

## Rational Road User Charges for Heavy Trucks

**Philip Laird**  
*Senior Lecturer*  
*University of Wollongong*

---

### Abstract:

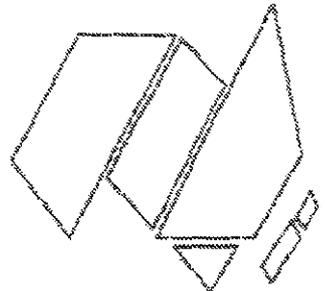
The paper discusses road cost recovery in Australia and New Zealand from heavy vehicles and the changes introduced over the last 15 years. An outline is given of the changes in road user charges for heavy trucks proposed by the National Road Transport Commission in 1992. After consideration of new data for fuel use by six axle articulated trucks that show a wide variation in fuel use, and other factors, the paper recommends consideration be given to reviewing the proposed changes before their implementation. The possible changes include less reliance on fuel taxes and charges as a road pricing mechanism and higher annual charges for articulated trucks operating at a high Gross Vehicle Mass limits in NSW and Victoria.

---

### Contact Author:

Philip Laird  
Department of Mathematics  
University of Wollongong  
PO Box 1144  
WOLLONGONG NSW 2500

Telephone: (042) 213 421  
Fax: (042) 214 845



## 1. INTRODUCTION

Over many years, efforts have been made in Australia to estimate what road system charges can be reasonably attributed to different types of heavy trucks (either rigid or articulated, and by numbers of axles) along with estimates of revenues from road user charges. Early work included that of the Board of Inquiry into the Victorian Land Transport System (Bland, 1972) and the Commission of Enquiry into the NSW Road Freight Industry (McDonnell, 1980, Vol. IV). During the 1980s, further work included that of the National Road Freight Industry Inquiry (May et al, 1984), three reports of the Inter-State Commission (ISC-1986,1987,1990), the Bureau of Transport and Communications Economics (BTCE-1988) and the Royal Commission into Grain Storage, Handling and Transport (McColl, 1988). With the exception of the Grain Commission, there was agreement in the above cited reports that the heavier articulated trucks hauling long distances were making less than adequate contributions to road system costs

Significant changes have also taken place during the 1980s in regards to road cost recovery from heavy trucks, following abandonment by the States of a system of road maintenance charges in 1979 after widespread truck blockades. These charges were introduced in the late 1950s (following the decision of the Privy Council in London to overturn a High Court decision to allow the States to restrict interstate trucking) and were based on the distance travelled and assigned mass of the truck. The removal of the road maintenance charges was followed by all States except Queensland imposing a diesel fuel franchise fee, and the Federal Government increasing fuel excise taxes. In 1987, following a report by the ISC (1986), the Federal Government introduced a Federal Interstate Registration Scheme (FIRS) in 1987 that included the option of mass-distance charging

After conditional recommendations were made by the National Association of Australian State Road Authorities (NAASRA-1985) for relaxation of mass and dimension limits, New South Wales and Victoria introduced a permit scheme in 1987-88 for heavy vehicles that were operating legally above standard mass limits. This included an option for a six axle articulated truck lifting its Gross Vehicle Mass (GVM) from 38 tonnes to either 41 tonnes or 42.5 tonnes, with respective annual NSW permit fees of \$1100 and \$3120 (in addition to a current annual registration fee of \$4162 (16 tonnes tare)). A modification of FIRS in 1988 also allowed the option of a six axle articulated truck of lifting its GVM from 38 tonnes to 42.5 tonnes, with respective registration fees of \$1250 and \$3285. This met with truck blockades in July 1988 and an apparent undertaking by the Federal Government not to increase these fees until a full review had taken place

Following recommendations from the ISC (1990) that a national scheme be established for the registration and charging of all vehicles operating in Australia, and an agreement made by the Commonwealth, all States and the ACT Government at the July 1991 Special Premiers Conference (SPC), and Commonwealth enabling legislation, a National Road Transport Commission (NRTC) was established. In June 1992, the NRTC (1992a) gave its determination on heavy vehicle road user charges. These charges were subsequently approved by a Ministerial Council with a view to implementation by July

1995. However, Western Australia did not agree on the grounds that the proposed charges were too high, and New South Wales did not agree on the grounds that the to the proposed charges would cost that State up to \$75 million a year (because the proposed charges for trucks were generally too low).

