



27th Australasian Transport Research Forum, Adelaide, 29 September – 1 October 2004

Paper title: Road pricing prospects for Australia

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Abstract (200 words):

International and technological developments in electronic congestion pricing and electronic pricing for individual heavy vehicle road use is generating considerable interest in future prospects for road pricing in Australia. Currently road pricing in Australia is based around largely inflexible road pricing systems that do not vary with individual vehicle use. There is growing interest in looking at more flexible road pricing arrangements, particularly in urban areas prone to congestion with the National Transport Commission also looking at more flexible pricing options for heavy vehicles. For heavy vehicles there may be prospects for at least incremental pricing over the medium term based around allowing vehicle operators the choice of paying an additional fee to allow additional access or mass than is currently allowed. The purpose of this report is to survey some of the key international developments in road pricing; discuss the applicability of these systems to the Australian situation; highlight drivers for change in Australia; and reflect on what might be achievable over the medium to longer term in introducing more direct or flexible road pricing systems in Australia particularly with regard to heavy vehicles.

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Introduction

International and technological developments in electronic congestion pricing and electronic pricing for individual heavy vehicle road use is generating considerable interest in future prospects for road pricing in Australia.

The purpose of this report is to:

- survey some of the key international developments in road pricing;
- discuss the applicability of these systems to the Australian situation;
- highlight drivers for change in Australia; and
- reflect on what might be achievable over the medium to longer term in introducing more direct or flexible road pricing systems in Australia particularly with regard to heavy vehicles.

Pressures for change in Australia's road pricing systems are coming from a number of sources. Internationally the introduction of new electronic road pricing systems in Singapore the UK and Europe in recent years has received worldwide interest. In Australia, the Australian Transport Council (2002) supports a move in transport cost recovery from predominantly fixed to predominantly variable cost basis. The National Transport Commission (NTC) as part of the Third Heavy Road Pricing Determination is actively assessing the feasibility of adopting more flexible road pricing arrangements which would either supplement or replace the existing heavy vehicle road pricing system. Various jurisdictions, road authorities and motoring bodies in Australia have also expressed an interest in looking at more flexible road pricing arrangements.

International developments

Key international developments in electronic road pricing have occurred in recent years. These developments have demonstrated the increasing technological feasibility of more flexible road pricing systems. Electronic cordon pricing was first introduced in Singapore in 1998 with the UK introducing its own form of electronic cordon pricing in central London in February 2003. The UK also has plans underway to have a Global Positioning System (GPS) based heavy vehicle pricing system underway in 2007/08. In Switzerland in 2001 and Austria in 2004 new electronic gantry based heavy vehicle pricing systems began operation, with the Swiss system also backed up by GPS. In Germany a largely GPS based heavy vehicle pricing system is proposed for start up at the beginning of 2005. Most of these systems feature the use of third-party (generally private industry) providers to administer the systems and collect the revenue. The administrative costs as a proportion of revenue vary from 4% to 6% for the Swiss system, 12% for the Austrian system and 45% for the London cordon pricing system. Member countries of the European Union (EU) are currently limited by a directive to not include externality costs in heavy vehicle charges, although they do permit charges to vary with vehicle emission characteristics. Switzerland is not a member of the EU and has based their system largely on recovery of external costs.

Singapore – cordon pricing

Singapore has been a leading exponent of the application of congestion road pricing. A 7.2 km² area in the central city area (encompassing the most congested parts of Singapore) is a

designated restricted zone (RZ), and a cordon pricing scheme operates on entry to that zone. Each of the 29 entry points to the RZ is demarcated by ERP overhead gantry signs.

On September 1, 1998 the Electronic Road Pricing (ERP) replaced the original manual permit based road pricing system (that had been in operation since 1975) for the downtown RZ and three expressways. In September 1999, the ERP was extended to some of the key arterial roads beyond the RZ encompassing 9 expressways with a total of length of 141km.

The ERP charges all vehicles, except emergency vehicles, entering the central area of Singapore on weekdays (7.30am-7pm), while 12 other ERP gantries along stretches of expressways and other main roads are operational only during the morning peak hours of 7.30am-9.30am on weekdays.

