

Ministry of Transport

Surface Transport Costs and Charges: Summary of main findings and issues

March 2005

Surface Transport Costs and Charges Study

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Summary of main findings and issues

1. Why measure the costs of land transport?

The *Surface Transport Costs and Charges* study (STCC) is designed to provide baseline data on the costs and charges associated with the road and rail networks. This information will assist the government to make decisions on the relative position of road and rail for freight transport and of rail, bus and private car for passenger transport. The ultimate goal of this work is to provide an ongoing answer to the question “What are the costs of land transport and who is paying them?”

The *Land Transport Pricing Study (LTPS)* undertaken in the mid-1990s indicated substantial possible differences between the costs directly faced by users of transport modes. The current study picks up where LTPS left off; goes into issues in greater detail; and provides more reliable information on costs and charges for land transport.

The aim of the STCC is to take a snapshot at a particular point in time in order to identify:

- the costs that road and rail users are paying at present
- the costs that they impose on society as a whole
- who besides users pay for land transport
- what the consequences of these findings might be. It is an information framework for future decision-making.

This approach goes to the heart of a sustainable transport policy. If there are significant differences between the share of costs paid by modes then other questions follow:

- Should all types of transport meet all the costs they impose on society? A key strategic question raised in the *New Zealand Transport Strategy (NZTS)* is the extent to which the transport system should eventually take responsibility for all the costs it imposes on society as a whole.
- If users of particular types of transport are not paying their full costs, what are the consequences of this?
- What are the consequences of the answers to these questions for a sustainable transport system?

The STCC is the first step to answering these questions. The current document describes the year 2001-2002, but it is intended that this report will be the first of a series of annual “snapshots” to show how the costs and charges of the land transport system change over time.

This booklet provides a brief summary of the first set of findings and an outline of the major possible implications.

A full technical document setting out the detailed findings of the STCC is available separately on the Ministry of Transport website: www.transport.govt.nz

2. Overview of the STCC approach

The STCC provides estimates of the costs faced by road and rail users, and the payments they make for using each mode. The study did not consider coastal shipping or air transport. The STCC is based on 2001/02 data and relates to the infrastructure and systems existing at that time. In particular it describes the rail system as it was before the Government repurchased the rail infrastructure. The main document has three main components:

2.1 Total costs and charges analysis

The total costs and charges analysis (TC) identifies the following for each network:

- The resource costs directly incurred by users/operators
- The charges paid to the government by users/operators
- The provider costs and external (social) costs.

The analysis of the rail network also includes an additional category – user charges – which identifies fare and freight revenues paid by end users.

Once these total costs and charges have been calculated, they are used to derive:

- The total costs faced by the user/operator - these are the costs that drive user/operator behaviour
- The total resource costs – these are the total costs to society
- The difference between the total resource costs and the charges levied – this is the amount not directly paid for by users.

In calculating a return on the two networks, infrastructure assets have been split into two groups:

- Recoverable assets - these have a significant opportunity cost in alternative uses
- Non recoverable assets - these are sunk costs which do not have sufficient opportunity cost in alternative use (e.g. tunnels, earthworks)

As a commercial entity, rail must earn a return on recoverable assets while under the current system road users do not directly pay a return on roading assets. In order to ensure the modes are compared on a level playing field, the calculations presented below include a return on recoverable assets for both modes, but do not include any return on non-recoverable assets. In this analysis we have used a Government rate of 7%, which is not necessarily the same as we would use commercially.

The total cost findings are summarised in this paper.

2.2 Fully allocated costs and charges

The estimates generated in the total cost analysis can be allocated equally across user groups to provide information on the national average costs and charges for each mode. For the roading network this was allocated across two dimensions:

- user groups (trucks and cars)
- road type (state highway and local roads, with each of these categories broken down further between urban and rural areas).

For the rail network, total costs and charges have been allocated across the three sub-sectors:

- long distance passengers
- urban passengers
- freight

These findings are summarised in this paper.

2.3 Marginal costs

The STCC also looked at the costs that extra traffic flows could impose on the land transport system, both in the short and long term. In addition, the study looked at the situation on five specific transport routes for freight or passenger traffic flows. These findings are summarised in the main document and have had some commercial information supplied in confidence removed.

3. The road network

3.1 What does the road system cost?

The total cost of the road system and its use is \$34 billion per annum. The key elements include user resource costs, user and related charges, and provider and external costs.

The total cost is dominated by the **user resource costs** paid by individual users. User resource costs total \$30.36 billion p.a. and comprise:

- | | |
|---|----------------|
| • Vehicle operating costs (including vehicle capital charges) | \$16.8b |
| • Traveller time costs (including congestion delays) | \$11.0b |
| <i>Congestion (\$1billion) is an internal cost carried by users and is not therefore included as an externality. Two thirds of the cost of congestion is in Auckland.</i> | |
| • Additional road accident/incident costs | \$2.2b |
| <i>These exclude private insurance and ACC premiums, but include the cost of the fatality, injury or suffering & property damage met directly by users.</i> | |
| • User costs for parking in central city areas | <u>\$0.36b</u> |
| | \$30.36b |

3.2 Provider and external costs

The total provider and external costs of the roading network equal \$3.7 billion p.a. This can be divided into three key categories: cost to public agencies, other financial costs and externalities.