The SPC agreement made in July 1991 provided that each Government would pass enabling legislation that would allow the adoption road user charges for heavy trucks determined by the Ministerial Council. In June 1993, the Commonwealth had passed such legislation whilst the position of the NSW and WA Governments remain unchanged, and the Victorian Minister for Roads and Ports has stated (personal communication, June 1993) that although the Victorian Government had agreed to the charges recommended by the NRTC in principle, "*...it has indicated that it will not introduce legislation for their implementation until there is agreement to an equitable basis for distribution of Federal road funding.*"

In essence, the heavy vehicle road user charges determined by the NRTC (1992a) include the following:-

- A. The component of diesel fuel excise that is to be regarded as a road user charge (as opposed to a general tax) be set at 18 cents per litre.
- B. That annual charges for freight and passenger carrying heavy vehicles be given by a schedule with uniform rates across Australia (excepting the Northern Territory and irrespective of either of two Zones provided for in the SPC agreement), and that the charges for each type of articulated truck (by number of axles) be the same, irrespective of GVM.

The NRTC annual charges were also designed, in aggregate for heavy vehicles over 4.5 tonnes GVM, to be 'revenue neutral' compared with current road user charges, and to raise an aggregate amount of about \$370 million throughout Australia as compared with current 1992-93 registration revenues of about \$362 million (NRTC, 1992b, Table G.12). The proposed NRTC charges also included an allowance of 3 cents per litre to account for levels of general taxation of the road freight industry that the NRTC considered was to be higher than average for taxation for other industries.

In examining the proposed NRTC charges, it is important to appreciate the difficulties faced by the NRTC in arriving at road user charges for Australia wide heavy truck operations. These difficulties should not be under-estimated, and include:-

- A. A long standing variation in road user charges across the 9 different jurisdictions (Federal, 6 States, 2 Territories) for a given type of truck at a given GVM.
- B. Wide ranging views on what revenues from heavy truck operators should be treated as road user charges, and what revenues should be treated as general taxation.
- C. Wide ranging estimates for road system costs attributable to heavy truck operations. One example, given by Mr. Ron Finemore at the 1992 Australasian Transport Research Forum, was that six axle articulated truck annual average road use charges should be:

Bureau of Transport and Communications Economics (1988)	\$44, 000
ISC (1990)	\$21,000
Over-Archng Group (OAG- reporting to the July 1991 SPC)	\$ 14,000
NRTC	\$ 4 000

Further to this was advice to truck operators from Federal Land Transport Minister, the Hon Bob Brown MHR, by way of letter in September 1991 that the annual charges for the heavier articulated trucks would likely be in the \$7000 to \$8000 range.

D. Federal involvement in road user charging (except for the ACT) being relatively recent, and mainly going back to the Federal Interstate Registration Scheme.

E. Abolition of the Inter-State Commission (ISC) in 1990. During its operation since 1984, the ISC had produced three definitive reports on road cost recovery from heavy trucks, and had developed considerable expertise in this area.

F. Failure over the years of the Australian Transport Advisory Council (comprising Australia's many Transport Ministers and supported by a Standing Committee of officials) to effectively deal with issues of road cost recovery from heavy trucks.

G. A very strong road transport lobby, that had made clear its preference for fuel only taxes, and its strong aversion to mass distance charges.

## 2. CHANGES IN DIRECTION

The NRTC proposals also represent a change in the current structure of charges where most jurisdictions having an annual registration charge for a truck with a given number of axles that increases with the GVM or tare mass. Whilst the NRTC annual charges generally represent an increase in annual registration fees for trucks registered in all States they allow a decrease for many trucks registered in NSW, and a marked decrease for B-Doubles registered under FIRS (from over \$11,000 a year as set in 1991 by the Federal Parliament to \$5500 a year (8 axle) or \$5250 (7 axle) a year).

The concerns of three State Governments about the proposed charges have been noted in the Introduction. Further expression of concern was given by the Business Council of Australia (1992), and also by the Industry Commission (1992), in part, as follows. *"...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... Charges for heavy vehicles that reflect costs they impose are essential to ensure best use is made of the nation's road and rail infrastructure, and that industry location decisions are appropriate in terms of minimising the overall cost of economic activity. 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...."*

To allow the NRTC to work towards full road cost recovery from heavy vehicles by 1995, and to try and allow for the different annual registration charges around Australia, the NRTC was given specific options, including:-

A. There would be two zones - a higher charging Zone A comprising NSW, Victoria, Tasmania and the ACT and a lower charging Zone B with Queensland, SA and WA.

