PRODUCTIVITY COMMISSION INQUIRY INTO FREIGHT INFRASTRUCTURE PRICING

SUBMISSION

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National Transport Commission

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Productivity Commission Inquiry into Freight Infrastructure Pricing: Submission

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Type of report: Submission

Objectives: To inform the Productivity Commission's inquiry into road and rail freight infrastructure pricing

NTC Programs: Productivity, Road Pricing

Key Milestones: Submission to Productivity Commission on 12th May 2006

Abstract: This submission aims to address the questions posed in the PC's Issues Paper. In addition, it seeks to demonstrate that the potential benefits of a better pricing scheme could extend well beyond simply having each mode 'pay its way'. A future scheme could help ensure that the freight task can continue to grow and utilise infrastructure in a manner that best meets the needs of the task.

It also highlights the inherent difficulties associated with the involvement of 3 levels of government in the provision of freight infrastructure in conjunction with the existing charge collection arrangements.

The submission also notes the NTC's preliminary work on a future heavy vehicle charging scheme and the manner in which it is designed to accommodate the PC's findings and COAG's ultimate directives, particularly with regard to the appropriate cost base

Purpose: For Information

Key words: Pricing, Productivity, Charges, Reform

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FOREWORD

The National Transport Commission's (NTC) recent paper Twice the Task identifies that Australia's freight transport industry needs more cooperation, leadership, and a sense of urgency to maximise Australia's international economic competitiveness. As this submission identifies, pricing reform has an important role in delivering those substantial productivity benefits.

Until we reach agreement on transport maximising its return on the assets involved we will all fail in that productivity quest.

Of course, the issue of pricing for services is difficult. Long-term national reform is always challenging, but that doesn't mean it is not worth pursuing; just that a lot of work and commitment is needed to see it through. The leadership provided by the Prime Minister, the Premiers and Chief Ministers in transport reform is a golden opportunity to do this.

The differing treatment on road and rail charging and the different institutional arrangements needs resolution at the Council of Australian Government (COAG) level. For example, with a majority of the interstate rail network in the hands of Australian Rail Track Corporation (ARTC), there is a strong argument for a single economic regulator for freight infrastructure. Additionally, heavy vehicle pricing will remain inefficient so long as the allocation of revenue bears no relation to governments' road freight planning and investment needs.

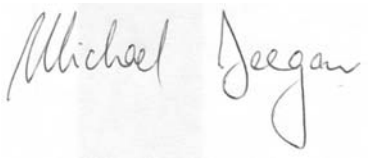
While the NTC (and its predecessor the NRTC), industry and jurisdictions have made significant progress on regulatory reform, the gaps continue to fall short of the outcomes our leaders believe have been achieved or should have been achieved. We must do better.

The NTC's paper for the Productivity Commission draws on the considerable skill and expertise of our staff. They too have found the slow pace of national reform frustrating.

Industry wants the NTC and others to better understand their issues related to reform. Jurisdictions often struggle to commit to national reform because of competing priorities and limited resources. Our paper tries to draw some of these competing threads together.

Pricing reform should not lose sight of the potential economic impact on safety decisions (and vice-versa). A discussion and neutral assessment about the need to streamline safety arrangements is also best considered by COAG in due course.

In summary, the NTC welcomes the opportunity to provide input into this important Inquiry. We look forward to participating in the process and working with the Productivity Commission in charting the vision to underpin pricing reform.



Michael Deegan
Chairman
National Transport Commission

EXECUTIVE SUMMARY

The Productivity Commission Inquiry – a challenging task at a crucial time

The Productivity Commission's (PC) Inquiry into Freight Infrastructure Pricing is an important Inquiry at a critical time of change in the freight industry. The NTC submission identifies an opportunity for more efficient road and infrastructure pricing to complement existing transport reforms for improved productivity and economic competitiveness.

Pricing reform is a key component of the NTC's *Twice the Task* vision for transport productivity reform, released in February 2006. A position paper from the *Twice the Task* project, *Improving the Regulatory Framework for Transport Productivity in Australia,* is closely aligned with the Council of Australian Government (COAG) agenda.

In the face of a growing freight task over the next 15 years, *Twice the Task* builds on past transport reforms and outlines why the momentum of reform must continue to maintain an efficient transport system. 'Doing nothing' will result in an additional 50,000 trucks, and one in four vehicles on the road network carrying freight by 2020.

Investment in track infrastructure and rolling stock, as well as operational and regulation reform, will increase rail volumes, however, road freight remains the dominant mode for the bulk of the freight task. *Twice the Task* concludes the utilisation of each mode needs to be optimised, with seamless modal interfaces.

A package of transport reform initiatives has already been approved by COAG to optimise the overall transport system. This includes more flexible regulation through Performance-Based Standards (PBS) for SMART heavy vehicles and technology–based route compliance tools to better match vehicle performance to the capacity of the existing road network.

The missing link in the NTC's *Twice the Task* vision is pricing reform. The current system of heavy vehicle charging provides little economic incentive for road owners to improve access for more productive heavy vehicles, nor for regulators to agree on arrangements for SMART heavy vehicles to pay for increased consumption of the road asset.

Current heavy vehicle charges, based on averages and aggregates, fail to reflect the diversity of the fleet and variability of pavement quality. More refined pricing has the potential to optimise road asset utilisation by heavy vehicles and generate more informed infrastructure investment signals.

Pricing for productivity

Road agencies are currently reluctant to improve access for more productive (heavier) vehicles without any direct compensation to maintain or upgrade the asset, believing this may lead to more rapid network deterioration. In reality, more productive vehicles may address the increased freight task with less deterioration than would otherwise be the case. A direct fee for service relationship between road asset owners and vehicle owners is essential to shift the intent of regulation from asset protection to optimising its use.

Creating a direct link between road infrastructure consumption and the road asset owner challenges existing institutional arrangements and will require the agreement of central agencies and the better inclusion of local government. Institutional reform is, therefore, difficult. But the substantial productivity benefits cannot be fully achieved unless this issue is resolved.

A form of direct charging already exists between track owners and above-rail users. Pricing is timeslot-based with rigid constraints (speed, mass, dimensions) on the physical service being provided with little opportunity for innovation even if above-rail operators are prepared to pay. Potential also exists for an incremental pricing approach to be applied to the rail sector. Further research in this area is needed.

A staged approach toward direct user-charging of heavy vehicles is prudent. Initially, a form of incremental mass charge for additional road asset wear could be applied to SMART heavy vehicles on a voluntary basis. This presents a 'low risk' opportunity to test technology and systems, and clearly demonstrate productivity benefits.

Subject to a cost-benefit analysis, the next stage is to implement direct-user prices, based on full road infrastructure cost recovery, for the heavy end of the fleet. This approach would target those heavy vehicles subject to productivity constraints inherent within the current pricing system and minimise implementation risk and costs. It is expected that these vehicles can realise the greatest productivity gains in the fleet. It is important to note that this approach would create boundary issues between those who pay direct prices and those who continue to pay fuel charges. This will need to be further considered.

There are diminishing benefits from extending the coverage of direct user charges in the short to medium term to all heavy vehicles. A clear business cost-benefit would need to be demonstrated.

What needs to change in heavy vehicle pricing

Heavy vehicle charges are currently based on the PAYGO (or Pay As You Go) approach, which achieves expenditure recovery at an aggregate level. PAYGO recovers heavy vehicles' share of road expenditure, including capital expenditure, in the year it is incurred. This differs considerably from the life cycle approach taken in the rail sector, which allows for a return of and on assets each year.

Heavy vehicle charges are structured as a two-part tariff:

- a fixed registration charge which differs for different classes of vehicle; and
- a diesel excise 'fuel charge'.

A number of limitations are apparent from this approach. This includes the established revenue split between the federal fuel excise and State/Territory Government registration fees (which does not reflect fixed and variable costs); inherent cross subsidies in favour of B-Doubles and roadtrains; and the over-recovery of smaller trucks to ensure pricing consistency with light vehicle registration charges.

The 3rd Heavy Vehicle Charges Determination recommended a small increase in fuel charges and a larger increase in registration fees for larger heavier vehicles to keep pace with increased road expenditure and address the cross-subsidies. In an environment of rising fuel prices, this recommendation was rejected by the ATC in March 2006.

The original policy objective of the current system was simply to set national heavy vehicle charges. The NTC believes the time is right to consider a more sophisticated pricing system, which looks beyond broad expenditure recovery. Efficient pricing of road and rail has the potential to optimise use of the transport network and improve productivity.

Competitive neutrality – what is the problem?

Much of the competitive neutrality debate has focused on costing methodologies, externalities and the cross-subsidy of heavier more fuel efficient B-doubles and road trains, which compete directly with rail. The NTC calculates the average annual B-Double subsidy at $10,500 per vehicle under the current arrangements.

However, the average percentage of total land freight which is contestable is approximately 9%. Because the rail freight's market share is comparatively smaller, contestable freight represents a significant percentage of the rail freight task, but less than 9% of the total freight task for road. Contestability is generally limited to specific freight corridors and markets.

Pricing alone will not solve the problem

Infrastructure pricing, a component of freight rates, only partially addresses the issue of competitive neutrality. Contestability, service quality, location and efficiency of modal interfaces, frequency of service, flexibility and the nature of the freight (e.g. time sensitive) are also important factors for mode choice.

Research on price elasticities suggests that demand for a specific mode is least elastic for long distance and high-density freight (e.g. the Eastern States-Perth rail corridor). Over short and medium haul routes, general freight users are more likely to consider service and flexibility, which favours road freight.

Neither sector fully reflects externalities in its freight rates; although the costs associated with heavy vehicle use are expected to be greater (particularly within the urban environment). However, further research is needed to determine whether pricing is the most appropriate mechanism for managing externality costs.

Congestion is largely driven by light vehicles, while safety and environmental impacts of heavy vehicles are already subject to regulation. A large proportion of safety costs are also internalised by regulation (assuming full compliance) and insurance, which is passed onto freight customers in higher rates.

At the heart of the competitive neutrality issue is the disparity in investment between road and rail. Private sector investment decisions in rail are now determined by risk and rates of return. Social amenity and political factors often characterise road investment decisions.

In order for rail and road to adequately invest in their respective sector a consistent and agreed national social policy is needed to fully evaluate projects and provide guidance for granting Community Service Obligations (CSOs).

What role does pricing play?

Although both sectors would argue that they do pay their way in aggregate, there are arguments to suggest that from an economic cost point of view, both sectors fail to do so.

PAYGO methodology for heavy vehicle expenditure recovery reflects nationally aggregated historical expenditure and is limited by (conservative) estimates and assumptions. Given the considerable planned growth in infrastructure investment, and only partial annual indexation, it is highly unlikely PAYGO will continue to recover expenditure.

In contrast, rail uses a common life cycle approach to cost recovery, with considerable variations in capital estimation of rail assets. This can create more variation than the

PAYGO model. It can also be argued that the rail sector fails to recover its true long-term capital cost; particularly on interstate corridors servicing general freight markets.

Pricing principles for heavy vehicles could provide the basis of a common approach across both sectors, which reflect the differences within and between each mode. Broad overarching principles could include:

- full infrastructure cost recovery without cross subsidisation across or within modes;
- optimisation of the existing network;
- incentives for optimal investment;
- flexibility to respond to customer needs; and
- increased or better access to the network.

Optimising the network – SMARTer use of the road network

Key to a more refined pricing approach for road infrastructure is the ability to differentiate the cost of heavy vehicle use on parts of the network. The current heavy vehicle pricing system, based on network wide aggregates and averages, hides all of these variations.

Consequently, there is no price signal to indicate that operating on some roads incurs a higher cost than others. Blunt price signals – where the 'real' transport cost is partially borne by other transport users, or the taxpayer – results in sub-optimal mode, vehicle and route choices.

Consistent road and rail pricing principles and direct-user charging will encourage transport operators to make more efficient mode and route choices. The marginal cost of using routes which are purpose-built to carry significant levels of freight traffic will be relatively low. In contrast, the real cost of using lowly trafficked regional and local roads which are not designed for large heavy vehicles will be much higher (primarily due to the low density of those roads).

Furthermore, the transition to 'incremental charges' has the potential to allow operators to purchase additional road wear within vehicle safety and infrastructure capacity limits. In this way, pricing reform combined with SMART heavy vehicles can deliver significant productivity improvements. A preliminary assessment suggests the benefits could outweigh costs by four or five to one (see, for example NTRC 1996).

A further macro impact of direct pricing is the impact on the distribution patterns of freight users. Currently, there is little price incentive for freight generators and users to consider the costs to freight infrastructure and the community in their choice of location or approach to logistics.

Freight movement strategies should complement land use planning and encourage business investment close to other upstream and downstream services and/or properly located intermodal terminals. Equally, access to industrial facilities can be encouraged via road or rail network interfaces on suitable freight routes rather than roads designed to service residential areas.

Improved heavy vehicle productivity also has a potential positive impact on rail freight. This is achieved through better alignment of road and rail mass regulations for heavy containers and reduced interface handling costs, which can represent a high proportion of overall logistics costs.

Managing the impacts pricing reform

Direct-user charging promises substantial economic cost-benefits; particularly in terms of optimal mode choice, asset use and productivity. There are also a number of impacts which will need to be considered and managed which recognise not only that some stakeholders are more vulnerable to reform than others, but that pricing reform needs to be complemented by other actions to be fully effective. This may include a requirement for an interim determination to complement a phased reform process and to ensure that the heavy vehicle fleet continues to recover its expenditure.

Stakeholder	Benefits of direct-user charges	Impacts to be managed
Truck fleet	Ability to purchase higher levels of road wear Better network access for more productive vehicles Low marginal road use cost on freight routes Investment focus on freight bottlenecks	Pricing pathways to manage the removal of vehicle cross subsidies
Regional transport operators	Low utilisation vehicles not disadvantaged by averaging	Increased trip costs on low traffic density roads with high road wear characteristics. This can be managed by factoring social amenity costs (CSO) into road classifications; or by averaging charges across road types
Road owner	Economic incentive to increase road asset utilisation (road wear) Pricing signals to inform investment priorities Constrain and manage the impact of a growing freight task	Institutional change Implementation and administration costs Potential bottlenecks will need to be addressed quickly
Freight customers	Improved service from more productive and better aligned road and rail transport networks Pricing signals to influence lowest cost distribution network design consistent with land use planning	Pricing pathways to manage the removal of vehicle cross subsidies
Rail sector	Improved pricing consistency across modes National social policy on CSO application Better mode alignment of mass controls Reduced terminal interface costs	Low marginal road freight prices on purpose-built freight routes
Community	Reduced truck trips and safer heavy vehicles No taxpayer subsidy of road costs Incentives to use key freight corridors consistent with land use planning Pricing signals for road upgrade priorities	Higher road use costs on low grade rural and regional roads. This can be managed by factoring social amenity costs (CSO) into road classifications; or by averaging charges across road types
Export industries	As above for operators and freight users	Export industries which rely on low grade roads for access will face increased costs. This can be addressed through explicit CSOs. Pricing signals to upgrade road corridors and fix freight bottlenecks will reduce transport costs

Implementing a direct pricing system

Whilst the potential benefits identified are considerable, international experience has shown development of direct pricing systems for heavy vehicles can be high risk and

expensive, with long lead times. Managing the rate of transition to a more efficient pricing system is an important factor to consider in a highly competitive industry.

NTC's work on scoping a future pricing regime for heavy vehicles indicates it is essential that an agreed policy framework is developed to guide the design and implementation of a specific system. In this light, the PC Inquiry can provide significant value by establishing:

a) the role of pricing reform in addressing the challenges facing the freight sector – both between and within modes;

b) a framework of consistent pricing principles for use of road and rail freight infrastructure, including guidance on the economic principles to apply in establishing the costs and costing methodologies; and

c) the need for a direct link between infrastructure use and expenditure by the asset owner.

In summary, the NTC submission concludes that a policy linkage between pricing reform and existing COAG productivity reforms can deliver benefits much greater than the sum of its parts. However, optimising infrastructure use and investment, by linking road use and expenditure, challenges existing revenue and funding arrangements.

NTC concludes reform of transport pricing will be less effective without a supporting institutional framework. Given the complexity of government relationships, COAG would need to agree on the appropriate arrangements to ensure effective national and consistent outcomes are achieved.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The Productivity Commission (PC) has been tasked with ambitious terms of reference. It has been asked to

> *"develop proposals for efficient pricing of road and rail freight infrastructure through consistent and competitively neutral pricing regimes in a manner that maximises net benefits to the community.."*

It has stated in its Issues Paper that it will focus its efforts to "establish a framework and principles for pricing road and rail infrastructure, as well as feasible paths for implementing them in the medium to longer term." Furthermore, it "sees value in exploring mechanisms and institutional arrangements that would better integrate infrastructure supply and demand".

The National Transport Commission (NTC) supports the objectives of this Inquiry. However, it notes that pricing alone will not necessarily lead to fully competitively neutral outcomes. Freight growth and needs have not always been the primary drivers of decisions in both the road and rail sector. As a result, neither sector is moving forward from an optimal starting point. In addition it will be important to consider the current environment in which both rail and road operate. Many environmental features in each sector do not only impact on the costs to be recovered, but the ability of pricing to achieve its objectives.

However the NTC strongly agrees that, accompanied by other reforms (such as Performance-Based Standards (PBS), Compliance & Enforcement (C&E) and the Intelligent Access Program (IAP)), a change to the way infrastructure is priced will lead to greater freight productivity with considerable benefits across the broad range of stakeholders.

Whilst the NTC has a strong regulatory reform role in both road and rail, it has a specific role in recommending infrastructure prices in the road sector, in relation to heavy vehicles. Therefore, this submission will contain a considerable amount of detail in this area. While the COAG decision is clear in its desire to better achieve competitive neutrality through pricing, it is also clear that it seeks to optimise usage of freight infrastructure. To that extent, the NTC believes considerable value would be derived through recommendations for prices that address:

- the basis for infrastructure cost estimation and allocation;
- how externalities should be treated;
- the appropriate principles for a new pricing regime based on achieving competitively neutral, cost reflective and efficient outcomes;
- a framework upon which those principles can hang (that is, the general approach that should be taken in developing an appropriate structure of charges); and
- the appropriate arrangements for going forward for the design and implementation of new road and rail charges regimes (noting that each sector faces different institutional challenges and reform processes).

It is important to consider how technology can play a role in pricing and what might be an appropriate approach for implementation. The NTC's work to date would suggest that it is

difficult to come to any definitive conclusions in this area until agreement has been reached in more detail on the underlying policy framework.

The NTC has already begun to examine some of these issues in response to requests by the Australian Transport Council (ATC) to scope a new future heavy vehicle charging system. Primarily NTC sought to further its understanding on:

- what the problem is that a future heavy vehicles charging system seeks to solve;
- the options for a direct pricing system that would address the problem; and
- the work streams, timeframes and resources required to design and implement pricing reform.

This work has not been undertaken in the context of competitive neutrality, however the findings from this study address a number of the issues raised by the PC in its Issues Paper.

1.1 Structure of this submission

This submission is structured in three parts to address the core objective of the PC Inquiry; that is, how road and rail freight access pricing can lead to competitively neutral outcomes and ultimately to a more efficient and productive freight sector. The reminder of this submission is structured as follows:

PART A: THE CONTEXT FOR THIS INQUIRY

Chapter 2: The PC Inquiry – This chapter discusses the PC's terms of reference and outlines the role of the NTC.

Chapter 3: Freight and the Freight Industry – This chapter discusses the changing requirements of the freight sector as a result of the expected changes to freight movement in the future. It describes how changes to the current regulatory and charging framework are required to better match vehicles to the freight task.

Chapter 4: Freight Infrastructure – Chapter 4 described the infrastructure for both road and rail and discusses the challenges each sector faces in terms of investment

Chapter 5: Other Essential Reform –: Chapter 5 discusses reform measures other than pricing that are currently being undertaken or are required to be undertaken in order to fully meet efficiency productivity and competitive neutrality objectives.

PART B: COMPETITIVE NEUTRALITY

Chapter 63: Competitive Neutrality - In this chapter the submission describes the competitive neutrality problem and discusses the role of pricing.

Chapter 7: Pricing Principles - Chapter 4 outlines the role of pricing and the factors which need to be considered in setting pricing principles consistent across road and rail. It also describes the other non-pricing barriers to competition.

PART C: OPTIMISING THE FRIEGHT NETWORK

Chapter 8: The History of Pricing in the Road Sector - Chapter 5 discusses the history of heavy vehicle charges and outlines the objectives of each past determination as well as the recommendations of the recently rejected 3rd determination.

Chapter 9: The Current Regime **-** This chapter contains a detailed discussion of the current heavy vehicle charges regime, including the cost estimation and allocation methodology as well as the existing structure of charges. This chapter also includes a brief comparison of the heavy vehicle charges regime to that of the rail sector.

Chapter 10: Moving to a New Regime: Chapter 7 discusses the findings of NTC work on scoping a future heavy vehicles pricing regime. It discusses the overarching options which are believed to derive the most benefits in the roads sector and approaches to implementation. It also discusses existing technology and complementary road reform as well as international experience. This section concludes with a discussion on the overarching benefits of pricing reform (particularly in the roads sector) compared to competitive neutrality objectives.

An index has also been prepared identifying which parts of the submission address each of the issues set out in the PC's Issues Paper. In addition, issues relevant to the text in specific locations in the submission are presented alongside the NTC's response.

PART A: THE CONTEXT FOR THIS INQUIRY

2. THE PC INQUIRY

The Key Messages:

- Clear and consistent pricing principles are needed across road and rail sectors.
- The basis for full infrastructure cost recovery in both modes needs to be established.
- Optimising the road network requires a direct link between infrastructure consumption and the road investment.

2.1 The scope of the Inquiry

On 10 February 2006 the Council of Australian Governments (COAG) decided that the PC should consider the issue of freight infrastructure pricing in the context of competitive neutrality and promoting productivity and efficiency in the freight sector to enable the projected doubling of the freight task.

Specifically the COAG decision requires the PC to:

(i) *identify the optimal methods and timeframes for introducing efficient road and rail freight infrastructure pricing in a manner that maximises net benefits to the community;*

(ii) *determine the full financial, economic, social and environmental costs of providing road and rail infrastructure;*

(iii) *identify other barriers to competition in road and rail transport; and*

(iv) *recognise transport operators and users and remote and rural communities will need sufficient time to transition and adjust to pricing arrangements.*

This Inquiry has come at a timely point for the industry. The question of what is the best way to price infrastructure is again being asked, with a general consensus that the current arrangements in the rail and road sectors do not facilitate the freight market making optimal decisions.

Issue: Do participants agree a key contribution of the review would be to establish a framework, principles and feasible implementation paths for pricing road and rail infrastructure, and to explore mechanisms and institutional arrangements that would better integrate infrastructure supply and demand? Given the terms of reference, where can the PC's inquiry add most value?

The NTC agrees with the PC's assessment of the key contribution of this Inquiry. The NTC believes the Inquiry can provide the greatest value to the NTC's task of improving safety, efficiency and sustainability of land transport through national regulatory reform by:

1. establishing what role pricing reform should play in addressing the substantial challenges facing the freight sector;

2. setting out a framework for consistent pricing principles for use of road and rail freight infrastructure to address concerns about the competitive neutrality of road and rail freight, including guidance on the economic principles to apply in establishing the

costs to be met through infrastructure pricing arrangements and on the costing methodologies to be used in calculating these costs; and

3. confirming the need to change the nature of the relationship between road users and road suppliers to support optimal use of existing infrastructure use and provide better information signals for optimal infrastructure investment.

The need for these outcomes is considered in more detail in Parts A, B and C of this submission. Clearly there are further areas in which the Inquiry can add significant value which lie outside the NTC's direct role. For example, there is a need for greater consistency of rail infrastructure pricing within the rail sector (see Part B). Lack of reference to these imperatives in this section is not to down play their significance, but simply to recognise the significance of the Inquiry to the future reform programme the NTC pursues on behalf of Transport Ministers nationally.

In addressing these areas the Inquiry will provide the foundations from which pricing reform can be implemented. In doing so, it will be important for the Inquiry to recognise the constraints, and the risks, inherent in transport infrastructure pricing reform.

The PC has stated it intends to focus its analysis on economic costs. This means it will look beyond financial measures of cost and consider the opportunity cost (the cost of the next best alternative) associated with infrastructure provision. The NTC agrees with this approach to determine the optimal level of expenditure. It is important to note that the economic cost associated with the provision of infrastructure differs from that resulting from using that infrastructure.

Issue: Do participants agree that the PC should focus on economic costs as the relevant measure of the costs of providing transport infrastructure?

There are two important themes that underpin this Inquiry: competitive neutrality and optimising networks. These themes address the cost base of prices as well as the pricing structures themselves. However, before these can be better explored it is important to understand the context of this Inquiry. The pricing challenge exists because of past decisions. Those decisions led to the current arrangements, which are no longer thought to be adequate for the future requirements of the industry. It is important to understand the history of these decisions and the extent to which pricing can address the problems within the road and rail sectors.

2.2 The role of the NTC

Before responding to the issues in the PC's paper, it is important to understand the role NTC currently plays in regulatory reform and infrastructure pricing.

The NTC is tasked under the Inter-Governmental Agreement for Regulatory and Operational Reform in Road, Rail and Intermodal Transport (IGA) with developing nationally uniform or consistent approaches to land transport regulation and operational reform, aimed at improving efficiency, safety, environmental sustainability and regulatory efficiency within road, rail and intermodal transport. It is also responsible for recommending national heavy vehicle road use charges to the Australian Transport Council (ATC). The ATC considers the NTC's proposals (for regulatory and operational reforms as well as heavy vehicle charges) and determines whether or not to approve them. If a majority approves the proposals, all governments are obliged to implement them.

Clause 5.1 of the IGA sets out that one of the responsibilities and functions of the NTC is to:

> *"(c) develop*
>
> *(i) road use charging principles for Heavy Vehicles (until such time as the Council decides that another organisation should undertake this function);*
>
> *(ii) Proposed Reforms in relation to Heavy Vehicle Road Use Charges based on charging principles agreed by the Council from time to time;"*

The IGA specifies that a:

> *"Road Use Charge means a fee for payment for use of the road system, which in the case of a Heavy Vehicle, does not include:*
>
> - *a nominal or other administration charge associated with registration of a vehicle;*
> - *stamp duties;*
> - *compulsory third party insurance premiums;*
> - *injury protection charges; and*
> - *administrative components of permit, licence or other fees."*

Clause 5.2 provides for other reforms developed by the NTC to differ in the areas of Australia in which they apply. However, the IGA does not allow this to occur with heavy vehicle charges, emphasising the importance placed on their national application[1].

The IGA does not set out any role for the NTC in rail access pricing, or in pricing of access to intermodal terminals. There is provision for additional functions to be referred to the NTC (provided a majority of Ministers agree), but to date no consideration has been given to asking the NTC to play any role in rail pricing. As a number of other bodies have roles in these areas, the NTC has no expectations of being asked to develop reforms relating to rail or intermodal access pricing.

Consequently, in discussing the details of infrastructure pricing this submission focuses on the areas in which the NTC has greatest expertise, that is, heavy vehicle road use pricing.

Beyond this, the NTC has much broader responsibilities in establishing a safe, efficient and sustainable land transport sector, through national regulatory and operational reform. The IGA sets out that the NTC was established to pursue an agreed objective of Australian governments of:

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[1] The NTC's role in recommending heavy vehicle road use charges follows on from that of its predecessor, the National Road Transport Commission (NRTC). The key difference is that the NTC's IGA is not prescriptive about the way the charges are to be developed. The Heavy Vehicles Agreement (the inter-governmental agreement underpinning the NRTC's role in heavy vehicle road use pricing) set out details about how the charges were to be calculated, including the data and model to be used along with the possible charging mechanisms. There was provision for some amendments to be made to the method, but a more onerous voting arrangement within the ATC was required to agree to any changes in the approach. Unlike the NTC's IGA, the Heavy Vehicles Agreement required charges to be agreed on a zonal basis. Complex rules applied to changing who was in what zone.

"…improving transport productivity, efficiency, safety and environmental performance and regulatory efficiency in a uniform or nationally consistent manner."