The *cost to public agencies* includes:

- Cost to maintain and operate network \$895m
- Capital return on infrastructure (recoverable) \$750m
- Economic depreciation charge \$20m

Other financial costs

- Police, Fire Service and Ambulance Services \$218m

Externalities

- Additional accident costs (not covered by ACC) \$670m
- Environmental costs \$1174m

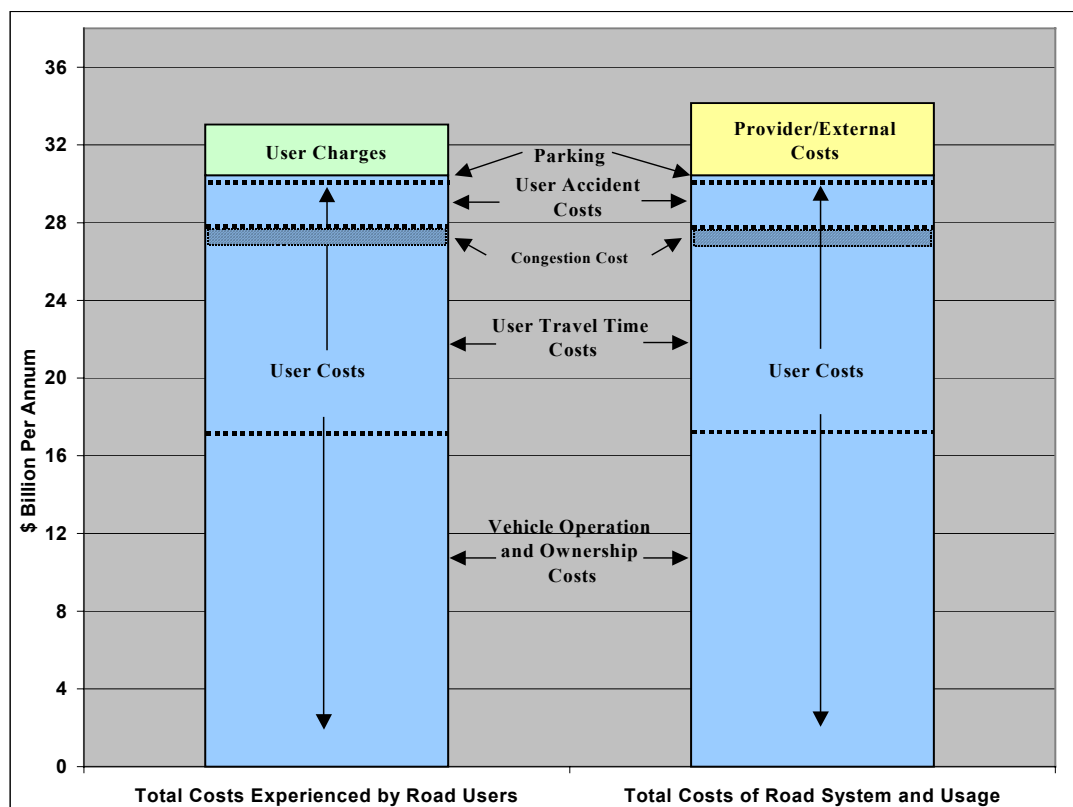


Figure 1: Total road system costs – Overview

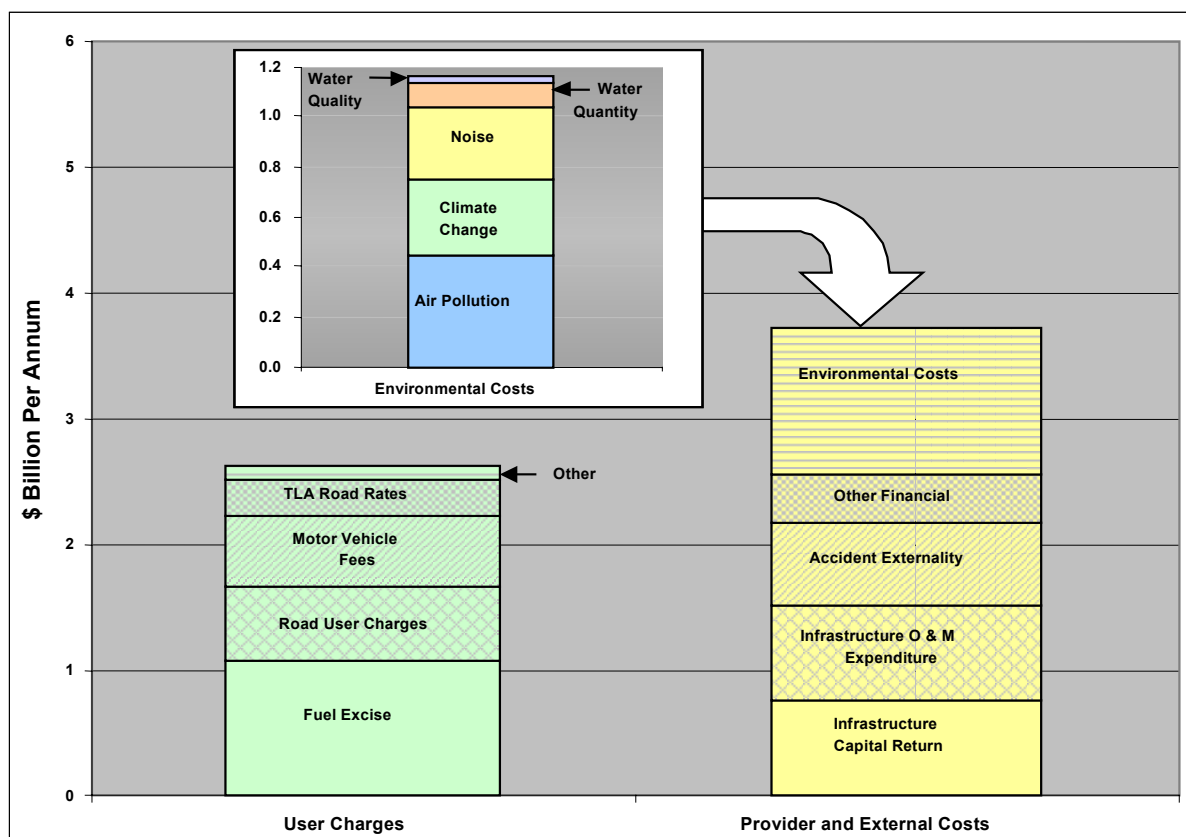


Figure 2: Total road system costs: user charges and provider/external costs

Important note: The fuel excise component in Figure 2 includes the proportion of fuel excise which goes to the Crown Account as well as that going to the National Land Transport Fund.

Item	Annual Figures - \$ Billion (2001/02)		
	Best Estimate	Likely Range	
		Minimum	Maximum
Provider/External Costs			
Road System Operation and Maintenance:			
Maintenance	0.77	0.75	0.85
Operations and Administration	0.38	0.38	0.38
Accident Externalities	0.67	0.33	1.34
Environmental Impacts	1.17	0.60	2.40
Road System Infrastructure Capital Return:			
Recoverable Assets (Land)	0.75	0.30	0.98
Totals	3.73	2.36	5.95
Current Charges			
Fuel Excise	1.09		
Road User Charges	0.58		
Motor Vehicle Fees	0.57		
Other	0.10		
Road Rates	0.29		
Total	2.63		

Figure 3: Total Road System Provider/External Costs And Charges Summary

3.3 Who pays for the roading network?

Road users pay 62% (\$2.3 billion per annum) and ratepayers pay 8% (\$0.3 billion per annum). The main components of the user and related charges are:

• Fuel Excise Duty	\$1079m
• Road User Charges	\$584m
• Motor Vehicle Fees	\$568m
• Other charges (Fire Service Insurance levy, Policy fines)	\$99m
• TLA Rooding rates	\$288m

Note that these figures include the proportion of fuel excise which goes to the Crown Account as well as that going to the National Land Transport Fund.

This leaves a shortfall of 30% (\$1.1 billion per annum) which is primarily linked to two areas of costs. These are the imputed costs of environmental and accident externalities (total cost \$1.8 billion per annum), and the rate of return on investment (\$750 million per annum).

Air pollution costs of \$442 million per annum are partially paid for by the health system, while climate change costs are not paid for by anyone. Water quality and quantity costs are not fully paid for by anyone either. This is because although local councils remove the flow of water, it is not generally treated to reach a specific quality. Noise pollution costs and their distribution are the subject of further work by the Ministry of Transport.

3.4 How are costs distributed by vehicle type?

The costs generated by vehicles differ according to size, type of fuel used etc. because of the wear and tear they inflict on the network and the pollution they cause.

