sufficient to cover long deferred maintenance and some upgrades that do not include any track straightening. The ARTC 2004-09 track upgrades are now underway at a cost in excess of $1 billion, plus AusLink funding from June 2004 to June 2006 amounting to $820m.

4 Road freight subsidies in Australia

The issue of road pricing for heavy trucks in Australia has long been contentious with a much litigation including the Hughes and Vale 1954 Privy Council case (see for example, Laird 2004). There have also been numerous inquiries going back to the 1970s, including an inquiry into the Victorian Land Transport System (Bland 1972) that found significant subsidies to rail freight and even larger but hidden subsidies to road freight. An inquiry by the New South Wales Road Freight Industry (McDonell, 1980)) also found appreciable subsidies to road freight. During the 1980s, detailed work was undertaken by the ISC (1986, 1987, 1990) in estimating road costs attributable to heavy trucks.

Some progress was made in improving road cost recovery from road freight during the 1980s with the establishment of a Federal Interstate Registration Scheme (FIRS), and the introduction in NSW and Victoria of annual surcharges for six axle articulated trucks operating above a then standard Gross Vehicle Mass (GVM) of 38 tonnes. In addition, the Federal parliament in 1991 set an annual registration fee for B-Doubles of about $11,000 under FIRS. However, it is of note that a BTRE (1988) study found during 1985-86, articulated truck operations had a resultant under-recovery of road system costs of $1283m.

In 1991, following an intergovernmental agreement, a National Road Transport Commission (NRTC) was formed with responsibilities including the determination of a system of national and uniform (within up to two zones) road user charges for heavy vehicles. It was initially intended that this be on a 'user – pays' basis with the option of some mass-distance pricing. However, the first determination of the NRTC (1992) was revenue neutral in terms of aggregate registration charges, with no mass distance pricing.

The views of the Industry Commission (1992), in commenting on these charges, are of note *"...Annual fixed charges are not efficient because costs vary with the distance travelled and the mass of the vehicle. The result is that some vehicles - the heaviest travelling long annual* *distances - will meet less than 20 per cent of their attributed costs... Differences between the recommended charges and road-related costs are greatest for vehicles competing with rail. The charges, as recommended, will therefore potentially distort the long-haul freight market as rail reforms take effect...."*

The second NRTC (1998) determination was a minor variation on the first determination. Both determinations were adopted by a vote of ministers of the Australian Transport Council. A third Heavy Vehicle Road Pricing Determination of a National Transport Commission (NTC - 2005a,b) was based on principles laid down in the earlier two determinations. Despite recommending only modest increases for the fuel road user charge and annual charges for B-Doubles, the NTC's third determination was rejected by the Federal, State and Territory transport ministers in March 2006. Access pricing for road and rail infrastructure is currently the subject of an inquiry of the Productivity Commission (2006), under reference from CoAG.

Using McDonell's methodology, which is different to that used by the BTRE (1988), under-recovery of road system costs from articulated trucks was calculated (Laird, Newman et al, 2001, see Appendix A) at $1235m in 1997-98, with an average hidden unit subsidy of 1.25 c/ntkm. For haulage on lightly constructed regional roads, the hidden subsidy is higher, with an earlier estimate of the NSW Roads and Traffic Authority noted by the Industry Commission (1991, p116) in the context of bulk haulage on local roads, as 3 c/ntkm.

It is of note that the McDonell, BTRE, the former ISC, NRTC and NTC methodologies each make use of Equivalent Standard Axle (ESA) kilometres for separable pavement cost allocation. In addition to the use of ESA kms, each of these methodologies use vehicle kilometers, Average gross mass (AGM) kms and passenger car equivalent (PCU) kilometers as parameters for cost allocation. The NTC (2005a page 20) found road system costs due to articulated trucks amounting to $1039m for 2005-06 with $469m for rigid trucks.

Vuong and Mathias (2004) after detailed analysis gave two estimates using different approaches of unit road wear unit rates of 7.49 and 8.85 cents per ESA - km. The average of these two relatively close estimates is 8.17 cents per ESA-km. By use of NSW RTA road cost indices (of 107.1 over the preceding two years from the 2005 RTA Annual Report), a value of 8.75 cents per ESA -km results.

Appendix A outlines the methodology used by McDonell (1980, Vol. IV, Appendix 3.1). Using this methodology with the above estimate of 8.75 cents per ESA km for arterial roads, and NTC data (2005a,b) gives appreciably higher estimates of road system costs due to heavy trucks. These include approximately $2436m for all articulated trucks, and $956m for all rigid trucks, in 2005-06. Further details are given in Table 2.

