

Setting the Right Framework: The Business Rules for Roads¹

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Abstract

Unlike other forms of national infrastructure such as electricity, telecommunications, gas, water, railways and ports, roads stand out as, for the most part, not being subject to market discipline or user pays pricing rules. As such, there are few clear signals for road providers and users alike about appropriate levels of usage and investment.

A new framework is required—one which involves reform of the fuel tax system and greater acknowledgement of the need for safer roads. In terms of their effects on economic efficiency, equity, the environment and revenue raising, existing taxation arrangements have many shortcomings. In particular they confuse revenue raising objectives with objectives of efficient resource allocation. Additionally, there is a need for a renewed focus on road safety. Every day, an average of five people are killed and 60 people seriously injured on our roads, most of which are preventable.

Implementing the framework of tax reform proposed in this paper will rely on the use of new and developing technologies such as GPS tracking. While not yet widely available, the time when we can realistically say that these technologies are affordable and practical is rapidly approaching. Creating political will to reform means demonstrating to the community that there are benefits from change. It also means setting out a clear pathway to achieve the needed change—in this respect the Smart Traffic 2004 Conference represents an important step in the right direction.

¹ This paper draws largely on AAA's submission to the 2001 Federal Government Fuel Tax Inquiry.

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³ The Australian Automobile Association (AAA) has been an official voice of motoring in Australia since 1924. AAA represents eight state based constituent motoring organisations' with a combined membership of over 6.2 million members. AAA supports and coordinates activities of our constituent motoring clubs and associations and represents the interests of these organisations, their members and, indirectly, all Australian motorists at the national and international levels. AAA is recognised by government and industry as the official voice of Australian motorists.

Introduction

Reform of road funding and taxation in Australia is long overdue. The current system is unsustainable. Years of tinkering with taxation arrangements, driven mainly by government revenue considerations but also justified from time to time as a means of charging for road use and offsetting perceived disadvantages of regional motorists and truckers, have resulted in a complex system riddled with anomalies, inefficiencies and inequities.

Unlike other forms of national infrastructure such as electricity, telecommunications, gas, water, railways and ports, roads stand out as, for the most part, not being subject to market discipline or user pays pricing rules. Telecommunications for example typically employs a series of charges for access to the network; service type (land line phones, mobiles and internet); peak and off peak usage; and volume (length of calls, data downloaded). Additionally, telecommunications providers give customers a broad range of transparent and timely pricing information in the form of regular statements. These mechanisms, which explicitly link supply and demand, give providers and customers alike important signals on the need for and location of new services (as a result of congestion for example), costs of use generally and in particular costs of use during particular time periods.

The current system of road transport administration has led to a major backlog in road infrastructure, inequities, is lacking transparency, exacts large costs in terms of crashes and displays a dinosaur like agility when it comes to reacting to emerging issues like urban congestion. These are issues which are typical of inefficient taxation and funding institutional arrangements, and ones that the Government is attempting to address, albeit by largely indirect means, with its new transport policy, AusLink.

On the other hand, the system we propose in this paper, which closely links the costs of road transport with charges, can improve allocative efficiency, enhance the international competitiveness of fuel using industries, reduce the inequities between urban and regional motorists, deliver better environmental outcomes and provide a sustainable basis for charging for road use and funding the provision of roads. Not so many years ago, these necessary reforms may have been just a pipe dream, but as the National Strategy for Intelligent Transport, “e-transport”, demonstrates, technological developments are moving with such rapidity that they are becoming a reality. Indeed, many of the technologies that might need to be employed in these reforms, such as GPS tracking, are widely used in the transport industry.