Some of the key responsibilities, in addition to those relating to heavy vehicle pricing are:

- developing regulatory reform proposals for road transport;
- developing a framework to improve and strengthen the co-regulatory system for rail safety including the application of mutual recognition;
- developing a national policy on key rail safety issues and procedures and standards to manager major rail safety risk factors; and
- monitoring and reporting implementation of reforms to the ATC and maintaining and reviewing existing reforms.

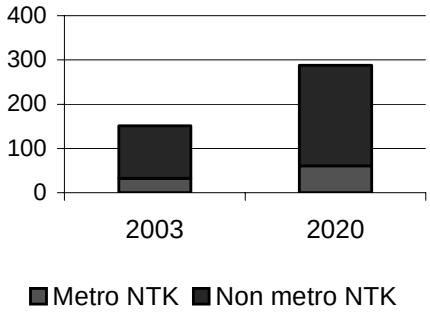
3. FREIGHT AND THE FREIGHT INDUSTRY

The Key Messages:

- Further transport productivity reform is required to manage the growing freight task.
- COAG has agreed to a package of transport productivity reforms.
- More efficient pricing has the potential to further improve productivity by creating a direct incentive to consume, rather than protect, the road asset.
- The diversity within and between modes creates a challenge for agreement on reform.

Pricing reform is a key component of the NTC's *Twice the Task* vision for transport productivity reform, released in February 2006. A position paper from the *Twice the Task* project *Improving the Regulatory Framework for Transport Productivity in Australia* is closely aligned with the Council of Australian Government (COAG) agreement for transport reform - reforming pricing to drive productivity subject to safety and environmental considerations.

The NTC proposes productivity-focused initiatives needed to address the forecast doubling of the land transport freight task. The underlying objective is to ensure the overall impact of freight movements in 2020 should be no worse than at present, and ideally better.



billion tonne-kilometres
Source: BTRE (2005a)

Figure 1. Freight Forecasts

A review of freight growth forecasts concluded that the rail freight sector will benefit from a more market-oriented approach, increased investment in rolling stock and track infrastructure and government initiatives to encourage port rail and intermodal terminals. But road transport will remain the dominant mode because of its flexibility and cost-competitiveness on shorter hauls. A 'do nothing' scenario for 2020 was seen as unacceptable as it would result in:

- a further mismatch of mass limits between modes;
- network congestion in urban areas and freight interfaces;
- one in four vehicles on urban roads carrying freight; and
- an additional 50,000 trucks on the network.

Twice the Task builds on past transport reforms and outlines why the momentum of reform must continue to maintain an efficient transport system. The report concludes the utilisation of each mode needs to be optimised, with seamless modal interfaces.

A package of transport reform initiatives is proposed to optimise the overall transport system. This includes more flexible regulation through Performance-Based Standards

(PBS) for heavy vehicles, pricing reform and technology–based route compliance tools. Integrating all three reforms promises synergistic benefits greater than the sum of the parts.

PBS can deliver significant transport productivity benefits by more closely matching the heavy vehicle fleet to the capacity of the existing infrastructure network. Current prescriptive (length and mass) vehicle regulations adopt a 'one size fits all' approach, which restricts the development of more productive and safer heavy vehicles through new technology (such as steering axles) and design innovation.

In contrast, PBS focuses on what these new Smart Management of Australian Road Transport (SMART) heavy vehicles can do – through a set of safety and infrastructure standards – rather than what they look like. For example, PBS standards will regulate the truck's ability to turn, brake, change lanes and travel straight ahead safely, without moving into the path of other vehicles or rolling over.

SMART heavy vehicles assessed to PBS standards are already operating under permit in some States. However, transport operators find the permit system, which is under increasing pressure, lacks consistency and accountability, and is administratively inefficient, particularly for operations in more than one jurisdiction.

COAG has identified PBS as a major productivity reform and calls for an effective and binding national decision-making framework. Specific benefits include:

- increased heavy vehicle productivity and safety;
- more flexible regulation, including greater alignment between road and rail; and
- mechanisms for quad axles and B-triples to access the network.

The productive capacity of SMART heavy vehicles can be more closely matched to the capacity of the infrastructure by using IAP as a route compliance tool.

IAP provides Global Positioning System (GPS)–based route compliance assurance for regulators through certified telematics service providers. The outcome is to improve access to the road network for trucks carrying larger loads.

The missing link in the NTC's *Twice the Task* vision is pricing reform. The current system of heavy vehicle charging provides no economic incentive for road owners to improve access for more productive SMART heavy vehicles, nor for regulators to agree to arrangements where individual SMART heavy vehicles produce more road wear.

Twice the Task concludes a direct fee for service relationship between road asset and vehicle owners is essential to shift the aim of regulation from asset protection to optimising its use. The report also identifies the potential for pricing to better inform infrastructure investment (see section 3.3).

Direct charging of the full cost of infrastructure use, linked to route choice, mass and distance, will allow operators to choose the right mode and level of consumption to deliver the best returns. The challenge is to achieve this objective in a cost-effective manner.

Other recommendations from *Twice the Task* are identified below. Some of these initiatives are outside the mandate of the NTC:

- a national body be established to plan and co-ordinate infrastructure investment co-operatively on a network basis. This builds on the Commonwealth Government's AusLink initiative;

- a review be undertaken of road and rail design standards to manage future freight capacity requirements;
- Australia should move further toward cooperative regulation, including the use of accreditation and industry Codes of Practice to provide more operator discretion in return for more accountability. This approach allows enforcement resources to be targeted on those outside compliance schemes;
- more flexible competition regulation that focuses on the whole transport chain, rather than individual parts, can deliver substantial productivity gains, providing competition policy is not compromised. Examples include the Hunter Valley Coal Logistics Chain and Export Grain Logistics joint venture;
- better alignment and harmonisation of regulation is needed, including consideration of a national rail safety regulatory system; and
- reforms be implemented progressively using jurisdictions to pilot reform allows the impacts to be fully assessed before full national implementation (e.g. quad axles in Victoria, IAP and Fatigue Management Program in Queensland).

It is important to distinguish the freight market from the freight infrastructure market. Freight infrastructure prices are only a component of final freight charges and only reflect the cost of supplying and maintaining infrastructure. There are a number of externalities that exist within operations that may not be reflected in final freight charges. This is particularly true with safety externalities that are not internalised. Whilst pricing may have a role in recovering these costs, it may be more appropriate for regulation to address them, effectively fully internalising the costs associated with these externalities.

Whilst freight charges are not the subject of this Inquiry, it is important for failures in freight markets to be addressed due to the impact that this has in the freight infrastructure market. Distortions in the freight infrastructure market arise out of the distortions in the final market as a result of demand signals. These ultimately drive investment signals in the freight infrastructure market.

3.1 The diversity within the freight industry

One of the most significant features of the Australian freight industry is its considerable diversity within, between and across the road and rail sectors. Arguably, this creates the biggest challenge to any reform in the land freight sector.

The road and rail sectors have very different structures (in terms of infrastructure supply and freight service providers) and there are complex interactions between road and rail service providers often via a range of intermediary agencies. Road and rail are competitors on some routes but are complements in others. Their relationship to each other is highly dependent on origin and destination as well as the freight itself.

The role of road and rail also differs significantly. The road use or road freight sector is dominated by private motoring users. The road sector is very much a mixed network with light vehicles and heavy vehicles sharing the whole network—few roads are freight specific. Much of the road freight activity revolves around the urban and regional distribution task. Line haul/long distance interstate activity often receives much of the public attention because many of the competitive neutrality issues facing the freight sector are present on those routes, and because at a national level this sector of the road freight industry is more active in representative associations and lobby groups. Because of the

dominance of light vehicles on the road infrastructure, the decision to invest in a road is dominated by light vehicle requirements, whilst the design and standard of the road is a combination of the needs of both heavy and light vehicles.

Although the rail sector also caters to freight and non-freight users, the relationship of the users of the network with the network is very different to that of road. Freight is divided into movement of bulk products (some on dedicated independent systems) and general freight which moves between major urban centres over relatively long distances (compared to road). Passenger trains are predominantly urban based, sometimes on separate track.

Operators vary considerably depending on the mode. In the road freight sector, ancillary operators (whose main business is non-transport related, e.g.: agriculture) have increasingly contracted their transport needs to hire and reward operators. NRTC (1998a) estimates the percentage of hire and reward trucks now represents 40% of the total fleet (26% in 1983) and 50% of total kilometres travelled.

Low barriers to entry have ensured a highly competitive marketplace. Hire and reward operators sought to improve margins, and respond to customer needs, by offering added value services such as warehousing, logistics management, freight tracking, systems integration and road/rail forwarding.

Although a number of large transport operators have emerged, the industry remains fragmented. About 85% of hire and reward operators have less than five employees (NRTC 1998a). Smaller businesses who are less able to improve vehicle utilisation through driver changeovers, or provide value-added services, anecdotally report significant price pressure.

Furthermore, the types of vehicles operating on Australian roads are considerably diverse (and are set to become even more so in the future). Freight carrying vehicles range from small vans used by couriers and tradespeople through to 200 tonne combinations of a prime mover and multiple trailers, specifically designed and dedicated to a particular task. Although there are broad classifications of heavy vehicles, the configurations of trailer and prime mover, as well as the increasing customisation of vehicles for specific freight tasks, has meant the traditional classifications no longer accurately encompass the whole heavy vehicle fleet.

Freight operators in the rail sector are fewer in number than those in road transport, and include both public and private carriers; some of the latter are very large integrated owners and exclusive operators of infrastructure dedicated to a single purpose (e.g. carriage of export iron ore). Rapid consolidation followed the privatisation of State government–owned railways, with two national bulk and intermodal operators emerging. The desire to offer a national integrated end–to–end supply chain has driven the vertical integration of freight services (such as Toll Holdings) and alliances between other operators.

There is also considerable diversity in the rail rolling stock fleet, particularly when compared to overseas wagon fleets. However their productivity is also hampered by rail pricing, operating rules and regulations.

3.2 Changing freight movements

Freight forecasts from the Bureau of Transport and Regional Economics (BTRE 2005a) predict the domestic freight task (including by air and sea) will increase by 80% from 378 billion tonne-kilometres (btk) to 683 btk between 2000 and 2020. Road and rail transport will almost double over the same period, increasing from 268 btk to 523 btk. The analysis

undertaken to support the *Twice the Task* paper revealed that all forecasts of the future freight task revealed similar pictures.

Although the greatest increase in the task will be in rural areas (driven by the minerals and agricultural sectors) the greatest impact will be in urban areas where the increasing trend for lighter but more frequent movements is expected to create significant congestion pressures. Long haul trips will be characterised by heavier payloads. In essence the variation between freight transport will grow further, placing even greater pressure on the existing regulatory regime to adequately reflect the freight task.

Road transport is expected to remain the dominant mode for freight movement, increasing its market share (calculated on tonne-km) by 6% to 42% (BTRE 2005a). Heavy vehicles offer a flexible door-to-door service capable of handling small shipment sizes, which is suited to managing the service demands of logistics chains.

A more market-oriented management approach and planned investment in track infrastructure, such as more passing loops, is likely to reduce trip times and increase rail's market share on long haul corridors (Melbourne-Brisbane and East-West). But rail is less competitive on short haul routes (Melbourne-Sydney). It has no role in urban and most regional distribution tasks.

Initiatives are in place to encourage the use of port rail shuttles and intermodal terminals in urban areas, but there is no alternative mode for the bulk of freight movements to

Box 1 : The changing freight task

Case study: Impact on freight users

Example 1: Carlton & United Breweries (CUB)

Carlton & United Breweries' (CUB) customer-driven multi-beverage strategy drove an evolution from a traditional hub and spoke distribution network set up around a few high volume beer brands, to a more complex model characterised by a wider range of stock units, smaller run sizes and a more diverse range of customers.

A review to develop a fully-integrated least-cost source manufacture and delivery network followed CUB's decision to close the Kent brewery in Sydney's CBD. Production was relocated to an expanded facility in Yatala, Queensland, in early 2005.

Linehaul B-double trucks carry multiple product inbound and outbound along the Pacific Highway. Slow moving product is trucked to the Acacia Ridge rail terminal in Brisbane and railed to Yennora in Sydney. Source: *SupplyChain Review*, March 2005

Example 2: Retail distribution

In 2003, Coles-Myer announced a decision to rationalise its distribution network from 41 to 24 facilities, which operate 24-7 for improved asset utilisation. Slow-moving product lines will be handled through two dedicated distribution centres (DCs). Direct-to-store deliveries from vendors are being reduced to minimise local stockholding.

Retailers' primary freight strategies (Factory Gate Pricing) are being rolled out to take control of, and manage, primary (inbound) freight movements into the DCs. This builds network volumes and further opportunities for back-loading secondary (outbound store) freight, the consolidation of small orders onto full truckloads and round-tripping.

Cross-docking product received at the regional DCs allows freight to be consolidated and loaded quickly onto specialised multi-temperature trailers, which replenish the stores 'just in time'. Product is loaded and delivered in roll cages in place of pallets to minimise manual handling.

warehouses, retail outlets, construction sites and homes. Only 10%-20% (NTC 2006a) of the current and projected road freight task faces competitive pressure from other modes.

To deliver the best outcomes for the nation, *Twice the Task* concludes it is important that the utilisation of each mode is optimised, with seamless interfaces at terminals.

4. FREIGHT INFRASTRUCTURE

The Key Messages:

- Drivers of investment for road and rail differ (e.g.: social amenity is a key factor for roads, economic viability for rail) and reflect ownership structures and use.
- Past investment decisions reflects the differing starting points for road and rail.

4.1 The road network

The road network is managed by all levels of Government. The National Highway is Australia's primary interstate road freight network, supporting regional and national economies in addition to supporting passenger movements. Because of its national importance, the Federal Government funded all aspects of the National Highway until the introduction of the Auslink funding scheme. Under this programme, the Federal Government funds projects of national significance and strategic importance in both the road and rail networks, but no longer guarantees to meet the full maintenance costs of the National Highway. While classification systems vary by State, State and Territory road authorities are generally responsible for the management and development of the freeways and major arterial roads (in both urban and rural areas) within their borders. These roads generally provide a function of linking population centres. State and territory authorities also administer Auslink funding, including the National Highway. The majority of the other roads that make up the balance of the national road network are predominantly managed, maintained and developed by the local municipal councils. There are, however, significant lengths of private roads in Australia. A small amount are toll roads. Most are on private land and support the resources sector (mines, farms and the forestry industry). Some also support remote communities in unincorporated areas.

Perhaps the key defining characteristic of the road network relative to that of rail is its extensiveness. It provides access to a far larger range of destinations, indeed most properties in the country are serviced by roads. While for the vast majority of rail lines there is an alternative available in road, the same could not be said in the opposite case. Significantly for the efficiency of the supply chain process, roads generally provide access right up to the point of delivery. However, often with rail, there exists the need for the 'last mile' of the shipping process to be undertaken by a truck.

Another defining characteristic of the road network is its multi-product nature. Its function extends to providing access for passenger vehicles to a far greater extent than is the case for rail. In fact, it can be said that providing access for passenger vehicles is the most significant driving factor behind network investment, design considerations and even sometimes maintenance assessments, whilst heavy vehicles influence pavement depth and bridge strength. In other words, the passenger task is far more central to roads. The ability of the freight and passenger tasks to co-exist within the road network is also an important feature. While some rail passenger services do share lines with freight, the road network jointly performs a number of tasks at the same time through a single network. In roads, the integration is far more seamless. So on one hand, passenger travel is far more prevalent and central to the road network's function, but on the other, the integration with freight travel is simpler.

The diversity of the road network is also notable, particularly in relation to purpose and construction standards. There is a clear link between the forecast levels of traffic and its standard of construction. For example, major intercapital corridors would enjoy far better

durability and smoothness than smaller rural roads where traffic is infrequent. Community service obligations (CSOs) also play a major role in the decision making process around constructing and maintaining certain roads. It A significant proportion of the road network is provided solely for the purposes of amenity as opposed to being economically justified. This is particularly true for local roads, in the sense that the standard of construction often exceeds what would be warranted on the basis of traffic levels. CSOs are also particularly relevant in rural areas where dramatically low traffic volumes would not justify the construction of certain roads in the first place. Conversely, in rail, there is far more reliance on financial viability in the decision making process around network expenditure. This is not to suggest that all roads are built above a standard that is economically warranted. Many have observed that there is significant underinvestment in roads in certain areas. As described earlier, all levels of government are involved in the provision of road infrastructure, so achieving optimal investment is a difficult task. Also, economic analysis is limited in its ability to assess the benefits of policies that serve re-distributional objectives within society.

Apart from the standard to which a road is constructed, differences in the geographical and climatic conditions in which roads operate are a large driver of their performance. For example, there are significant sections of Queensland where the roads are built on 'black soil', which in wet weather conditions is soft and malleable, leaving the pavement susceptible to loading and early failure. Queensland is also subject to heavy rains in parts, which also impacts on roads' durability. In places where the roads are built on hard rock-like surfaces, or where there is little rain, one would expect better performance of the roads. This is the case in South Australia and Western Australia.

4.2 The rail network

The rail freight network is considerably smaller and (except for heavy haul mineral lines) less dense than the road freight network. The rail network does not extend to provide access to almost every property, in all regions of the country. It comprises a system of national interstate corridors joining all capital cities and major industrial centres, which predominantly carry containerised general freight, steel and some bulk commodities; this system has recently been extended to include Darwin. Linked to this system are state-based networks predominantly dedicated to bulk commodity transport (grain, coal and other bulk products). In two States, Western Australia and South Australia, there are significant privately owned lines integrated into and dedicated exclusively to iron ore mining operations. There are also major urban passenger rail systems in all mainland capital cities. Parts of the Sydney and Melbourne urban passenger networks also cater for freight trains.

While the rail network is able to accommodate varying requirements of operators through tradeoffs in axle mass/speed, outline gauge, train length, and numbers of tracks, it has natural capacity constraints due to the technological limits of braking and acceleration which impact on the headway requirements between trains. A fundamental difference between the road and rail freight networks is the requirement for the capacity to be explicitly managed on the rail network. Management of capacity is measured in 'paths'. The requirement to manage train "paths" has impacted on the pricing approach which has been adopted. Train paths provide the basis for the rail infrastructure charging system: prices generally comprise a fixed 'flag-fall' component for occupancy of a "path" plus a variable mass-distance charge. It can therefore be observed that rail infrastructure pricing incorporates a 'congestion' charge.

4.3 Investment

Drivers of investment in the road and rail sectors differ considerably. Road infrastructure is owned and maintained by around 700 road agencies including the State and Territory road authorities and local governments. In contrast, rail infrastructure is managed by nine track owners or long-term lessees, the largest of which are the Australian Rail Track Corporation Ltd (ARTC) (Commonwealth Government owned), Queensland Rail (State Government owned), WestNet Rail and Pacific National (privately owned). Major dedicated iron ore railways in Western Australia are owned by Rio Tinto and BHP-Billiton, and in South Australia by One Steel. Unlike road infrastructure managers, all rail track owners are either public or private corporations driven by commercial objectives.

Issue: How can infrastructure investment decision-making be improved? For example, through application of consistent and transparent cost–benefit methodologies? Or are institutional reforms also needed to promote a more commercial approach to road and rail infrastructure provision and pricing? What institutional reforms would be most effective or desirable?

There are a number of features which differentiate road infrastructure managers to rail. The most important revolve around the institutional arrangements in road, in particular the impact that the lack of hypothecation has on investment signals.

Hypothecation is essentially the flow-through of charges revenue to the organisation incurring the cost. This does not currently exist in the road sector. Instead, charges revenue flows back to the consolidated funds of State, Territory and Federal Governments. Whilst some States and Territories earmark this funding for road expenditure, it is not necessarily earmarked for roads/PAYGO expenditure (i.e. the expenditure which heavy vehicle charges are calculated to recover). Because agencies do not receive direct funding from infrastructure users they are subject to the budget process for capital and maintenance funding and compete with other departments and agencies. Budget allocation is based on cost benefit analysis as well as political priorities. This can create uncertainty on future funding.

Furthermore, due to the high mixed use of the road network, investment which may have a greater benefit for the freight market (compared to private use) does not always have priority. As a result, freight routes may be inconsistent in quality. Also, work on bridges and other freight bottlenecks may be downgraded in importance. The absence of a pricing mechanism that can encourage truck operators to use the lowest cost routes means that funding to provide freight infrastructure cannot be as readily targeted to preferred routes.

The rail sector does not generally suffer this arrangement. The corporatised nature of the rail industry means that revenue from the charges set by the rail infrastructure manager are directly returned to the manager[2].

Despite this, the rail network faces a greater challenge in terms of capital investment than the roads sector. From the 1960s investment in new and replacement rail infrastructure was neglected by the system's mainly State Government owners. Exceptions were parts of the network in Western Australia and Queensland. This has left a legacy of under-investment, which has hampered the provision of competitive services, especially in New South Wales, Victoria and South Australia. New owners/lessees in all States except Queensland have

[2] The exception to this is Queensland Rail where track and train management is vertically integrated within a single, wholly government owned corporation.

begun to address this issue, but revenue yields are often insufficient to warrant either catch-up or new investment. In effect, achieving the required rates of return is difficult.

Adding to this challenge is the fact that freight and passenger networks are largely separate. This has meant that unlike roads, the rail sector has been largely unable to benefit from government investment in the rail network (which is predominantly in the passenger network). The combination of this and the inability to achieve the rates of return required by investors has meant considerable investment in the sector is now required to enable it to meet service requirements. The consequence of this is that although the short run marginal cost of rail operation is relatively low, the long run marginal cost may be higher than in roads due to the backlog in investment.

It is important to note that the situation in rail does differ from State to State as different levels of reform have been undertaken. For example, in some networks (such as Victoria) freight does benefit from the passenger network to a greater degree. Some parts of the network receive greater CSOs than others (although they may be inconsistently applied). However, the general situation remains that investment in rail is more difficult than in roads.

5. OTHER ESSENTIAL REFORM

The Key Messages:

- Pricing alone cannot address the challenge of improving transport productivity.
- Road and rail reform needs to consider better alignment between the modes.

The previous chapters outline a complicated sector. They describe the different structures of the road and rail sectors, the diversity within the sectors and also the future pressures placed on the industry as a result of the growing freight task.

It is clear that pricing will have an important role in enabling the freight industry to deal with its future requirements. Specifically it can enable enhanced access to the network, manage existing demand and provide better signals for future investment. However, pricing exists within a broader framework. It is important to understand how the full impact of pricing can only be achieved in combination with other reform measures.

Issue: Other than price, what are the major impediments to efficient use of road and rail freight infrastructure? These might include (but not be limited to):

- *prescriptive regulations;*
- *differences in regulations across jurisdictions;*
- *inadequate infrastructure investment decisions;*
- *access impediments to rail track or intermodal facilities;*
- *regulatory and planning impediments to private infrastructure investments; or*
- *industrial relations issues affecting service levels.*

How should these impediments be addressed? Which are the most important? Is there a preferred sequence of reforms?

5.1 Performance-Based Standards (PBS)

The regulatory framework for the roads sector is characterised by prescriptive rules. One of the aims of the NTC is to establish uniform or consistent regulations across all States, Territories and the Commonwealth. Considerable progress has been made on this front and has led to significant improvements in productivity. However, these benefits are difficult to maintain in an environment where exemptions from rules are continually sought in response to changing freight needs and technological change. Pressure to grant these exemptions is high where the existing prescriptive rules are based on the lowest common denominator on the more vulnerable parts of the road network.

The new wave of reform requires a more flexible arrangement and the ability for the market to determine usage (including how much road wear it is economic to cause) and inform investment. The current prescribed approach cannot facilitate this. Establishing a direct pricing regime can be a mechanism for achieving this outcome. However, it requires a platform from which it can be launched as pricing on its own will not manage safety outcomes or protect vulnerable infrastructure from destructive loading (where a single vehicle is sufficiently heavy to instantly destroy infrastructure rather than speed up its rate of wear).

COAG (2006) has identified the NTC Performance-Based Standards (PBS) project as a key initiative in the improvement of productivity. PBS, if implemented as envisaged, will provide an alternative national regulatory framework to the present (technologically retrospective) system of heavy vehicle regulation in each separate jurisdiction.

Over the longer term, PBS is seen as the key productivity reform that replaces one-size-fits-all rulemaking, as it will provide a regulatory framework for operator-driven flexibility in vehicle design and operation, subject to agreed safety and asset standards. PBS is seen as a key element in a regulatory approach to road transport which will enable continuous productivity gains and technological improvement, whilst meeting reasonable safety, road asset protection and environmental standards. However, it will need to be able to provide a genuinely national regulatory framework for operator-driven flexibility in vehicle design and operation, with safety and asset protection standards which are not excessively conservative.

The PBS approach is seen as one part of a new regulatory paradigm for road transport regulation. Some of the elements of this approach are in place while others are under development. The basis of the approach is to position appropriate safety and environmental requirements, combined with assurance that these requirements are met, as prerequisites to community acceptance of more highly productive vehicles. This approach is seen as a bridge between the currently divergent views of those who place greatest emphasis on the productivity objective and those who place greater weight on safety and environmental outcomes.

The limitation of this approach as it is currently being developed is that, without a pricing mechanism, the infrastructure impact standards are predicated on SMART heavy vehicles causing no more wear than their prescriptive counterparts. While this gives the flexibility for marginal productivity improvements to occur, significant improvements are not able to be achieved. If vehicle operators could determine how much infrastructure wear they were prepared to pay for, PBS provides the additional controls to ensure the vehicle can safely operate at the desired mass and a means of specifying the level of infrastructure wear that will result.

Thus, while PBS in its own right can facilitate better usage of the existing network, coupled with pricing it can provide a mechanism by which the market suffers fewer constraints.

5.2 Compliance and enforcement

Pricing can enable enhanced access to the network for both rail freight and the heavy vehicle fleet. However, due to the sheer size of the road network and number of operators, the issue of compliance and enforcement is a greater concern in the road sector. Thus while regulatory approaches have been adopted to manage safety and environmental externalities, the full cost of these externalities is not internalised in the road sector while compliance with the regulations is not forthcoming.

Two major reform initiatives are currently being introduced to tackle both the existing issues with compliance as well as new challenges arising from a more flexible system of regulation.

The Compliance and Enforcement (C&E) initiative developed by the NTC is introducing a new way of looking at responsibility for breaches in the conditions of use of the network (Austroads 2006). It has introduced a “Chain of Responsibility” concept, which essentially means that the driver is no longer solely responsible for a number of regulatory breaches. Instead a more holistic approach is taken to determining who is responsible for the breach. For example, the problem of overloading is no longer only the problem of the driver. If a vehicle is found to be overloaded then all those in the transport chain who were involved in decisions about putting the vehicle on the road are held responsible for their decisions. This means the packer, loader, vehicle operator, dispatcher and receiver are all held

accountable. The initiative imposes obligations on all these parties to take reasonable steps to ensure the law is upheld. Knowing that a vehicle is overloaded, or being in a position where they should have known, and doing nothing about it is no longer acceptable. The objective is to create incentives for the whole industry to take responsibility in the carriage of freight. In addition this initiative goes some way to addressing the competitive advantage of road due to poor compliance. Coupled with the introduction of risk-based categorisation of offences, a greater range of sanctions, increased powers of enforcement offices and procedures to make achieving a conviction simpler, these changes have the potential to impact significantly on compliance outcomes in the road sector.

The Intelligent Access Program (IAP) is also crucial in allowing greater flexibility in access to the network. Enhanced access to the network may be granted to operators provided they participate in IAP to ensure they meet conditions for their access. IAP requires vehicles to be fitted with a telematics device in order for the vehicle's location to be monitored using GPS and other devices. The information collected through the device is transmitted to a service provider. Should the vehicle breach its conditions of access, a non-compliance report is immediately issued to the relevant jurisdiction. Although there is a cost of participating in IAP, the benefits of enhanced access exceed the costs. In early trials of this approach, these benefits proved to be significant.

IAP will be crucial for the monitoring of any enhanced rights purchased by operators through a direct pricing regime. There is also considerable opportunity for an enhanced IAP to be used for collecting information for charging purposes. However, as will be discussed later in this submission, there are considerable limitations to the technology which may limit its application and the scope of direct pricing.

5.3 Investment evaluation

As has been discussed, more fundamental to the issue of pricing in the freight sector is the issue of infrastructure investment. Investment in the arterial road network is subject to cost benefit analysis (CBA). A CBA effectively calculates the full economic cost and benefits of a project. A positive CBA reflects a project where the benefits exceed the costs and therefore is justified. This approach has been applied in varying means since the early 1980s for arterial roads in each jurisdiction. It is not as rigorously applied to local road investment decisions.