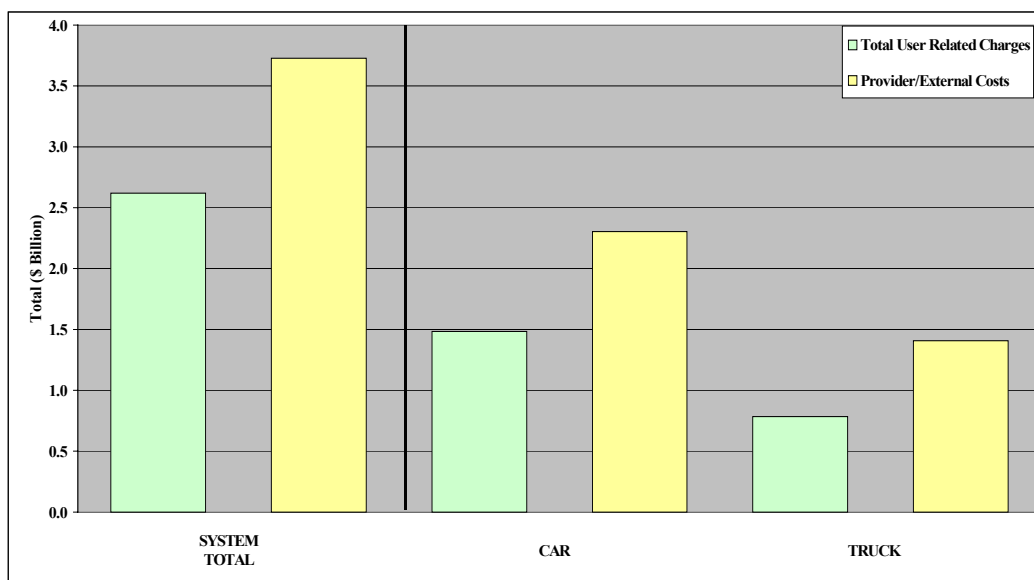


Figure 4: Road System Allocated Costs – Comparison of user charges and provider/external costs according to vehicle type

When the total charges (excluding rates) paid by users are allocated across the vehicle fleet according to type we find that:

- cars directly pay 64% of their costs,
- trucks directly pay 56% of their costs
- buses directly pay 68% of their costs.

Although trucks were sub-divided into four categories in the STCC, data limitations prevented the full average cost analysis from further disaggregating the allocation for trucks according to specific truck weights and/or types.

3.5 How are costs distributed by road type?

The costs associated with each road type differ according to the level of maintenance required, traffic volumes, etc. Users on state highways pay approximately 87% of their costs while those using local roads pay approximately 50% (excluding rates). When rates are included in the local roads calculations (and these are paid by all ratepayers, not just road users), the users on urban local roads pay 56% while those on rural local roads pay 73%.

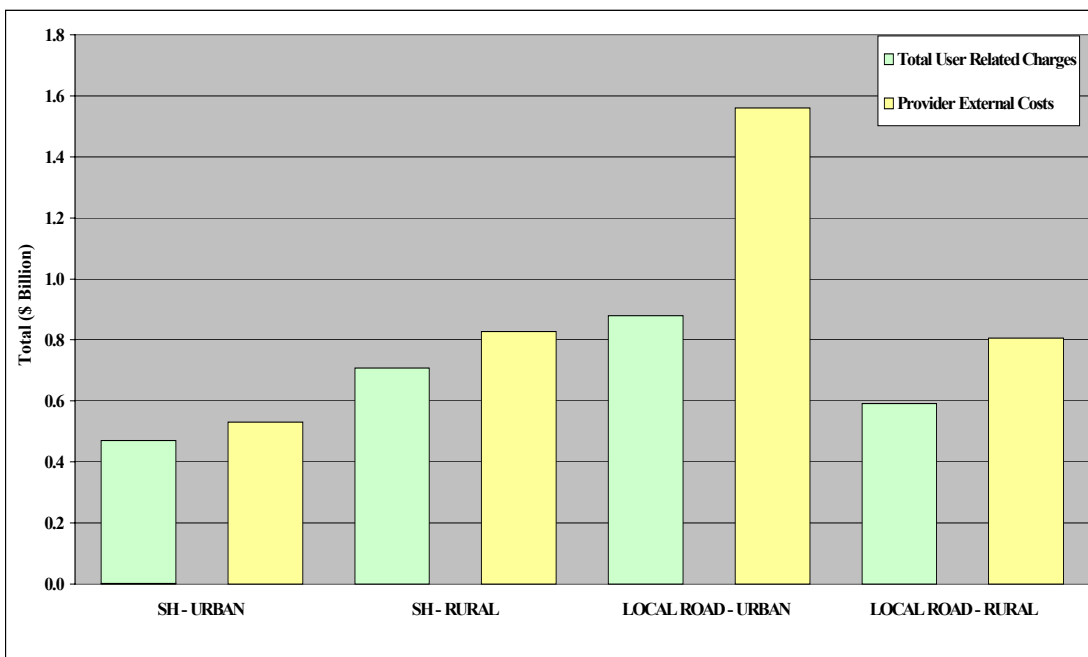


Figure 5: Road System Allocated Costs – Comparison of User Charges and Provider/external costs according to road type

3.6 Fixed charges and variable charges

Users pay for roads in two ways. The first is through fixed charges such as licences and registration, which do not vary according to road use. In other words, no matter how many kilometres are travelled, the cost of registration is the same for each vehicle type. Fixed charges earn \$568m per annum in revenue and cover just 15% of the total road costs.