B. There would be three levels of charges for each type of truck (the OAG concept) based on GVM; effectively for light, medium and heavy mass options. The lower limit was for trucks where no mass - distance charges would be required, and the higher limit for six axle articulated trucks would apply for these trucks with a GVM of 42.5 tonnes.

C. Road trains could be charged at lower rates, to allow full cost recovery to be phased in by the year 2000.

In setting road user charges in 1992, the NRTC dispensed with zones, charges dependent on GVM, and concessional rates for road trains. When one takes into account both theoretical considerations, and actual current Australian practice, the changes proposed by the NRTC in road user charging for heavy vehicles are radical changes. As such, the changes invite close attention. These changes include:

1. The reliance on fuel use as a charging mechanism.
2. In cost allocation, a substitution of average gross operating mass (AGM) for equivalent standard axles (ESA) for attribution of separable pavement costs.
3. The view that demand for trucking services will not be appreciably affected by the road user charges.

## 2.1 Fuel charges

The NRTC (1992a,1992b), in addition to giving consideration of a Fuel-Only Charge Option (with further consideration given by NRTC, 1993), assigned as part of the diesel fuel tax (excise) as a road user charge a value of 18 cents a litre

Reservations about the use of fuel taxes as a way of charging for road use are longstanding. For example, the former Industries Assistance Commission (IAC, 1986) noted that although such taxes had an "*... intuitive appeal*", this approach had deficiencies and raised the need for consideration of alternative charging instruments, including congestion charges (also raised by the Business Council of Australia, 1992) and vehicle-kilometre charges (including mass-distance charges as raised by the ISC (1990)). The IAC (1986, p115) took the view that steps should be taken to replace fuel taxes "*...with other better targeted charging devices*" as soon as possible.

One problem with fuel use as a road user charge is that fuel use, in litres per 100 kilometres varies appreciably between similar trucks depending on many factors including the skill of the driver, the type of truck engine, terrain, and road conditions along with the Gross Vehicle Mass (and hence the axle loads). The NRTC noted that

(average) fuel use by six axle articulated trucks varied between States from 53.8 to 58.0 litres per 100 km.

As part of a Land Freight Transport Energy Evaluation project supported by the Energy Research and Development Corporation (Laird and Adorni-Braccesi, 1993), arrangements were made with the Australian Bureau of Statistics (ABS) to provide data from the 1991 Survey of Motor Vehicle Usage (SMVU). Table 1 gives details of the estimated numbers of six articulated trucks, by GVM and distance travelled. It is noted that of the estimated 28,264 six axle articulated trucks, only 10 used petrol, with 99 using LPG, LNG, dual or other fuel. It is also of note that that the average fuel use in Australia for six axle articulated trucks from the 1991 SMVU was 51.7 litres per 100 km, as opposed to about 55 litres per 100 km in 1988.

Table 2 gives the average distance travelled over 12 months to 30 September 1991 for six axle articulated trucks. Table 3 gives details of the estimated numbers of six axle articulated trucks, by gross vehicle mass, and fuel usage.

---

**TABLE 1 ESTIMATED SIX AXLE ARTICULATED TRUCK NUMBERS  
BY GVM AND DISTANCE TRAVELLED 30 SEPTEMBER 1991**

	Distance travelled to 12 months ending 30 September 1991 (000 km)					
	to 100	100 + to 150	150+ to 200	200 + to 250	250 +	Sub- Total
<b>GVM</b>						
to 32 tonnes	1388	214	176	65	41	1883
32 to 35 t	1267	217	284	30	9	1806
35 to 38 t	3569	882	473	351	111	5387
38 to 41 t	4486	1580	1960	423	204	8653
over 41 t	5356	3233	1928	674	348	10,353
Sub-total	16,067	5126	4821	1542	709	28,264

Reference: Australian Bureau of Statistics Tailored product for Wollongong University.

---

**TABLE 2 AVERAGE DISTANCE TRAVELLED BY SIX AXLE  
ARTICULATED TRUCKS TO 30 SEPTEMBER 1991**

<b>GVM</b>	
to 32 tonnes	79,100
32 to 35 t	83,000
35 to 38 t	89,300
38 to 41 t	107,000
over 41 t	113,100
Total fleet	102,600

Reference: Australian Bureau of Statistics Tailored product for Wollongong University.