Investment justification in the rail sector is generally undertaken on a different basis. This is due to the liberalised nature of the sector. Private or corporatised entities (such as the Australian Rail Track Corporation (ARTC)) are less inclined to undertake a complete CBA as part of their investment evaluation. This is because it is more interested in the private returns (profit) to the company rather than the full economic benefits of a project which includes benefits that accrue to society. Generally speaking, those projects which are deemed to have a greater social benefit by government are then funded by an explicit CSO or grant.

This disparity in investment evaluation places rail at a significant disadvantage. Furthermore, whilst road freight often benefits from politically motivated investment (due to the greater mixed use of the road network), the same is not true for the rail sector. The same political motivations can also work to the detriment of road freight, where they divert scarce funds from economically justified projects that benefit freight to projects with less net benefit that support mobility or access needs of specific communities. In order for pricing to be effective, it will be important that not only does it provide investment signals,

but that those signals are able to be acted on. In order for that to occur there must be consistency in the investment evaluation process across modes and jurisdictions.

5.4 Planning land use

Pricing can only have an impact if investment is able to be undertaken. To this extent it is important that land use planning considers the issue of freight transport. In particular, the issue of access to intermodal terminals is crucial for the efficient movement and management of freight and enables rail freight in particular to be more competitive.

Similarly, land use planning outcomes need to complement freight movement strategies, so that it is possible for business to locate upstream and downstream services close to other industries in order to reduce transport needs in response to a change in freight prices. Equally they need to be able to access the road or rail network on suitable freight routes rather than on routes primarily designed to provide residential access.

Potentially, road pricing could be used as a tool to encourage use of routes more suited to heavy vehicle use, where for example a number of routes might be chosen to access an industrial area and there is a preference for planning, amenity or investment reasons to concentrate heavy vehicle traffic on only one of the available routes. This use of pricing would require the ability to vary prices according to location.

5.5 Improving intermodal access

Issue: For which tasks and for what proportion of the freight task are road and rail complements?

Road and rail are often viewed only as competitors to each other. In this regard, any reforms to the road sector which may improve its productivity are often viewed as a threat to the rail sector. However, it is important to appreciate that rail and road are also complements. The rail sector is heavily dependent on road transport for pick up and delivery of its freight. This includes movement of bulk products to rail heads over short distances by road and long distance to export ports by rail. Although it is unknown what proportion of the freight task this involves there is very little freight for which road is not part of the transport solution and improved flexibility and access for the road sector could actually lower costs and improve service for the rail sector.

The cost associated with this road interface is often a high percentage of the overall cost of rail freight movement. Improvements in road fleet productivity can therefore have a positive flow on effect to rail costs. This may be achieved through the improvement of the road rail interface at intermodal terminals to allow better access. It may also be facilitated through the enhanced access of road operators to use longer vehicles or those that can carry greater mass to previously restricted parts of the network which may also be intermodal access points. Pricing is an effective tool which can facilitate this.

Box 2: Road and rail working together

Case Study: The global supply chain of meat

The NTC's *Twice the Task* report identifies the need for more flexible regulation to better align and road and rail modes. The weak link in global export supply chains is often the landside road transport leg in Australia.

For example, the US state of Pennsylvania legislated to increase mass limits in 2005 to 107,500 lbs (48.76 tonnes) for trucks carrying 40 foot shipping containers of frozen meat from the port direct to the warehouse. Previously, these heavy containers would be packed below capacity to stay within legal truck weight limits.

According to the Port of Philadelphia, the legislation was the end result of a cooperative effort to contain the costs associated with importing refrigerated and frozen meats. By allowing heavier containers, shippers can take advantage of economies of scale to keep transportation costs low, resulting in lower end costs to consumers.

Most frozen meat cargoes entering the Port of Philadelphia consist of grinding meat originating in Australia and New Zealand. This meat is a prime component in hamburger patties, pizza toppings and seasoned ground meat for tacos.

Performance-Based Standards (PBS) provides a framework for innovative heavy vehicles such as a 50 tonne quad axle semi-trailer to access the road network. Equipped with lift and steering axles, this SMART truck can carry higher mass containers from the abattoir to the railhead without causing unacceptable damage to the road network.

PART B: COMPETITIVE NEUTRALITY

6. COMPETITIVE NEUTRALITY

The Key Messages:

- Infrastructure pricing is only part of the problem and therefore has little influence on mode choice.
- The contestable market for freight is relatively small; although more important for some markets and corridors.
- Regulation has a greater role than pricing in managing externality costs.

The PC Issues papers states "competitive neutrality pricing implies an absence of differential subsidies (implicit or explicit) between transport modes or within them".

Issue: Do participants agree with the PC's interpretation of competitively neutral pricing? If not, how should 'competitively neutral pricing regimes' be interpreted?

Within the transport industry, competitively neutral pricing is generally described as each sector paying its way. The rail sector generally argues that the road sector fails to pay its way because it does not incorporate externalities in its charges, and often suggests that the full costs of providing and maintaining the road network are not captured through the current expenditure recovery arrangements. The road sector states externalities are internalised and that it overpays for use of the network.

Neither sector paints the true picture. Furthermore, the issue of competitive neutrality goes beyond simply pricing.

6.1 Is there a problem?

There is little doubt that a competitive neutrality problem exists in the freight transport sector. However, the extent to which it is a problem very much depends on ones perspective.

6.1.1 The contestable routes

Not all routes on the rail and road network are contestable. Contestable routes are essentially the routes where freight customers have a choice of using either road or rail. Although there are a number of contestable routes, the one which generally seems to suffer from the failure in competitive neutrality is the national highway between Brisbane and Melbourne (see Figure 2).

Figure 2. Auslink National Network

There are no specific estimates of the level of freight that is contestable in Australia. One approach to assessing the possible magnitude is to consider the intercapital corridors. Based on BTRE estimates of road and rail freight volumes on these routes (BTRE 2003) taken as a proportion of the land freight task as a whole, overall contestable freight share could amount to roughly 26% of net-tonne kilometres.[3] This translates to rail's overall market share amounting to roughly 9% of the total freight task. However in many instances, road and rail freight are complementary goods, rather than competitors.

Issue: On which routes and for which freight tasks are road and rail more likely to compete? What are the key factors influencing contestability? Are these factors likely to change? What proportion of the freight task is contestable?

Whilst this paints a general picture that the rail sector has more reason to be concerned with competitive neutrality than the road sector, this is not strictly true. The true level of interest is dependent on the specific freight market and route in question.

[3] This approach does not explicitly account for intra state bulk movements. For intrastate bulk rail, the net tonne kilometres in question are absent from the 'contestable' total and the base which it is expressed as a percentage of. This would be offset by the fact that interstate bulk road is excluded from the 'contestable' total but included in the base. Therefore, the omission of intrastate freight from the calculation should not significantly affect the calculated percentage contestable freight.

Table 1. Rail Market Shares by Corridor and Year

Corridor	2001	2004	2010
Melbourne-Sydney	0.12	0.10	0.07
Sydney-Brisbane	0.16	0.12	0.07
Melbourne-Brisbane	0.31	0.32	0.33
Sydney-Adelaide	0.18	0.15	0.11
Melbourne-Adelaide	0.15	0.11	0.05
Eastern States-Perth	0.71	0.71	0.71
Sydney-Canberra	0.00	0.00	0.00
All corridors (tonnes)	**0.21**	**0.19**	**0.16**
All corridors (tonne-km)	**0.37**	**0.35**	**0.33**

Source: (BTRE 2003, as cited in NTC 2006b). Market shares on either basis are essentially the same by corridor but the average rail market share over all corridors is higher on a tonne-km basis as rail market shares are higher on longer corridors.

6.1.2 Elasticities of demand for road and rail, and their dependency on mode shares

Issue: How sensitive are freight users to price changes

Whilst price is often argued as being the reason behind the lack of competitive neutrality, this is only part of the picture. Much of the research on elasticities suggests that demand for the use of a specific mode is more inelastic the higher the mode share. This is not unexpected as the significant cost savings of very long distance rail freight give it a significant advantage over road freight. However, the same is not true over the relatively shorter routes. In these cases, although rail may have a slight cost advantage to road, it is unable to match service quality. As a result, road is able to effectively compete along these routes.

This is demonstrated in a set of cross price elasticities calculated in recent work undertaken for the NTC. Own price elasticities for road were obtained through a literature review, and these were converted to cross price elasticities using standard economic relationships.

The range presented in Table 2 results from different market shares and freight rates in the five corridors for which suitable data are available. The cross elasticities are larger for the shorter corridors (Melbourne-Sydney, Sydney-Brisbane, Melbourne-Adelaide) where the rail markets have a low share.

Table 2. Cross Price Elasticities

Corridors	Road Price Elasticity	Cross Price Elasticity	
		Minimum	Maximum
Short haul	-0.5	4.03	5.39
	-0.7	5.64	7.54
Medium haul	-0.7	3.62	3.62
	-0.9	4.65	4.65
Long haul	-0.9	0.61	0.61
	-1.1	0.75	0.75

Source: (NTC 2006b

This analysis clearly indicates that over short and medium haul routes, freight users are less sensitive to changes in prices and consider other issues when making modal choices. What the analyses are not able to show (as sufficient data is not available) is that in all likelihood price elasticities vary considerably between different types of freight. Low value goods, such as most bulk products, which are not time sensitive, are more likely to be responsive to differences in freight rates, while high value, time sensitive freight (such as just in time retail deliveries) are likely to be insensitive to freight prices.

The following section discusses what issues affect competitive neutrality.

6.2 What is the issue?

6.2.1 Externalities

Externalities are not completely addressed in the pricing regimes for either rail or road. However, it is generally accepted that the externalities associated with the road sector are much greater than those associated with rail. Therefore this section will focus on roads.

Issue: What are the major externalities associated with road and rail freight infrastructure use?

There are considerable barriers which have prevented externalities from being incorporated in heavy vehicle charging. These include:

- relatively little quantitative research on externalities in Australia—much of the research done in this area has been done in Europe and the US;
- uncertainty as to the degree to which some externalities may in fact be internalised;
- the lack of a charging regime which would effectively incorporate externality costs; and
- no policy decision in terms of the objective of including externality costs in charges—if the objective is to reduce the externality, then regulations may be a more appropriate mechanism.

The most commonly identified road externalities have been identified and discussed in light of these considerations.

Safety

The costs of accidents relating to heavy vehicle use are extremely significant. The NTC estimates that in 2000, these amounted to around $2 billion a year (ATC 2003). The degree to which these costs are currently internalised is not known[4]. For example, the extent to which compulsory third party insurance premiums and private third party motor vehicle property insurance covers the wider costs of heavy vehicle accidents would need to be established before any pricing arrangement could even be considered.

Issue: How are these externalities related to road or rail use? For example, do the impacts vary by vehicle type, mass, distance travelled, location and type of road? What role do other factors play, such as vehicle age, or driver behaviour and ability?

Are any of these external effects already incorporated in freight costs? By what mechanism? To what extent do existing mechanisms adequately address the externalities? What are the costs of these mechanisms?

A related problem is the assignment of costs of crashes involving heavy vehicles. A large proportion of heavy vehicle crashes involve more than one vehicle, typically a car and a heavy vehicle. However, analysis of crash data reveals that in around 80%[5] of these crashes the light vehicle is assigned fault—that is, despite being involved in a significant number of crashes, the heavy vehicle is rarely the cause of the crash. Nevertheless, improved performance from the heavy vehicle or its driver might mean that it is more readily able to avoid a crash that is the fault of another road user.

There currently exist a number of regulatory measures aimed at reducing safety externalities. Fatigue regulations are currently under development by the NTC, which address the problem from a range of angles. Performance Based Standards being developed by the NTC would also have the effect of enhancing safety outcomes by providing the incentive of improved access to networks. Compliance and enforcement initiatives also address safety concerns.

Ultimately, there are a number of difficulties in determining the appropriate treatment of safety externalities. One of the main difficulties is in fully understanding the extent of the externality. Heavy vehicles have a significantly greater involvement in fatal accidents than light vehicles: however, light vehicles exceed heavy vehicles in their involvement in total accidents on a VKT basis[6]. Furthermore, the causes of accidents vary and therefore determining a charge which can adequately reflect the cost and those incurring it is difficult.

For that reason, it may be more appropriate for safety externalities to be internalised through safety regulations or improvements in infrastructure standards and passed on to freight customers through freight charges.

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[4] However, work is currently being done by the BTRE on this topic

[5] ATSB monogram on truck crashes

[6] NTC acknowledges that this probably simply reflects the dominance of light vehicles on the road as well as trip time and location.

Congestion

The issue of congestion is not limited to heavy vehicles. There is a strong case to suggest that congestion is mainly driven by light vehicles. This is because the freight sector has commercial incentives not to operate in congested areas, or at times of high congestion: essentially the value of a freight trip is greater than the value of a private trip and influences time of use.

The appropriateness of incorporating a congestion charge into a national freight pricing system is also questionable due to the local nature of the problem. It would be difficult to develop universal pricing solutions that would satisfactorily account for the geographic, network and utilisation differences between cities.

It is important to note that although congestion is not a significant issue in relation to road freight, it may be more of an issue for rail freight where capacity constraints are tighter.

Greenhouse emissions

Issue: How should greenhouse gas emissions be valued?

Greenhouse gas emissions by their nature are not internalised within the freight industry. There is an absence of adequate technology, at present, that might provide a suitable regulatory solution, although technologies such as hydrogen engines may ultimately provide a solution. Therefore, many are of the view that pricing would be an appropriate tool to moderate their incidence.

However, greenhouse gases are essentially proportional to fuel usage. Fuel economy is already taken very seriously by the industry as it has a very significant effect on profitability. Manufacturers constantly strive to produce the most fuel efficient engines they can, without the need for regulation, solely because of market demands. While some countries regulate light vehicle greenhouse emissions, none regulate heavy vehicle greenhouse emissions because of strong market demands for fuel economy.

It is also important to note that freight vehicles produce only a small proportion of all greenhouse gases. It may therefore be more appropriate to deal with greenhouse gases through a broader approach than freight infrastructure pricing. The most common of these approaches is a form of carbon trading or carbon taxes.

There have been developments in Europe where the price of carbon is now stabilising in the marketplace. The absence of any robust models for the Australian situation means that it has been inappropriate for any financial calculations to be made regarding which greenhouse gas costs should be allocated to the transport industry. However, in the absence of a clear policy platform which applies to all industry sectors throughout the country, the incorporation of externalities charges has not been justified so far.

In the meantime, the Australian Government has introduced some initiatives to help reduce greenhouse gas emissions from the transport sector. These are as follows (Australian Greenhouse Office 2006):

- alternative fuels programmes;
- Green Vehicle Guide;
- National Average CO_2 Emissions Target; and
- mandatory fuel consumption labelling through an Australian Design Rule.

Urban Air Pollution

Similar to greenhouse emissions, pollution externalities (i.e. harmful particulate matter and poisonous gases) are not absorbed by those who produce them. A number of initiatives are currently underway which address this issue from different directions. Of primary importance is the introduction of a new Clean Fuels Strategy to commence on 1 January 2006 under which all diesel fuel sold in Australia will contain 90 per cent less sulphur. This will offer a marked long-term benefit for urban air quality, but it is not yet clear what costs will be passed on to heavy vehicle users to pay for the higher quality fuel.

Another measures is the introduction of a package of stringent new-vehicle emission standards for petrol and diesel vehicles to take effect from 2002, based on European standards commonly referred to as Euro 2, 3 and 4, and recognising US equivalents. These standards regulate four groups of compounds: nitrogen oxides (NOx), hydrocarbons (HC), carbon monoxide (CO) and particulate matter (PM) for new vehicles sold. As can be seen from Table 3 below, each stage generally represents a dramatic drop in the allowable emissions, particularly for NOx and particulate matter.

Table 3. Emission levels under Euro standards (Compression Ignition)

	NOx (g/kWh)	HC (g/kWh)	PM (mg/kWh)
Euro I	9.0	1.23	400
Euro II	7.0	1.1	150
Euro III	5.0	0.66	100
Euro IV	3.5	0.46	20
Euro V	2.0	0.46	20

Source: (LTEC 2004)

The Australian implementation schedule is deliberately set marginally behind that in Europe, where Euro V standards are scheduled to be implemented in 2008. The current Australian timetable indicates Euro IV standards will be implemented by 2007 (new models) and 2008 (all models). Euro V standards will apply in 2010 (new models) and 2011 (all models). The two-year lag allows for the engines to be proven in the Australian freight environment which includes hotter conditions and more onerous duty cycles. In the case of heavy diesel vehicles, estimated costs of meeting Euro V standards are of the order of $2,500 to $3,600 per vehicle (LTEC 2004).

This approach of imposing regulation to achieve fuel quality and emission standards is accepted practice across the globe. It is generally found to be a more cost effective way of reducing or limiting emissions. It could be argued that this approach has met community expectations and is effective, so there is little value in replacing it with a pricing approach. However, it should also be noted that despite significant restrictions being placed on road vehicle emissions, there are no regulations restricting locomotive (rail) emissions.

Noise

Transport and environment regulatory authorities around the country have a range of programs in place for addressing noise, for which internalisation of the cost does not occur. There is extensive international research on the impacts and costs of noise (noise impacts health, thereby creating a health cost). Regulatory regimes exist to manage noise for both road and rail. Road noise is regulated by vehicle design and in-service standards.

Enforcement levels of in-service noise vary widely across the country. Noise regulations are complemented by measures put in place by road authorities including noise barriers and low-noise pavements. In the rail industry, the situation varies across the country, and includes noise guidelines, licensing arrangements, etc. Significant noise problems remain in both road and rail. NTC is working to develop a regulatory response as a way of controlling engine brake noise from heavy trucks (NRTC 2003a). NTC is also working with the Australasian Railways Association (ARA) to encourage further improvement of rail noise, particularly the very problematic issue of 'wheel squeal'.

There is also the possibility that the road user pricing formula could be used to discourage poor performance. Modern and well maintained vehicles that are driven sensibly contribute substantially less to the problem than their older or poorly managed competitors, so it is possible to argue that this creates a disadvantage in the marketplace for those who perform well. Again, there is no robust model available to accurately quantify these costs at this stage.

Key research on externalities

The BTRE is the main body in Australia to produce research into externalities, and is generally the best source of information on this topic. The investment appraisal guidelines (Austroads 2003) produced, in conjunction with the Federal Government's Auslink transport infrastructure funding initiative, provide some guidance on the treatment of externalities. However it must be cautioned that these are based on applying European information on health and other impacts of emissions, etc to similar conditions in Australia.

Issue: Are there other Australian or overseas studies estimating external costs of freight transport? How well do results from overseas studies translate to Australia?

Translation of overseas results to Australia is problematic, due to different vehicle densities, population densities, geographic and air flow factors and operating conditions. However, as there is insufficient Australian work, overseas studies are often relied upon. In order to include environmental externalities into heavy vehicles charges (or rail charges) better local work will need to be undertaken.

6.2.2 Investment inconsistencies

As has been touched on at the beginning of this chapter, the issue of competitive neutrality goes beyond simply each sector paying its way. At the true heart of the problem is the disparity in investment between road and rail. The remainder of this section examines why this disparity exists.

Drivers for investment and investment signals

Drivers for investment in the road and rail sectors differ considerably. This is primarily due to the different ownership structure for infrastructure managers in the two sectors.

As discussed in Chapter 5, rail infrastructure managers are driven by profit incentives. As such, rail investment is largely determined by rates of return and the level of undiversified risk. The burden of recovering this return on the majority of the infrastructure that rail freight utilises is placed almost solely on the freight sector as their freight and passenger networks are largely separate.

Investment decisions are not driven by private returns in the road sector. Instead social and political considerations factor into the investment decision. Furthermore, the apparent needs of light vehicles generally have greater weight than those of freight vehicles. To that

extent the decision to proceed with a capital project is largely driven by light vehicle needs, whilst the level of investment is driven by heavy vehicle needs[7].

Whilst this may seem largely appropriate given the high proportion of light vehicles on the road compared to heavy vehicles, it may not necessarily lead to an economically optimal outcome. The key reason for this is the poor investment signals from both heavy and light vehicles with neither category of vehicle having a mechanism by which they can indicate the relative value they place on a road or route. The only signal road managers receive is actual use of the road for which there is limited information currently available. However, the lack of a price associated with a road means that road usage information does not reflect optimal usage and does not allow for effective management of the road network.

Furthermore, unlike the rail sector, the road sector is more subject to the political process in investment decisions. Often this will see a road with only a marginally positive CBA ratio being given preference over a more economically justified but lower profile project.

The need for a clear social policy

Optimal modal share includes socially desirable outcomes. In order for rail and road to adequately invest in their respective sector to achieve this outcome requires a consistent and agreed national social policy. The policy should state clear objectives in terms of environmental and social outcomes by which road and rail are able to fully evaluate projects. The objective of the policy is to provide guidance by which CSOs can be granted. Such a policy would enable the rail sector to seek government support on projects which achieve social objectives. It would also provide a further tool by which government funding could be allocated to achieve social outcomes in the road network.

A clear social policy would also assist in reducing politically motivated investment decisions.

[7] This is generally due to the economies of scale of building a pavement to a high design standard. Furthermore, the greater the depth of the pavement, the lower the future maintenance cost. Road width decisions are generally driven by light vehicle requirements as width generally addresses congestion issues.

7. PRICING PRINCIPLES

The Key Messages:

- Consistent broad pricing principles across road and rail are important; but should also consider specific objectives of each mode
- Improvements in road and rail pricing can deliver a competitively neutral regime, but not necessarily a competitively neutral outcome

7.1 Setting pricing principles

Whilst the principles guiding road pricing are clearly road specific, the NTC suggests that it could form the basis of a common principle to be applied to both sectors. There are a number of commonalities in the pricing objectives for the two sectors. These are discussed below. A principle incorporating these features would allow for a common broad base for pricing: however, it is important to note that the objective of pricing within each sector cannot be solely competitive neutrality. The differences between and within each mode (as described in Chapter 4) require pricing objectives more reflective of the specific requirements of each sector.

Issue: The Commission interprets *consistency* as requiring the same pricing *principles* to be applied to, and within, both principal modes of freight transport. *Do participants agree with this interpretation? If not, how should 'consistency' be interpreted?*

Full infrastructure cost recovery without cross subsidisation

As will be discussed later in this submission there is considerable cross subsidisation within road infrastructure charges. This is a result of the considerable variance in the usage and costs which are averaged under the current heavy vehicle pricing methodology—mostly between highly and lowly utilised vehicles within a class and between smaller heavy vehicles and B-doubles, and with the rejection of the 3rd Determination proposals, road trains. In order to achieve a competitively neutral pricing regime, it will be important not only that each sector pays its way, but also that each class of vehicle does. This is equally important in ensuring optional infrastructure use.

Optimisation of the existing network

Until now, the key objective of pricing, particularly for the heavy vehicle share of road freight infrastructure, has been to achieve aggregate cost recovery. In the case of heavy vehicle road pricing, the current system's primary objective is to establish a national set of uniform registration charges for heavy vehicles. However, this approach is not effective in the management of the network. It does not provide any signals about the cost involved in maintaining specific parts of the network that an operator chooses to use. This is true in the road and rail sector, although arguably there is greater diversity in costs in the road sector.

In order to effectively manage the expected increased freight task and minimise maintenance and investment costs, it will be crucial to effectively utilise the existing network as well as invest further in both road and rail.

Incentives for optimal investment

One of the major constraints to the efficient level of investment being undertaken in the roads sector is the failure of investment signals to flows through from pricing. Although

pricing reform can be used to better manage the existing network, unless a mechanism exists by which signals for investment flows through to road agencies, the impact of reform will be limited. Although hypothecation is the most obvious solution to achieve this, it is not the only one. Alternatives include the better tagging of pricing revenue to expenditure and allocation through some central fund.

Flexibility to respond to customer needs

With improved technology, freight customers are increasingly seeking innovation in freight transport both in the road and rail sector. Combined with PBS, road pricing is able to help facilitate the flexibility required in regulations to allow these vehicles on the network, as well as better matching of road and rail transport tasks to improve the productivity of combined transport systems.

Similarly, rail freight is constrained in its ability to address customers' needs. This is primarily as a result of the run down state of some of the rail track infrastructure, but is also related to the inability of rail transport to collect and deliver smaller consignments at times convenient to the freight customer. Pricing will be essential in helping to ensure that operators are able to utilise innovative rolling stock whilst allowing the infrastructure manager to recover the costs of doing so.

Increased or better access to the network

Currently road and rail operators are restricted in terms of access to the network. For roads, there are restrictions on where vehicles of various characteristics (such as mass and dimensions) can operate. These restrictions are regulatory. For rail, the greater issues are track access conditions which regulate speed and mass. These conditions are set by the track infrastructure provider, in negotiation with the rolling-stock operator.

A large part of the problem in gaining this enhanced access is that infrastructure managers are protective of their assets because of the uncertainty associated with funding. Pricing reform can enable infrastructure managers to be indifferent to better or enhanced access to the network (subject to safety and environmental considerations) because of the compensation they receive for granting access. This is not possible at present in either the road or rail sectors.

7.2 How pricing can better achieve competitive neutrality

Although both sectors would argue that they do pay their way in aggregate, there are arguments to suggest that from an economic point of view, both sectors fail to do so.

7.2.1 Does expenditure equal cost?

Issue: Are rail and road network charges broadly covering their aggregate costs? If not, why not? To what extent are there divergences from full cost recovery between and within freight transport modes?

There is general agreement that the road sector currently recovers expenditure associated with road infrastructure through road charges. However, there are a number of reasons why this recovery may not equate to the optimal cost of maintaining the network.

The first is that expenditure estimates may not be correct. Road expenditure data is varied in quality and accuracy. Whilst over time there have been considerable improvements made to data sets, there is still a significant degree of estimation required in relation to local road investment. Local roads constitute around

84% of the length of the network (Austroads 2005) and therefore errors in this estimation could mean over or under recovery through charges.

The second reason is that current charges recover past expenditure which may not reflect future maintenance expenditure needs. There is some suggestion that unfunded maintenance work means that parts of the road network are deteriorating beyond optimal levels. Ultimately this, if true, will result in an increased vehicle operating costs or further capital expenditure. The PAYGO methodology recovers the average of the three previous years expenditure. Although there is an annual adjustment of registration charges, this is capped by CPI. In addition, two-thirds of the current heavy vehicle charges are collected through an agreed fuel charge, which is not currently adjusted annually. Given the considerable growth in infrastructure investment in the transport sector over the coming years, it is highly unlikely that this methodology means that the road sector will continue to recover its costs. This is particularly so with the rejection of the 3rd Determination. Furthermore, it is argued that the high demand in the construction sector, combined with the high cost of oil leading to increased costs of asphalt, has lead to prices rising in the road construction sector at a greater rate than CPI. If this were true, it would mean that the annual adjustment does not even allow for a steady state situation.

Finally the lack of certainty in obtaining funding for investment can mean that expenditure does not equal cost. The issue is that the optimal level of investment may not be taking place because of the process to obtain funding (i.e. through the budget process in roads and through disincentives to invest in rail infrastructure). Should hypothecation be a feature of the road industry, this would be less of an issue as there would be a direct link between expenditure and revenue.

The implications of expenditure not equating to efficient costs is clear—the correct level of expenditure may not be undertaken in the road sector and the recovery of expenditure is not necessarily comparable to rail (assuming that rail charges fully recover optimal costs). However, it is difficult to know if this means that road operators (particularly those competing against rail) are under or overpaying compared to rail.

7.2.2 Approaches to capital valuation

Issue: Are these approaches to capital valuation appropriate for each mode? Why or why not? What are their advantages and disadvantages? Are there other approaches that would be more appropriate?

The road and rail sectors have different pricing regimes to enable access to their respective networks. As has been described in the PC Issues Paper, the road sector uses a cost estimation approach known as PAYGO whilst the rail sector uses the more commonly applied life cycle costing approach. The key difference in these two approaches is the way in which capital expenditure (capex) is treated. Under the PAYGO methodology, capex is in theory recovered in the year that it is incurred (if we accept PAYGO assumptions). Under the life cycle costing approach adopted in rail, recovery of capex is spread out over time. Whilst the PAYGO approach will be discussed in more detail in subsequent chapters and the Appendices, it is appropriate at this point to make a number of observations.