Variable charges are gathered as excise duty on petrol vehicles and road user charges on diesel vehicles and equal 44% of the total costs of the roading network. Drivers of diesel vehicles pay according to the actual kilometres travelled by means of road user charges (RUC). While the revenue from RUC has risen over the past few years, the revenue earned from petrol excise duty is declining in terms of the yield per vehicle kilometre travelled. This is because of the ongoing improvement in energy efficiency of petrol vehicles. As new technologies become prevalent (for example hybrid vehicles and hydrogen powered vehicles), the yield per vehicle and therefore the total revenue earned will continue to decline, posing a revenue risk to road income.

4. The rail network

4.1 What does the rail system cost?

The figures in this section refer to the previous structure of the railways, before the Government took over the infrastructure. The STCC shows that the total costs of the rail network in 2001/2002 were \$527 million per annum, while Tranz Rail received total revenue of \$432 million p.a. These costs comprise:

• Operating costs	\$322m
• Capital charge on rolling stock @ 7%	\$64m
• Capital charge on infrastructure assets	\$130m
• Environmental externalities	\$11.3m

The total rail costs have been allocated across the three main businesses using the rail network: freight, urban passenger (Tranz Metro), and long distance passenger (Tranz Scenic). The STCC further examined the urban passenger business in Auckland and Wellington.

The costs allocated to the rail freight business (Tranz Rail) total \$409m and account for 77.5% of the total costs of the rail network. These costs are:

• Operating costs	\$235m
• Capital charges on rolling stock	\$52m
• Capital charges on infrastructure	\$113m
• Environmental externalities	\$8.5m

The long distance passenger total costs are:

• Operating costs	\$20m
• Capital charges on rolling stock	\$3.5m

The urban passenger total costs equal \$70m (rounded). These costs comprise:

• Operating costs	\$43m
• Capital charges on rolling stock	\$8m
• Capital charges on infrastructure	\$17m
• Environmental externalities	\$1m