Shortcomings in the Current Model of Taxation

Current taxation arrangements have serious shortcomings. In particular they:

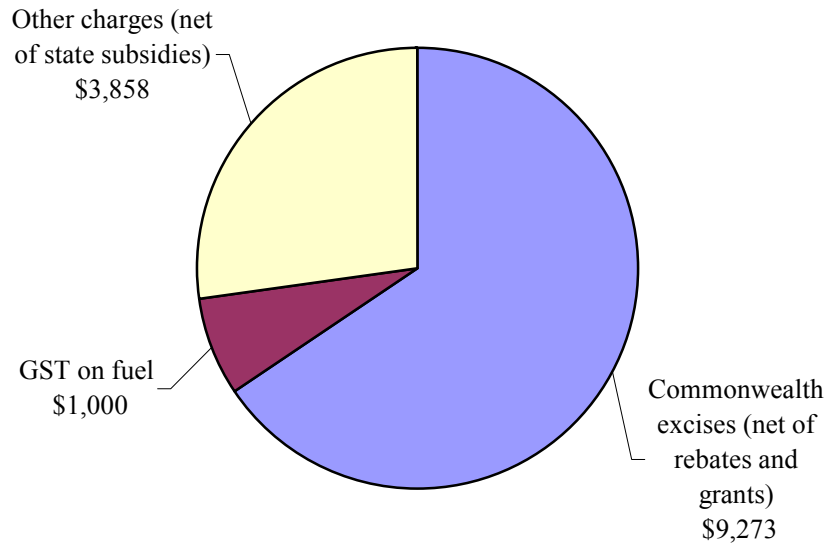
- confuse revenue raising objectives with objectives of efficient resource allocation;
- encourage resource allocation inefficiencies in the use of fuel and reduce the international competitiveness of industries intensive in their direct and indirect use of fuel;
- fail to achieve an efficient use of roads;
- are regressive and penalise regional relative to urban road users; and
- are costly to administer.

As a result Australia's national income and community living standards are reduced.

Current Arrangements

Motorists pay plethora of taxes and charges including Commonwealth fuel excise and GST, and State and Territory registration fees, stamp duties, license fees and so on. Importantly, part or all of these taxes and charges are justified by governments as a charge for road use. Across all levels of government, the total burden is around \$14 billion annually.

Figure 1 – Estimates of Taxes and Charges on Motor Vehicle Use (\$ million, 2001-02).



These estimates exclude the aviation fuel component of the fuel excise and rebates and grants. They also exclude taxes on motor vehicle purchases and tariffs on motor vehicle imports. State fuel subsidies of \$539.3 million for 2001-02 have also been deducted. Source: AAA (2001).

As can be seen in Figure 1 above, Commonwealth fuel excises (with a customs duty on similar imported products) are by far the largest source of the motorist revenue—nearly 75 per cent of the total. It is estimated that the excise and customs duty will raise around \$13.3 billion in 2003-04 (Australian Government 2003), which represents some 7.0 per cent of total Commonwealth taxation revenue. Additionally, there is also a ‘tax on tax’ in that the excise incurs GST. It is estimated that GST revenue from fuel taxes, which is rebated to the States, raises a further \$1 billion in annually (AAA, 2001). About \$2.8 billion is returned to vehicle operators through excise rebates, subsidies and grants.

Governments have traditionally viewed fuel excises as primarily a revenue tax. The decision in 1983 to index fuel excises to movements in the consumer price index to maintain the real value of excise collections is acknowledgment of this, as road funding was not similarly indexed. Indexation was removed in March 2001, partly in recognition of the fact it could no longer be justified, particularly with the introduction of the GST.

With the advent of the GST, the Commonwealth fuel taxation component (fuel excise plus GST) represents up to 100 per cent of the fuel cost in the pump price of unleaded petrol in capital cities. Rates of tax as high as this stand out dramatically when compared

to the 10 per cent GST on most goods and services. They are obviously affecting consumption and production decisions of fuel purchasers.

Figure 2 – Implicit Tax Rates on Unleaded Petrol (March 2004).

Capital City	Fuel Cost cpL	Subsidies and Grants			Pump price cpL	Implicit tax rates (% of fuel cost)	
		Excise cpL	Grants cpL	GST cpL		Excise %	All taxes %
		Brisbane	48.30	38.143		8.35	7.81
Sydney	47.49	38.143	0.00	8.56	94.2	80	98
Canberra	47.95	38.143	0.00	8.61	94.7	80	98
Melbourne	47.20	38.143	0.43	8.49	93.4	81	99
Hobart	53.44	38.143	1.95	8.96	98.6	71	88
Adelaide	47.13	38.143	0.00	8.53	93.8	81	99
Perth	46.58	38.143	0.00	8.47	93.2	82	100
Darwin	54.05	38.143	1.10	9.11	100.2	71	87

Source: FuelTrac.