**TABLE 3 SIX ARTICULATED TRUCK NUMBERS, BY GROSS VEHICLE MASS FUEL USED AT 30 SEPTEMBER 1991**

		Gross Vehicle Mass -tonnes					
From	To	-	32	35	38	41	Sub-
		32	35	38	41	-	Total
<b>Diesel fuel use</b>							
<b>in litres per 100 km</b>							
Over	To						
-	35	246	134	387	520	449	1737
35	40	64	141	413	320	389	1327
40	45	166	142	537	616	983	2444
45	50	727	615	1768	2713	3196	9019
50	55	97	151	518	1491	1020	3276
55	60	426	449	1134	1990	2440	6438
60	65	66	31	150	441	680	1369
65	70	21	59	81	108	162	431
70	75	47	34	300	317	736	1435
75		23	50	99	137	479	789
Subtotal		1883	1806	5387	8653	10,535	28,264

Reference: Australian Bureau of Statistics Tailored product for Wollongong University

Table 1 shows that over half the fleet of six axle articulated trucks have a GVM of over 38 tonnes, and about 37 per cent of the fleet have a GVM of over 41 tonnes; also one half of the fleet travelled more than 100,000 kilometres in the 12 months to September 1991.

Table 2 indicates that the average distance travelled by six axle articulated trucks tends to increase as the GVM increases. Table 3 shows that for the entire fleet of six axle articulated trucks using diesel fuel, there is a wide variation of fuel use (based on a respectable sample size of about 2200). The wide variation of diesel fuel use by six axle articulated trucks was also found from fuel use citations in Truck and Bus Magazine and a survey in August 1992 conducted in Sydney of some 200 long distance truck drivers (Laird and Adorni-Braccesi, 1993).

In the fuel use of more than 65 litres per 100 km, whilst the heavier trucks (over 38 tonnes GVM) out-number (at 1839) the 234 lighter trucks (under 35 tonnes GVM), there are even higher numbers (3277) of heavier trucks using fuel at an economical rate of up to 45 litres per 100 km. When the relative standard errors supplied by ABS are taken into account for the heavier trucks at either low fuel use (up to 45 litres per 100 km) or high fuel use (more than 65 litres per 100 km), we find the following possible truck numbers, at 95 per cent confidence limits:

	Low fuel use	High fuel use
From 38 to 41 tonnes GVM	946 to 1965	256 to 868
Over 41 tonnes GVM	1263 to 2379	974 to 1780
Over 38 tonnes GVM	2209 to 4344	1230 to 2648

It then appears that for the heavier six axle articulated trucks, that as well as a wide variation of fuel use, there are higher numbers of heavier trucks using fuel at an low rate of up to 45 litres per 100 km than at a high rate of over 65 litres per 100 km.

In terms of fuel component of road user charges set at 18 cents per litre, for a six axle articulated truck hauling say 120,000 km per year, and using fuel at the NRTC average rate of 55.5 litres per 100 km, a charge of \$11,988 would be imputed. However, there are some six axle articulated trucks hauling 120,000 km per year using fuel at a high rate with a charge of at least \$14,040 being imputed, and there are even more such trucks using fuel at a low rate with a charge of at most \$9720 being imputed. The difference in imputed road user charge between these two categories of fuel use for a heavy six axle articulated truck is then over \$4000 a year. If a fuel-only option of road user charging at 25 cents per litre was used, the difference is \$6000 a year.

This is one of many problems with heavy reliance on fuel taxes for road pricing. A further problem is that since the 1988 SMVU, there has been a clear increase in average gross operating mass for six axle articulated trucks along with an increase in fuel efficiency. Whilst this is commendable from improving productivity and energy efficiency, it does have implications for economically efficient road pricing.

## 2.2 Cost attribution for road construction

In road cost allocation, there is general agreement that costs for a particular vehicle over a given road can be determined as a function of vehicle kilometres, Passenger Car Units (1 for a car, 2 for a rigid truck, and 3 for an articulated truck), average gross operating mass kilometres (AGM-km) and equivalent standard axle kilometres (ESA-km). This ESA factor is driven by the fourth power of the axle load, and a six axle articulated truck with a GVM of 38,41, and 42.5 tonnes has respective ESA factors of 3.38, 4.37 and 5.06.