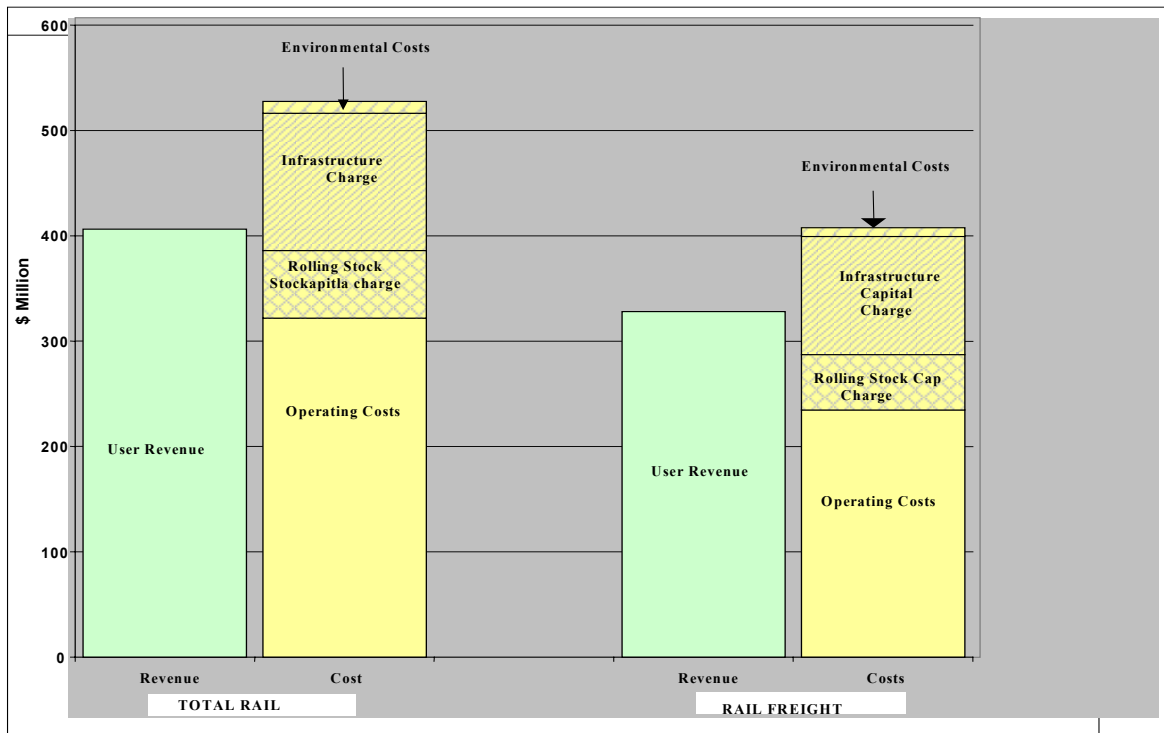


Figure 6: Costs and Revenue for rail network overall and for freight services

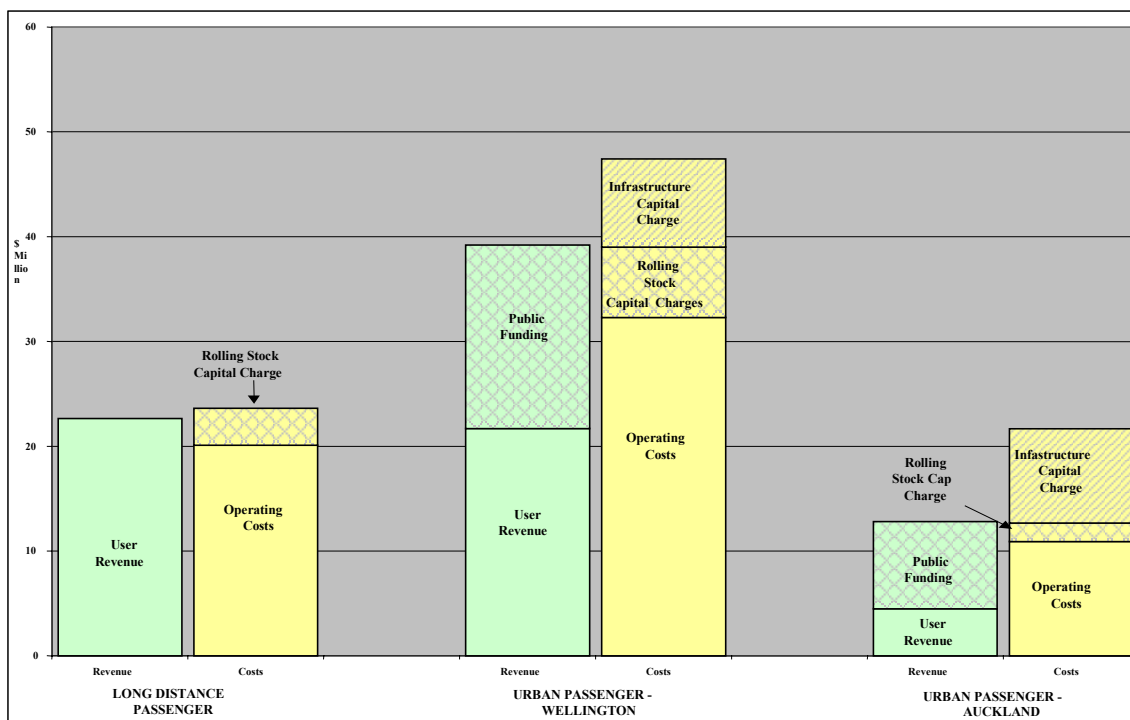


Figure 7: Costs and revenue for rail network passenger services

4.2 Who pays for the rail network?

The STCC shows that all users pay 77% (\$406 million per annum) of the total costs - a higher percentage than that directly paid by road users.

When the costs and charges of the rail system are allocated across the three businesses (Tranz Rail, Tranz Metro, and Tranz Scenic) it shows that:

- The rail freight business (Tranz Rail) recovers approximately 82% of costs
- Tranz Scenic (long distance passengers) recovers 96%
- Tranz Metro (Wellington – Auckland) recovers 37% of costs

Taxpayers together with ratepayers pay 5% of the total rail costs by means of a passenger transport subsidy (\$25.8 million per annum) to Tranz Metro. This leaves a shortfall of 18% (\$95 million per annum), which is primarily linked to an inadequate rate of return. Environmental externalities are negligible for rail because the limited number of services and the location of the services means there is minimal air pollution, while the porous nature of their tracks means that water runoff is not a problem because of the nature of the receiving environment.

5. What does the STCC total cost analysis tell us?

5.1. Total costs and levels of charge

Identifying the total costs of road and rail and the charges that users pay tells us where the costs and charges of a particular activity are potentially out of balance. Simply altering charges to match is only one way of addressing the issues identified. There is a wide range of measures that can be taken to reduce air emissions from road and rail, for example, and such measures may well cost substantially less to implement than the costs that have been identified in the STCC. The result would be a substantial net benefit to society.

One of the main reasons for developing the present STCC process into an ongoing annual document is to understand how policy measures affect costs and charges over time. Changes to the diesel fuel specifications that come into force in early 2006, for example, will substantially reduce emissions from diesel trucks, cars and locomotives and therefore the costs that these impose on the economy – and future versions of STCC will reflect the costs and charges impacts of such changes.

5.2. Tax recycling

It is also important to recognise that even if road users were eventually to pay some additional charges to deal with one or more of the costs identified in this report, these increases could be offset by reduced taxes and charges elsewhere in the economy.

Most of the costs that have been identified as not being paid for by road and rail users are already paid for in some way by taxpayers or ratepayers – a range of Government taxes help to pay for hospital costs, for example. The real question that STCC raises is

whether road and rail users should eventually meet all the costs that they generate at point of use, while general taxpayers and ratepayers are no longer expected to meet such costs. The costs to New Zealand as a whole would be the same – the real question is who should pay?