Taxes and Road User Charges are Unrelated to Expenditure on Roads

It is clear that the road user revenue collected by governments is largely unrelated to expenditure on roads. In the case of fuel excise, of the revenue collected (\$13.3 billion in 2003/04), it is estimated that 23.6 per cent is allocated to fuel rebates, subsidies and grants; 15.0 per cent is allocated to road construction and maintenance; and the remaining 61.4 per cent contributes to funding other government activities (AAA, 2001). This is summarised in Figure 3 below.

Figure 3 – Use of Revenue Raised Through Fuel Excise (2001/02).



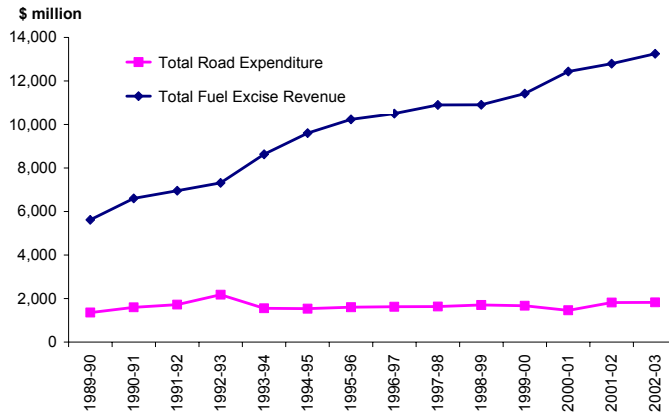
Source: AAA (2001).

The *Australian Land Transport Development Act 1988* (ALTD Act) provides for the hypothecation of a portion—deemed to be a road user charge—of the fuel excises to road funding. If the Minister for Transport and Regional Services does not make a determination as to what the road user charge is, a default rate of 4.95 cpl applies. The actual rate set by the Minister during the past decade has remained at lower than the default rate, varying between 3 and 4 cpl. Notably, the House of Representatives Standing Committee on Communications, Transport and Microeconomic reform has recommended that the hypothecation provisions within the ALTD Act be removed to end the notion of a link between fuel excises and road funding (Webb 2001). The government has agreed with this in principle, but is yet to implement the recommendation—this may come with the AusLink white paper which is expected in May 2004.

The relatively small amount of fuel excise spent on roads is, in part, reflected in Figure 4 below, which shows the total revenue collected by the Commonwealth and total expenditure on roads (which, apart from the ALTD program, now also includes the Roads to Recovery Program and financial assistance grants for local government).

It is important also to note motorists’ perceptions about how much of their taxes go towards funding roads. In a national survey in 2003, when asked “how many cents, out of the 38 cents Federal Government receives from each litre of petrol, is spent on roads?” the mean response was 12cpl, which is around twice the actual amount spent. Clearly there is an issue here relating to transparency. 89 per cent of motorists said more of the fuel excise should be spent on roads, and notably, 95 per cent of regional motorists said more should be spent on roads (AAA, 2003).

Figure 4 – Commonwealth Road Expenditure and Fuel Excise Revenue.