It is not claimed that the modified McDonell methodology is 'correct' (indeed, it could now usefully be updated). However, the alternative estimates do give support for a major review of the methodology currently used by the NTC. The large difference ($1.5 bn) between the two methodologies of estimated road system costs using common NTC data is due mainly to the NTC making less use of ESA -km for cost allocation, using a lower implied unit ESA - km value (3.22 cents per ESA-km (NTC, 2005b,p47)) and using vehicle kilometers rather than PCU kms for the allocation of non-separable costs.

Under the current NTC scheme, cost recovery is in two parts. First are the annual registration charges estimated from NTC (2005a Table 2 for charges and 2005b Table 46 for numbers of trucks) as a total of $300m for articulated trucks, and $154m for all rigid trucks. Secondly a fuel charge at 20 cents per litre and using NTC (2005b Table 46) estimates of fuel use, the fuel charge totals $620m for articulated trucks, and $378m for all rigid trucks. This gives cost recovery of $920m from all articulated trucks and $454m from rigid trucks. The resultant under-recovery is about $1.5 billion for articulated trucks and some $420m for rigid trucks.

TABLE 2 ATTRIBUTABLE 2005-06 ROAD SYSTEM COSTS, CHARGES ETC
(and freight tasks with average unit subsidies)

	Costs *$m*	Charges *$m*	Deficit *$m*	2003-04 *btkm*	*cents per ntkm**
Six axle semitrailers	1111	469	642		
Nine or more axle B-Doubles	568	168	400		
All B-Doubles	692	205	487	38.2	1.19
Road trains	391	119	272	25.2	1.08
All articulated trucks	**2436**	**920**	**1516**	**121.3**	**1.17**
Rigid trucks	**956**	**532**	**424**	**27.8**	**1.42**

References: Costs as per Appendix A charges based on a fuel charge of 20 cents per litre and annual charges per vehicle (NTC, 2005 a,b) freight tasks (ABS, 2004) with averages using freight tasks increased by an assumed 7 per cent to 2005-06.

For B-Doubles with 9 or more axles, the estimated under - recovery of road system costs using the McDonell methodology etc is $400m. From the NTC (2005b, Table 45, p 95) there were 5976 such vehicles in 2003, given an average subsidy of about $67,000 per year. This compares with the NTC (2005a page 33) estimate that the subsidy in the second determination of charges for heavy vehicles amounted to $8400 per 9-axle B Double; also that the proposed subsidy in the Third Determination was $5400.

From the NTC (2005b, Table 45) data, the number of the 9 or more axle B Doubles significantly increased from 707 in 1997 to 5976 in 2003. It appears that the appreciable subsidies one of many factors in the rapid growth in numbers of these trucks, quite possibly into inappropriate applications (eg using narrow city roads or lightly constructed rural roads).

As recognised by many earlier definitive reports by Government, fuel taxation is of limited effect to achieve equitable charging. So also are annual fixed charges. Hence the desirability of "*variable mass distance charges*" that were provided for in a 1991 intergovernmental agreement of heavy vehicle road pricing principles. As noted above, this option was set aside by the NRTC in the first two determinations and the NTC in the third determination.

The BTRE (1999 page xi) noted *"Under the current road user charging system, trucks overall are undercharged for their use of the road system. Moreover, larger more heavily laden vehicles and those travelling larger distances are charged the least (per tonne kilometre) while smaller, less heavily laden vehicles and those travelling shorter distances cross-subsidise them."* The BTRE (1999 p 58) suggested that *"Mass-distance based road use charges offer greater scope to reflect the avoidable cost of heavy vehicle road use."*

The former FIRS had two levels of annual registation charges for six axle articulated trucks, a lower one for standard Gross Vehicle Mass (GVM) of 38 tonnes, and a higher one to allow for a legal GVM of 42.5 tonnes. It would be equitable to go back to such a scheme. In the same way, there should be consideration given to distance differentiation in the setting of charges. It would be a cost-effective and fraud proof system to offer rebates to low kilometre vehicles and extend Safe-T-Cam nationally to assist in compliance. For those truck operators paying full fees (as opposed to low kilometre fees), it would be possible to offer quarterly or even monthly charges to make it easier to meet payments.