The ISC (1990) had allocated 60 per cent of pavement construction costs and pavement maintenance costs on the basis of ESA km. The NRTC, after consideration of the differing views of the State Road Authorities and the Australian Road Research Board, chose to retain ESA km for separable pavement maintenance costs and to substitute AGM-km for ESA km for separable pavement construction costs. Changes of this nature were noted by the consultant to the NRTC (1992c, p19) as affecting the road track cost for a six axle articulated truck travelling 120,000 km a year by almost \$5000 a year.

Whilst the level of separable pavement costs attributable to ESA - km is debatable, a change of the order proposed by the NRTC warrants further justification before acceptance. There is also a need for road pricing for heavy trucks to account for the additional costs incurred when providing 'rigid' pavements in highway reconstruction.

## 2.3 Demand for trucking services

Consultants for the NRTC (1992c) examined how demand for trucking may be influenced by road pricing, and concluded that it was very low for changes in location and production levels along with changes in modal split. This result, as it was relied upon by the NRTC, deserves questioning in the light of the following:-

1. Removal of a former \$2-50 a tonne surcharge for certain road haulage of grain in South Australia leading to a shift from rail to road, and hence a transfer of costs to Local Government, and then the State Government following the Commonwealth's 1989 legislation that, inter alia, deregulated grain transport. This was well documented by the Industry Commission (1991a, Vol I, p115) in their report on Rail Transport
2. Estimates of savings of road system costs with a transfer of some interstate freight from road to rail. One estimate was \$60 million a year based on 6 million tonnes a year with under-recovery of road system costs at an average of 1 cent per net tonne km (Laird, 1990a). Another estimate, due to Australian National (IC, 1991b, Vol II, p53) of potential transfer was with upgrading rail to improve rail delivery times and other standards was a modal shift of 4.2 million tonnes of net freight by 1998-99.
3. The ability of the use of B-Doubles, with their lower unit operating costs, to influence modal change from rail to road (eg oil from Brisbane to Maryborough). The former RORVL study (NAASRA, 1985) gave a broad estimate of a potential transfer of 3 million tonnes a year from rail to road with use of B-Doubles.

The consultants (NRTC, 1992d) finding of demand for trucking being little influenced by road pricing used assumptions including an average truck operating cost of \$3.00 per kilometre and average changes in road user charges at \$0.05 per kilometre (NRTC, 1992d).

The average truck operating cost at \$3.00 per kilometre was sourced as an average cost from the ISC (1990, Vol 1, p75). Whilst such an estimate may reflect full costs to a truck operator (working reasonable hours and making full provision for depreciation, etc), it is well known that truck operation in Australia is very competitive. For Australian trucks, a long haul operating cost of \$1.28 a kilometre is quoted by the Bureau of Industry Economics (1992, p xv). A rate of \$1.50 a kilometre is considered appropriate.

The assumed average changes in road user charges at \$0.05 per kilometre is questioned as being too low for the heavier articulated trucks - which are the trucks most used in competition with rail freight services. Some differences in actual and proposed charges are shown in Table 4. We see that within Australia, there are differences up to 10 cents per km (to which could be added about 4.7 cents per kilometre for ISC external costs of noise and air pollution (based on 8.5 cents per litre of diesel fuel used at 56 L per 100 km). If one goes across the Tasman Sea, the difference could increase for the heavier trucks to 20 cents per km.

By use of the consultants formula (NRTC, 1992d, pA20), with very high supply and demand elasticities (10) to and changing operational costs from \$3.00 to \$1.50 per vkm and increase the changes in road user charges from \$0.05 to \$0.20 cents per vkm, the 'benefit' changes from about \$25 million to about \$503.5 million. With high supply and demand, elasticities (1) changes in Vehicle Operational Costs and road track costs gives 'benefit changes from \$2.3 million to about \$50 million.

The NRTC's charter includes a provision to seek improvements in transport efficiency. It is doubtful if this can be achieved by the road user charges proposed for heavy vehicles.