Whilst there are different approaches taken to the treatment of capex in the transport industry, in theory they result in full cost recovery at an aggregate level. The extent to which this is achieved is dependent on differences between the discount rate and the rate of return (including a margin for the risk associated with the investment) and the level of maturity of the market.

Issue: What difference do the two approaches make to relative prices charged for road and rail?

Issue: Should the same methodologies for assessing capital costs be applied in each mode?

Even if both sectors were to adopt the same treatment of capex, there are considerable variations in capital estimation in the rail sector. Where rail infrastructure access regulators become involved in processes for negotiating prices charged to above-rail users, the most common method mandated for calculating the cost of capital is Depreciated Optimised Replacement Cost (DORC).

However, this is not universally applied. For example in Victoria, the rail freight business was privatised on the proviso that the purchaser was required to regard the capital embodied in the existing rail network as a sunk cost and accordingly was not able to seek to reflect the cost of this capital in its rail infrastructure charges. The Victorian rail access regime allowed for (and continues to allow for) the purchaser (the access provider) to earn a return on new capital (a form of DORC). Whilst using a method other than DORC is not unusual to establish the original asset base, it does have a number of implications, the most important of which is that whilst ultimately the DORC valuation will prevail (as new capex is incorporated into the asset base it will replace the value of the previous asset base), this may take some time to achieve. In the interim, the asset base may be discounted compared to the DORC valued asset base. Simply put, the rail approach to estimating the capital base can create more variation in the estimation of capital than the PAYGO approach.

7.2.3 Cost allocation

The issue of competitive neutrality in pricing revolves more around the allocation of costs than the treatment of capital. The key issues in relation to the allocation of costs in the road sector is the level of allocation of common costs to heavy vehicles compared to light vehicles and the accuracy with which variable costs can be attributed to different users. The approach used to estimate shares of costs associated with different heavy vehicles is discussed further in Chapter 9.

The NTC allocates common costs on a VKT basis. The rail sector has argued that allocation has a bias towards the light vehicle fleet and therefore heavy vehicles are not paying their full share of costs. Train-km are used to allocate common costs for some parts f the rail network. NTC has not confirmed whether this approach is universally used. While section 9.2.3 will discuss this issue in more detail, the key point is although there are different methods by which common costs can be allocated, there is no economic basis by which to prefer one method over another.

Attribution of variable costs is also difficult—but for different reasons. Lack of information on the relationship between variable costs and road use means that the form and nature of cost functions for roads can only be roughly estimated. Establishing these relationships is particularly difficult because of the multi-product nature of roads, and because of the limited engineering knowledge of how they perform in a technical sense. Roads provide services to multiple agents, including motorised and non-motorised road

users, adjacent property owners and services industries. Motorised road users include a wide range of users, from motorcycles through to road trains. The NTC understands there are similar difficulties in establishing the direct relationship between different types of rail track works and rail usage.

7.2.4 Removing cross subsidies in roads

The current approach to pricing in the heavy vehicles sector results in cross subsidies within the sector. This is for a variety of reasons including:

- The considerable variation in road type and quality, as well as vehicle usage of the infrastructure and vehicle fleet, means that the averaging inherent in road pricing does not adequately reflect the cost of usage of individual vehicles.
- Those vehicles that most benefit from averaging are those that carry greater mass over long distances. A further benefit is obtained with fuel efficient vehicles. This is particularly the case with B-doubles over the contestable routes, as this class of vehicle benefits from cross subsidies from smaller heavy vehicles as well as the effects of averaging.

In order to achieve a competitively neutral pricing regime it will be imperative to address this issue. However, as chapter 10 will discuss, although a direct pricing regime will remove these cross subsidies, the enhanced access which complements the regime may mean that the competitive position of road and rail freight transport is not significantly impacted.

PART C: OPTIMISING THE FREIGHT NETWORK

8. THE HISTORY OF PRICING IN THE ROAD SECTOR

The Key Message:

- The original objective of heavy vehicle pricing was to achieve expenditure recovery in aggregate through nationally consistent charges.

The NTC has prepared three sets of recommendations for national heavy vehicle charges. The first of these (known as the First Determination) was prepared and agreed by the ATC in 1992, and implemented between July 1995 and October 1996. Prior to this, annual registration charges were set by State and Territory governments, largely on the basis of fiscal needs, and there was no agreed consideration of the amount of fuel excise paid by heavy vehicles that could be considered a payment for road use. The annual registration charges varied considerably (from $100 to in excess of $7000 for the 6-axle articulated truck, the workhorse of the trucking fleet) and were based on very different factors in each jurisdiction (sometimes the manufacturer's rating of gross mass, sometimes tare or unladen mass, sometimes engine bore diameter and so on).

The First Determination instituted a two part charging system based on a fuel charge and an annual registration charge that varied with vehicle type and size (number of axles and gross mass)[8]. The combination of these two charges reflected, in general, the share of road expenditure allocated to each type of heavy vehicle. However, there was over recovery from smaller trucks and buses[9], which was matched by under recovery from larger vehicles so that there was exact cost recovery in aggregate. The reason given for this was that the wholesale sales tax system differentially impacted on larger vehicles, so that total level of payments to governments from operators of these vehicles was considerably greater.

The Second Determination was developed between 1998 and 2000, agreed to by the ATC in 2000 and implemented between July 2000 and October 2000. Under this Determination, the fuel charge was increased to 20 cents/litre and cross subsidies between smaller trucks/buses and larger trucks were removed[10]. As the charges for the smaller trucks and

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[8] The fuel charge at this time was entirely nominal. The total amount of excise paid by heavy vehicles was the same as that paid by all other vehicles, around 36 cents/litre. The fuel charge was set at 18 cents/litre, considerably less. It did not apply on top of excise, but was a nominal component of it. Thus, the fuel charge had no impact on the amount paid at the pump for fuel. Nor did it have any impact on the amount of funding made available for expenditure on roads.

Similarly, the annual registration charges were generally paid into consolidated funds. The only exceptions were New South Wales, where annual registration charges were paid directly to a dedicated road fund, and Western Australia, where part of the revenue obtained was set aside for transport funding.

[9] The fuel charge is set so that it is sufficient to fully recovery expenditure allocated to the smallest trucks. However, an annual registration charge is still applied as State and Territory governments are concerned that the annual charge for these vehicles needs to be commensurate with charges for vehicles just under 4.5t, the cut-off point after which the national charging system applies. This has flow on effects through other small trucks and buses. The outcome is clear over recovery of the share of road expenditure allocated to these vehicles. However, the NRTC and the NTC have also noted that the full social costs of use of these vehicles, which are predominately used in urban areas where noise and air quality have greatest impact, are likely to be considerably larger than their share of road expenditure.

10 This was achieved by increasing charges for those that were being subsidised, but not reducing the charges for those that were subsidising others. There is some difficulty in reducing the registration charges for lighter vehicles, as to do so in a cost reflective way would mean the charges for this classification of vehicle would be less than that of light vehicles.

buses were greater than their share of road expenditure, this meant that there was over recovery in aggregate, but that each class of vehicles at least (or, for smaller vehicles, more than) paid its way. There was one exception to this for B-doubles (a prime mover hauling two semi-trailers)[11].

At around the same time, the federal government implemented its taxation reforms, which saw the removal of wholesale sales taxes (that had previously overly impacted on larger trucks) and the introduction of a diesel excise grants scheme, so that the effective level of excise for some heavy vehicles (diesel vehicles over 20 t and diesel vehicles between 4.5 t and 20 t used outside urban areas) was reduced. The effective level of excise for these vehicles was initially reduced to 20 cents/litre, but as a result of removal of indexation of the rate of excise and changes in indexation of the rebate amount, the effective level initially increased and later decreased to 19.636 cents/litre, the level at which it remains today.

Following this, the ATC agreed to put in place an annual adjustment procedure which effectively sought to index the annual registration charge component of the national charging system by reflecting changes in road expenditure and expected changes in road use, moderated by expected fleet growth. This procedure has applied since 2001. The nationally agreed fuel charge is not impacted by the annual adjustment procedure.

In 2005, the NTC prepared recommendations for a 3rd Determination which were considered by the ATC between January and March 2006. The recommendations, which were rejected, included an increase in the fuel charge component of the charges, no change in registration charges for more than half the fleet, small (less than $40) increases in registration charges for most of the remainder, and substantial increases (around 30%) for B-doubles and road trains.

The NTC has observed that changes in road use and road expenditure meant that it was increasingly difficult to find a balance between registration charges for prime movers, trailer registration charges and the fuel charge that achieved the desired outcome of full cost recovery for each class of vehicle[12]. Consequently, the recommendations reflected a continuation of over recovery for the smaller trucks and buses, full recovery from road trains, and a continuation (albeit a reduction) in subsidy for B-doubles. The proposals were a relatively small readjustment of charges to ensure road trains and other larger trucks paid their share of road expenditure, and to reduce the B-double subsidy, so that for the first time prime movers as a total group would pay their share of expenditure.

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[11] These were a relatively new vehicle configuration that were (and still are) relatively fuel efficient for the load that they carry. This fuel efficiency meant that the fuel charge collects a much smaller proportion of costs for this vehicle type compared to other vehicles in the fleet. Consequently, a relatively large annual registration charge would be needed to fully recover the share of expenditure allocated to B-doubles. This would have meant that a B-double prime mover would need to pay considerably more than a double road train prime mover (the less safe next alternative to B-doubles). The result was an explicit recommendation to subsidise B-doubles, by pegging the prime mover charge to that of road trains. Since the time of the Second Determination, B-doubles have become a much more widely used vehicle, as they have a considerable productivity advantage over single semi trailers, and some operational advantages compared to road trains. In particular, the nine axle B-double that hauls two triaxle semitrailers has grown from around 700 vehicles in 1997 to around 7000 in 2003. The subsidy to this form of B-double (which was only just being introduced when the Second Determination was calculated) is much greater than to the more common form of B-double in use at that time.

[12] Full expenditure recovery for each class of heavy vehicle is the primary requirement of the pricing principles agreed by the ATC that the NTC is required to apply in preparing its recommendations.

For the first time, the level of the fuel charge was no longer nominal—it is now directly reflected in the effective level of fuel excise for all heavy vehicles under the Australian Government's energy policy. In its energy policy, the federal government has indicated intentions to adjust the fuel rebate in accordance with the annual adjustment process for heavy vehicle registration charges and at the same time to reflect the fuel charge agreed through the ATC in setting the rebate amount (although it was announced this will not occur in 2006 in the recent federal budget). It will apply to all vehicles over 4.5 t from July 2006, regardless of the type of fuel used or where the vehicle operates.

The rejection of the 3rd Determination recommendations means[13] that:

- An average nine axle B-double travelling around 180 000 km per annum will receive a subsidy of $10 500 per annum. For vehicles used in line haul and travelling higher annual kilometres (typically 300 000 km to 400 000 km each year) this subsidy amounts to around $20 000 per annum.
- Road train prime movers will no longer pay their share of costs.
- There will continue to be over recovery from the smaller trucks and buses, but within a couple of years it is likely that mid size vehicles will be under recovering their share of expenditure.
- The imperatives for establishing a new system of charging for road infrastructure use by heavy vehicles have increased. It is unlikely that any further incremental changes could be achieved that are consistent with the current pricing principles while retaining the current method, and in particular, pricing mechanisms.
- Any changes to heavy vehicle pricing arrangements will need to be preceded by political will and agreement to changes across governments with differing objectives.
- An interim change to charges is likely to be needed ahead of full implementation of a new charging system, as establishment of a direct charging system is likely to take some time and in the absence of any adjustments at this time, charges can be expected to be further out of step within a few years.

[13] If we accept the assumptions behind the NTC models.

9. THE CURRENT APPROACH

The Key Message:

- Achieving additional objectives for transport productivity will require more sophisticated direct user prices.

9.1 Principles

The current heavy vehicle charges regime is bound by the principles approved by the ATC in August 2004. Specifically, they state:

"*National heavy vehicle road use prices should promote optimal use of infrastructure, vehicles and transport modes"* subject to the following:

- *full cost recovery of allocated infrastructure costs while minimising both the over and under recovery from any class of vehicle;*
- *cost effectiveness of pricing mechanisms;*
- *transparency;*
- *the need to balance administrative simplicity, efficiency and equity; and*
- *the need to have regard to other pricing applications.*

The current pricing principles require a balanced approach to be taken to setting prices (for example, balancing administrative complexity with the extent that costs are reflected). However, as discussed in the previous chapter, the constraints to the current approach make achieving this balance difficult. This is due to the current structure of charges and mechanisms for collecting them, the lack of linkage between revenue arrangements and charges, and the need to take account of light vehicle charges.

9.2 The current costing methodology

The PC has sought further information on the PAYGO approach and particularly how it captures capital costs.

PAYGO, or Pay-As-You-Go, is the mechanism by which costs of providing and maintaining roads are estimated. It is based on the idea that all expenditure, including capital expenditure, is fully recovered in the year it is incurred.

The current road network is the result of construction activity which occurred previously when traffic levels were lower. The amount spent now is based on expected traffic levels over the coming fifteen to thirty years, which can be expected to be higher—that is, it provides for both current and future traffic. Consequently, construction costs in the current year might be higher than those that are rightly the share of the current traffic.

The amount currently spent on maintenance is the result of accumulations in pavement and bridge wear over the past twelve months to twenty years, caused by past traffic which was less than at present. Consequently, maintenance costs attributed to the current year might be expected to be smaller than the true share of maintenance costs (which are yet to be incurred) resulting from the current traffic.

These two effects are taken to negate each other under the PAYGO approach, so that the amount spent in the current year approximates the true share of costs associated with the current traffic.

The costs to be applied in the cost allocation modelling are broken down by expenditure category and by Urban/Rural/Local/Arterial expenditure. A three–year average of expenditure is used to smooth out any major fluctuations, particularly in the split of expenditure between categories. Table 4 illustrates this breakdown as it applied in the 3rd Determination. As section 9.3 will show, there are some limitations associated with the need to estimate aspects of the local road expenditure. However, the process of these estimations has improved significantly over the years.

Table 4. Third Determination Road Construction and Maintenance Expenditure Data: Annual Average 2002-03 to 2004-05

($ million, 2006 dollar values)

	Expenditure Category	Arterial Urban	Arterial Rural	Local Urban	Local Rural	Total
A	**Servicing & Operating Expenses**	308	321	142	123	894
B	**Road Pavement & Shoulder Maintenance**					
B1	Routine Maintenance	89	311	41	119	560
B2	Periodic Maintenance of Sealed Roads	86	200	40	76	402
C	**Bridge Maintenance & Rehabilitation**	56	96	26	37	215
D	**Road Rehabilitation**	131	334	61	128	654
E	**Low Cost Safety / Traffic Improvements**	162	128	75	49	414
F	**Asset Extension / Improvements**					
F1	Pavement Components	440	495	88	133	1156
F2	Bridges	115	171	23	46	355
F3	Land Acquisition, Earthworks, Other Extension / Improvement Expenditure	801	736	159	197	1893
G1	**Corporate Services**	**99**	**127**	**NA**	**NA**	**226**
	Total Road Construction and Maintenance Costs	2287	2919	655	908	6768
G2*	**Enforcement of Heavy Vehicle Regulations**	44	49	NA	NA	93

NA not applicable

Costs are allocated among the various vehicle classes by assessing how much of the expenditure is believed to be variable (that is, it varies depending on the level of use) and applying the appropriate allocator to each expenditure category. The allocators are chosen on the basis of what measure of road use has most influence on the need for road works to be undertaken. These allocators are as follows:

- Vehicle Kilometres Travelled (VKT), which reflects the level of usage;

- Passenger Car Unit-km (PCU-km), which reflect the amount of space the vehicle takes up on the road;
- Equivalent Standard Axles–km (ESA-km), a measure of the relative pavement wear of different loads, axles and tyres over which the load is spread; and
- Average Gross Mass-km (AGM-km), which measures how much mass the vehicle carries and is related to road and bridge wear.

For some expenditure categories it is more appropriate to allocate costs based on usage based factors such as VKT, for others, such as those relating to the repair of damage, ESA-km is a more appropriate measure. In some expenditure categories, the expenditure is considered to be attributable to more than one road use factor, and the cost allocation is split accordingly. Where the expenditure is not considered to be attributable to vehicle use at all, costs are allocated to vehicles on the basis of VKT. The implications of, and drivers behind, the cost allocation rules are discussed further in Section 9.2.2.

Establishing relationships between costs and usage is a complex and difficult process, not least because of the effort involved with setting up appropriate data capture. It is necessary to firstly obtain agreement on the desired approach to establishing the relationships[14]. Obtaining cooperation from the road agencies is also necessary, and this too can be problematic because it normally involves the allocation of resources to facilitate data collection. This commitment would be required over a period of years in order to capture an appropriately long time series which would reflect the life-cycle of the asset. As well as obtaining an appropriately long time series, the importance of sampling broadly should also not be underestimated. This is because construction standards, operating conditions, engineering practices and budgetary considerations across the country vary significantly and need to be represented in a national system of charges. This too comes at a cost.

Issue: What are the key attributes of road use likely to affect road infrastructure costs (for example, vehicle and load mass, the distance travelled, the location and type of road)? What is the nature of the linkages?

How accurately can road use by trucks be linked to generation of infrastructure costs? How does the type of road affect these costs?

Once the process has been established, there exists the potential for distortions in the data to occur. These can arise for a number of reasons, including the following:

- changes in the jurisdictions' road management strategies. For example, the choice to rehabilitate or reconstruct some sections rather than maintain them could potentially lead to a loss of maintenance sample points. This may cause lower overall observed maintenance costs as the high maintenance cost sections fall off the database;

[14] There are various available approaches to establishing relationships between costs and usage. Engineering cost allocation methodologies seek to allocate costs on the basis of engineering models of road damage. These methodologies forecast the costs resulting from incremental traffic flows. Costs of additional units of different types of road use can be compared with a base case to calculate their marginal costs. Econometric methods use regression modelling to establish "best fit" relationships between observed road costs and a set of explanatory variables (of which road use is one). Differentiation of these relationships then gives the marginal costs.

- changes in investment priorities of jurisdictions could influence annual expenditure over the data collection period; and
- contracting out maintenance activities where the provision of detailed maintenance expenditure is not required under the contract. This could lead to a reduction in the accuracy of the data on expenditure occurring on road section samples over the later years of the collection.

The complexity is also due to the multiple elements that drive costs. In addition to mass, distance and type of road, vehicle configurations (i.e. the number and types of axles on which the load is carried) is also extremely important. This has a fundamental impact on the relative road wear associated with an individual vehicle. Thus total weight (of the vehicle and any load) and axle configuration are significant determinants of pavement wear (i.e. reductions in the capacity of the pavement to carry more loads). However, other factors, including number of wheel passes and laden weight of the vehicle are probably more relevant to repairing minor surface deficiencies and deformation (e.g. potholes). Distance travelled is the primary factor linked to costs of servicing and operating the road network, which is primarily related to traffic levels. Laden weight and how much space the vehicle takes up are the most relevant factors for bridge costs. Distance travelled and the space taken up by a vehicle determine the level of traffic/safety improvement costs. Space capacity is also the primary factor in non-pavement construction costs.

All of these relationships vary by road type (that is, its type of construction, the environment in which the road is located—soil type, weather conditions, etc., design standard and so on). As a result location is a significant factor. While it is known that these variations exist and that they are significant, they cannot at present be quantified. Generally, marginal costs and average costs (using most allocation methodologies) are lower for highly trafficked links and higher for less utilised links. This has the implication that linkage of charges with road types would result in higher costs for key corridors typically serving remote and rural areas and deemed minor roads (irrespective of its importance to the community). This may lead governments to support remote and rural areas by averaging charges across road types or through forms of direct subsidy of road infrastructure costs.

The establishment and strengthening of such relationships is a key task in any road pricing scheme, regardless of its form. As such, the NTC intends to undertake further work to build on the existing knowledge base it has developed in this area.

9.2.1 The assumptions underpinning PAYGO

Until now it has been thought that current road construction and maintenance expenditure provides a reasonable proxy for annualised costs of providing and maintaining roads for the current vehicle fleet. Annual expenditure will be the same as annualised costs if:

1. the network is reasonably mature and is neither expanding nor contracting significantly;
2. across the network there is no overall deterioration in pavement or bridge condition;
3. ‘lumpiness’ in investment is limited, so that across the network the amount spent on each type of road work does not fluctuate markedly;
4. traffic growth is relatively small and steady; and

5. the roadwork undertaken, and the road network itself, should be optimal (that is, road investment that is not economically justified does not occur, and investments that are worthwhile are not deferred).

The extent to which these underlying assumptions hold true ultimately determines the appropriateness of the PAYGO approach to calculating the cost base.

9.2.2 Cost allocation rules

Different expenditure categories are most appropriately distributed among the various classes of vehicle depending on the specific nature of that expenditure category. The rules are based on the best available scientific information on the relationships between road use and road expenditure needs. In a number of cases, these relationships are not well understood. Nevertheless, compared to other countries, Australia has gone to some effort to attempt to establish well–founded relationships on which to base its cost allocation rules.

The cost allocation rules used in the 3rd Determination are shown in Table 5. These are more or less consistent with earlier determinations, reflecting the underlying relationship between each expenditure category and its appropriate allocator(s). The only category where the choice of cost allocator method changed is the Road Pavement and Shoulder Maintenance category. Section 9.3 discusses the process through which the newer relationships were derived.

Table 5. Third Determination Cost Allocation Rules

Expenditure Category		VKT	PCU-km	ESA-km	AGM-km	Non-Attributable (VKT)
A	Servicing & Operating Expenses	100	0	0	0	0
B	Road Pavement & Shoulder Maintenance					
B1	Routine Maintenance	0	37	0	37	26
B2	Periodic Maintenance of Sealed Roads	0	10	0	60	30
C	Bridge Maintenance & Rehabilitation	0	0	0	33	67
D	Road Rehabilitation	0	0	45	0	55
E	Low Cost Safety / Traffic Improvements	80	20	0	0	0
F	Asset Extension / Improvements					
F1	Pavement Components	0	0	45	0	55
F2	Bridges	0	15	0	0	85
F3	Land Acquisition, Earthworks, Other Extension / Improvement Expenditure	0	10	0	0	90
G1	Corporate Services	0	0	0	0	100

One way of understanding the impact of the choice of allocator is to consider the proportion of total usage under various measures represented by each of the broader vehicle types. These are summarised in Table 6 below. This table takes SMVU data on

vehicle use by each parameter[15], and shows the percentage that each of the broader vehicle classes contributes to the total for all vehicles.

Table 6. Percentage of road use factors represented by each of the broader vehicle classes

	Number	VKT	PCU-km	AGM-km	ESA-km
Light Vehicles	97.2%	93.4%	84.2%	16.0%	6.2%
Rigid Trucks	1.9%	3.0%	5.7%	19.5%	20.8%
Articulated Trucks	0.4%	1.9%	5.2%	32.9%	36.8%
B Doubles & Road Trains	0.1%	0.9%	3.4%	27.1%	31.5%
Buses	0.3%	0.7%	1.3%	3.2%	3.3%
Other	0.1%	0.1%	0.2%	1.3%	1.4%

As can be seen, where VKT or PCU-km is chosen as the appropriate allocator, cost allocations are skewed more heavily towards light vehicles, which is mostly due to their sheer numbers. This would be appropriate for expenditure categories which relate to the level of usage and the space taken up on the roads. Where the allocator is AGM-km and ESA-km the heavier vehicles form a larger percentage of these measures of use and are assigned a commensurate larger share of allocated costs. This would be appropriate allocators for the damage-repair type expenditure categories where they are used. The high percentage of B-doubles and road trains in the total AGM-km and ESA-km are particularly significant in light of them representing such a small proportion of the total fleet in number. This accords with their large contribution to road damage and wear which contributes to the value of the maintenance dollars spent.

There is a tendency in discussions of cost responsibilities of heavy vehicles to focus on pavement, and perhaps bridge, costs. However, since the late 1980s when collection of data on expenditure by type of road work commenced, the proportion of road budgets expended on pavement works—either maintenance, major repair or construction of new or replacement pavements—has fallen considerably. This is illustrated in Figure 3.

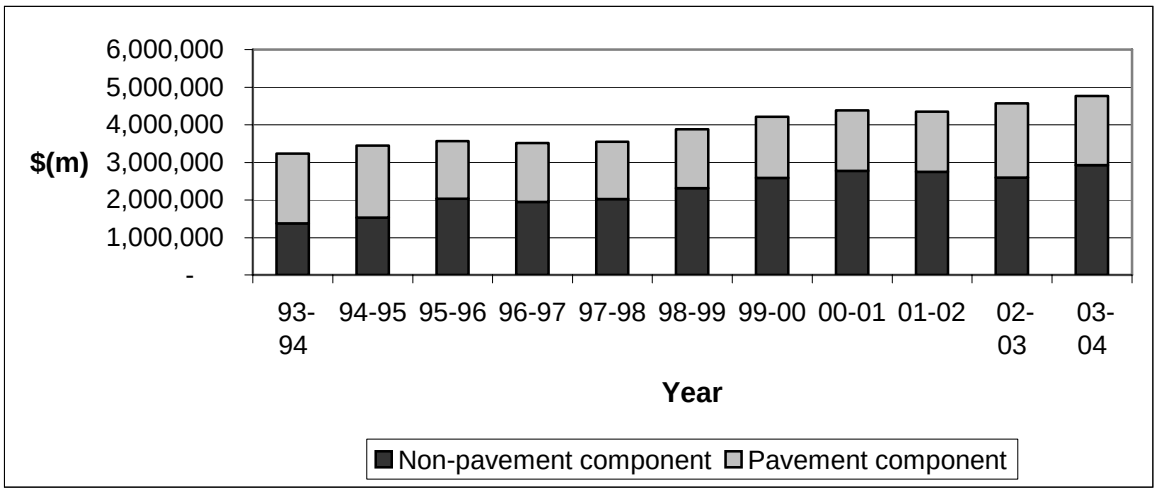


Figure 3. Pavement and Non-Pavement Road Construction and Maintenance Expenditure by Year *(constant dollar terms)*

[15] With the exception of ESA-km, which is derived by applying a formula to the AGM-km data.

The shift that has occurred over time is more starkly illustrated in Figure 4. The significance of this change in expenditure patterns lies in the perception and approach to estimating the share of expenditure on roads associated with heavy vehicles. There is little reason to link non-pavement expenditures closely with heavy vehicles, in most instances. These costs—such as running and servicing the road network, building noise attenuation barriers, improving traffic signals and addressing accident black spots—are driven by the needs of all road users, and this type of road work is not undertaken in response to the presence of heavy vehicles.

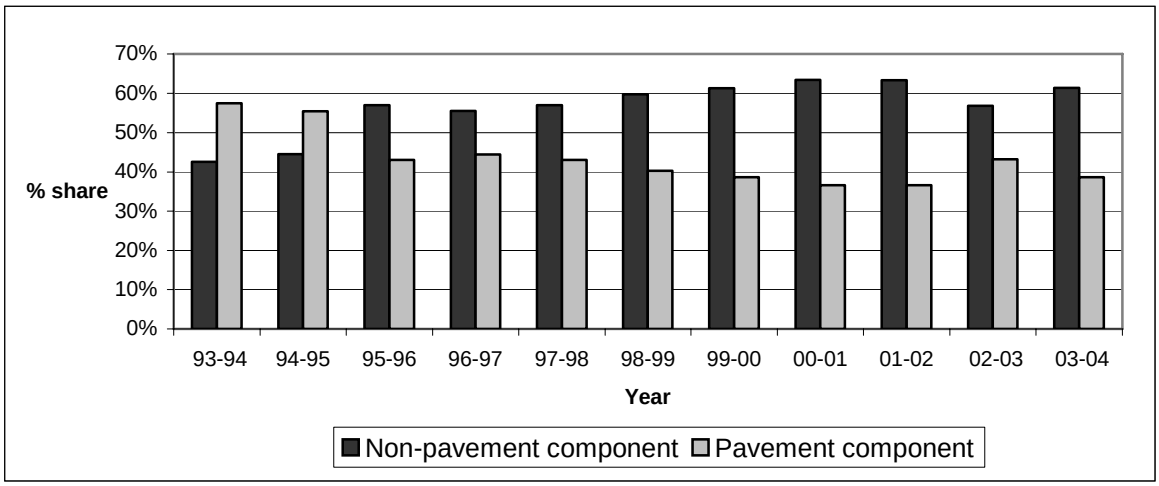


Figure 4. Proportion of Road Construction and Maintenance Expenditure on Pavement and Non-Pavement Works *(per cent)*

9.2.3 Common costs

Some costs of providing and maintaining roads have little relation to road use. These 'common costs' have previously been referred to by the NTC as non–attributable costs, or non–separable costs. The proportion of each expenditure category that is considered to be non-attributable is shown in the right column of Table 5. These proportions are established from engineering and statistical models of the relationship between road use and expenditure needs.