The ERP charge is now levied per crossing rather than per day, and varies by time of day and vehicle type. Singapore's ERP system developed an electronic device, termed the In-vehicle Unit (IU), into which a CashCard is inserted. The IU, which is about the size of a pocket diary, is installed permanently behind the windscreen, taking its power from the vehicle's battery. It receives an electronic signal from the gantry at the entry point to the restricted zone or expressway, and amplifies the CashCard's responding signal, which is then 'read' by the device in the gantry. All gantries are connected to a central computer which monitors and controls the system.

The new electronic system enables variable pricing. Prices are increased where and when traffic levels are high, and reduced when traffic levels are low. Every three months the fee structure is reviewed, and adjusted, if necessary to maintain traffic flow. Charges vary from 50 cents to S\$3 for cars and can vary for each half-hour and at each gantry.

The cost of introducing the electronic road pricing scheme was a substantial S\$197 million, and although revenues are a relatively low S\$80 million per annum, revenue generation is not an objective. The revenues from the system are directed into a common revenue pool and are not used to support expenditure on transportation infrastructure and operations.

United Kingdom – London cordon pricing

The London congestion pricing scheme was introduced in February 2003 and has been successful in terms of its main objective of reducing congestion, although the net revenue from the pricing scheme has been considerably less than expected. This net revenue is earmarked for investment in London's public transport system.

This scheme operates only in a small area (21 km²) of central London and uses a flat charge of £5 per day (Monday-Friday 7am-6.30pm) for all vehicles. A flat rate system was introduced because it was relatively easy to implement and for the public to understand. Exemptions and discounts apply to a range of vehicles, e.g. exemptions for taxis, buses, emergency vehicles and the disabled, and a 90% discount for zone residents. Enforcement is by 688 fixed cameras observing vehicle registration plates.

The following achievements have been recorded during the first year of the system's operation Transport for London (2004):

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- Congestion within the zone has fallen by 30% and the volume of traffic has reduced by 15%.
- The time that drivers spend stationary or moving in queues in the charging zone has reduced by up to a third.
- Of the 65,000 to 70,000 car trips that are no longer made to the charging zone during charging hours, between 50 to 60% have transferred to public transport (mainly buses), 20 to 30% now divert around the charging zone and 15 to 25% have made other adaptations, such as changing the timing of trips.
- By reducing the volume of traffic and increasing the efficiency with which it circulates, congestion charging has been directly responsible for reductions of 12% in emissions of both oxides of nitrogen and fine particles from road traffic. Savings of 19% in traffic related CO₂ emissions and 20% in fuel consumed by road transport within the charging zone have also been experienced.

Plans to widen the charging zone to a broader area of London roughly equivalent to the existing area are already underway for introduction in 2006.

United Kingdom – heavy vehicles

The UK government plans to have an electronic distance based charging system for lorries operational by 2007/08. Currently major competition problems exist between UK-based hauliers, who pay high fuel excise in the UK, and EU-based hauliers who have rights of operation on UK roads but can operate at significantly lower costs due to being able to buy cheaper fuel on the Continent. The objective of the UK lorry plan is to level the playing field between UK and foreign hauliers by applying charges to all vehicles and recovering the revenue to the UK. From 2007/08 heavy vehicles will be charged according to the distance they travel, and including variation by type of road and time of day, using a GPS based system. The UK scheme will charge vehicles by maximum permitted mass for the vehicle class. Revenue from the freight scheme will not be hypothecated, with the scheme intended to be revenue neutral NTC (2004a).

Switzerland

The Swiss introduced a new electronic Heavy Vehicle Fee (HVF) in January 2001. One of the main goals of Swiss road pricing policy is the transfer of freight transport from road to rail, particularly transalpine traffic. A range of further reforms including fee increases, increases in maximum truck weights, cross-alpine rail infrastructure upgrades and new rail competition policies will be introduced in stages until 2008. The Swiss system is by far the most expensive for heavy vehicle operators, compared to other systems surveyed in this report (see Table 1).