5 External costs

Attention to road and rail freight external costs since 1999 includes that of the BTRE (1999), the Australian Rail Track Corporation (2001), the Bus Industry Confederation (2001), Queensland Transport (Laird, 2003), the Victorian Department of Infrastructure (Pratt, 2003), Austroads (2003), the Australian Transport Council (ATC - 2004) and the ARA (2005b). Further attention was given by this writer (Laird, 2005b) who gave estimated values as in Table 3.

It may be noted that, excluding unrecovered road system costs, the metro articulated truck road external cost of about 1.75 cents per ntkm is less than half the approximate value cited by Austroads (2003) of some 4 cents per ntkm. The road freight unit external costs in Table 3 when indexed to Dec 2003 values (13 per cent) are 1.11 cents per ntkm in non-urban areas and 1.86 cents per ntkm for haulage in urban areas. With an articulated truck freight task of 121 btkm (Table 1) including about 25 btkm in urban areas (from ABS (2004) data), the social and environmental costs of articulated truck operations for 2003-04 were about $1525m.

Using indexed unit rail freight external costs of 0.19 cents per ntkm plus an additional 0.29 cents per ntkm for haulage in urban areas and with a non iron - ore rail task of 96 btkm in 2003-04 (Table 1) and assuming say 10 btkm of this freight task is in urban areas, an external cost of about $215m results.

Table 3 Revised Australian land freight externality costs

Externality Measure	**Road (c/ntk)**	**Rail (c/ntk)**
Accident Costs	0.60	0.03
Air pollution		
- Metro	0.65	0.22
- Rural	0.13	0.04
Noise pollution		
- Metro	0.22	0.12
- Rural	0.07	0.04
Greenhouse gases	0.18	0.06
Congestion (Metro only)	0.10	-
Increased road maintenance	1.00	
TOTALS		
Metro	**2.75**	**0.43**
Rural	**1.98**	**0.17**

Reference: Laird (2005) for 2000 values with air pollution costs from motor vehicles being based on the mid-range estimate of the annual health related costs given by the BTRE (2005b) and BTRE (2003) of PM10 emissions in Australia's capital cities with kilometres driven for various types of motor vehicles, and greenhouse gas costs based on $A25 per tonne CO_2e. Note that road maintenance costs for roads of light construction are higher, also that any rail track subsidies may need to be taken into account.

Under present road pricing for heavy trucks and the absence of any diesel fuel excise being levied on rail since 2000, these external costs are not being recovered. Further work is required in the area of land freight external costs, including the cost of rail congestion. However, this should not stop government now incorporating into road and rail pricing conservative values for external land freight costs, so that the operators of diesel powered road vehicles and trains pay a basic externalities charge. This charge could be later adjusted following refinement of the initial estimates. It is also recommended that the additional revenue generated be applied to long overdue land transport infrastructure upgrades.

6 Impediments to land freight

Many organisations and individuals have argued that Australia's land freight infrastructure needs improving, and that more funds should be allocated to this, with some preference for 'user pays'. As seen by Kilsby et al (2004) on behalf of the National Committee on Transport of Engineers Australia, *"… there is a large backlog of necessary works to bring Australia's land transport infrastructure up to scratch. … The paper then argues for a better pricing framework than we currently have, and for interim government intervention in the modal choice for port-related freight before an improved pricing framework can be achieved. The paper concludes with a number of policy recommendations, which if implemented together would eventually allow Australia to claim that its land transport infrastructure was truly "fit for purpose" for present and future freight and passenger tasks."*

Much attention has been given to the need to improve Australia's road system and this in part has been further addressed by increased road funding in the 2006 Federal budget. However, Australia's rail track supporting rail freight in South Eastern Australia, with the exception of Hunter Valley coal lines, ranges from basically substandard to adequate. This statement is made for the following reasons.

a) As recognised by many reports, including Engineers Australia (2001) and this writer (Laird et al 2005), much of the track linking Australia's three largest cities has 'steam age' alignment and is in need of straightening. Rail track proposals to improve the alignment are noted in the ARTC (2001) Track Audit, the 2004 Federal budget speech, the 2004 AusLink White Paper, and the ATC (2004 page 248 of Vol 3). However, the ARTC 2004-09 work programme does not include any rail deviations (Owens, 2006).

b) Growing rail congestion affecting parts of the Sydney, Melbourne and Brisbane networks. Improved separation of freight and passenger trains is also needed in Adelaide.