Issue: What are the major common (non-separable) costs of providing road and rail infrastructure?

How significant are they?

Examples of non–attributable costs are the costs of repairing storm or flood damage and the costs of building a minimum possible standard of road or bridge. Some pavement wear occurs because road building materials deteriorate with age and weather (such as deterioration of road seals with exposure to sunlight). This wear would occur regardless of whether vehicles used the road or not, and consequently it is also non–attributable.

A significant proportion of the total allocated costs falls into the non-attributable category. Table 7 illustrates this situation. Non-attributable costs represent about 66% of the cost allocated to light vehicles, but only 16% of costs allocated to heavy vehicles. Taken as a percentage of total allocated costs, the proportion of non-attributable costs is 54%.

Issue: Given a requirement for full recovery of freight infrastructure costs, how should common costs be allocated across freight and passenger uses? What are appropriate criteria? For example, should common costs be allocated on the basis of 'fairness' or of efficiency? Should common costs of road and rail be allocated in the same way?

These common costs are then allocated across the entire fleet on an arbitrary basis. In the previous charges determinations, this has been done on the basis of VKT, since it represents the general level of use by a given vehicle class. This approach was used as a rough proxy for the extent of the network accessed by different types of vehicles, knowing that some vehicles use a relatively contained component of the road network while others access parts of the network across the nation. As we have seen, where VKT is used as the appropriate allocator, the share of costs is skewed more towards the lighter vehicle classes as they represent such a high proportion of the fleet.

Issue: What are the likely efficiency impacts of different allocations of non-separable costs?

There are various ways to allocate/recover the common costs. Economic theory does not provide a definitive answer as to the best approach. Some have suggested that allocating cost on the basis of PCU-km is a more appropriate method than allocating by VKT. This method would essentially assign higher weightings to the distances travelled by heavier vehicles, based on the larger amount of space they take up on the roads. It is suggested that using PCU-km as the appropriate allocator for common costs is justified on the basis that investments in new capacity may be driven by considerations of congestion easing. While this may be true, it could also be argued that heavy vehicles have significant economic incentives to avoid travelling at peak times, meaning that their contribution to congestion is less than it would otherwise be. In this way, heavy vehicles internalise the cost of congestion to them while reducing their contribution to it. In addition, those elements of new construction work that are related to levels of use are treated as variable, or attributable, expenditure. If investment in new capacity is driven by the needs of traffic levels, this should be reflected in these variable costs.

Others have argued that common costs should be shared between all road users equally, that is on the basis of numbers of vehicles. This approach would reduce the share of common costs allocated to heavy vehicles compared to the current approach.

Ramsey pricing is a well accepted approach to the recovery of common costs. Under this approach, the difference between marginal and total costs is recovered from different users in proportion to the inverse of their elasticity of demand. It has been shown that under certain circumstances this results in the most economically efficient outcome, as it does not distort the pattern of demand. Ramsey pricing is difficult to apply to roads because elasticity of demand is difficult to measure and highly situation specific, and different prices for many different situations would be impractical. Furthermore, car use may well be more inelastic than inter-capital truck use, as roads provide access and mobility benefits to private car drivers that they value highly and are willing to pay for. Applying Ramsey pricing in this case may lead to an even larger proportion of shared costs being attributed to light vehicles (and a lower share to trucks) than at present.

Table 7. Allocated costs by expenditure category

		Light Vehicles			Heavy Vehicles		
		Attrib-utable	**Non-Attrib-utable**	**Total**	**Attrib-utable**	**Non-Attrib-utable**	**Total**
A	Servicing & Operating Expenses	831	0	831	63	0	63
		0	0	0	0	0	0
B1	Routine Maintenance	206	135	342	209	10	219
B2	Periodic Maintenance of Sealed Roads	76	112	187	206	8	214
C	Bridge Maintenance & Rehabilitation	13	133	146	58	10	68
D	Road Rehabilitation	11	344	355	274	25	298
E	Low Cost Safety / Traffic Improvements	377	0	377	36	0	36
		0	0	0	0	0	0
F1	Pavement (new)	34	588	622	488	47	534
F2	Bridges (new)	44	279	323	10	22	32
F3	Land Acquisition, Earthworks, Other Extension / Improvement Expenditure	160	1574	1734	34	125	159
G1	Corporate Services	1	207	208	0	18	18
	Total Allocated Cost	1754	3372	5126	1377	265	1642

9.3 Criticisms of the current costing methodology

9.3.1 Criticisms of PAYGO

PAYGO has been considered an appropriate methodology for a number of reasons. The most prominent of these is that it is able to utilise the data that is currently available on road expenditure. In the absence of accurate and appropriately disaggregated data that would allow modelling under a different methodology, PAYGO has the advantage of being based on the most defensible data sets available. It has further advantages relating to the degree of understanding and acceptability that it currently enjoys. This means that it is transparent and has a large degree of industry acceptance as a model.

However there are a number of significant flaws and limitations in this methodology, which are becoming increasingly problematic in respect of the model's acceptability and accuracy. With the advancement of technology and increasing recognition of the need to invest resources in improving road pricing methodology, the potential to overcome the hurdles in moving to a fairer system is more apparent. The flaws and limitations of the model need to be well understood in order for them to be overcome, and some of the most critical ones are discussed below:

Validity of PAYGO's underlying assumptions

- PAYGO's first assumption relating to the maturing of the network is probably reasonable. The conflicting pressures of a growing freight task combined with finite space on which to build roads means that key future productivity gains will be made through improved utilisation rather than vast network expansion.

- Of particular concern is assumption 2 – "across the network there is no overall deterioration in pavement or bridge condition". Through the limited availability of funding, it is entirely possible that expenditure to rectify pavement and bridge deterioration will take on a reduced importance. This is because of a possible temptation to delay these types of works in favour other measures with more visible benefits, such as congestion and safety.

- Assumption 3 regarding lumpiness of investment is, to some degree, mitigated by the use of a three-year average of expenditure data. However, electoral and economic cycles have the potential to create distortions in long run expenditure patterns. While costs are assessed on a national basis, the three-year smoothing approach can deal with the level of lumpiness that normally occurs. However, if the network is disaggregated to a particular jurisdiction, or region, lumpiness becomes more of an issue. For example, if a particular state had embarked on a major freeway construction programme for a short period, this would be likely to significantly alter the proportion of expenditure on different types of road works, which would in turn impact on the share of costs allocated to heavy vehicles.

- Analysis of SMVU data would suggest that assumptions about traffic growth is accurate at an aggregated level. However, it is impossible to confirm whether this is true at a more local level, and therefore what impact this may have on cost estimates.

- Assumption 5 – "the roadwork undertaken, and the road network itself, should be optimal" is likely to not hold true due to the current institutional arrangements for road provision. Because there is no current link between where the costs are incurred and the works that are funded, the potential for sub-optimal investments exists.

Estimation required in the local expenditure data

One of the problems with the existing system is its reliance on estimates of local government expenditure. For arterial road expenditure (including national highways), data is obtained directly from State and Territory road authorities. This data is broken down by expenditure category and by an urban/rural split. Estimates of local government authority (council) spending on roads are obtained from the Australian Bureau of Statistics. Additional data is obtained from State and Territory road agencies to allow State spending on local roads to be estimated and adjustments made for double–counting of local authority spending on arterial roads on behalf of State/Territory governments.

Two problems occur with this data:

- Breakdowns by expenditure category are not available for expenditure on local roads, as the only information available simply distinguishes between capital and maintenance expenditure. Consequently, it has been necessary for the NTC to estimate the amount spent on different types of road works on local roads using the relevant proportions of spending on arterial roads.

- The accuracy of the data reported to the Australian Bureau of Statistics is limited. The Bureau recently revised estimates of expenditure on roads by local councils, and as a result revised estimated 2000/01 , and 2001/02 by 17 % and 18 % respectively, that is around $ 600 to 650 million per annum respectively. While this revision has improved the accuracy of the data considerably, there remains a high level of uncertainty over the exact size of spending on local roads.

9.3.2 Criticisms of other elements of current charging method

Estimation of travel on different road types

Road usage data is not currently provided in a form that neatly separates the level of vehicle usage by the road types by which the expenditure is classified. It is therefore necessary to make estimates of the proportions of travel on each part of the road network.

Local road use estimates have historically been one of the weakest areas of data used in the estimation of heavy vehicle cost responsibilities. Therefore, as part of the 3rd Determination a major study was undertaken which has provided far more defensible data.

The focus of the survey method was to estimate relative use of the road network rather than estimate the absolute level of use of the network. The key finding from this study on local road use is that there is a much higher percentage of travel on local roads than was previously assumed.

- Light vehicles undertake 37 per cent of their travel on local roads, compared with the Second Determination estimate of 35 per cent.
- Rigid trucks and buses travel 30 per cent on local roads compared with a Second Determination average of 25 per cent.
- Heavy vehicles travel 16 per cent on local roads compared with an average of 5 per cent in the Second Determination.

Some commentators believe that the approach used, while a significant improvement on the previous estimates, will systematically over-estimate use of the larger heavy vehicles on local roads. This critique and the NTC's response is discussed further in Appendix B. The approach replaced a 'guess' about the level of use of local roads by different types of vehicles prepared in the early 1980s. No survey data was available to inform this 'guess', which formed the basis for assumptions about local road use by vehicle type until the work was undertaken for the 3rd Determination, despite evidence from sensitivity testing that showed that cost responsibilities for heavy vehicles are reasonably sensitive to the level of local road use assumed.

Aggregation of expenditure

The cost base that applies in the current PAYGO system is nationally aggregated. This is the case because of the previously identified need for nationally consistent charges. It ignores differences in the standards jurisdictions maintain their roads to meet, and that vehicles around the country do not use the network uniformly in the pattern suggested by the surveys and the average vehicle usage data. In reality vehicles would normally use sections of the network that are characteristic to the type and location of their operation, not characteristic of the national 'average'.

National aggregation of the cost base has the advantage of producing a nationally consistent charging scheme. However this must be considered in light of the equity problems posed by vehicle cost allocations being based on a cross section of road use which may not reflect actual operations of individual vehicles, and the level of service that is provided in their specific area of operation. It creates the potential for vehicles that use proportionally more of the lower cost sections of the network to be disadvantaged. Equally, vehicles that predominately use high cost parts of the network are advantaged under the current methodology. As previously noted, there is no pricing incentive for operators to choose to use lower cost routes under the current system.

Variation in unit costs calculated using the current methodology provides some guidance to how significant the aggregating of the road network is to estimates of costs. The costs shown are not total costs divided by total use, but instead show the costs allocated on each measure of use divided by use. They are additive, in that when combined with use estimates and summed, they will give a total road use cost estimate.

The level of variation in unit costs across these four relatively aggregated components of the road network is relatively large. This suggests that even greater variations would be found if variations in environment and construction standard were taken into consideration. It is also notable that different relationships are found between different types of costs across the four sub-networks. That is, for example, while costs linked to tonne-km are lowest on urban arterial roads, costs linked to passenger car equivalents (the space taken by a vehicle) are lowest on urban local roads. These variations reflect, in large part, differences in the functions performed by different components of the road network. Thus while providing additional space on the road network and improving traffic flow is a priority on urban arterial roads, it is not so important on urban local roads.

Table 8. Marginal cost per road type

Type of Cost	Arterial Urban	Local Urban	Arterial Rural	Local Rural	Total
Marginal Costs					
Vehicle Kilometres Travelled (c/km)	0.71	0.48	0.66	0.54	0.64
Passenger Car Equivalents (c/PCU-km)	0.27	0.16	0.34	0.27	0.29
Equivalent Standard Axles (c/ESA-km)	4.46	4.92	2.70	5.12	3.43
Average Gross Mass (c/tonne-km)	0.10	0.20	0.13	0.25	0.13
Non-attributable costs (c/km)	2.25	0.69	2.27	1.41	1.99

Averaging within vehicle categories

Another limitation of the cost allocation process is the use of average vehicle utilisation figures to derive an allocated cost for each vehicle class. Under this arrangement, vehicles in a given class will recover on average their allocated costs. For vehicles whose utilisation is less than the average for their class, their quoted cost allocation overstates their actual burden on the road network. Similarly, for high-utilisation vehicles this burden will be under-stated. Without data about individual vehicles, it is not possible to know their true burden.

This imbalance is partially corrected through the fuel component of the charging scheme as it introduces a component of the charge that varies with use.

The significance of this factor is shown in Figure 5 and Figure 6 for a six axle articulated truck and a nine axle B-double respectively. These figures illustrate the effects of averaging kilometres travelled, average gross mass and fuel consumption levels and the combined effects of averaging all three. The ranges of kilometres travelled shown are based on Survey of Motor Vehicle Use data on the distribution of travel across the vehicle fleet. Examples for the two vehicle types' distribution of travel are shown below their respective cost allocation/revenue graph. These distributions provide an indication of how many vehicles are advantaged and disadvantaged by the averaging process. The revenues are based on current charge levels. Note that the comparisons are on a per vehicle basis,

and the charges recovered don't reflect spare trailer revenue that would normally be factored in to the charge.

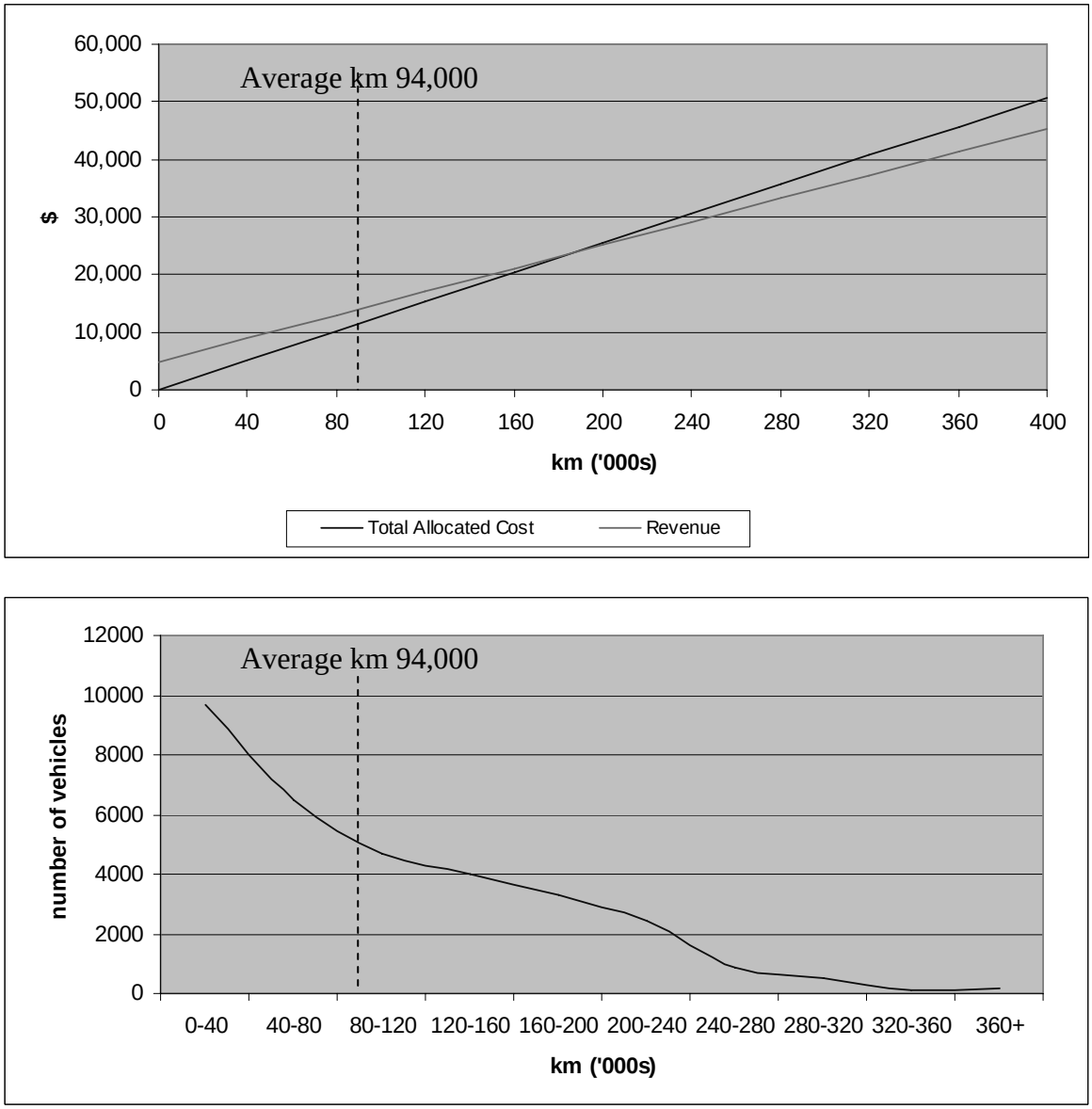


Figure 5. Allocated costs for 6-axle articulated trucks varied by distance, distribution of distance

One notable feature of the revenue/allocated cost profile for the 6-axle articulated trucks is that revenue exceeds allocated costs before the point of average utilisation. This is because the current charges over recover for this vehicle class. If spare trailer revenue were accounted for, the revenue line would be shifted upwards, implying still more over recovery.

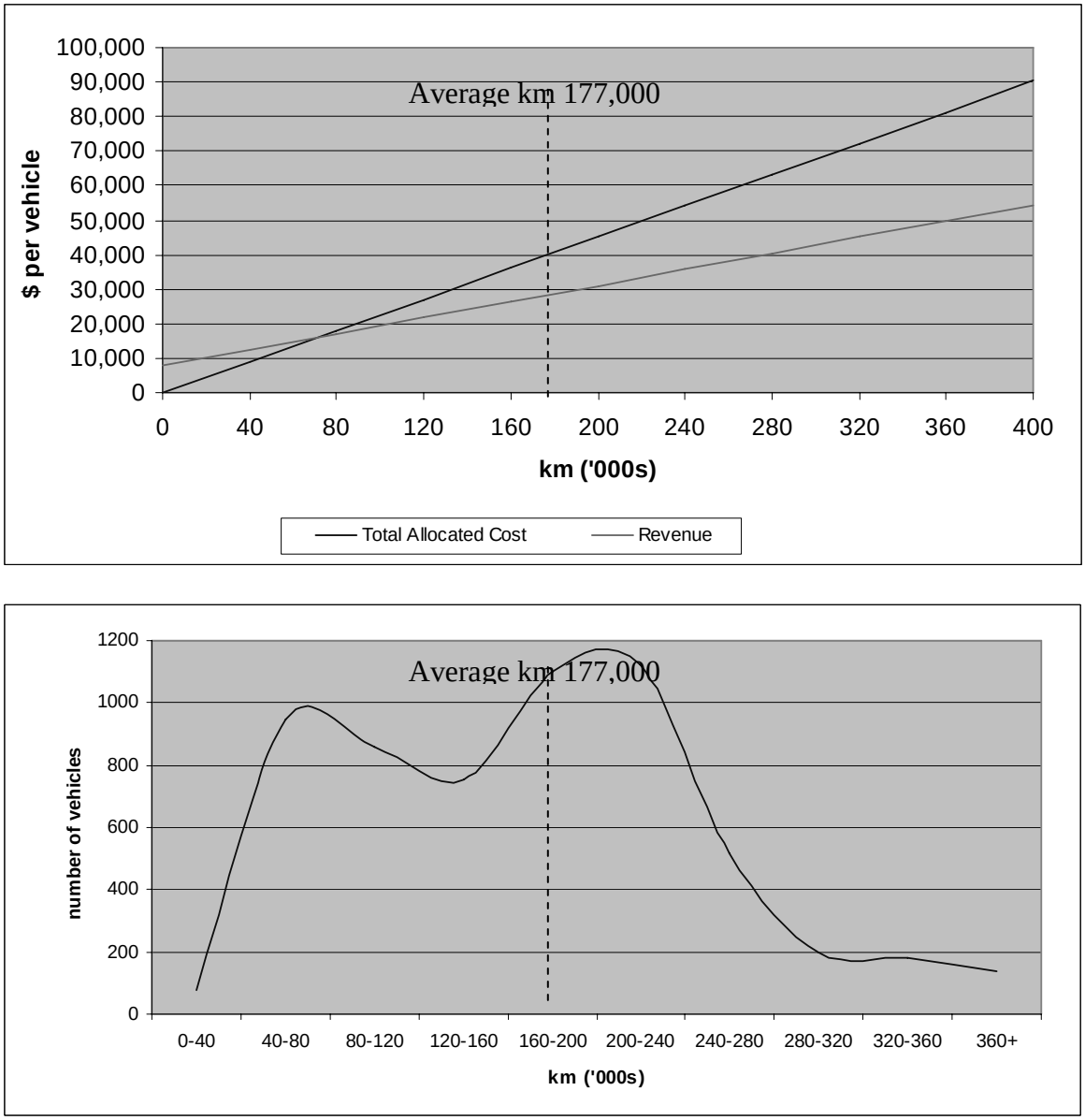


Figure 6. Allocated costs for B-doubles varied by distance, with distribution of distance

For B-doubles, the under-recovery within this vehicle class is evidenced by the fact that allocated cost begins to exceed revenue at utilisation levels that are well below the average. Removing the subsidy would shift the revenue line upwards. Regardless of this, B-double costs increase at a far greater rate with usage than the current charging arrangements can capture.

The bi-modal nature of the distance distribution is also notable. This reflects an overall distribution with a separate characteristic distribution for line haul operations.

The impact on costs and revenue when mass is varied is also relevant. Figure 7 and Figure 8 show for constant (that is, average) distances travelled, how variation in mass impacts on allocated cost and revenue. The range of vehicle masses represented are thought to represent a reasonable range of operations, centred around the average gross mass for each vehicle class. In these cases, around half of the possible variation in fuel consumption rates are thought to vary by mass, as demonstrated by the positive relationship between revenue

and mass. The graphs illustrate how costs vary by mass at a much faster rate than revenues do, owing to the relationship between mass and road wear.

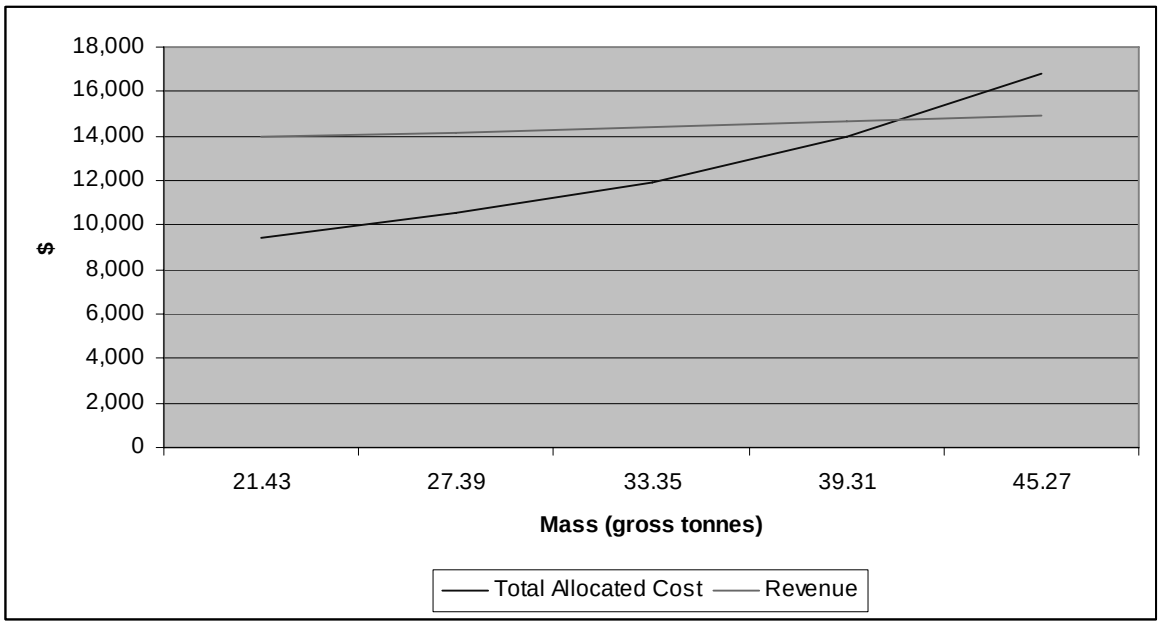


Figure 7. Allocated costs and revenue varied by mass for 6-axle articulated trucks

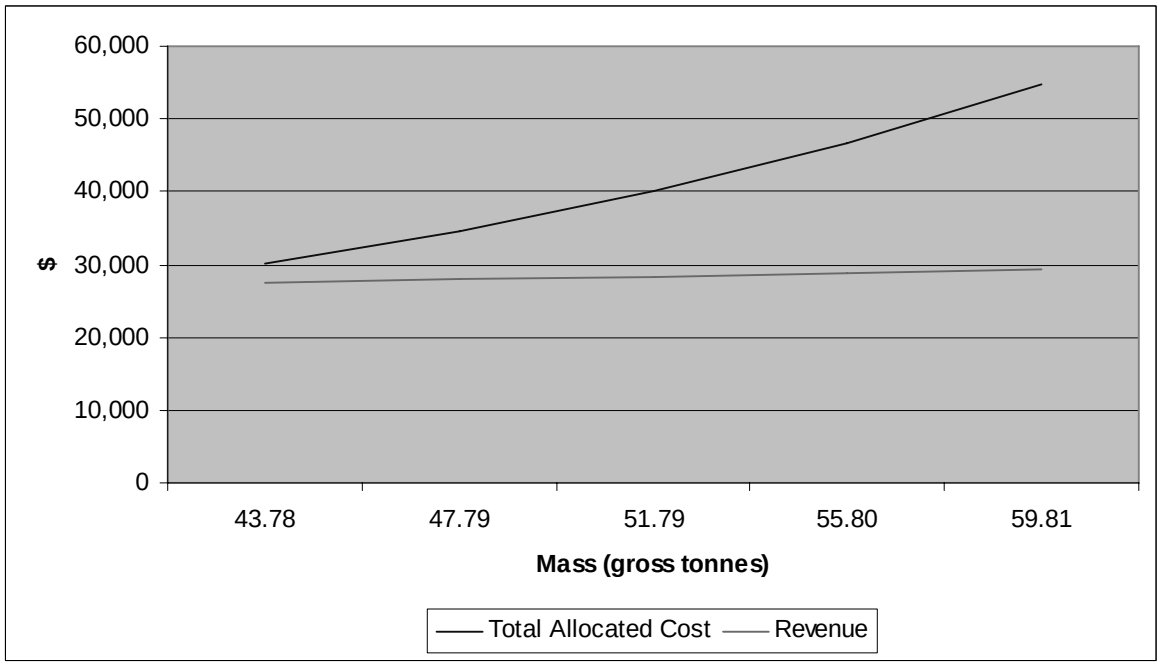


Figure 8. Allocated costs and revenue varied by mass for B-doubles

The impact of fuel efficiency on a vehicle's treatment under the current charging arrangement has been illustrated in Figure 9 and Figure 10 below. In this case, both mass and distance travelled is assumed to be constant at the average values for the respective vehicle classes. In reality, there is likely to be some interplay between fuel efficiency and mass. However, unlike in the previous example where mass is deemed to have a quantifiable impact on fuel efficiency, it can't be said that fuel efficiency impacts mass directly. Accordingly mass has been held constant in these examples. Once again, the range of fuel consumption rates are thought to represent a reasonable range of operations, centred around the average value for each vehicle class.