5.3. Identifying the main issues

The analysis set out in the main report and summarised in this paper shows that the current system of costs and charges has generated four major issues that need to be considered in more detail. These are:

- The costs of road traffic congestion
- The viability of the rail sector
- The costs of environmental impacts from road and rail
- The fairness of the road charging system

5.4 The costs of road traffic congestion

When users do not directly pay the full price of any service, demand generally exceeds supply and over-consumption is likely to occur. Traffic congestion is a symptom of excessive demand for road capacity, since it acts as a rationing device in the absence of pricing. Congestion principally occurs in urban areas and it is therefore not surprising to find that road users in local urban areas pay only 56% of their costs (including rates).

A pricing policy that sought full cost recovery from users for all road costs (including environmental externalities and return on investment) could result in higher user prices in urban areas, which would reduce demand and therefore help alleviate congestion, and improve environmental and other impacts.

The current study of road pricing in Auckland is investigating a range of options in this area, and will report back in November 2005.

It can also be argued that requiring road users to pay “up front” fixed charges (such as Motor Vehicle Registration fees and rates) also provides no incentive to users to change their behaviour and adjust their road use. Transforming these fixed charges into variable charges – for example, charges for each kilometre travelled, as with the existing Road User Charges system - could further influence change towards more sustainable road use.

However, the cost of fixed charges (MV fees) together with variable charges (RUC, FED) currently paid by users, together equals only 7% of the total costs to users of owning and operating their vehicles. This means that for some people, relatively small increases in use based charges may not significantly influence their travel patterns because of the comparatively high sunk costs they have already paid to purchase the vehicle. For others however, changes to the fixed charges will influence behaviour.

Dealing with congestion is not just a matter of price. It is increasingly clear that congestion can only be tackled by new pricing systems combined with new road

construction; better management of existing roads; provision of high quality alternative public transport systems; and encouragement of low impact modes such as walking and cycling. There are no quick fixes!

5.5. The viability of the rail sector

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

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

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

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

5.6. Environmental externalities of road and rail

Externalities are the costs (or benefits) that arise from the activity of a consumer of a good or service, that are not directly paid for by that consumer and affect other members of society. The STCC has identified the effect on the environment of road and rail air emissions, water pollution and noise as being key negative externalities, where costs are borne outside the road or rail system. Road and rail users do not currently have to take these costs into account when making their travel or transport decisions.

Land transport-related public health costs are generated almost entirely by road traffic, with particulate matter emissions from rail equal to less than 2% of road traffic emissions. The overall environmental externalities generated by rail are lower because the total level of rail activity in New Zealand is comparatively small and because the rail trackbed is permeable resulting in little water runoff.

The total cost analysis shows that the costs of environmental externalities of road traffic total \$1.2 billion per annum. Approximately 85% of environmental externality costs relate to impacts in urban areas and include air quality, noise, and water quantity (runoff). Local air pollution is the most costly environmental externality and is estimate to cost \$442 million per annum. Air pollution is of course, strongly linked to high traffic volumes and congestion. When allocated across vehicle types, heavy commercial vehicles account for 43% of local air pollution, cars account for 34%, light commercial vehicles account for 22% and buses account for only 1%.