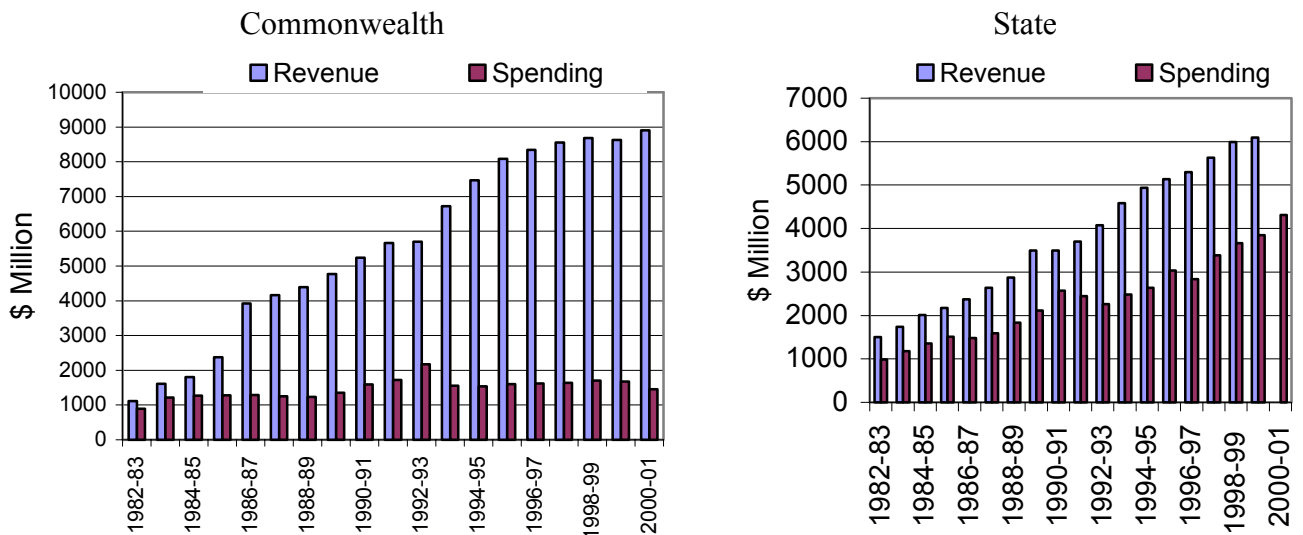


Source: Commonwealth Budget Papers.

Figure 5 below provides a broader picture by comparing both Commonwealth and State taxes and charges on motorists with Commonwealth and State expenditures on roads. The surplus of revenues from motorists over expenditure on roads has grown steadily over time for each level of government.

In addition to this, approximately \$2 billion is spent on roads by local government. The BTE has estimated that around 70 per cent of local government road expenditure is from council funds (mainly rates).

Figure 5 – Commonwealth and State Revenue and Expenditure on Roads



Source: BTRE (1989-90 to 2000-01); Commonwealth and State Budget Papers.

It is clear that motorists think that roads are under-funded. In 2003, 59 per cent of motorists said that they thought the roads in their local area should be better, citing issues

like poor maintenance and upkeep, safety and congestion as being of concern (AAA, 2003). While ever road user charges and road supply decisions are not linked—which is largely the case now—the system remains inefficient and inequitable. However, by imposing a degree of market discipline into the system, which links supply and demand, important signals on the need for and location of new roads, and the use of roads, will emerge.

Inefficiencies and Inequities are High

The current taxation and charges arrangements do not achieve an efficient use of the roads. Efficient road use is achieved when motorists pay the full social cost of their road use—costs of road wear, environmental damage, congestion and vehicle crashes. With the exception of road tolls in limited areas and heavy vehicle road use charges, road users do not currently pay directly for their use of roads. As discussed earlier, part of the fuel excise has historically been envisaged as acting as a surrogate for charging for road use and to some extent the environmental performance of fuels, but it is an inaccurate and inefficient means of road use charging as the amount of excise a user pays does not reflect the social costs imposed by that person's road use.

If recovery of road expenditure costs is the target of taxation, then passenger motor vehicle drivers are charged too much for their road use. The National Transport Commission's (NTC), formerly the National Road Transport Commission (NRTC), gives us a guide for determining this. The NTC's scheme works by charging for each heavy vehicle class using:

- annual access charge;
- a mass-distance charge (collected as a fixed annual charge); and
- a road use charge which is expressed as a notional share of the fuel excise needed to achieve cost recovery after the access charge and mass-distance charge have been deducted. The notional component of fuel excise is 20 cpl.

The BTCE noted the principal determinants of pavement damage (that is, road wear and tear) as being the axle loads of vehicles, the distance travelled by those vehicles and the quality of the road; with the pavement damage increasing dramatically with axle load (BTCE 1988). It is estimated that in 1996, 22 billion kilometres were travelled on the National Highway System, of which cars accounted for 82 per cent and heavy vehicles 18 per cent (6 per cent rigid trucks and coaches, and 12 per cent articulated trucks).

However, in contrast to distance travelled, heavy vehicles accounted for the vast majority of total pavement loading—99.97 per cent (Austroads 2000). Cars are responsible for negligible road wear. The BTCE has estimated the pavement damage per car to be in the order of \$1 per year (IC 1994).