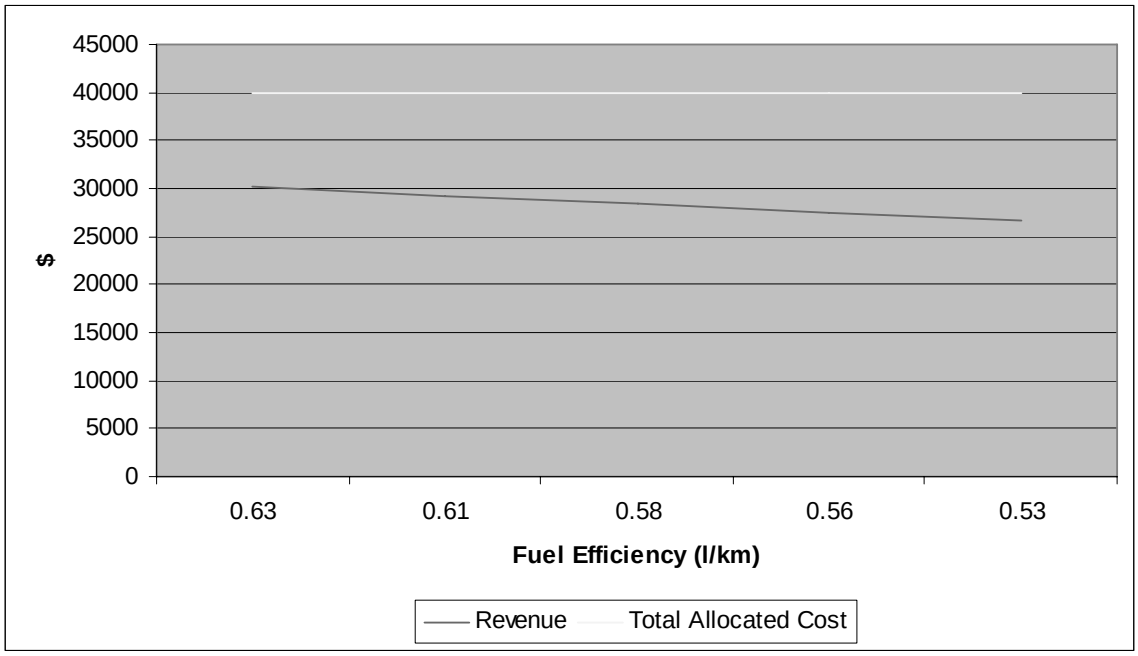


Figure 9. Allocated costs and revenue varied by fuel efficiency for 6-axle articulated trucks

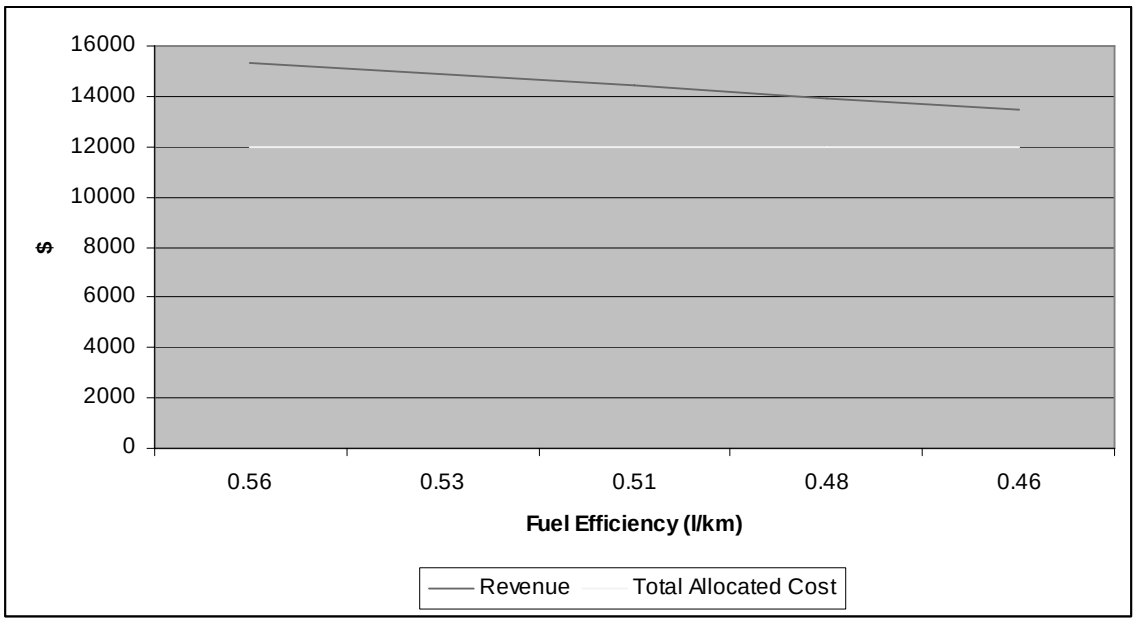


Figure 10. Allocated costs and revenue varied by fuel efficiency for B-doubles

As we have seen, it is difficult to represent the interplay of the different variables affecting allocated costs and revenues in a two dimensional space. To this end, Figure 11 and Figure 12 show how a combination of utilisation levels at both the low and high end of their respective ranges impact on costs and revenues. These assume that poor fuel efficiency characterised by low distance, urban operations in congested areas is offset by the fuel efficiency gains of carrying less mass. Similarly, the fuel efficiency benefits of long-distance operations that occur in uncongested areas are offset by the higher masses that these vehicles would normally carry. Therefore, the fuel consumption rates used in these cases is the average for the respective vehicle class.

Most notably, these figures demonstrate how the problem of under-recovery in high utilisation vehicles is disproportionately larger than that of under-recovery in low-utilisation vehicles.

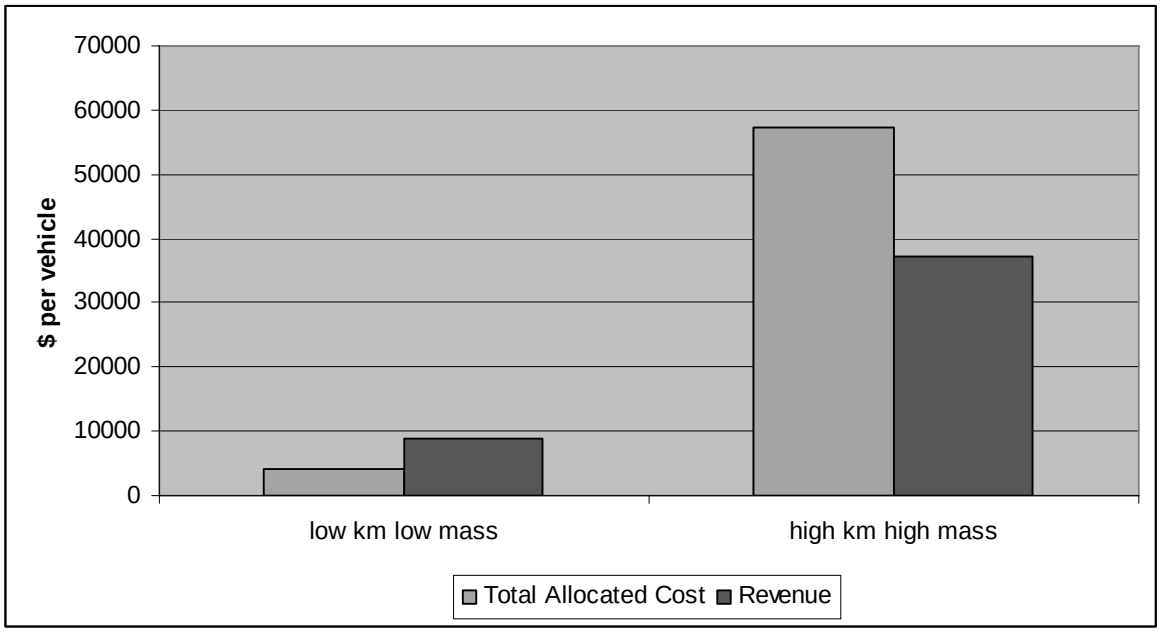


Figure 11. 6-axle articulated truck allocated costs and revenue for different utilisation scenarios

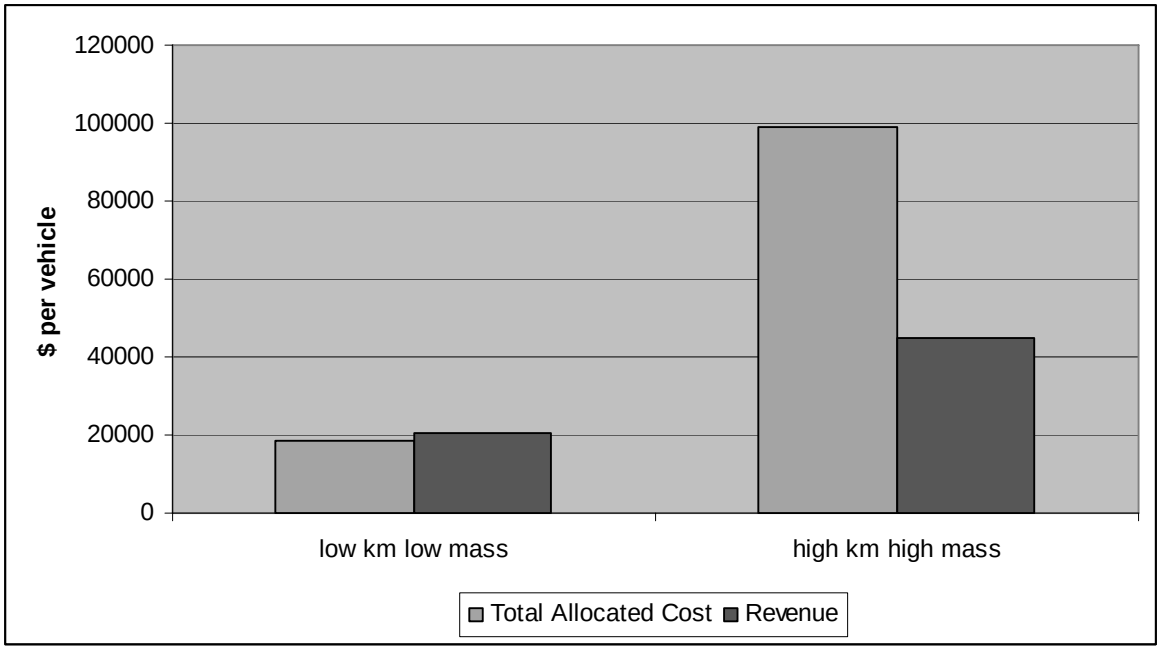


Figure 12. B-double allocated costs and revenue for different utilisation scenarios

Cost allocation rules

There is some disagreement about the rules used to allocated costs between different road users. The treatment of pavement maintenance expenditure remains the most sensitive of these. Despite a number of attempts to establish a statistical relationship between road use and pavement maintenance expenditure, a clear, statistically significant relationship has not been able to be established. As part of its conclusions in putting forward proposals for a 3rd Determination, the NTC proposed that further data collection and research be undertaken in this area.

Issue: For example, do participants agree with the NTC's Third Determination estimates of variable road costs attributable to different classes of vehicle?

Do they agree with the NTC's estimates of common costs and the way in which they are allocated? Why or why not?

Do they agree with the exclusion of some costs, such as enforcement costs, from the cost base for road charges?

Some commentators assume that this type of expenditure must automatically be linked to equivalent standard axles (as is pavement reconstruction/rehabilitation which is undertaken to restore structural capacity or strength to a pavement when this has worn out as a result of environmental factors and traffic loadings). However, the factors influencing pavement maintenance works are less well understood. Routine pavement maintenance comprises activities such as repairs to potholes and small amounts of cracking. Periodic pavement maintenance includes reseals and resheeting to restore surface texture, repair deterioration of the seal with effects of sunlight and prevent ingress of water. It is likely that a mix of factors relating to road use influences the need for this type of expenditure, including tyre passes, horizontal pavement forces produced by scrubbing of tyres, axle loads, dynamic loads and spatial repeatability of loadings.

The NTC has also noted that cost allocation rules for a number of the non-pavement road works are based on limited analyses. A scan of international practice revealed that overseas approaches are generally fairly arbitrary, or specific to local conditions and cannot readily be translated to Australian circumstances and road types. The more significant expenditure items include earthworks, land acquisition and low cost traffic and safety improvements.

The major drawback of the current cost allocation rules is that they are all assumed to be constant across the road network, and have been drawn from analysis of the sealed arterial road network. Unsealed roads, low traffic local roads and high capacity routes are all likely to be considerably different to this average. Little work has been done to explore this issue to date, with some initial scoping work being undertaken for the NTC in 2005 being the only attempt to explore the potential variation in cost allocation relationships with road type.

Expenditure that is excluded

The rail industry has expressed considerable concern that a number of elements of expenditure by agencies responsible for providing and maintaining roads are excluded from the cost allocation calculations that have been undertaken by the NTC. The NTC's reasons for excluding these expenditures are that:

- they are recovered through existing fees and charges;
- they do not relate to the needs of motorised road users; or
- they are not related to the provision and maintenance of roads.

Examples are curbing and guttering, bike paths, footpaths, administrative costs of registration and licensing systems and repairs due to servicing.

9.4 Current charges regime

The current system of heavy vehicle charges relies on a two-part pricing mechanism, comprising a variable and a fixed component. The two components of the charging system are a fuel charge (the variable charge) and annual registration charges (the fixed charges). Under the Heavy Vehicles Agreement (the inter-governmental agreement underpinning the NRTC's role in recommending heavy vehicle charges), the fuel charge was referred to as the 'road use charge' and annual registration charges comprised an 'access charge' and 'mass distance charge'. The current heavy vehicle charges also provide for a permit fee, based on a rate per equivalent standard axle kilometre (a measure of relative pavement wear of different loads and axles) for movement of indivisible loads over 125 t gross mass.

Issue: How efficient are current charging arrangements for heavy vehicles? What are the major sources of inefficiency? Would changing the weight attached to registration fees, on the one hand, and fuel levies, on the other, result in more efficient pricing of heavy vehicle road use? How, and to what extent?

The current charges regime has been very successful in achieving its original objective of achieving aggregate cost recovery and allowing a nationally uniform pricing regime to be applied. However, as has been discussed throughout this submission, it is generally accepted that the regime is fast reaching a point where it becomes a constraint on productivity.

The remainder of this section discusses the specific elements of the current regime and details its shortcomings.

9.4.1 How the charges are split and levied

The current split between variable and fixed charges

Normally under a two–part charging system, the fixed and variable components of the charges reflect the fixed and variable components of the costs. This is not the case with the current heavy vehicle charging system. No attempt is made to recover the variable component of the costs via the fuel charge. This is in part because the fuel charge does not closely reflect differences in variable costs between different types of vehicles. It is also because the system has been considerably constrained because there is no link between the revenues collected and the revenues made available for road funding.

The significance of this constraint goes back to the First Determination. While the NRTC, like the NTC, was instructed not to make recommendations relating to road funding, clearly any recommendations for national heavy vehicle charges had the potential to alter funds available to different governments. The approach adopted in the First Determination was to set the fuel charge and the total amount to be collected from annual registration charges so that there was no change in the share of funds flowing to State/Territory governments and the Federal Government. None of the funds flowed to local governments under the mechanisms available (although local road costs are recovered through the charging system). It was not possible to move from the varied registration charges that applied prior to the national system to any set of national charges without altering the distribution of funds between individual State and Territory governments, and no attempt was made to do so.

Under the method of calculating charges the NRTC was asked to adopt, the fuel charge was set to fully recover the share of expenditure allocated to the smallest rigid trucks. This resulted in a fuel charge of around 15 cents/litre. However, an adjustment was made to reflect the high incidence of wholesale sales tax on larger heavy vehicles, which had been estimated to be equivalent to 3 cents/litre. The result was a fuel charge of 18 cents/litre. This resulted in the balance of charges to be collected through the annual registration component matching (in round terms) the total amount collected at that time from registration of heavy vehicles.

For the Second Determination, two approaches were used to establish the fuel charge. One was based on simple indexation of the First Determination charge. The other was based on recalculating how much was required as a fuel charge to fully recover the costs of the smallest rigid trucks. Both calculations resulted in the same charge of 20 cents/litre (after rounding). Fortuitously, this led to roughly the same split between fuel and registration charge revenues (a ratio of roughly 7:3).

As part of the development of recommendations for the 3rd Determination, the NTC examined what fuel charge would be needed to match (in aggregate) the total separable costs allocated to heavy vehicles. The result was a fuel charge of around 12 cents/litre to 14 cents/litre. The result of this would have been to significantly alter the balance of revenues between levels of government, and to increase the reliance on the fixed component of the charges for the largest vehicles.

It is notable that the proportion of costs allocated to each class that are attributable is not a constant amount. Thus while calculating the fuel charge in this way would give an overall balance, it did not mean that the appropriate balance was achieved for different types of

vehicles. This is because fuel consumption is only roughly related to road infrastructure cost responsibilities of different vehicles. If the fuel charge was to reflect the separable costs for each vehicle class, a different fuel charge would need to apply to each class. This would be extremely costly administratively, and potentially subject to rorting. Such an outcome would negate the benefits of a fuel charge as a relatively cost effective way of levying charges on vehicles.

As discussed in Section 3, considerable work needs to be undertaken to better understand the relationship between usage and cost and to obtain better quality data in general. This will assist in moving forward in the development of charges. Until more work has been done to collect better data and understand the basis of costs, it may be premature to form any conclusions on the exact structure and split of charges.

Fuel charge

The fuel charge is collected (until July 2006) as a nominal component of fuel excise and goes into consolidated revenue of the Federal Government. The annual registration charge are collected by the State and Territory governments and are payable on new registrations or annual renewal of registrations of heavy vehicles. A pro-rata amount is collected for less than full year registration. In most States, the amounts collected are paid into consolidated funds. In New South Wales the revenue from registration charges is earmarked for road funding. In Western Australian some of the amount collected is set aside for transport funding.

The fuel charge has only been a nominal component of fuel excise up until now. This is because the charge was less than the total amount of excise paid and did not effect the amount paid for fuel at the pump. However, with the introduction of taxation reforms in 2000, this situation changed for some vehicles. The Federal Government introduced a rebate system where the difference between the fuel excise and the amount of the fuel charge could be claimed back via a grants scheme. This arrangement applies to all vehicles over 4.5 t gross mass in rural areas, and to all vehicles over 20 t gross mass in urban areas. It only applies to diesel fuel. At the same time, off road users of diesel had access to rebates of the full amount of excise paid. This included rail operators, for the first time.

Initially the rebate was exactly the right amount for the effective level of excise for the applicable vehicles to match the level of the fuel charge. However, there was no formal acknowledgement that it had been set to do this.

A complex set of changes occurred in 2001. Fuel excise was indexed, but the rebate remained the same so that the effective level increased. An arrangement was then introduced to index the rebate amount. In the meantime, the Federal Government decided to cease indexation of fuel excise (in a situation of rapidly increasing oil prices) and the level of excise was reduced to its pre-indexed level. The rebate amount remained unchanged. Consequently, since around 2001 the effective level of excise paid by applicable heavy vehicles has been 19.636 cents/litre.

In Queensland, the situation is more complex still. This is due to the arrangements whereby the Federal Government returns the amount of the fuel excise collected in lieu of fuel franchise fees that had formerly applied in other states and territories to the Queensland Government (as Queensland did not have a fuel franchise fee). The Government repays this amount to fuel wholesalers. Consequently, the effective level of excise in Queensland is a further 3 cents/litre less than the fuel charge (assuming the refund is passed on by the fuel wholesalers).

In 2005, under its energy policy, the Federal Government signalled its intention to formally set the level of the diesel fuel rebate (to be extended to all fuels and all vehicles over 4.5 t gross) to reflect the fuel charge agreed by the ATC. This means that any changes to the fuel charge from now on are no longer nominal—they impact directly on the cost of fuel to transport operators.

One of the major drawbacks of the fuel charge is that fuel consumption can vary considerably between vehicles that have the same road infrastructure cost responsibilities. Older vehicles generally have higher rates of fuel consumption—these vehicles also often carry lighter loads and travel less annual kilometres per annum (as they tend to be used more for urban or local distribution tasks rather than line haul operations). Vehicles used in urban environments also consume more fuel than the same vehicles in rural highway operations, due to the stop-start nature of urban travel.

In addition, while responsibility for road costs increases exponentially with the load carried, fuel consumption is linearly related to load. This is why the two part system of charges exists. The annual registration component of charges is used to ensure that each class of vehicles, on average, recovers its share of road expenditure after taking into account the amount paid (on average) through the fuel charge.

Annual registration charges

By contrast, the annual registration charges are somewhat more straightforward. All jurisdictions levy the charges, and all provide concessions to selected groups (mostly farmers). Proposals to levy lower amounts for those who travel low annual kilometres have not been successful, due to the administrative difficulties of preventing fraud or rorting of such arrangements.

States and Territories administer, on behalf of the Federal Government, the Federal Interstate Registration Scheme (FIRS). This scheme was originally established to provide a means of levying registration on vehicles engaged solely in interstate trade. Under earlier interpretations of the Australian Constitution, State–based charges for these vehicles could not be levied. The interpretation of the Constitution changed with the Hughes and Vaile case in 1954. There is no longer any barrier to States and Territories levying charges on vehicles operating solely interstate, provided these charges are cost-based and do not discriminate compared to charges applied to the same vehicles operating intrastate.

One of the major constraints on the annual registration charge component of the current system is the need to take account of charges levied on vehicles that lie outside the national charging scheme, that is, vehicles up to and including 4.5 t gross mass (based on the manufacturer's rating). State and Territory jurisdictions have successfully argued that there is a potential for distortions in vehicle choices if the up-front annual charges for vehicles just over 4.5 t were significantly lower than those for vehicles up to 4.5 t.

The annual registration charges vary with vehicle type (rigid truck, prime mover type, trailer and bus) and vehicle size (number of axles and, for rigid trucks and buses, load capacity measured by manufacturer's rated mass)[16]. The variations have been selected to match variations in use and responsibilities for road wear. They therefore match variations in road expenditure shares.

[16] Vehicle types, along with the annual charges and maximum masses and dimensions allowed are illustrated in (NTC 2002-2006)

Clearly, the major drawback of the annual registration component of the charges system is that this part of the charge is not able to reflect any differences in use between vehicles within a class. These variations can be significant, particularly for the larger vehicles.

Data on annual kilometres of travel shows that rigid truck use varies between a few hundred kilometres per annum up to around 80 000 km for smaller trucks and up to 150 000 km for larger rigid trucks. The distribution of annual travel is relatively even for these vehicles. This means it is just as likely a vehicle will travel 5000 km as 50 000 km.

For B-doubles there is a considerable proportion of vehicles travelling up to 60 000 km, fewer vehicles travelling between 100 000 and 160 000, and then larger numbers travelling more than this. The maximum annual distances are as high as 450 000 km. Thus, there is a bi-modal distribution of annual kilometres for articulated trucks, with the average travel on which the annual registration charges are based being between the two peaks in the distribution. This situation was demonstrated earlier in Figure 6.

For articulated trucks, there used to be a similar bi-modal distribution, with the distances involved being less than for B-doubles. Over time, the utilisation profile of these vehicles has changed significantly. Figure 5 represents the current situation, where a large proportion of vehicles travel up to 40 000km, and the number of vehicles travelling higher distances declines thereafter. Most of this change has been brought about through the large uptake of articulated trucks for short distance purposes.

Through traffic

The current pricing system is not able to address issues about the difference between where a vehicle operates and who receives the revenue from pricing its access to the road network. This is in part because there is no link between revenues and road funding under the current arrangements. However the current charging mechanism is not able to distinguish the location of a vehicle and assign revenues on the basis of location. This is a significant factor where there is a high level of through traffic. This is the situation in New South Wales, where a high proportion of north/south interstate freight movements travel through that State at some point. It also applies to any number of local councils, who are located between the source and destination of freight moved on local roads.

10. MOVING TO A NEW REGIME

The Key Messages:

- Direct user pricing can deliver the maximum productivity benefits.
- A sound policy framework is required before considering technology tools.
- A staged approach to implementation minimises the risk.
- Policy options are available to mitigate adverse impacts.
- Benefits of direct user pricing are limited without supporting institutional reform.

10.1 Is direct pricing appropriate?

The current pricing regime is successful in that it recovers current estimated expenditure. However, its fundamental failing is that it does not provide any signal for efficient usage or investment. Nor does it provide for greater flexibility in the use of the existing network.

A mass distance charge, however, has the potential to revolutionise the way roads are used. The major efficiency is the increase in utilisation of roads with greater mass limits. The benefits of operating at higher masses are conservatively estimated to be around five times the costs. Therefore, greater wear of roads (particularly those designed at a high service standard) can be easily justified by the increased benefit associated with that wear.

The existing regime cannot differentiate the road network in any way. There is no signal for operators to indicate that operating on some roads incurs a higher cost than operating on others. A direct charge could provide this signal. Whilst it is clear that this would encourage operators to make route choices that avoided high cost roads, it is difficult to fully understand the impact of a new regime. This is because there are a number of competing factors:

Issue: What are the likely resource impacts of a shift to pricing regimes that better reflect marginal costs of using road and rail infrastructure?

How would such pricing affect use of existing infrastructure? Would impacts vary across corridors? If so, why?

- With cross subsidies removed, the cost of long distance operations is expected to increase.
- B-doubles are fuel efficient therefore their costs may go up when charges are no longer based on fuel consumption.
- Generally speaking arterial roads have a lower marginal cost than local roads and therefore the cost of operating on arterial roads will be relatively cheaper than on local roads.
- The cost base itself may increase with a move away from PAYGO.
- There is no information on demand elasticities for road use (what limited information exists relates to demand for freight movements, rather than road use).

Until the charges themselves are calculated it is difficult to know with great certainty how behaviour may be affected. However, generally speaking, it is expected that long distance operators carrying heavier loads on arterial roads are likely to obtain the greatest benefits from improved access and the ability to purchase higher levels of road wear. While the overall cost of providing their service may increase, the actual service that they will be able to provide will also improve.

Although work has been undertaken on demand elasticities for roads and cross elasticities between road and rail it has been limited due to the lack of data to calculate elasticities. However, the studies suggest that freight customers are more responsive to service quality than price. If rail services were to improve through improved infrastructure, there may be greater pressure for a modal shift.

Issue: What are the key drivers of their decisions to use either road or rail transport

It is more uncertain what impact a mass distance charge might have on investment decisions. Whilst it is expected that a new regime would provide better information in terms of investment requirements, it is uncertain as to the extent that this will actually be reflected in investment. The key reason for this is the lack of hypothecation. Whilst the better information may assist road agencies in the budgeting process, it does not address the non-alignment in revenue allocation and expenditure between States and levels of government.

10.1.1 The specific benefits

This section describes the specific benefits of direct pricing for heavy vehicles. A summary is presented in Table 8.

Road freight operators

Road freight operators are currently restricted in their road use through the application of prescriptive road regulations. The regulations classify the road network and restrict vehicles on the basis of their physical dimensions and weight.

Prescribed regulations have a number of advantages. They help to maintain safety, they are relatively easy to monitor and therefore enforce, and it broadly works in line with the existing pricing structure. Up until now, they have proven to be an effective, albeit blunt, regulatory device.

However, with advances in technology, road operators are able to be more customer focussed and offer more innovative vehicles that better respond to customer needs. B-doubles are a good example of such a vehicle. Within the prescribed environment, though, the ability for operators to fully utilise these vehicles (despite many of them adhering to the intent behind the regulations) is limited. Therefore operators expect that a new regime will deliver better access to the road asset and enable greater fleet productivity.

Road infrastructure managers

There are over 700 road infrastructure managers. They consist not only of the State road agencies, but also local government authorities. The incentives on road infrastructure managers differ to those of rail infrastructure managers. This is primarily due to the lack of a direct exchange between suppliers and users in the road sector, which is not an issue in the rail sector. This essentially means that the revenues gained through charges do not necessarily flow back to road agencies, but instead go through consolidated funds from which road agencies are allocated an amount.

As a result, road agencies seek through pricing more accurate information to support appropriate investment and minimise costs through the optimal usage of the network. They are concerned less about the revenue from charges and more about managing usage on the road. Indeed, the lack of control and certainty over future revenue streams provides a perverse incentive to limit usage of the road network.

Freight customers

Road and rail share common customers. Ultimately customers will be seeking reductions in their transport costs and a more specialised service. However it is important to note, that studies suggest that freight customers are more influenced by service quality than service price. Therefore, the ability of the road sector to offer a better service through greater access to, and rights on, the network and a movement away from prescribed regulations better serves the requirements of customers.