c) The interstate standard gauge mainlines are mostly limited to 23 tonne axle load limits for wagons moving no faster than 80 km per hour, or 21 tonne axle load limits for wagons moving no faster than 115 km per hour. Double stacked container capability is confined to west of Parkes and Adelaide. This may be compared with the Canadian/US Class I railroads that for the most part are capable of moving 286,000 lb wagons at 60 miles per hour (ie nearly 32 Tonnes Axle Load (TAL) moving at 100 km per hour) and to move double stacked containers.

d) Failure to complete residual gauge standardisation of broad gauge freight lines in Victoria and South Australia, in part due to flawed rail freight privatisation procedures.

e) Allowing grain lines in New South Wales, Victoria and South Australia and other states to degenerate, and remain with low axle loads (eg 19 TAL in NSW).

f) Failure over many years to invest in the Tasmanian track (now being addressed).

In the short term, there is a good case for advanced planning of grade and curve easing on the interstate mainlines along with Queensland's North Coast line. Here, the Queensland difficulties with Caboolture – Landsborough duplication on approved alignment is of note. Despite major planning efforts, the work has suffered extensive delays due to land acquisition problems and political sensitivities at a state level. Indeed, the Queenslands Transport Minister, The Hon Paul Lucas MP (2005) has noted the need to *“reserve rail corridor land before it becomes a costly issue”.* In a similar way, such problems have impacted on the development of intermodal terminals in Sydney.

There is also a case for rehabilitation of branch lines in South East Australia. The alternative is to see more and more freight move by B-Doubles on lightly constructed roads. The fact that rail operations are no longer vertically integrated means that government may need to work harder to seek contributions from beneficiaries as well as provide more public funds to facilitate track upgrades that will enhance Australia's export potential.

7. Twice the task and energy efficiency

Earlier this year, the NTC (2006) in a report 'Twice the task' drew attention to the severe challenges facing Australia to deal with growing volumes of bulk exports and import containers. Although some discussion is given to oil price scenarios, the report gives a somewhat business as usual approach to a growing freight task, but gave little attention for the need for road pricing for heavy trucks and mainline track straightening.

A speech given by the then NTC Acting Chairman on 14 February 2006 notes that *"only 10-20 per cent of the road freight task is contestable."* Accepting that only 10 per cent of the articulated truck task of 121 billion tonne km is transferred to rail, the reduction in diesel use at 2004 estimates of 36.7 tonne km per litre (ABS, 2005) would be about 330m litres (per year). The diesel needed by rail would be about 110m litres and allowing for some road pick up and delivery, a net saving of over 200m litres per year would result. There would also be an appreciable reduction in external costs.

A good approach to energy use in transport was given 27 years ago by the ATC (1979). This report was prepared, following the second major world oil price shock during the late 1970s. Although the data used in this report is now dated, the approach as follows is commended: *"... rail is relatively energy efficient compared to road for long distance freight ... (and) ... does have fuel substitute options, such as coal-oil slurries or electrification .... As far as possible pricing and cost recovery policies should be consistent across the modes so as to encourage use of modes appropriate to particular tasks. Appropriateness may be defined broadly as minimising the total social cost of transport services, including externalities.*

The need to improve fuel efficiency of both road and rail freight, and where appropriate, shift freight from road to more energy efficient modes, are increasingly important. For rail, the benefits of selected Sydney - Melbourne track straightening (Laird, 2006) by construction of 200 km of new track built to modern engineering standards are substantial. They include for intermodal freight trains a time saving of 105 minutes, a fuel saving some 34 per cent of the average fuel use by the train on the old sections of track, and the potential over time through diversion of line haul road freight to rail a total of some 50m litres of diesel per year. There would also be appreciable reductions in train operating costs as well as external costs.

The costs to Government and the community of effectively encouraging both line haul and some bulk freight to road transport through substandard national rail track and 'highway subsidization' are high. These costs include extra fuel use and impacts on quality of life, and could be considerably reduced by comparatively modest investment in rail track and improved road pricing.

APPENDIX A An estimate of 2005-06 road system costs attributable to heavy vehicles

The approach adopted in this appendix is that used by McDonell (1980, Vol. IV, Appendix 3.1) to calculate road system costs due to heavy trucks for 1997-98. An outline of the methodology was given by the ISC (1986, p267) along with this writer (Laird, 1990 and Laird, Newman et al, 2001, Appendix E).