**TABLE 4**                      **COST RECOVERY AND COSTING OPTIONS**  
**1990-91 Cents per vehicle kilometre for 6 axle articulated trucks**

Scheme	(Vehicle Mass)		
	38t	41t	42.5t
NSW current levels - fuel efficient	14.4	15.2	16.5
NSW current levels ABS	19.6	20.4	21.7
ISC Recommended charge (ABS)	19.9	23.8	26.3
NRTC Recommended charge (ABS)	20.0	20.0	20.0
New Zealand levels	29.5	36.4	42.1

Note: For the NSW current charges, the ISC and NRTC recommended charges, a total fuel tax of 31 cents per litre is used with an assumed annual haulage of 150,000 km. The NSW levels depend on the assumed fuel use, with fuel efficient rate at 40 litres per 100 km and the ABS being the 1956 rate of 56 litres per 100 km. The New Zealand charges given are after removal of a 12.5% Goods and Service Tax and currency conversion at a rate of \$1A=\$NZ1.30.

### 3. ROAD COST RECOVERY FROM HEAVY VEHICLES IN NSW

Since the NRTC proposed charges have generated much opposition in NSW, it is worth examining some of the aggregate road system costs attributable to heavy vehicle operations in NSW, and the offsetting revenues. At the outset, it is necessary to note cost recovery calculations are heavily assumption dependent and that they also rely on estimates of numbers of trucks of various types, their loadings and distances travelled.

As noted by McDonnell (1980), there are serious data deficiencies affecting the road freight industry. Despite this Commission recommending that steps to improve this situation be given high and early priority, calling for research to remedy data conflicts, despite the ongoing work of the State Road Authorities and work of the ISC and now NRTC, the fact is that serious data limitations remain. With this in mind, two broad estimates of the NSW 1987-88 road system costs attributable to heavy vehicle operations are made. These are based on NRTC distances for each type of truck (rigid, or articulated, by numbers of axles), with one estimate using NRTC unit costs and the other using actual New Zealand road user charges.

Table 5 clearly shows that for 1987-88 in NSW rigid trucks, taken as a whole, more than met their total road system costs whilst articulated trucks in general, and six axle articulated trucks in particular, are clearly not meeting their total road system costs.

A review of the New South Wales State's taxation system (Collins et al, 1988) also found under-recovery of road system costs, with a modest \$10 million for all articulated trucks, or about \$2000 for each six axle articulated truck on the basis of a GVM of 38 tonnes.

**TABLE 5 NSW ROAD TRACK COSTS FOR TRAVEL BY ALL VEHICLES USING ALL ARTERIAL RATES 1987-88**

Millions of dollars

Type of Vehicle	Costs		Revenue		Total
	NRTC	New Zealand	Registration	Fuel	
Rigid trucks	54	231	108	101	209
Articulated trucks	254	396	45	128	173
Six axle articulated trucks	221	299	27	102	129

Reference: NRTC costs based on NRTC estimates of distances each class of vehicle, and unit charges (NRTC,1992d, Tables 2.3 and 2.8), and New Zealand cost based on NRTC distances and current road user charges applicable in New Zealand for each type of truck operating at standard mass limits.

Registration fees based on ISC (1990, Vol 2, p247) with maximum GVM at standard mass limits and fuel revenue on ISC (1990, Vol 2, p243) fuel use at 18 cents per litre.

---

Following a relaxation of mass limits in NSW under a permit scheme, there was an estimated 1609 six axle articulated trucks with GVM over 38 to 41 tonnes and 1300 six axle articulated trucks with GVM over 41 to 42.5 tonnes (Australian Bureau of Statistics Tailored product for University of Wollongong, 1993) With respective permit fees of \$1100 and \$3120, the permit income is about \$5.8 million.

Under-recovery of road system costs from heavy truck operations, has been accepted in a series of recent decisions in the New South Wales Land and Environment Court (Stein, 1989). This Court has upheld in a number of cases the right of Local Government Councils under the New South Wales Environmental Protection and Assessment Act, 1979 to impose additional road use charges on heavy truck haulage as a condition of development consent where bulk road haulage is involved, and at levels of 3 cents per net tonne km. The Industry Commission (1991, Vol I, p115) accepted this type of charging and recommended that State and Territory laws be amended with a capacity to impose specific pavement damage and externality charges on heavy vehicles. However, such regional road pricing did not form part of the 1992 work programme of the NRTC (1992e).