Rail sector

As has already been discussed in this submission, the rail sector has long argued that road freight vehicles should pay their way. There are two issues it would expect to have addressed through a new road pricing regime. First, that the base charges fully reflect costs. Should the PAYGO assumptions prove to not hold, there may be an argument that the two cost approaches do not provide equivalent cost bases. The rail sector has also argued that road costs should incorporate externalities.

The second and perhaps greater issue is that cross subsidies are removed. This would address the particular concern of competitive neutrality with vehicles that compete directly against them (such as B-doubles). As has already been mentioned, B-doubles are currently subsidised on average by $10,500 per annum. The expectation is that removing the subsidy will remove distortions that lead to sub-optimal modal choice.

However, perhaps the greatest benefit for the rail sector lies not in how it may be able to compete more effectively against road by increasing the cost of road transport, but rather how it may be able to reduce its own costs and increase productivity through a more effective and efficient distribution service. Road operations are crucial to the overall service provided by rail operators. The road interaction with rail is currently limited not only by the physical infrastructure on intermodal terminals, but also the limitations in access of some heavy vehicles which would otherwise allow for a more cost effective and efficient pick up and delivery service (a major component of rail freight costs).

The community

Community expectations are that pricing will promote road usage consistent with social considerations. This is generally seen as a reduction in congestion and pollution as well as heavy vehicle traffic through residential areas.

However, in more remote communities, it is expected that any pricing regime will reflect their disadvantaged position. Transport is a significant cost of living in the more remote areas of Australia and as such, the broader impact of a pricing regime must be taken into account.

Table 9. Summary of Benefits

Stakeholder	Benefits of direct-user charges	Impacts to be managed
Truck fleet	Ability to purchase higher levels of road wear Better network access for more productive vehicles Low marginal road use cost on freight routes Investment focus on freight bottlenecks	Pricing pathways to manage the removal of vehicle cross subsidies
Regional transport operators	Low utilisation vehicles not disadvantaged by averaging	Increased trip costs on low traffic density roads with high road wear characteristics. This can be managed by factoring social amenity costs (CSO) into road classifications; or by averaging charges across road types
Road owner	Economic incentive to increase road asset utilisation (road wear) Pricing signals to inform investment priorities Constrain and manage the impact of a growing freight task	Institutional change Implementation and administration costs Potential bottlenecks will need to be addressed quickly
Freight customers	Improved service from more productive and better aligned road and rail transport networks Pricing signals to influence lowest cost distribution network design consistent with land use planning	Pricing pathways to manage the removal of vehicle cross subsidies
Rail sector	Improved pricing consistency across modes National social policy on CSO application Better mode alignment of mass controls Reduced terminal interface costs	Low marginal road freight prices on purpose-built freight routes
Community	Reduced truck trips and safer heavy vehicles No taxpayer subsidy of road costs Incentives to use key freight corridors consistent with land use planning Pricing signals for road upgrade priorities	Higher road use costs on low grade rural and regional roads. This can be managed by factoring social amenity costs (CSO) into road classifications; or by averaging charges across road types
Export industries	As above for operators and freight users	Export industries which rely on low grade roads for access will face increased costs. This can be addressed through explicit CSOs. Pricing signals to upgrade road corridors and fix freight bottlenecks will reduce transport costs

10.2 Options for reform

10.2.1 Findings of NTC scoping study

It has been widely accepted by the road sector that following the 3rd Determination recommendation there would be some element of reform to charging. In this context, road agencies sought further advice from the NTC as to what a new pricing regime may look like and how it may be implemented. In response to this request, the NTC undertook a scoping study which detailed a full mass distance pricing scheme and outlined possible stages to achieve this ultimate outcome. It is believed that a mass distance pricing regime would best result in the productivity gains sought by the industry and other outcomes described above. However, it is not certain what costs would be associated with these outcomes. Therefore the study provided for several end points in terms of pricing reform, and a number of interim positions.

The ultimate endpoint for a heavy vehicle charging regime is a complete mass-distance-location regime. This option provides for a possible policy scenario in which charges are based on full infrastructure costs, including full road and social costs. The study described these charges as being mandatory and based on vehicle characteristics (such as mass), distance and road type and provide for access above current prescribed limits. The key features of such an approach are described in table 8.

Table 10. Key features of a full mass distance regime.

Required revenue	Revenue would be required to cover: • full road infrastructure costs • societal costs incurred through road use
Cost allocation	The user bears the full cost of the use of the road. This includes: • charge related to the benefit of the use of the road • additional road charges related to the use of that road by that vehicle • additional societal charge related to the use of that vehicle
Vehicles subject to the charge	All heavy vehicles over a prescribed limit (which may be 4.5 tonnes)
Obligation for the charge	The charge will be mandatory
Roads attracting the charge	The charge will be applied to all distance travelled in Australia by eligible vehicles
Calculation of the charge	The charge will be applied to each vehicle based on: • relevant characteristics of that vehicle (eg mass, number of axles) • distance travelled by that vehicle on each type of road • applicable rate for that vehicle and type of road • (Optional) incremental charge for use of specified roads
Data for the charge	Automatic data collection by means of on-board equipment installed in the vehicle

Asset management information	The charges, mass and distance travelled would need to be disaggregated by: • jurisdiction (Local Government, State, Federal) • road link (Reference to actual road – excluding general access roads • road type (e.g. PBS categories L2, L3 and L4) • road ownership (Federal, State, Local) • date/time • vehicle characteristics

There are considerable benefits associated with such an approach. Operators would be able to increase the productivity of the heavy vehicle fleet through greater access to the network and the ability to carry additional mass. Furthermore, prices could be used to encourage greater utilisation of roads that are designed for higher service standards. It is expected that regardless of the funding allocation of base charges, the incremental revenue associated with charges which recover costs over the base would accrue to road managers.

Whilst this endpoint is assessed as achieving all of the key outcomes sought by stakeholders as discussed above, there may be considerable cost and risk associated with it. Although the benefits are expected to be high, they will not be universal. Yet costs will necessarily be incurred by all road operators. In addition there is considerable cost involved in the development and operation of the required technology. Therefore the study suggested a number of possible interim positions.

A stepping stone to a full mass distance approach may be a form of incremental pricing. This approach incorporates features of the full mass distance regime but applies it only to characteristics over current prescribed limits. It has the potential to unlock significant productivity improvements while also changing the nature of the relationship between asset providers and users. The scheme could be administratively based or automatic.

Issue: Would a system of incremental charging, as outlined by the NTC (2004a), provide a useful stepping stone to broader application of mass–distance charging? Are there drawbacks to such an approach?

An administratively based scheme would entail operators purchasing a package of additional rights over the prescribed limits. The charges for each component would be predetermined, with the overall cost of the package dependent on what rights were purchased (whether those rights were actually used or not). Compliance would be an essential element of the scheme and in such an arrangement could be undertaken through IAP. Such a scheme may also require vehicles to be PBS vehicles to ensure that they could safely operate with the additional benefits. Under an automatic scheme, rights would not have to be predetermined. In this case, technology would be required to determine the charges for specific trips. Again, IAP would form a sound foundation for the technology required, although it is expected that there would need to be considerable advancement of the On Board Unit (OBU). Transport Certification Australia (TCA) will detail in its submission the limitations in technology in meeting the requirements of an automatic scheme – particularly in monitoring mass.

The benefits of an incremental pricing scheme accrue almost solely to road operators. . Road managers receive relatively few benefits other than compensation for the additional usage of the road. Of crucial importance is the inability of incremental pricing to act as an

effective signal for investment. Its limited application to the industry means there is a slight signal where increased investment is required, but no signal for disinvestment. Community and rail stakeholders similarly gain little, although the rail sector may find its complementary road services more effective.

The considerable benefits to road operators and freight customers mean that the system could be applied on a voluntary basis. It would present an opportunity to test technology and systems that would be required for a more comprehensive pricing regime. Incremental pricing provides a low risk opportunity for stakeholders to be reassured about moving to a direct pricing regime.

A further stepping stone to a full mass distance regime could be a partial approach where direct charging is applied to part of the fleet. Charges for most vehicles would remain in their current form (i.e. registration and fuel charges), although all charges would be based on full infrastructure costs. However, heavier vehicles would be subject to a mandatory mass distance charge as described above. The benefit of this approach is that it targets those who are more subject to the shortcomings of the current system whilst leaving smaller vehicles which do not benefit from the system, would not incur the compliance and administrative costs of the new arrangements.

Application of a new regime must be carefully considered. Confining the approach to specific corridors and/or vehicle classes, if not on an 'opt in' basis, would lead to boundary problems. At least at the margin, restriction of the application of more refined pricing could distort vehicle and route choice. Considerable care would need to be taken in this regard; however, it would provide one way of containing the costs.

The form of charges

Considerable work needs to be done in this area. If a full mass distance model was to be adopted with charges based on average cost rather than marginal cost, charges could be fully variable - there would be no need for a fixed charge.

Alternatively if a marginal cost approach was taken to charging, a fixed access charge could be incorporated to ensure full cost recovery. There is a risk associated with this approach in that it could result in a similar situation to what currently exists. That is, it might be difficult to apply or calculate differentiated fixed costs to the industry, particularly where there is considerable variance in operations within a class of vehicle.

Marginal cost would form the basis for incremental charges. If an interim position were taken, it is expected that at least a portion of the fleet would be subject to a base fixed and variable charge, although the basis of that charge may differ from the current system. It is expected that the structure of the charge will reflect the attributes being charged. For example, differential charges would be required by road link, road type and location. Furthermore, charges would need to reflect the effect of various vehicle characteristics on different types of roads. Also, charges may need to be developed for externalities.

Issue: How should additional revenue be collected? For example, via uniform or differentiated access charges (such as registration fees or charges for using certain corridors), average-cost pricing, discriminatory prices or some combination of these?

What criteria should determine how much each user contributes above marginal cost? Should every user contribute the same amount? Should recovery be based on principles of efficiency? Of equity?

Further work would need to be undertaken to determine what the appropriate approach would be in setting the charges. It will need to be guided by an agreed objective and the consideration of complexity and cost effectiveness. However, in principle it is expected that efficiency rather than equity (through taxes) will guide recovery.

Externalities in charges

The PC has sought views on whether it would be appropriate to incorporate externalities in the charging scheme. It is a difficult issue. Whilst regimes in Europe have incorporated externalities in their charges, the revenues from those schemes have not been used to address behaviour. In Switzerland, for example, the revenues from its LSVA have been put towards rail infrastructure and cycle routes. The funding allocation approach currently taken in Australia, does not provide a direct link for revenues to be allocated to alleviate the externality problem. Furthermore, as discussed in section 4 a number of externalities have a local environment impact, and therefore, it is difficult to apply a general rule in a national scheme.

Issue: Should costs of some or all external effects associated with freight transport be incorporated in road and rail charges? Which ones? Why or why not? Is it feasible to incorporate costs of some or all externalities in road and rail prices?

Would incorporation of externalities in road and rail user charges lead to the efficient abatement of some or all externalities? Why or why not? For example, to what extent would imposition of congestion charges on heavy vehicles ease urban congestion in the absence of charges on passenger vehicles? By what mechanism would road or rail charges encourage reductions in noise and air pollution?

The PC has raised congestion as a specific issue in its paper. However, heavy vehicles play a relatively low role in the contribution to congestion[17]. The commercial incentives on freight vehicles means their value of time is considerably higher than for light vehicles.

Even if all vehicles were included in charging arrangements, it may be difficult to develop a national scheme of charges to address congestion. The primary reason for this is that the networks in each of the major urban areas are different from one another. Therefore, the optimal congestion charging method may differ from one city to another. Whilst a national congestion charge may recover revenue to allocate towards investment to relieve congestion, the charge itself may not change behaviour.

The PC has also asked how charges could address the issue of noise and air pollution. Again, the problem is not simple. Not all heavy vehicles create noise pollution. However, noise pollution is primarily a concern in residential areas. If a marginal cost approach was taken to charging, it is expected that infrastructure pricing for using roads in residential areas would be higher than for arterial roads due to the differing design standards and subsequent maintenance cost associated with heavy vehicle usage. This would create an incentive for heavy vehicles to minimise their usage of residential roads. Incorporating noise costs alongside infrastructure costs might increase these incentives. The effectiveness of these approaches in reducing noise depends on the sensitivity of users to price. Alternatively a specific charge could be applied to those vehicles with noisy braking

[17] It is important to remember that heavy vehicles are considered to be those that are over 4.5t. Anything less is not covered by heavy vehicle charges and is therefore deemed a light vehicle. Other studies, such as that undertaken by VECI in Victoria have included vehicles over [1t] in their definition of heavy vehicles and therefore may place more weight on those vehicles contributing to the congestion problem.

systems. As discussed in section 4, the NTC is looking at regulatory methods to address engine brake noise and a range of regulatory approaches are being implemented to manage other forms of noise.

The issue of air pollution is more difficult, as its impact is even more heavily influence by location. Noise costs are a good example of this as the cost only exists in unpopulated areas. Currently environmental externalities are being addressed through vehicle standards and the Clean Fuels Strategy. Australia has adopted European and equivalent US standards for emissions, although has a later implementation date for heavy vehicles than Europe with roll-out of Euro IV. These standards, however, do not address greenhouse gas.

In effect there are several issues associated with the incorporation of externalities in pricing:

- broad price signals like those provided by the existing regime, are unlikely to affect behaviour by transport operators;
- a new regime may better influence behaviour but may be too complicated to be very effective;
- a new regime is likely to affect modal choice but the extent to which this might happen is unknown due to the lack of data on elasticities; and
- it is probably good policy.

As such, NTC's scoping study found that it would be appropriate for feasibility studies to be undertaken to determine what is hoped to be achieved through the inclusion of externalities in charges and whether pricing is the most appropriate mechanism for achieving it.

10.3 The impact of price reform

10.3.1 Impact on investment

As has been discussed above, there is considerable potential for direct prices to better inform investment decisions. This is because users will be able to respond to pricing signals indicating the service and routes most valued (see Box 3).

Issue: How could individual user charges for road use improve modal and network investment decisions

However, pricing will only improve investment decisions if it results in more direct linkage of revenue and expenditure. The lack of this linkage in the road sector would suggest that it would be difficult for pricing signals to flow through to investment. Although there may be better information about which parts of the network are most valued, revenue allocations may not facilitate the investment. So long as this continues, pricing can only lead to optimal use of a given network and provide a weak signal for investment. Optimal investment would have to be achieved through other means.

10.3.2 Impact on remote and rural areas

Remote and rural areas of Australia can be expected to be significantly impacted by a move to direct pricing of freight infrastructure. These areas are typically highly dependent on road transport, with the exception of a small number of locations serviced by rail. Many rural and remote regions are long distances from import ports and manufacturing

centres of Melbourne, Sydney and Brisbane, and long distances from export ports for the mining and agricultural products they more commonly produce. The roads to these locations are often relatively lowly trafficked and can be expected to have higher marginal costs than roads built to take advantage of economies of scale and carry heavier loads.

The combination of these two factors—long distances and high marginal costs—mean that costs of getting supplies to rural and remote areas, and costs of getting the things they produce to their markets are likely to increase.

This can be expected to result in a small increase in the costs of living in rural and remote areas. The transport component of the costs of final consumption goods for populous and remote areas are shown in Table 11. Transport is a higher proportion of the total costs of production of these goods in remote areas compared to populous areas. Thus an increase in the cost of transport to remote areas is likely to negatively impact living costs in these locations.

Issue: If, for example, road user charges were directly related to the distance travelled and marginal damage to roads, including regional road networks, what implications might this have for regional and remote communities? What are the major constraints on modal choice in these areas (for example, access to rail or intermodal facilities)?

Table 11. Proportion of cost of consumer goods relating to road transport

	Eastern Seaboard Capital Cities	Average Across Australia	Distant Areas
Dairy Products	4.05%	4.20%	4.75%
Food Products	4.59%	4.75%	5.33%
Soft Drinks	4.07%	4.28%	4.89%
Other Groceries	2.34%	2.38%	2.59%
Total	4.06%	4.20%	4.74%
Adjusted Total	4.71%	4.85%	5.39%

Source: BTRE Report 112, to be published

Equally, transport is a higher proportion of the costs of production for low value, high density product such as minerals and some agricultural products, such as woodchips and grain. These products are a significant component of rural economies, and an increase in costs of their production can be expected to negatively impact on their economic viability. The transport component of a range of industries is shown in 0

Table 12. Road Transport Costs as a Proportion of Production Costs

Industry Using Road Transport Industry Inputs	Road Transport Industry Share of all Intermediate Inputs
Sheep	5.9%
Grains	8.6%
Beef cattle	7.6%
Dairy cattle	5.3%
Other mining	14.9%
Meat and meat products	12.1%
Dairy products	6.5%
Fruit and vegetable products	7.1%
Oils and fats	8.6%
Beer and malt	9.3%
Sawmill products	14.8%
Pulp, paper and paperboard	7.3%
Ceramic products	11.9%
Cement, lime and concrete slurry	27.7%
Plaster, other concrete products	15.8%
Non-metallic min. products nec	15.1%

Source: (SMVU 2001)

Conversely, regional freight service providers typically have much lower levels of utilisation than other transport operators. In many cases, trucks are operated as an ancillary function to some other business, for example farming. For many of these operations the task of driving is shared with other tasks within the business, significantly limiting the level of use that can be achieved. In other circumstances, the truck is used for a seasonal activity, such as transporting grain harvest, and there is little work for the vehicle the rest of the year. Once again, this limits the level of utilisation that can be achieved. For some regional freight service providers (who provide distribution services within the local region, rather than long haul freight services), the market they serve is relatively thin. Again, utilisation levels for these operators are often very low.

Regional freight service providers with low utilisation levels might benefit from direct pricing arrangements if the relatively large fixed component of current charges is replaced by a variable charge. The fuel component of the current charges is already variable and consequently reflects the level of utilisation for each operator. This impact may however be outweighed by the impact of replacing network wide average costs with location specific costs of infrastructure provision and maintenance.

The general conclusion is therefore that regional and remote areas would be negatively impacted by the introduction of direct charging arrangements for road infrastructure. This raises a series of social policy issues akin to those of the 'Telstra in the bush' debate.

Issue: How could or should any adverse impacts on transport operators and users, including those in remote and regional communities, be managed/minimised

It would be possible to mitigate these impacts (at least in part), and reduce the significant political and policy problems for rural and remote areas, through the pricing principles adopted. For example, moving from a full expenditure recovery principle to a marginal cost recovery

principle would reduce the impacts of moving to a direct pricing arrangement on rural and remote regions[18]. Alternatively, a direct subsidy could be introduced, by including explicit pricing principles for dealing with community service obligations to meet social policy requirements. Other approaches that might be taken outside of pricing principles would include introducing direct subsidies or grants to support rural and remote communities and export businesses. All of these approaches would require funding from some external source, such as general taxation revenue, or possibly a cross subsidy from road users in other locations.

Box 3: Regional infrastructure investment

Case study: the grain industry

A reported deterioration of regional rail freight networks has been of concern to primary producers and rural communities. The National Farmers Federation (NFF) has been vocal in calling for substantial investment in regional rail networks.

The NFF argue that the poor state of regional rail networks forces farmers to truck grain on small country roads (sealed and unsealed to varying standards) which are not designed and built for heavy vehicle use. It argues these inefficiencies have a negative impact:

"Our competitiveness is diminished, prices are pushed up and jobs lost, which ultimately adds to inflationary pressures and higher interest rates than we need otherwise have." (NFF press release, January 2005)

The Grain Infrastructure Advisory Committee (GIAC) *Report on Road/Rail Options for Grain Logistics* (2004) similarly argues that branch and restricted lines in New South Wales are built to 'pioneer line' standard, which restricts train loads and speed and adversely impacts on the cost and competitiveness of rail services. This in turn affects incentives for private investment in transport and storage for these lines.

GIAC refer to the impact as a "cost and service spiral". Lower cost road freight provides an incentive for farmers to bypass local silos and truck grain to more efficient 'super silo' grain receival sites located on high volume rail lines.

The report identifies rail upgrade priorities and lines where it would be more cost effective to upgrade the local road network for trucks. Factoring in 'externality' costs had little impact on the outcome.

[18] While common costs are a relatively small component of the total costs allocated to the larger heavy vehicles under the current costing methodology, they are a larger proportion of total costs per vehicle for smaller vehicles. Even where they are a relatively small proportion of allocated costs, in absolute terms they are a significant amount. Excluding common costs from the charges to be recovered may be more significant for rural and remote roads than the current methodology (which aggregates over all road types) suggests, as there is some evidence to suggest that common costs are a higher proportion of total costs on more lowly trafficked roads.

10.3.3 Macro implications

There is limited information available to assess the impact of changes in prices for freight infrastructure on its use. Some evidence is available of the effects of changes in freight prices on freight demand (recent studies in this area are reported in Starrs 2006). While this provides an indication of the impacts of changes in freight infrastructure prices, it is measuring the effect on an upstream market, and is not able to capture all of the potential effects of a change in a downstream market price. This is made more complex by the recognition that there is not a single freight market, but multiple products (that comprise freight movements) and associated markets.

Issue: Given scope for intermodal substitution and other adjustments, what would be the eventual impact of different pricing options on freight costs, output prices and output levels in user industries? What are key factors affecting this impact — for example, whether goods carried are exported and their prices set in world markets

Consider for example, a change in freight infrastructure use prices that sees prices for use of some routes increase, and prices for use of other routes decrease (most likely a heavily trafficked route where there are considerable economies of scale that are hidden by the averaging arrangements inherent in the current road freight infrastructure prices). Further, prices for smaller vehicles using these routes may be decreased, while prices for larger vehicles increased. The impact will therefore depend on which route and what sort of vehicle is currently used to transport any particular type of freight. If the freight movement relates to distribution of manufactured goods within an urban environment, it is likely to be carried in a smaller vehicle. If the freight is to be carried over a large distance, is bulky or heavy, or in a large quantity, it is likely to be carried in a larger vehicle.

However, changes in relative prices of smaller versus larger vehicles may reduce incentives to consolidate freight into larger quantities. In combination with a reduction in prices for use of heavily trafficked routes, this may see more, smaller vehicles on urban arterial roads. On the other hand, for heavy, long distance movements of freights on regional roads, a net increase in price may occur, and this traffic might be reduced.

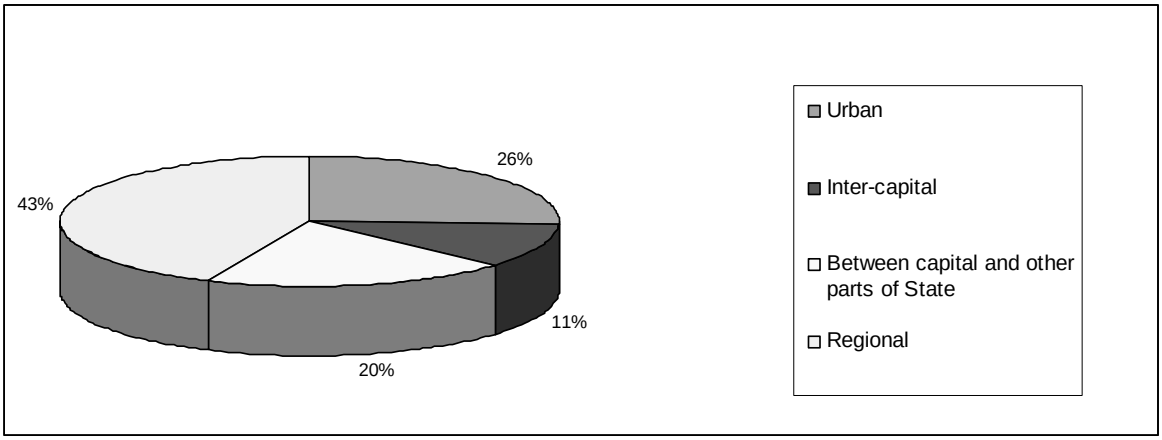
However, the evidence on elasticities suggests the changes in prices would need to be relatively large in order for changes in the level of road use to be significant. Typically, charges for road use can be expected to be a relatively small component of vehicle operating costs. NTC estimated that the registration charges proposed for the Third Determination were less than 5 per cent of operating costs for average heavy vehicle operations. These charges could be doubled without having any significant impact on total vehicle operating costs, and therefore freight rates.

What evidence is available suggests that freight movements are relatively price inelastic. That is, a small change in price has limited impact on the quantity of freight movements demanded (see Starrs 2006). Non-price factors may be more significant in influencing the level of demand, including reliability, service times and so on. Starrs reports that a range of studies have shown this is particularly the case in relation to decisions over which mode of transport to use.

A breakdown of road freight movements are provided in Figure 13. This figure shows that:

- Inter-capital freight movements are a relatively small component of the total road freight task;

- Urban freight movements are more significant; and
- The bulk of road freight movements are regional, interstate movements.



Source: 2003 SMVU unpublished data

Figure 13. Freight movement – total distance by area of travel

There are multiple ways of measuring freight activity (number of trips, tonnes moved, kilometres travelled, net tonne kilometres moved, gross tonne kilometres moved, volume moved over what distance and so on). Tonne-kilometres is the most widely used measure, not because it is the most useful or ideal measure, but because more data is available. In Figure 13, road freight movements have been measured using kilometres travelled. A tonne-kilometre measure would show a larger proportion of activity in inter-capital and regional freight movements, as urban freight is typically lighter and bulkier.

Road and rail modes compete over most (but not all) inter capital movements. A small proportion of regional freight movements are also contestable between the two modes, most notably where there are grain rail routes. It is difficult to asses what proportion of regional freight is in this category, but suffice to say it is a relatively small amount given that the grain rail networks are relatively small and regional Australia relatively large.

The NTC's analysis of heavy vehicle infrastructure costs indicates that there is considerable variation in costs by road type. The model used is not designed to separately assess costs on roads operating in competition with rail, but does provide an indication, using the PAYGO assumption, of variations in costs between four categories of roads:

1. urban arterial roads;
2. rural arterial roads (including national highways);
3. urban local roads; and
4. rural local roads.

Unit costs for these four road categories are shown in Table 8

This data would tend to suggest that unit costs for intercapital routes may be lower than on other roads. The expenditure data available allows national highways to be separately

Issue: What would be the impact of different pricing regimes on costs and use of different truck types and the overall level of road freight if mass–distance and/or location-related prices were imposed? How would this affect transport operators? How would they respond? What would be the effect on road freight prices

identified, but is not matched by usage data[19]. Consequently, direct analysis of unit costs on these roads has not been possible. If an estimate could be prepared, this would be the closest proxy to intercapital roads that could be prepared using an aggregate (as distinct from route by route) analysis. Early analysis of what proportion of expenditure is attributable to vehicle use suggested that this proportion was likely to be lower on more highly trafficked roads (see Martin 1994). This would suggest that unit costs for intercapital routes may be even lower still. This should not be any surprise as intercapital roads carry significant levels of freight traffic and are built for the task. However, as there are significant economies of scale in pavement design (following an exponential relationship probably with a power of around 12), this means that the additional costs of providing for higher levels of freight traffic are relatively small.

By contrast, it is likely that a much larger proportion of costs on lowly trafficked regional and local roads is related to use. The unit costs shown above show that pavement related costs (Equivalent Standard Axle kilometres) are higher for these roads. This will be even more significant where the road was not originally designed for any significant freight task, but has later been subject to heavy vehicle traffic (for example, with the opening of a new freight intensive business such as a mine, forest reserve, manufacturing plant, warehouse etc). In these cases, economies of scale will not have been able to be exploited.

The current pricing system, being based on network wide aggregates and averages, hides all of these variations. This makes it very difficult to assess exactly what different pricing options for the costs of freight infrastructure might mean for the costs of freight movements. Add to this the possible inclusion of externalities, which can be expected to present even greater variations across different parts of the national road network, and the net outcome is difficult to assess without details of the business rules that would be applied in any new pricing option.