Therefore, if recovery of road costs were the objective of taxation, and assuming that existing registration fees were held constant, passenger vehicle drivers should be paying a fuel charge of 7cpl, not the current 38.1cpl. The passenger motor vehicle therefore is

cross subsidising the road wear caused by heavier vehicles, which leads to inefficiencies and distortions in the economy. It may also give a competitive advantage to road freight. The current arrangements are also inequitable in the sense that those who do the most damage do not pay for it.

The current arrangements also place a disproportionately high burden on low income households. And, to the extent that fuel taxes can be envisaged as being in part charges for road use, they penalise regional motorists relative to urban motorists. Table 1 below shows that those earning lower incomes are more likely to use a larger share of their income on fuel excise costs than those in higher income brackets.

Table 1 – Fuel Excises are Regressive (1998/99).

Income quintile	Average household income	Total expenditure on fuel	Excise	Excise as share of income
	\$	\$	\$	%
Lowest 20%	8,300	538	345	4.2
2nd quintile	21,526	908	583	2.7
3rd quintile	37,040	1,241	797	2.2
4th quintile	58,019	1,547	993	1.7
Highest 20%	103,807	1,905	1,223	1.2
Average	45,719	1,227	788	1.7

Sources: ABS (2000) and AAA (2001).

As discussed earlier, AAA’s survey of motorists’ attitudes indicates that they feel that they already pay enough for their roads. This is supported by motorists’ response to the question of whether more toll roads should be built, which saw 63 per cent not in favour and 29 in favour (AAA, 2003). The key reason for those motorists not in favour was that they thought roads should be funded by governments, who are already collecting enough road taxes. Interestingly, many motorists who supported the building of more toll roads did so because they support the concept of user pays. It appears that the issue for motorists when it comes to user pays is not the principle itself, but that the current arrangements do not lend themselves to user pays partly because they lack transparency.

Road Deaths and Injuries

As well as the economic shortcomings of our current roads framework, there is also a very serious ‘human’ element—in 2003, there were 1,633 deaths and more than 22,000 serious injuries on Australian roads (ATSB 2004). Road crashes exact an enormous emotional burden on Australian society. Conservative estimates place the cost of crashes at more than \$15 billion annually, impacting on human capital, the health system, productivity, and insurance.

The National Road Safety Strategy was introduced in January 2001 and it aims to reduce the fatality rate by 40 per cent by 2010. When the strategy was introduced, the fatality

rate per 100,000 population was 9.3 and the target for 2010 is 5.6. AAA estimates that the good result in 2003 means that for the first time, the strategy is ‘on target’. There is evidence however, that the number of injuries—which is not explicitly measured in the strategy—is increasing.

While road safety continues to be a relatively important issue for motorists, the degree of its importance has declined somewhat during that past decade. Motorists ‘concerned’ about road safety had reduced to 72 per cent—a 22 per cent decline on 1995 figures (AAA 2003). This finding appears to run contrary to actual road safety performance, which showed that the national road toll remained relatively static during that same period, and that the number of injuries sustained may actually have increased.

The Right Framework

Paying for the Costs of Road Use

Economic theory suggests that to achieve an efficient use of existing roads, road users should be charged according to the full marginal social cost they impose through using the road—the so-called short run marginal cost pricing rule. Marginal social cost measures the resource cost to society of the road user’s decision to make the journey. The cost of the original investment in the road is sunk and plays no role in the efficient pricing rule.

Road users impose four components of social costs:

- road use and wear
- environmental harm
- congestion costs; and
- crashes and injury/death.

To achieve an efficient use of roads, motorists should be charged for these costs according to the marginal cost their travel decision imposes. How best to charge for each category of cost is the key issue.

Charging for Road Use and Wear

As discussed earlier, road users ‘use’ infrastructure in that they wear and damage it. Pavement damage depends on the technical characteristics of the road, the axle configuration of vehicles and load per axle as well as distance travelled. In principle, charges can be set to match these costs—charges based on mass/axle weight and distance travelled.

The National Transport Commission (NTC) has undertaken considerable analysis on appropriate road user charges for these vehicles. However, the objective followed by the NRTC is a budgetary one—full cost recovery—rather than the desired economic

efficiency objective of marginal cost pricing of road use. There is no direct link between revenue collected from the charges and spending on roads.