## 5. THE NEW ZEALAND SCHEME

In New Zealand, all vehicles over 3.5 tonnes Gross Combination Mass (GCM) have been required to purchase distance licenses since 1978 (Laird, 1990b). The actual road user charges depend on the axle configurations and loadings for the vehicle and any trailers. The charges now include a 12.5 per cent Goods and Services Tax (GST). To aid compliance, each vehicle paying road user charges must be fitted with an approved distance measuring device such as a hubodometer. The income from road user charges is fully applied to road works and amounted to about \$208 million in 1986-87. Estimates of

evasion of road user charges in New Zealand range up to 8% and the New Zealand Audit Office (1989) recommended further efforts to minimize the evasion of road user charges. Such efforts are being made with 1989 Transport Law Reform legislation that includes particular attention to hubodometers.

Road pricing for heavy trucks affects the rates charged for rail freight services in New Zealand and is one of many reasons why New Zealand Rail Ltd has returned a profit for two years now. During 1992-93 New Zealand Rail Ltd was in the process of privatisation. The parties that have expressed an interest in purchasing this rail system are understood to have sought guarantees that New Zealand's present system of road user charges would remain intact for at least five years.

Whilst the New Zealand scheme is not perfect, and would be difficult to implement over the next few years in an Australian context, its underlying basis, as recognised by the ISC, does have some merit.

## 6. CONCLUSIONS

Taking into account both theoretical considerations, and actual current Australian practice, the changes in road user charging for heavy vehicles proposed by the NRIC are radical changes. As such, and in view of the NRIC's charter including a provision to seek improvements in transport efficiency, the proposed changes invite review before implementation. The possible changes include:

1. Less reliance on fuel taxes and charges as a road pricing mechanism.
2. In cost allocation of separable pavement construction costs, the retention of an equivalent standard axles (ESA) factor.
3. Consideration, at least in Zone A, or part thereof, of higher charges for articulated trucks operating at a Gross Vehicle Mass higher than the former NAASRA standard limits.

## 7. ACKNOWLEDGEMENTS

The author would thank the Energy Research and Development Corporation for their financial assistance of a Land Freight Transport Energy Project, the project's research officer Ms. G. Adorni -Braccesi for assistance with the calculations, and the Australian Bureau of Statistics for providing data from the 1991 Survey of Motor Vehicle Usage (SMVU). The views and findings remain the responsibility of the author.

## 8 REFERENCES

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

Bureau of Industry Economics (1992) International Performance Indicators, Road Freight

Bureau of Transport and Communications Economics (1988) Review of Road Cost Recovery.

Business Council of Australia (1992) Fast-Tracking Transport Reform

Collins D et al (1988) Report of the Review of the New South Wales State's taxation system, Sydney NSW Government Printer.

Industries Assistance Commission (1986) Report No 397, Certain Petroleum Products-Taxation Measures,

Industry Commission

- (1991) Rail Transport Inquiry Final Report
- (1992) Annual Report

Inter-State Commission

- (1986) Cost recovery arrangements for Interstate land transport,
- (1987) A Review of Federal Registration Charges for Interstate Vehicles,
- (1988) Harmonisation of Road Vehicle Regulations, AGPS, Canberra

Laird P G

- (1990a) The potential for liquid fuel savings in Australian land freight transport, Greenhouse and Energy, Edited by D Swaine, p 304-314, CSIRO, Australia
- (1990b) Road cost recovery in Australia and New Zealand, Transport Reviews, Vol 10, p215-217

Laird P G and Adorni -Braccisi G (1993) End of Project Report Land Freight Transport Energy Project, Energy Research and Development Corporation

McColl J (1988) Royal Commission into Grain Storage, Handling and Transport Report, Volume 1, Canberra AGPS

McDonell G (1980) Report of the Commission of Enquiry into the N S W Road Freight Industry, Volume IV, Government Printer, Sydney

May T Mills G and Scully J (1984) National Road Freight Industry Inquiry Report, AGPS, Canberra.

National Association of Australian State Road Authorities (1985) Review of Road Vehicle Limits, Sydney

National Road Transport Commission

- (1992a) Heavy Vehicle Charges Determination
- (1992b) Discussion paper on Heavy Vehicle Charges
- (1992c) Enhancing road transport efficiency, Working Paper 1
- (1992d) The economic benefits of improved pricing, Working Paper 2
- (1992e) Work Programme
- (1993) Welfare loss from fuel-only charges for heavy vehicles

New Zealand Audit Office (1989), The Planning of Roads, Government Printer, Wellington.

Stein Hon Justice (1989) Transcript of Judgement re Baulkam Hills Shire Council and another party, New South Wales Land and Environment Court