Table 1 Average Rates for Truck-km Charges (40 tonne truck)

Country	Charge	Charge basis	Australian cents equivalent per tonne/km	Australian cents equivalent per/km
Switzerland – applies to all roads	January 2004	85% external cost recovery 15% road track costs	1.7	72
	January 2005		2.8	115
Austria – applies to motorways and select expressways	January 2004	100% road track costs and debt reduction	1.1	47
Germany – applies to motorways only	January 2005, Planned rate	100% road track costs	0.5	21
			0.6	26
Australia:	Implicit 2002/03 rate based on 1998 2 nd Determination data factored up by the BTRE road construction and maintenance price index		0.4	18.5

Source: largely based on ECMT (2004)

The HVF applies to all trucks over 3.5 tonnes driving in Switzerland and applies to all roads. The fee is calculated according to three criteria:

- kilometres travelled on Swiss roads;
- highest authorised total weight; and
- pollutants emitted by the vehicle.

At present the HVF covers three externalities that the government considered were of sufficient importance and could easily be given a monetary value: health costs and damage to buildings caused by air pollution, the costs of noise, and the costs of accidents. Together these external costs account for approximately 85 percent of the HVF. Only about 15% of the fee is to recover direct road costs.

Swiss vehicles are fitted with an on-board recording device. This is coupled to a tachograph that records the kilometres travelled. If the vehicle travels over the border, a microwave radio device fitted above the road deactivates the registration. On returning into Switzerland, the recording is reactivated in the same way. The vehicle operator downloads data each month and transmits this electronically to Customs, which calculates the fee and sends out an invoice. The on-board unit also incorporates a GPS positioning device and movement sensor to provide additional monitoring and validation of the distance travelled. Foreign vehicles which are not fitted with the on-board recording device are required to declare the tachograph reading on entry and exit and to pay the charge NTC (2004a).

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Two thirds of the revenue from the HVF is used to upgrade rail infrastructure including the construction of two major new rail tunnels through the Alps. One third of the revenue goes to local areas for road provision.

Germany

Germany is currently introducing a new distance-based heavy vehicle charging system on its motorways. Objectives of the new German heavy vehicle charging system for motorways include increasing the contribution made by heavy goods vehicles to the funding of infrastructure in line with the user pays principle, increasing the contribution made by foreign trucks towards German infrastructure costs, introducing a distance-related charge to establish fairer conditions of competition between road and rail freight transport, and encouraging a shift to less polluting vehicles.

The charge will apply to all heavy goods vehicles (12 tonnes or more) using German motorways. It will vary between EUR 0.09 and EUR 0.14 per kilometre depending on the number of axles and emission characteristics. At an as yet undetermined future date the average toll will be increased to EUR 0.15 per kilometre but it is expected that this may be accompanied by a lowering of other taxes.

Revenue from the German heavy vehicle charging system will be earmarked entirely for improving transport infrastructure. Most of the revenue is to be used for upgrading federal trunk roads. However a proportion will be used to reduce capacity bottlenecks in the rail and waterway networks.

A GPS based electronic tolling system has been chosen to avoid the need for toll plazas or large numbers of overhead toll gantries. Charges will be collected without any intervention in the free flow of traffic on the motorways NTC (2004a).

Toll Collect, the appointed operator, was due to start operation of the scheme in August 2003. However, there have been many technical problems with the monitoring and charging system, and initial operation is now not expected to commence until 1 January 2005, with full operation of the system to commence by 1 January 2006.

Austria

In January 2004, Austria introduced a new gantry based electronic road charging system for heavy vehicles over 3.5 tonnes on motorways and select expressways that is distance-based. The objective of the new pricing system is to finance motorways.

Compliance activities involve 100 enforcement gantries and 30 automatic mobile enforcement vehicles. All vehicles over 3.5 tonnes are required to fit an on-board unit. This is made available at a cost of EUR 5. Vehicle operators may pay the tolls either in advance or monthly in arrears. Vehicles are charged by means of microwave beacons mounted on each motorway link with no impact on the free flow of traffic. The scheme is now fully operational and experiencing few problems NTC (2004a).

Transferring international road pricing systems to Australia

Every vehicle charging system to date has been unique, due to the many specific national and local requirements. There are some specific requirements of a potential future Australian system that would make it substantially different to any other charging system.