Charging for Environmental Harm

The use of vehicles can cause damage to the environment—through noise and emissions. Fuel combustion releases an array of pollutants including organic compounds, nitrogen oxides, carbon gases and particulates. These can be harmful to human health through exacerbating respiratory problems, although technical change in engines and fuels is bringing about dramatic changes in emissions levels and the air quality in Australian cities is improving. The environmental risks of greenhouse gases are well documented. Vehicle noise can also be regarded as a cost imposed by road users on others. Its cost is traditionally measured in terms of the reduction in house prices in affected areas.

It is appropriate that vehicle users be charged for the damage they do to the environment to internalise these costs. This will provide incentives for environmental damage to be reduced. It also provides funds to compensate the losers.

The amount of environmental damage from emissions will vary according to the type of vehicle (particularly engine size and efficiency), the type and cleanliness of the fuel and where the vehicle is used. Charging directly and accurately for environmental damage is therefore difficult. A compromise is needed between the efficiency gains from a highly differentiated set of charges to reflect actual environmental damage in a particular situation and the administrative cost of greater complexity in the charging system.

It would make sense to impose some of the environmental charge through registration fees—which could reflect, for example, engine size and efficiency. There is also an important role for different registration charges based on the fuel used in road vehicles. These charges should vary according to the cleanliness of the fuel.

Charging for Congestion

Congestion imposes costs on other road users, in the form of increased travel time and running costs, and on society through increased localised pollution.

Typically, road users are not charged for these costs, and in the absence of a price mechanism to allocate a road to those motorists who most value it, many roads are overused (congested) at particular times. The result is inefficiencies in road use, in vehicle use and in the use of motorists' time. The existence of congestion may imply underinvestment in the road network.

Because of the complexity of urban travel behaviour, estimating congestion costs is not straightforward. Congestion costs are however, believed to be large. Congestion costs on roads in Australia's six major cities were estimated at \$12.8 billion per year in 1995 and projected to be \$29.7 billion by 2015 (BTE 1999).

Congestion pricing aims to charge road users for the costs they impose on other commuters. Congestion charging is needed to send appropriate price signals to road users about the true cost of their trip, and as a result generate more ‘efficient’ traffic flows. Congestion charging provides an important market-based signal of the need for additional road investment as well as the timing of that investment. It has the potential to contribute much to fixing the road supply problem.

To date there are only a few congestion charging systems in operation, such as in Singapore and Norway. The introduction of such systems have in the past been limited by the drawbacks of needing to use inefficient devices such as tollbooths and passes, but as the National ITS Strategy demonstrates, technology is rapidly catching up. In principle, GPS technology will allow for most of the criteria of a first best congestion pricing system to be achieved—time specific, location specific, vehicle type specific, convenient for users. GPS systems are already employed throughout the transport industry—by trucking companies and taxi fleets—to track vehicles, and it is just one more step to track each vehicle’s location, and charge accordingly. However, audit systems will be necessary to ensure accuracy as the GPS devices alone will not provide sufficient legal status for the necessary transactions.

Crash Costs

Much of the potential costs of vehicle crashes are already internalised to the road user—through the purchase of ‘safe’ vehicles and various insurances. But there are also external costs that need to be charged back to road users to ensure that they face the full social costs of their road use. Intelligent use of third party insurance pricing should assist in costing crashes.