In brief, the approach used by the NSW Commission was a pay-as-you-go one to gain an estimate of the cost to improve and maintain the NSW road system for various categories of vehicle. These included light rigid trucks with less than 4.1 tonnes carrying capacity, heavier rigid trucks, articulated trucks and all other vehicles. Costs were identified as separable pavement costs (trucks), separable other costs (trucks), separable costs (non trucks), and common costs. For heavy vehicles, including buses, separable pavement costs were allocated using unit costs for equivalent standard axle kilometres or ESA kms. Other separable costs for trucks such as easier grades, overtaking lanes and stronger bridges were found by using broad estimates provided by the NSW Government; as suggested by the ISC, these other separable costs may be allocated on the basis of gross/ average vehicle weight kilometres. After making an allocation for separable costs for the various classes of vehicles, all other costs are regarded as common costs, which are allocated on the basis of "passenger car equivalent" distances.

For 1997-98, using NRTC second determination data, ISC ESA km unit costs adjusted for inflation and the McDonell methodology, the total Australian road system costs attributable to all trucks was approximately $1955m for all articulated trucks, and $545m for all rigid trucks including truck - trailers (Laird, Newman, 2001, loc.cit.); also, that under the NRTC scheme with annual registration charges and a fuel charge at 18 cents per litre, 1997-98 NRTC data showed cost recovery of about $720m from all articulated trucks, and $495 million from rigid trucks and truck - trailers. The resulting under-recovery of road system costs, using the above approach, was about $1235m for all articulated trucks, and $50m for rigid trucks and truck - trailers.

It is stressed that these figures, like the ones that follow, are approximations based on limited data. A modified version methodology developed by McDonell is now applied for 2005-06 using data released by the NTC during the third determination. The seven step process we use is as follows.

1. Determine the total expenditure T for the given financial year for expenditure on all roads, and, the combined figure R for arterial road maintenance and construction costs, by all levels of government.
2. Allocate separable pavement costs P due to all heavy vehicles using ESA kms.
3. Find 'other separable costs of heavy vehicles' Q for the larger roads, stronger bridges, extra passing lanes plus easier grades to accommodate heavy vehicles. Take Q as 15 per cent of R with allocation between each class of vehicle on the basis of AGM kms.
4. Assign separable costs S of all other vehicles as 11 per cent of T.
5. Evaluate the remaining costs as common costs, C = T - P - Q - S.
6. Allocate these common costs to various classes of vehicles on the basis of passenger car unit equivalent kilometres using 1 for a car, 2 for rigid truck, 3 for an articulated truck, 4 for B-Doubles and smaller road trains and 5 for larger road trains (NRTC, 1998).
7. Calculate the total attributable costs to each class of truck and other vehicles.

The NTC (2005a, p7) data shows that an estimated $5206m (R) was applied to construction and maintenance of arterial roads (rural and urban). According to the NTC (2005b, p13) urban and rural road agency expenditure (Federal, State and Local Governments) was $10,395m (in 2005-06 terms). This is the amount T.

An important question is that of an average unit cost for an equivalent standard axle kilometre (ESA km). It is understood that the NTC's Third Heavy Vehicle Road Pricing Determination process did not derive a unit cost (which depends on the type of road) from first principles or on advice from the road construction authorities but rather the NTC (2005b, p47) found it (3.22 cents per ESA-km for arterial roads and higher for local roads) as a result of 'working backwards. In this case, we use the unit cost of 8.75 per ESA km, as outlined in Section 5.

Using these assumptions, the methodology outlined above and detailed NTC (2005b, Tables 46 and 47) data, it is found that attributable road system costs in 2005-06 amounted to approximately $2436m for all articulated trucks and $956m for all rigid trucks. In addition, attributable road system costs of $1111m for six axle articulated trucks, $692m for 9 or more axle B-Doubles and $391m for all road trains are estimated.

Acknowledgements

The author thanks the CRC for Railway Engineering and Technologies for assistance. He is also grateful for the research assistance of Ms G De Battista of the School of Mathematics and Applied Statistics of the University of Wollongong. However, the research findings and results of this paper along are not necessarily endorsed by the Rail CRC or other agencies.

References

Australasian Railway Association
- (2004) *Australian Rail Industry Report: 2003*
- (2005a) *Australian Rail The 2004 Productivity Report*
- (2005b) *The future for freight* (Port Jackson Partners Ltd)

Australian Bureau of Statistics
- (2003) *Survey of Motor Vehicle Usage for 12 months ended 31 Oct 2002*
- (2004) *Survey of Motor Vehicle Usage for 12 months ended 31 Oct 2003*

Australian Rail Track Corporation
- (2001) *National Track Audit* Appendices (Booz.Allen and Hamilton)
- (2005) *Annual Report*

Australian Transport Council
- (1979) *Transport and Energy Overview*
- (2004) *National Guidelines for Transport System Management In Australia*.