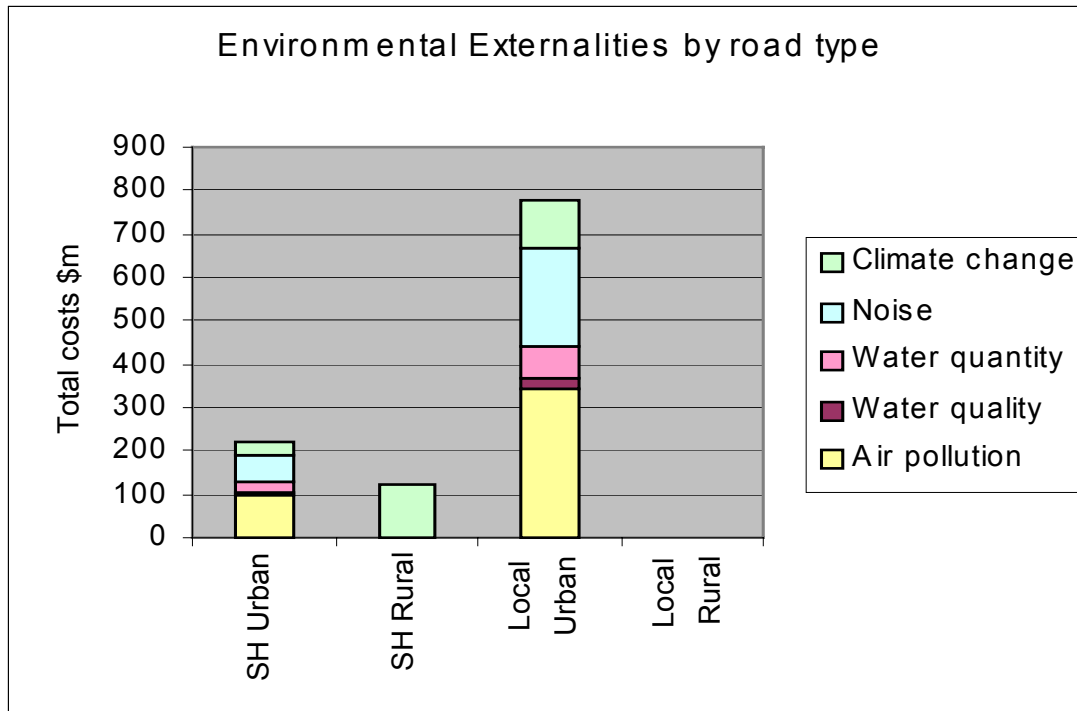


Figure 8: Environmental externalities by road type

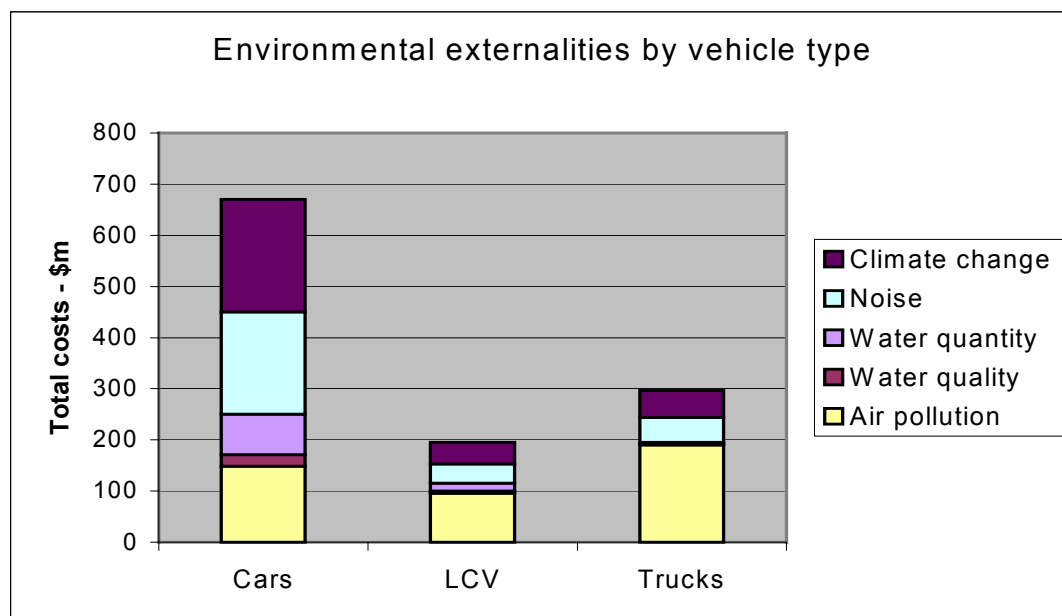


Figure 9: Environmental externalities by vehicle type

Transport related greenhouse gas emissions (GHG) cost \$317m per annum, and cars generate 70% of GHG emissions in New Zealand. Cleaner technology and the implementation of fuel specifications will reduce environmental externalities, but because users currently do not directly pay for the cost of pollution, there is no incentive for them to reduce road use which will in turn, further reduce air pollution.

It is important here to repeat that simply altering user charges is only one way of addressing the issues noted here. There is a wide range of measures – regulation, design, education and taxation – that can be taken to reduce environmental externalities.

5.7. The fairness of the road charging system

Ratepayers currently pay 8% of the costs of the roading networks and contribute to passenger transport subsidies. Rates are fixed charges based on property values and bear no relationship to the use of the roading network by property owners. While it can be argued that most ratepayers use public transport and/or drive cars, using rates to contribute to the cost of roads creates equity issues, particularly as the demography of New Zealand's population is changing.

As noted earlier, road users also pay motor vehicle registration fees and some of their Accident Corporation Commission charges as a fixed annual or quarterly charge. These are fixed charges unrelated to actual use of the road network, and there may be a case to translate these charges into use based charges related to fuel tax or Road User Charges.

It can be argued that this would be fairer to road users and also promote a more sustainable approach to road use.

6. Conclusion

In reading this document and the full Surface Transport Costs and Charges document available on the Ministry website (www.transport.govt.nz) it is important to remember a number of key points:

- The study provides a benchmark database which shows how much the land transport system costs and who pays these costs.
- STCC makes no specific policy proposals – it is the first of a series of ongoing measures of the land transport system to inform policy.
- STCC makes no recommendations about levels of tax or charges.
- It is an important input into implementing the vision and objectives set out in the New Zealand Transport Strategy.