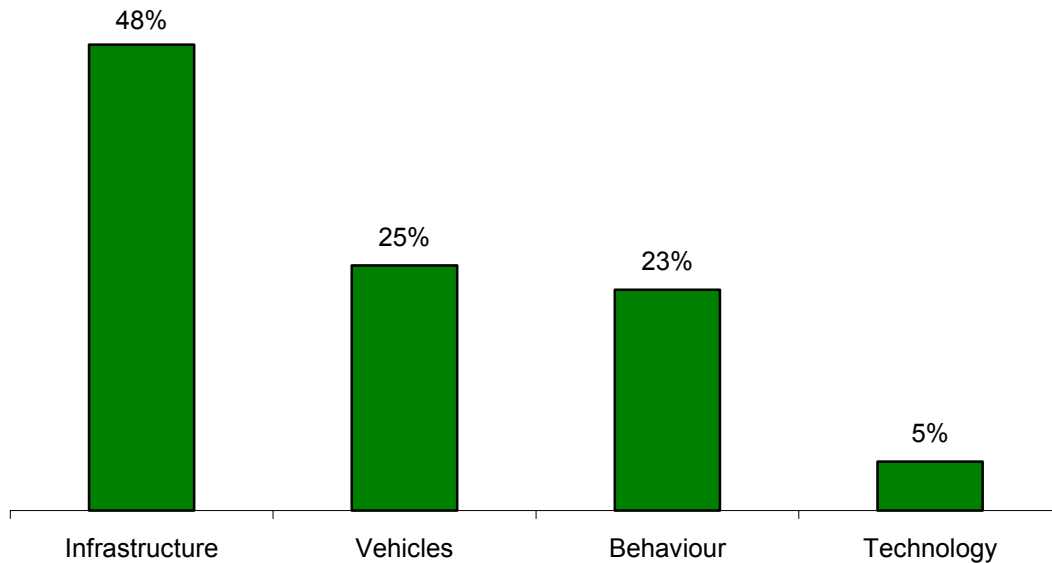
However, addressing road safety issues will require more than pricing—it will require a concerted effort by all of society, including road users, business, governments and vehicle manufacturers. With this in mind, the AAA, in partnership with the Australian Local Government Association (ALGA), the Australian Trucking Association (ATA), the Australasian College of Road Safety (ACRS), as well as some 20 other ‘supporter’ organisations, have recently embarked on the *SaferRoads* project.⁴

The *SaferRoads* project is designed to lift the profile of road safety in the community, as well as highlighting the potential that improving road infrastructure has to save lives. The National Road Safety Strategy (NRSS) aims to reduce the national fatality rate by 40 per cent by 2010 (ATC 2002). The strategy establishes a measure of how four key strategic objective areas could contribute to achieving the 2010 target. As shown in Figure 6, making road infrastructure safer has the greatest potential to save lives, followed by safer vehicles, improved road user behaviour and technology. Importantly, while technology is projected to play a relatively small role to 2010, beyond then its role is certainly likely to expand with the widespread application of features like Intelligent

⁴ For more information on SaferRoads, visit the website: www.aaa.asn.au/saferroads

Speed Adaptation, which is currently being tested by the Transport Accident Commission (TAC).

Figure 6 – Percentage contribution to the NRSS target (ATC 2002).