Australian Trucking Association (2004) *Trucking - driving Australia's growth and prosperity*

Austroads (2003) *Valuing Environmental and Other Externalities*

Bland, Sir Henry (1972) *Report of the Board of Inquiry into the Victorian Land Transport System*

Bolland J Weir D and Vincent M (2005) *Development of a New Zealand national freight matrix* Australasian Transport Research Forum

Bureau of Industry Economics (1995) *Rail freight* Canberra
Bureau of Transport and Regional Economics (BTRE)
- (1988) *Review of road cost recovery*, Canberra
- (1999) *Competitive neutrality between road and rail* Working Paper No 40
- (2003) *Urban pollutant emissions from motor vehicles: Australian trends to 2020*
- (2005a) *Avline issue no 7*
- (2005b) *Health Impacts of transport emissions in Australia: Economic costs* WP 63
- (2006a) *Waterline issue no 40*
- (2006b) *Freight Measurement and Modelling in Australia*

Bus Industry Confederation (2001) *Getting the Prices Right: Policy for More Sustainable Fuel Taxation for Road Transport in Australia* Submission (by Mr John Stanley) to the Commonwealth Fuel Taxation Inquiry.

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

Engineers Australia (2001) *Australian Infrastructure Report Card*

Industry Commission
- (1991) *Rail Transport*
- (1992) *Annual Report for 1991-92*

Inter-State Commission, Canberra
- (1986) *Cost recovery arrangements for interstate transport*
- (1987) *A Review of Federal Registration Charges for Interstate Vehicles*
- (1990) *Road Use Charges and Vehicle Registration, a National Scheme.*

Kilsby D Laird P and Bowers D (2004) *Australian Transport Infrastructure: Fit For Purpose?* Australasian Transport Research Forum, Adelaide

Laird P
- (1990) *Road cost recovery in Australia and New Zealand*, Transport Reviews, Taylor and Francis, London, Vol 10, p 215-227
- (2003) (released by Queensland Transport, Brisbane) *Rail Studies: Land Freight External Costs in Queensland*
- (2004) *A half-century of highway subsidisation – or 50 years after Hughes and Vale* Railway Digest, November p 26-29
- (2005) *Revised Land Freight External Costs In Australia*, Australasian Transport Research Forum
- (2006) *The Sydney - Melbourne Rail Corridor - options for the 21 st Century* Australian Rail Summit, July, Sydney

Laird P Michell M Stoney A and Adorni-Braccesi G (2005) *Australian freight railways for a new century* AusRail Plus Sydney

Laird P Newman P Bachels M and Kenworthy J (2001) *Back on Track: Rethinking Transport Policy in Australia and New Zealand* UNSW Press

Lucas Hon Paul MP (2005) *Track and Signal*, Oct-Nov-Dec, page 77

McDonell G (1980) *Report of the Commission of Enquiry into the New South Wales Road Freight Industry*

Meyrick S (2006) Presentation to BTRE Colloquium, June, Canberra

National Road Transport Commission
- (1992) *Heavy Vehicle Charges: Determination.*
- (1998) *Updating heavy vehicle charges: draft policy paper*

National Transport Commission
- (2005a) *Draft Regulatory Impact Statement* Third Heavy Vehicle Road Pricing Determination
- (2005b) *Technical report* Third Heavy Vehicle Road Pricing Determination
- (2006) *Twice the task*

Owens M (2006) *Development of ARTC's North/South investment strategy*, Conference on Railway Engineering, Melbourne, p 289-298

Productivity Commission
- (1999) *Progress in rail reform*
- (2006) *Inquiry into road and rail freight infrastructure pricing - Issues paper*

Pratt C (2002) *Estimation and valuation of environmental and social externalities for the transport sector* Australasian Transport Research Forum, Canberra

Queensland Rail (2005) *Annual Report* 2004-05

Queensland Transport (2006) website accessed 30 June http://www.transport.qld.gov.au/qt/RPF.nsf/index/RailRegServ

Steering Committee on National Performance Monitoring (1996) *Government Trading Enterprises Performance Indicators 1990-91 to 1994-95.*

TranzRail Holdings (2003) *Annual Report*

Vuong B and Mathias C (2004) *Estimates of unit road wear cost* ARRB Transport Research Report No 361