- Size and diversity of road network – the Australian road network is vast and mostly rural. The scope for the permanent or temporary installation and staffing of roadside equipment is limited. Many vehicles operate largely in isolation across vast distances. The cost-effectiveness of any operations or compliance activities across this network will be an issue.
- Organisational responsibility and local autonomy – Commonwealth, State and Territory administrations have responsibilities in setting charges, authorising journeys and collecting revenue. It may be difficult to build flexible charging systems which can address all the various requirements in a cost-effective manner NTC (2004a).

In terms of trying to apply a London-type congestion charge to any Australian city differences in transport infrastructure and travel patterns between London and that of our own cities would need to be taken into consideration. For example, inner London has much more limited road capacity relative to inner Melbourne, Sydney or Brisbane. Australian cities have significant points of congestion occurring in arterial roads outside the inner zone. London is also very different to Australian cities, with Central London particularly suitable for congestion pricing because of its limited road capacity and relatively good travel alternatives including walking, taxi, bus and subway services and a ring road around the border of the congestion zone area.

Current road pricing in Australia

Currently road pricing in Australia is based around tolls along some specific road/bridge links in major cities designed to fund the cost of the infrastructure, fixed registration charges for light vehicles and a two part pricing system for heavy vehicle charges. Heavy vehicle charges are designed to recover their share of road construction and maintenance costs through an indirect nominal fuel charge and a fixed annual registration charge.

Light vehicle registration charges are set independently by individual State and Territory Governments as part of their budget processes and are not linked to infrastructure costs and road use. Along the eastern seaboard a number of toll systems are in operation along specific road/bridge links. Interoperability was achieved for all nine road/bridge links in February 2003.

The NTC is responsible for determining heavy vehicle road user charges. The NTC methodology for calculating heavy vehicle charges is based on the Pay As You Go (PAYGO) system, which aims to fully recover the heavy vehicle industry's share of annual road expenditure by jurisdictions. Heavy vehicle charges are calculated using an expenditure allocation process that depends on road expenditure, road use, and expenditure allocation parameters. The process shares expenditure on different types of road works between classes of road users, in proportion to their estimated use of the road system. Different measures of road use (for example, vehicle-kilometres, tonne-kilometres, Passenger Car Equivalent (PCU) kilometres, Equivalent Standard Axle (ESA) kilometres) are used to allocate different types

of expenditure, depending on what drives the need for each type of road work. Once the share of costs attributable to each class of road user has been determined, the two part charging system is applied consisting of the nominal fuel charge and the registration charge. These are based on at least fully recovering allocated costs from a vehicle class, with charges set at a level to fully recover from the average vehicle within a class based on average distance travelled. However, these charges are only fully updated every few years under a Determination.

Annual adjustments to heavy vehicle registration charges have occurred since 2002, largely based on changes in annual road expenditure. However, the annual adjustment procedure only provides a rough indication of the likely changes in charges needed to maintain cost recovery. The fuel charge that was set at 20.0c/litre in the 2nd Determination and is not included in the annual adjustment process. However, this fuel charge is unofficially reflected in the net diesel excise (after rebates for eligible vehicles) of 19.633 cents per litre. In June 2004, the Federal Government DPC (2004) announced that as from July 1, 2006, the net diesel excise will be officially recognised as a road user charge and that the NTC will be responsible for annual adjustments to this through its annual adjustment process.

Drivers for change to road pricing in Australia

There are a number of drivers for change to Australia's current road pricing system. Apart from recent important international developments, there are growing concerns about increasing travel requirements, delivering greater transport productivity, congestion in the major cities, shortages of infrastructure funding, the flow of charges back to road owners, changing modal split and meeting environmental targets. Australia's largely inflexible road pricing systems are not readily adaptable to respond to these concerns.

The lack of a direct link to the road user, by an appropriate charging regime, means road agencies in Australia cannot set a price for use of the network, differentiate between users or time of use and therefore cannot influence road use behaviour or receive signals from the market in relation to how much users are prepared to pay.

In terms of increasing travel requirements and the need to deliver greater transport productivity, the BTRE (2003) has forecast that the freight task will double over the next 20 years, with passenger car activity expected to grow by a third over the same period.