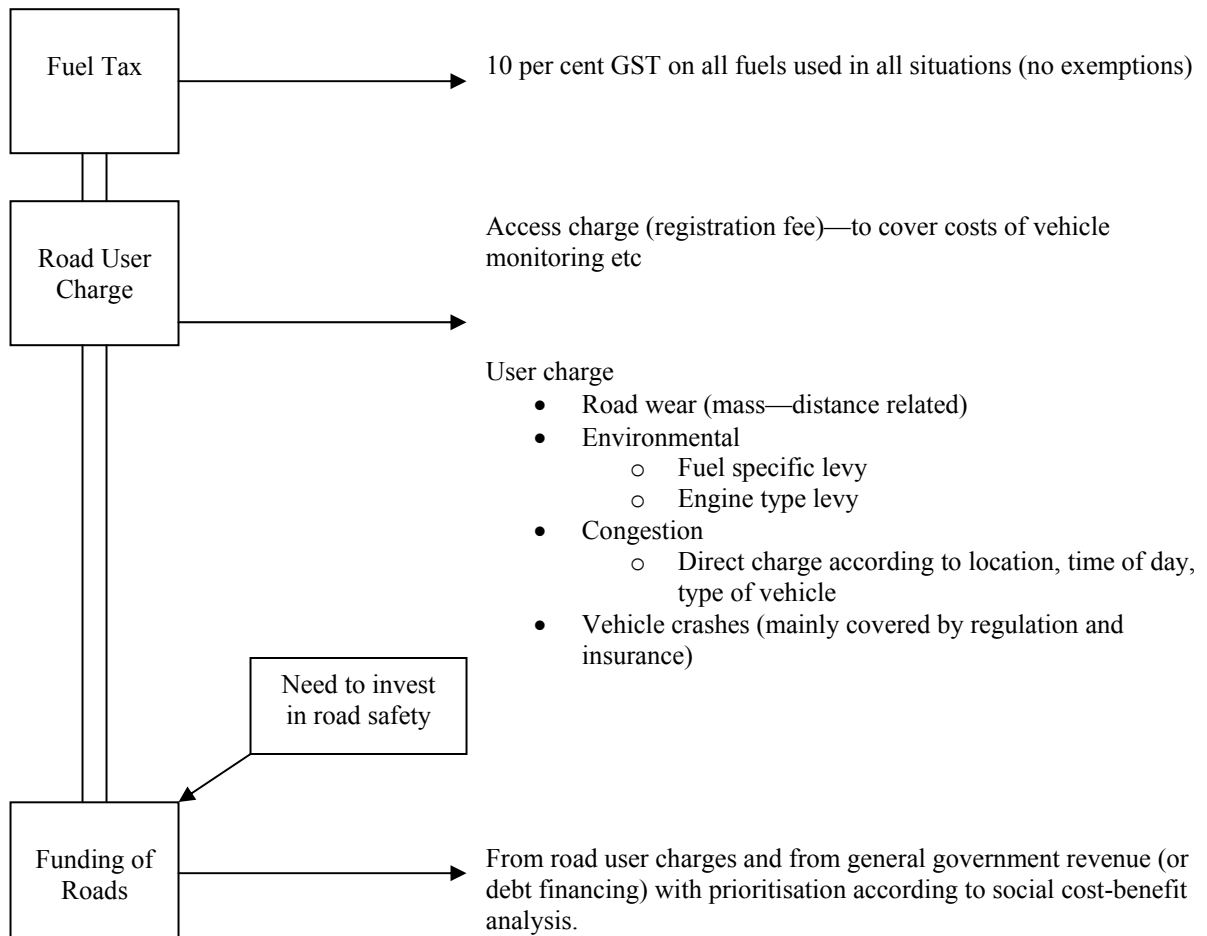


A Practical Framework for Road Transport

While technologically it might not be a reality yet, an ideal road charging system would be designed to achieve efficient use and provision of roads. It would contain an access charge which would give users the right to access the road system and a set of user charges based on actual road use. The access charge would, in principle, be small, designed to cover the costs of registering and keeping track of vehicles.

The user charges would be set to recover from individual users the full marginal social costs of their use of roads. They would contain a component to reflect the use of road infrastructure. Ideally this would be a mass/axle weight distance based charge rather than a fuel charge, and would be negligible for light vehicles. There would also be a fuel based charge to reflect environmental costs of burning fossil fuels in road vehicles. The appropriate charge set for this would be revised periodically to take into account improvements in engine efficiency and fuel quality. Some part of the environmental charge could be built into the access charge to reflect the type of engine being used on the road. Congestion costs would be charged directly according to time of day (as parking charges are currently), location of road used and type of vehicle. In the absence of an effective direct charging mechanism there would be no charge on fuel designed to charge for congestion. Regulations and changes to insurance, rather than charges, could be used to reflect the social costs of crashes.

Figure 7 – Proposed Road Charging and Funding Framework.



The Challenges

There are two key challenges to implementing such a framework. The first is technological—in the absence of facilities to charge directly for road use and congestion, the model discussed above is a long term goal. The real question then becomes, how do we introduce technologies like GPS tracking, which is used widely in telecommunications and in trucking and taxi fleets, into the wider vehicle fleet?

The second challenge is political. The inefficiencies in the current system are well known. They have been analysed and exposed in numerous official inquiries and gatherings of experts. Yet governments have shown little interest in reform. This is partly due to the divisions in responsibilities between Commonwealth and State governments. And no doubt the reluctance of treasuries to relinquish a source of revenue has played a part.

Creating political will to reform means demonstrating to the community that there are benefits from change. It also means setting out a clear pathway to achieve the needed

change—in this respect the Smart Traffic 2004 Conference represents an important step in the right direction.

The stakes are high. With BTRE estimates showing substantial growth in demand for road transport to 2020, it is crucial that we make the decisions now about setting the right framework for administering roads.

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