The forecast increases in future travel and freight requirements have considerably heightened concerns about congestion, particularly in the major cities. This has resulted in growing calls for looking at congestion road pricing from various sources such as:

- the Australian Council of Infrastructure Development;
- the Australian Automobile Association, which supports consideration of tolls provided they take into account existing taxes and charges that motorists incur;
- the Melbourne Metropolitan Transport Forum (2004), representing 15 Local Councils, which commissioned a study of London style congestion charges for arterial roads that would fund public transport improvements; and
- Brisbane City Council, which has suggested cordon pricing within Brisbane should be considered, with funds raised being used to improve the road network and public transport Doyle (2004).

In response to this growing debate on congestion the NTC (2004b) in its strategic planning has incorporated a proposal to produce an issues paper on the need for a national framework in which local congestion pricing systems can be applied.

Issues associated with shortages of infrastructure funding and lack of hypothecation of charges back to road owners are growing. Under the current heavy vehicle charging system there is no link between the charging system and road funding arrangements with around two-thirds of the revenue accruing to the Commonwealth through the fuel charge, and the remaining one-third accruing to State and Territory Governments through registration charges. Local governments do not receive any revenue directly from the heavy vehicle charges despite the fact that they are responsible for the local road network that makes up the majority of the total road network in terms of length.

It is likely over the next 10-15 years that fuel excise tax revenue will decline by about 25% due to the number of hybrid vehicles on the road. This would mean that today's key form of indirect road pricing, the fuel tax, would need to be substantially altered.

Changing modal split may require more flexible pricing arrangements. For example, achieving the Victorian Government's objective of increasing the share of all motorized trips by public transport from 9% to 20% by 2020 may require the imposition of a congestion charge in Melbourne depending on the success or otherwise of alternative options.

Current road pricing arrangements for both light and heavy vehicles do not address externality costs such as environmental costs. A move to more flexible road pricing arrangements will provide the potential to charge for externalities such as noise, air and greenhouse emissions.

Flexible pricing arrangements for heavy vehicles

The NTC is looking at more flexible pricing options for heavy vehicles that could initially involve incremental pricing that builds on our current system, or individual user pricing that might replace part or our entire current heavy vehicle pricing system.

A move towards more direct and individual user pricing of heavy vehicle road use could have the following broad objectives:

- to enable more flexible vehicle regulation that gets the most out of available infrastructure (accompanying the parallel development of performance-based heavy vehicle design standards);
- to improve pricing signals by more accurately aligning prices with the costs incurred by road management agencies, heralding a possible move towards recovering the marginal social and/or environmental costs of road use by heavy vehicles; and
- to provide revenue more directly to those responsible for the various components of the road system, in line with the costs they incur in doing so.

Incremental pricing

Incremental pricing is used to describe a process whereby road users are charged additional fees (over and above 'base' charges) for particular activities that are not normally allowed.

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For example, a logging truck might be permitted, for a fee, to use a section of road at higher masses than normal limits. The fee would be calculated to cover the truck's contribution to road wear and tear costs, over and above that collected through the standard charges.

Current developments in telematics in Australia which involves the use of GPS technology, mobile communications and information technology to monitor the compliance of vehicles with respect to access conditions set by jurisdictions is helping to provide a basis for future incremental road pricing in Australia.

Several past studies have suggested that the cost savings to industry through being allowed to operate at higher masses can more than outweigh the incremental cost of maintaining the infrastructure NAASRA (1985) and NRTC (1996). However, it would be important to ensure that the structure of the incremental pricing system and the method of collection and/or distribution of funds were cost effective. In addition, higher masses and other characteristics would still need to be subject to upper bounds, for reasons such as protecting against pavement or structural failure, or unacceptable safety risk. Previously such limits were undefined but are now increasingly known through Performance Based Standards work.

It is expected that incremental pricing:

- would apply over and above 'base' charges;
- would recover the incremental costs associated with road use above levels that the 'base' charges cover;
- could be differentiated according to vehicle characteristics, road standard, axle weight, load types, season (and any other cost drivers or proxies);
- could be charged by different authorities/levels of government;
- may apply to loaded travel only (if for a higher-mass vehicle);
- may imply use of dynamic measurement/recording technologies unless fixed or proxy charges are used; and
- may complement the move towards Performance-Based Standards for heavy vehicles.

Keys to a successful incremental pricing regime would include:

- transparency in identifying and allocating the incremental costs, and who collects the charges;
- careful analysis to ensure that the charges capture only the additional costs and that they do not introduce any double counting or over-recovery; and
- cost efficiency, to ensure that the costs of recovering the charges are reasonable.

A number of different operating models and mechanisms could be used for an incremental charging system. These range from simple permit systems operated directly by relevant authorities through to comprehensive road use monitoring systems using GPS and communications technology operated by independent private sector service providers.

Incremental pricing charges and benefits

Figure 1 provides an example of how an operator of a 6-axle articulated truck, that is not volume or mass constrained, might benefit from an incremental charging system based on incremental increases in mass above current NTC Gross Vehicle Mass limits of 42.5 tonnes.

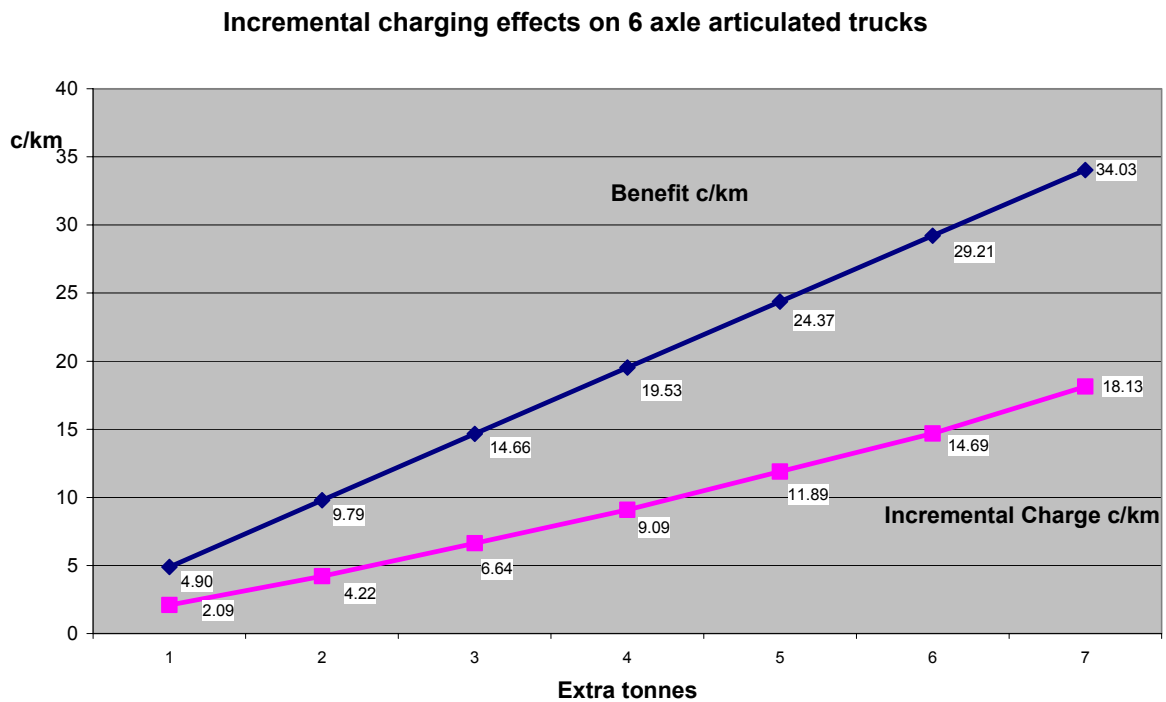


Figure 1 Incremental road pricing and increased mass for 6 axle articulated trucks

A number of simplifying assumptions have been used in this example. The incremental heavy vehicle charges are based on 2nd Heavy Vehicle Determination values NRTC (1998) that have been factored up to 2002/03 terms using the BTRE road construction and maintenance price index. The incremental charge only applies to travel when the vehicle is operating at that higher mass level. The gross benefits have been estimated by assuming, for example that over a 12 month period a 5% increase in mass will equate to a gross cost saving over the total operating cost level of 5%, everything else remains equal, with 5% less trips per annum required than normally would be the case to move that level of higher mass. An adjusted benefit is then derived by reducing the gross cost saving for the increased fuel use which is represented by the benefit line in Figure 1. No other potential additional costs have been considered in this illustrative example, such as increased crew costs due to higher mass reducing speed and increasing travel times or increased maintenance costs. Total vehicle operating costs are based on 1997 estimates that have been factored up to 2002/03 terms by using the TransEco linehaul cost index (1997-2003).

For a 6-axle articulated truck the incremental analysis illustrated in Figure 1 shows that if the vehicle operates at 47.5 tonnes, 5 tonnes above the NTC mass limit of 42.5 tonnes, it is estimated to generate a benefit of around 24 cents/km compared to an additional (incremental) heavy vehicle charge of around 12 cents/km over the fully laden trip. The net benefit to the operator is the difference between the benefit and the incremental charge equal to 12 cents/km. If a 6-axle articulated vehicle travelled on average 120,000 kilometres per annum, of which 50% of the distance travelled involved carrying an extra 5 tonnes over the 42.5

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tonnes mass limit, the net benefit after the incremental heavy vehicle charge would equate to \$7,200 per annum (60,000 km* \$0.12).

The benefits of incremental pricing are eventually eliminated once mass is increased on a vehicle above a certain point. This is due to the fact that the effect on bridge loadings and pavement damage are not linear functions of vehicle mass or axle load, despite the appearance of Figure 1. This is due to the nature of the heavy charge calculation that is largely dependent on the ESA 4th power rule, such that as mass increases the heavy vehicle charge under the present formulae will eventually increase sharply and absorb all of the potential benefit. The ESA 4th power rule is used in the National Transport Commission methodology for estimating road wear. The appropriateness of this 4th power rule has been the topic of considerable debate given that its origins date back to tests done in the United States in the 1950's. However, it is generally regarded as appropriate for the unbound granular pavements that make up 90 to 95% of Australia's road network. It is thought likely that a higher exponent should apply for the other pavement types that make up the rest of the network. Exponents from 5 for deep asphalt pavements up to 12 for concrete or stabilised granular pavements have been suggested. Until adequate research on axle load equivalency identifies the appropriate exponents to be used for different pavement types in Australia, this issue will not be fully resolved ARRB (2003).

Individual user pricing

Individual user pricing for heavy vehicles would essentially replace the existing system with a set of mass-distance related charges that users incur based on their actual road use. Implementation would involve measuring and monitoring road use, collecting the revenue and re-distributing it as needed between various road managers.

The rationale for investigating application of individual user pricing systems is based on ensuring that road users face price signals that accurately reflect the costs associated with their activity. This would contribute to greater internal efficiency and equity within road charges between different heavy vehicles as well as encouraging neutrality between road and other modes (to the extent that users of other modes face price signals that accurately reflect the marginal social cost of their activity).

A move to individual user pricing of road use for heavy vehicles would have a substantial impact on intergovernmental revenue flows if hypothecated. Removal of the fuel excise component of current charges would reduce Commonwealth revenue from fuel use, whilst removal of the registration charge would reduce State and Territory Government revenue. Replacement of these with direct, individual user pricing for road use would require a revenue allocation method and agreement between responsible authorities.

Therefore there is significant policy and institutional issues to be overcome before individual user pricing for heavy vehicles could be introduced. This is not realistically achievable within the time period of the 3rd Determination. The 3rd Determination is due for implementation by the end of 2006. Consideration of individual user pricing is therefore more relevant to future heavy vehicle road pricing Determinations, post 2006.

Conclusion

It is apparent from this review that emerging technologies for monitoring and measuring road use are making direct pricing systems more feasible and widespread. In addition there are growing pressures for change to make Australia's road pricing system more flexible.

Nonetheless there are some significant system design and administration problems to address, particularly with regard to changing established governmental revenue flows. However, there are prospects for at least incremental pricing for heavy vehicles over the medium term, which allow vehicle operators the choice of paying an additional fee to allow additional access and/or mass than is currently allowed. For operators with vehicles that are not volume or mass constrained there are demonstrated benefits from incremental pricing compared to the relative level of incremental heavy vehicle charge that would equate to the higher mass level (up to a given point).

Acknowledgements

I would like to acknowledge the contributions to this paper which were drawn from the work of William McDougall, Ted Van Galdermansen and Margaret Starrs for the National Transport Commission and the contributions from the following National Transport Commission staff, Barry Moore, Robert Davenport, Fiona Calvert and Keith Lloyd.

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