If new pricing options were to include provision for purchasing additional road wear, within safety and absolute capacity limits of the infrastructure, pricing has the potential to enable significant improvements in vehicle productivity. Under the present system, regulatory limits on the mass a vehicle can carry provide a highly prescriptive means of managing the road wear a vehicle produces. Replacing this with a pricing arrangement has the potential to alter the relationship between road user and road supplier significantly. This can be expected to result in better information for roads suppliers on the value to users of the roads they consume, while enabling greater efficiencies in vehicle operation. Previous assessments of the benefits and costs of allowing increases in mass limits suggest that benefits are significantly greater than the costs, in ratios of around four to one or five to one (NRTC 1996) Preliminary assessment by the NTC of the potential for this sort of pricing arrangement suggests similar outcomes would be possible (NTC 2004a). Depending on the extent to which such a pricing system applied across the road network, the macro economic benefits of such an approach can be expected to be significant. Analysis of these effects for a simple (and relatively small) increase in mass limits associated with the use of road friendly suspensions found that net direct benefits of improved productivity in freight movements (in the order of $100 million per annum) would result in an expansion in Gross Domestic Consumption of around $600 million per

[19] National highways include the major intercapital routes (with the exception of the Pacific Highway—one of two major routes between Sydney and Brisbane), but also include other major routes to provide a network of roads that circle the continent. These roads were formerly funded by the Australian Government, and operated by States and Territories. Under the Auslink programme, the set of roads funded by the Australian Government has been expanded, but federal funding no longer covers all maintenance requirements.

annum (NRTC 1996). These estimates provide a conservative indication of the potential that a pricing approach to managing road wear could provide. They do not include any indication of the possible supply side benefits that might result, which would need to be added.

A further macro impact of pricing options may be to alter distribution patterns of freight users, with consequent changes in land use. Under the present system, there is little incentive or reason for freight generators and users to consider the costs to freight infrastructure and the community of their choice of location or approach to logistics. The current pricing arrangement includes only limited additional costs per trip (via the variable component of charges in the fuel charge). These costs do not vary depending on whether the freight is generated from or is to be moved along a low cost or high cost route. A direct pricing arrangement that varies costs by road type can be expected to provide greater incentives for freight users and generators to co-locate, minimise double movements and so on. This may result in a slowing of the shift to just–in–time logistical services.

The impact of pricing options on freight users, whether the options result in a net increase or decrease, will depend on the extent to which the freight user is able to pass on price increases or decreases. It can generally be assumed that the road transport industry will pass on any cost increases or decreases, as it is a relatively competitive market. There is at least some anecdotal evidence of destructive competition in segments of the road freight market where cost increases are not passed on in freight rates, although cost reductions would tend to be passed on. It is not quite so clear how the rail freight market would respond. In freight markets where the freight user is subject to prices set in the world market, it is possible that contracts will be lost or won depending on whether the options result in an increase or decrease in freight costs, and the extent to which transport costs are a significant proportion of the total costs of production. Where the freight user operates in a competitive domestic market, cost increases and decreases would be expected to be passed on to upstream industries and ultimately consumers.

The major markets in which freight users are subject to world prices are in the resources sector (agriculture and mining). In these sectors, transport can be a more significant component of the costs of production, as shown in Table 11. This table is based on analyses undertaken for the NTC on the impact of proposed changes in charges associated with the 3rd Determination recommendations.

10.4 Implementation

The PC has asked what might be the best approach to implementation and how quickly a mass distance charge could be implemented. NTC has further explored this issue as part of its scoping study on future heavy vehicle charging. It found the order in which work is undertaken is of utmost importance. It is crucial that a sound policy framework is established before considerable work is undertaken on technology. In general terms the following elements need to be addressed in order to design and implement a successful charges regime:

Issue: What would be the best approach to implementation? For example, should any new regime replace existing arrangements across the board or be introduced on an incremental, 'opt in,' basis? Or should such charging be confined to major corridors or classes of truck? If so, which ones?

- political support;
- public/industry support;
- legal support;
- new organisational arrangements;
- new financial procedures;
- new contractual arrangements between government and the private sector;
- new administrative procedures; and
- use of new technology.

The scoping study also made a number of key findings specific to implementing a direct pricing regime (such as a mass distance charge) in Australia:

1. Design of a direct pricing regime is complicated. There is considerable detail behind a regime which will have consequences in the technical specification and cost. Much of the early work involves determining the business rules by which charges will be applied. The business rules effectively specify what should be charged and by how much, and requires clear policy decisions to be made on cost, parameters and road classification. As such, it is important to have a clear process which will ensure that an implementable model is designed to meet the clear policy objectives and the risks associated with implementation are minimised.

2. Whilst a full direct pricing regime could deliver a number of the benefits sought from price reform, there is considerable cost and risk associated with a complete approach. The cost is primarily due to the technology that would have to be adopted – namely an On Board Unit (OBU). The expert advice the NTC has received is that although IAP provides a sound technological basis for dynamic pricing, the OBU may need to be adjusted or replaced to accommodate the requirements of the charging regime. Furthermore, there is concern whether technology would develop sufficiently in the timeframes anticipated for a new charging regime to accommodate dynamic mass or compliance of non-uniform mass limits. This would require significant development costs in addition to the more obvious implementation cost. The risks are numerous with the key one being the regime may not deliver the benefits as expected.

3. It may therefore be appropriate to take a phased approach to pricing reform. In doing so, key elements of the system can be tested. A sensible first step may be a form of incremental pricing. A partial direct pricing regime may be considered a further step. These approaches could be relatively low risk as platforms already

exist in the form of PBS and IAP, upon which these stepping stones could be launched. However, it is important that these approaches apply the agreed business rules. The risk in implementing an incremental charges regime or partial mass distance regime in advance of the business rules being established is that it may not be consistent with the rules that are ultimately determined. This would mean that these are no longer stepping stones to a more complete regime, but instead are alternatives which may not reap the same level of benefit.

NTC would expect that a project plan for design of a direct pricing regime would consist of two major streams of work – policy development and technical.

The policy tasks are:

- P1: develop methodology for full road infrastructure;
- P2: develop methodology for estimating and allocating external costs;
- P3: develop road classification for asset management and other costs (additional costs and externalities);
- P4: apply full road costs to road network;
- P5: determine parameters to be used for determination of the change; and
- P6: develop business rules for charging.

The technical stream has assumed that IAP would form the foundation for compliance or on board data collection. The tasks in the Technical Stream are:

- T1: add mass to IAP (Intelligent Access Program);
- T2: Intelligent Access Map Stage 2 (including PBS network);
- T3: Intelligent Access Map Stage 2 (including HML network);
- T4: add asset management and price information to IAP;
- T5: Intelligent Access Map Stage 3 (including price information);
- T6: define specification for on-board equipments;
- T7: develop fee collection scheme; and
- T8: identify service provider for IAP and charging.

Issue: If mass–distance and/or location charges were deemed to be efficient and technically feasible, how quickly should they be introduced? What are the major implementation tasks and risks

The interaction between the two streams of work are shown in Figure 14.

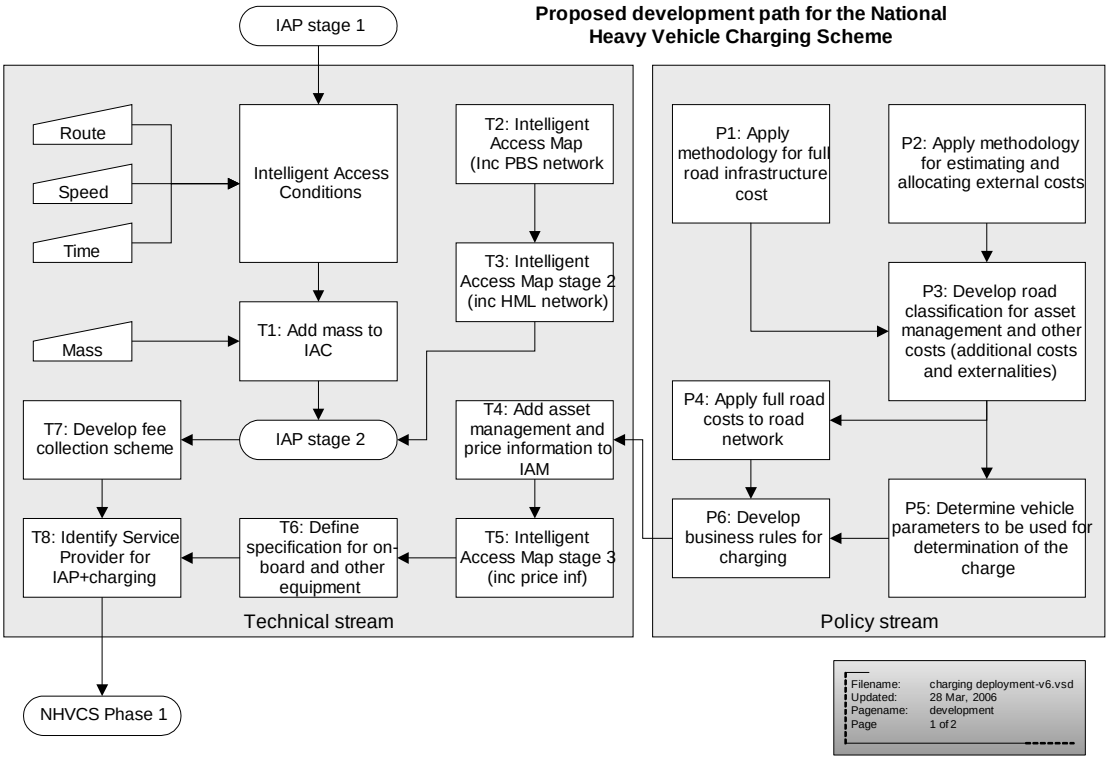


Figure 14. Development of a Heavy Vehicle Charging Scheme

This process ensures that a fully considered model is designed and tested, minimising the risks associated with procurement and implementation.

The approach would suggest that the earliest the business rules could be determined, adopting the outcomes of the PC Inquiry, is 2009. At this point an administrative incremental pricing regime could be implemented on a voluntary basis and an automatic incremental pricing regime could begin development and testing. Endorsement of a more complete direct pricing regime could be sought in 2013.

Issue: What would be feasible timeframes for the introduction of some form of high-technology tracking system to Australia? To what extent are any of these technologies already in commercial use in Australia?

Additional issues will need to be considered to establish the institutional arrangements. Whilst this approach accommodates any decision on revenue allocation, it will be important for the analysis of benefits and costs and a clear decision is made in terms of how base and incremental revenue is allocated between federal, state and local governments. As has been discussed, currently the split does not reflect expenditure by each of the jurisdictions, and local government does not receive any formal allocation[20].

10.4.1 International experience

Whilst there have been a number of countries that have adopted some form of technology for the purpose of heavy vehicle charges, the NTC has focussed its reviews on those

[20] There may be a constitutional constraint on local government being able to be allocated revenues directly through the charges mechanism.

adopted in Switzerland, Germany and the UK, as the regimes adopted in those countries is more consistent with that envisaged for Australia.

Switzerland

Issue: How well have distance and location pricing regimes performed overseas? What have been their objectives and have these been achieved? Are there lessons for Australia

Switzerland developed its heavy vehicles charge, the LSVA, in response to its bilateral agreement with the European Union which allowed heavier mass limits on the Swiss roads. Switzerland, a country which already had a number of constraints on when heavy vehicles could operate on its roads, was keen to implement a regime which would not only recover the cost of access but which would also suppress national and foreign heavy vehicle traffic and move freight traffic to rail.

The LSVA is charged on the basis of:

(a) kilometres travelled in Switzerland;

(b) maximum authorised total weight; and

(c) the pollutants emitted by the vehicle.

All domestic vehicles over 3.5t are required to have an OBU. Foreign vehicles may or may not have one but register their tachograph reading upon entry and exit of the country. The requirement for all vehicles to stop at the border for customs requirements makes monitoring of foreign vehicles relatively easy, as does the fact that the scheme is based on total distance travelled within the country and maximum permissible weight. There are also internal checking devices such as the tachograph reading being able to be checked against satellite positioning.

By all accounts, the Swiss system has been very successful. It has increased the productivity of its heavy vehicle traffic through the reduction of actual vehicle numbers (by 8% between 2000 and 2003) but an increase in the loaded weight per lorry and decrease in empty vehicles. The net result of this has been an overall increase in the total percentage of freight carried by road.

Germany

Germany sought to replace the paper-based Eurovignette based on time with a distance based charged. The objective was to ensure a fair and efficient contribution to costs. It was particularly concerned with establishing a system where foreign vehicles crossing through Germany contributed to revenue needs.

Germany's approach was to outsource the whole project. It meant that very few project staff were required to specify and manage the project, but that the consultant/supplier budget was considerable. Although Germany could be considered a success story in that it now has a technology based charging system, there have been considerable weaknesses with its approach that has meant there are limitations with the resulting technology.

One of the problems cited with the German experience is that the delay in implementation resulted in revenue losses[21]. This serves to highlight the uncertainty associated with the development of new technology.

One of the biggest problems of the German system is its high degree of inflexibility. The German government specified its requirements to its consultants at a very high level. The System has been developed to deliver only those requirements. It does not allow for changes to be easily made. The German Government is now seeking to extend the charging regime to other roads and is prevented from doing so (except at very high cost) by the limitations of the system.

United Kingdom

The unsuccessful Lorry Road user Charge (LRUC) was developed with the objective that all lorries using UK roads contribute on a fair and equal basis towards the cost that they generate. However, whilst there was a broad objective of the charge, this was not sufficiently developed into a coherent and comprehensive policy framework with political support. The result was a large project team of around 300 people working on developing a charging regime with a common clear base. Technology was developed but it was not clear that it addressed the fundamental requirements of the government and stakeholders. As a result, on the eve of tenders being awarded, the Minister for Transport put a halt to the project.

10.4.2 Lessons learnt

It may appear that the case studies discussed above describe technological solutions to address what would appear to be a similar objective in Australia and that therefore it may be possible for Australia to simply adopt that technology. However, this is not the case. The Australian environment is unique. This is due to a number of factors:

- the three levels of government;
- the diverse quality of roads;
- the diversity in the networks themselves;
- highly varied usage across the network;
- low density between links due to population density;
- wide range a vehicles on the road; and
- the incentives resulting from the current revenue allocation methodology.

Furthermore it is important to note that whilst the objectives described above may seem reasonable to apply to the Australian environment, the objectives for Australia are likely to be far more complex. Rather than a broad cost recovery requirement to fund shortfalls in road expenditure, the task for Australia is more about ensuring optimal usage of the network and that individual vehicles pay the cost of their usage. In doing so cross subsidies will be removed and signals for better usage and investment will be provided.

[21] The revenue loss is of little concern to us. It was as a result of early notification from the German Government that it intended to leave the Eurovignette. The 18 month delay in implementing the MAUT meant that Germany received no income during that period as it was not collecting revenue under either the Eurovignette or the MAUT.

The objective of these pricing schemes was largely to recover the costs of road infrastructure provision. Whilst there is some discussion as to whether expenditure accurately reflects the true cost of road provision in Australia, current expenditure is more than recovered through the current charging scheme.

These factors noted above mean the technological requirements for any charging system to meet the Australian objective will be considerably more complex than anything established elsewhere in the world. Whilst IAP could certainly form a sound basis for this technology, it is highly unlikely that the current version of the IAP OBU would be sufficient to capture the relevant data.

One of the key lessons to be learnt through the European experience is to ensure that not only is the objective of the charging system very clear, but that the technology is developed with enough flexibility to accommodate any future changes. Essentially this means that the policy framework must be sound before a technological solution is found. The UK experiences also suggests that the policy framework must be agreed to at both a political and industry level.

The approach that will be discussed in the next section outlines a process by which a project team will be able to develop a detailed technological specification and which should minimise the risk of failure.

10.5 An interim determination and transitional arrangements

The rejection of the 3rd Determination recommendations has significant implications for pricing reform. The objective of the recommendations had been to reduce the level of cross subsidy occurring between vehicle classes and to ensure in each class of heavy vehicles continued to pay their way. The numbers reflected more recent and accurate estimates of expenditure as well as usage and allocation. The rejection of the recommendations means that although heavy vehicles may be currently covering expenditure costs in aggregate, they will not continue to do so given expected future expenditure. In addition, central agencies may not be prepared to release funds for necessary capital and maintenance expenditure if they do not receive adequate funds through charges revenue.

Any future pricing regime will require base costs to be fully cost reflective (with the definition of cost reflective being guided by this Inquiry). This is particularly the case if incremental pricing is to be implemented as a stepping stone to a more complete price reform. This is because road managers will be less inclined to support the granting of enhanced rights to the network if base charges plus incremental prices did not compensate for the cost of usage. If incremental prices are based on marginal cost, this would not occur.

It is therefore likely that an interim determination is required if analysis shows that the annual adjustment does not sufficiently keep pace with committed and planned future expenditure.

It is also important to note that there may be transitional issues for some smaller operators and their customers which will need to be managed. The extent to which this is a problem will not be known until a specific model is developed.

10.6 Institutional arrangements

The institutional arrangements surrounding both the rail and road sector have been referred to throughout this submission. It has been noted that the rail sector suffers from the lack of a consistent national framework whilst the road sector is hindered by the failure to link pricing signals with investment.

The implication of these arrangements is clear. Pricing reform will be limited in its impact if the institutional arrangements are not addressed. The high variable cost associated with heavy vehicle access clearly demonstrates that they have an impact on investment and suggest that it should be treated in a commercial manner: the grounds for linking usage with investment through institutional mechanisms is stronger for heavy vehicles than it is for light vehicles which seek to recover predominantly fixed costs.

Hypothecation in the road sector is the most obvious mechanism to link prices with investment and is consistent with common commercial practice. Hypothecation linked with direct pricing would enable strong signals to pass through to road managers as to where the sector most values investment. However, hypothecation will not achieve the required linkage between demand and supply without further institutional change. Road agencies in their current form would be unable to directly receive pricing revenue and would still need to seek investment funds through the state budget process. In order for hypothecation to be fully effective, road agencies would need to be corporatised.

This is a significant reform. Therefore simpler ways of achieving the same objective will need to be investigated. What is clear is that without this link users of the network would receive a strong demand signal whilst road managers simply received usage information. Whilst it can be argued that this is an improvement in information flows, the ability for road owners to act on this information is limited by their allocation of charges revenue. Therefore the arrangements would require pricing revenue to flow to jurisdictions in a manner consistent with the information signals. Furthermore, the ability of local government to directly receive pricing revenue would need to be investigated. It is believed there may be a constitutional constraint prohibiting the direct receipt of charges revenue, therefore alternatives mechanisms may need to be adopted (for example, altering the grants formula).

Whatever financial arrangements are finally agreed upon, administrative arrangements will be required to support price reform and will need to consider all three levels of government. The most efficient model would involve establishing a single body to offer administrative support. The model of TCA supporting IAP may be able to be adapted. Separate administration of pricing systems by each manager will not be cost effective. Equally, separate potentially incompatible systems, in each state would not be workable or cost effective.

The institutional issues for rail are equally challenging, with operators facing both state and national regulation. The establishment of a consistent pricing mechanism better facilitates the movement towards a national rail regulator.

The options for the appropriate institutional reform will ultimately depend on the pricing model adopted and the objectives of pricing.

10.7 Impediments to efficient pricing and operation of transport infrastructure

While there are a number of sound reasons for moving to a new system of transport infrastructure pricing, there are also a number of impediments to be overcome.

10.7.1 Political will

The greatest of these is the need for alignment of policies between all three levels of government and each of the governments making up Australia's federal system. . This will be difficult to achieve in Australia's federal system. Responsibility for making changes and the impacts of them are spread across three tiers of government. These governments have differing political ideologies and allegiances, and at the same time, they will be impacted differently. Over the time in which decisions will need to be taken to effect the changes needed, most governments will go to elections and possibly change governments. Leadership by heads of government is therefore essential, throughout the process of change.

Without political will, the commitment necessary to make a fundamental change to the operation of transport in Australia will not be forthcoming. The changes needed are substantial, not minor tinkering. This will take time and resources.

10.7.2 Resistance to change

It is normal for most people to resist change and fear the unknown. Existing systems therefore have a degree of inertia that must be overcome. For decades, innovative members of the transport industry have used permit systems to enable productivity improvements. As a result there are a myriad of permits enabled under administrative law to operate outside normal mass or dimension limits, or on roads that would not otherwise be available for that type of use. These systems suit those who have successfully lobbied to be given permission to operate in this way.

Shifting to a new regulatory approach that combines pricing and performance based rules to manage access to the road network requires not just new rules, systems, processes and institutions—it also requires a new way of thinking. This is the most difficult to achieve.

Significantly, there will also be transitional impacts to be managed. A process of dealing with these issues up front, rather than sweeping them aside is essential. Financial assistance, grandfathering of current arrangements and sweeteners may all need to be considered.

A related issue is lack of confidence in new systems and technologies. This must be overcome by a staged programme of testing and trialling. This will not only build confidence in the new arrangements, but ensure that their benefits can be maximised.

10.7.3 Lack of data

Pricing systems rely on data. Lack of data presents a considerable impediment to more efficient pricing and operation of transport infrastructure. Data constraints are pervasive, affecting almost all areas of the transport system.

One of the major current constraints to optimising use of the road network by heavy vehicles is the lack of scientific knowledge about the absolute limits of different parts of the current infrastructure and how it interacts with heavy vehicles. As a result, it is not

clear how the infrastructure will perform under different heavy vehicles or loads. This lack of knowledge makes it difficult to assess and assign costs of roads to vehicles.

Data on road use is also highly constrained. Better information on road use and what this use is worth to transport operators cannot be cost effectively obtained without an improved pricing system.

One of the major impediments to establishing an efficient pricing system is the lack of data to support costing of the network. This is a particular problem on local roads, but applies network wide. Any costing system will need to be highly reliant on assumptions.

10.7.4 Current incentives

The current regulatory system, relying on prescriptive limits on vehicle mass, dimensions and configurations, presents little need to road agencies to align usage of the road network with the maximum net benefits that can be obtained from its use. There is no mechanism by which any additional costs can be recovered and reflected in the funding available to road managers.

At the same time, there is little incentive for freight consignors to choose vehicles, routes or modes that minimise costs to transport infrastructure. For example, a local government might decide it would prefer to concentrate heavy vehicle traffic along a particular route in order to take advantage of economies of scope in road design, minimising the overall investment and maintenance costs across the network. Unless heavy vehicles are encouraged to choose this route over more expensive options, this planning and investment will be to no benefit.

PART D: CLOSING REMARKS

11. CONCLUSIONS

This submission has discussed in depth the issues raised by the PC in its Issues Paper. It has also raised a number of other measures which need to be addressed particularly in the road freight sector to ensure the industry as a whole is more productive and can meet the requirements of the future freight task.

Our submission began by introducing the NTC and acknowledging the challenging task ahead of the PC.

The NTC believes the PC can add most value through this Inquiry through the establishment of clear and consistent pricing principles across both road and rail and the determination of the basis for full infrastructure cost recover in both modes. The NTC also notes that optimising the road network requires a direct link between infrastructure consumption and road asset investment.

The NTC has described the future challenges for the freight industry. It has discussed how further transport productivity reform is required to manage the growing freight task and that COAG has already agreed to a package of transport productivity reforms. Missing from that package is more efficient pricing, which has the potential to further improve productivity by creating a direct incentive to consume rather than protect the road asst. However, the diversity within and between modes creates a challenge for agreement on reform.

Pricing is a key signal from freight infrastructure investment. However, it must be remembered that the drivers of investment for road and rail differ and reflects ownership structures and use. Furthermore, past investment decisions reflect the differing starting points for road and rail.

The submission highlights that pricing alone cannot address the challenge of improving transport productivity and that road and rail reform needs to consider better alignment between the modes.

In relation to competitive neutrality, infrastructure pricing is only part of the problem and studies suggest that it only partially influences modal choice. Also, the contestable market for freight is relatively small, although more important for some markets and corridors. The submission also discusses how regulation may ultimately play a greater role in managing externality costs which is a factor in competitive neutrality.

The PC has noted, and the NTC agrees, that it can provide most value in the provision of pricing principles. The NTC notes that consistent broad principles across road and rail are important but the specific objective within each mode will need to be considered to further develop appropriate pricing regimes. It is also important to remember that a competitively neutral pricing regime may not necessarily result in a competitively neutral outcome.

It is important to understand what pricing has, until now, sought to achieve. The original objective of heavy vehicle pricing was to achieve expenditure recovery in aggregate through nationally consistent charges. The current regime has been successful in achieving this objective however the requirement of greater transport productivity requires a change for more sophisticated direct user prices.

The NTC strongly supports the movement to a new regime with direct user pricing delivering the maximum benefits. However, reform must proceed with caution. A sound

policy framework is required before considering technology tools and a staged approach to implementation will minimise the risk. There may be adverse impacts for some, but these can be mitigated through available policy options. Ultimately, however, the benefits of direct user prices are limited without supporting institutional reform and arguably this is where the greatest challenge lies.

The NTC has welcomed the opportunity to contribute to this important Inquiry. This submission has addressed the key issues facing the industry; however, the NTC acknowledges that much more work is required to better understand the extent of the problems. It has therefore commissioned several studies which seek to better understand the problems and identify practical options. These will be submitted to the PC as supplementary submissions upon their completion.

The NTC also welcomes the opportunity to further discuss the contents of this submission and new issues which have arisen as a result of the consultation process at the planned roundtables in June and Hearing in October.

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APPENDIX A: EXPENDITURE ESTIMATES

Cost summary

Table 13 shows the annual expenditure on public (local and arterial) roads from 2000 up to the most recently available data for which there is a complete set available. For the purposes of comparison, these are shown in 2003-04 dollars based on changes in the Road Construction and Maintenance Index, an input cost index prepared by the BTRE.

Table 13. Estimated Road Construction and Maintenance Expenditure

	Type of road work	1999-00	2000-01	2001-02	2002-03	2003-04
A	**Servicing and operating**	1,476.3	1,408.7	1,440.2	1,377.9	1,369.6
B	**Road Pavement and Shoulder Construction**					
B1	Routine maintenance	905.4	854.4	841.7	769.3	766.9
B2	Periodic surface maintenance	672.7	676.6	663.1	564.2	579.9
C	**Bridge maintenance/rehab**	327.2	318.4	343.5	331.9	307.5
D	**Road Rehabilitation**	1,057.8	926.7	908.5	930.6	927.7
E	**Low-cost safety/traffic**	629.8	669.2	749.6	712.0	625.3
F	**Asset Extension/Improvements**					
F1	Pavement improvements	1,368.7	1,289.1	1,327.0	1,641.9	1,373.5
F2	Bridge improvements	554.2	523.3	585.7	429.9	453.3
F3	Land acquisition, earthworks, other extensions /Improvement expenditure	2,733.9	2,750.5	2,556.1	2,300.8	2,506.8
G	**Other Miscellaneous Activities**					
G1	Corporate services	274.1	200.9	186.3	223.1	215.8
	Total	9,726.0	9,617.8	9,601.8	9,281.7	9,126.4

The data available for calculating charges is impacted by a number of lags. Road agencies can only begin to compile their expenditure data in the required format after the close of the financial year, thereby introducing a one year lag for arterial expenditure. Local road expenditure, which is compiled by the Australian Bureau of Statistics (ABS), has an effective two year lag. The question therefore arises as to whether or not the cost base applied in a charges determination/annual adjustment is keeping pace with the increase in road expenditure required to meet an increasing freight task and demand for roads. There is insufficient data available to establish a longer term pattern that might indicate whether expenditure is declining in real terms. However, this would appear to be the case, suggesting the physical quantum of road work performed has reduced.

This problem is far less significant than the implications of declining real road expenditure in the PAYGO model. One would expect increased investment in the road system in line with the increasing freight task. However, capital expenditure (represented in category F) hovers around 50% of total expenditure over the entire duration of the time series. In addition, expenditure in category B – Road Pavement and Shoulder construction, represents a declining proportion of the total expenditure in each year. This is particularly problematic for PAYGO assumption number 2, that across the network there is no overall deterioration in pavement or bridge condition. Essentially, if the network is not in a steady state the argument exists that PAYGO will incorrectly estimate both capital and maintenance costs. There is currently a credible argument that the road system is

degrading and current HV charges are inadequate to cover the HV share of a sustainable system. In the short term this means that maintenance expenditure may not reflect full maintenance costs. In the long term, lack of preventative maintenance and repair works will mean that the pavement (or bridge) needs to be replaced earlier than would otherwise be necessary. In the meantime, vehicle operating costs may be elevated.

Issue: In particular, how well does the PAYGO approach capture capital costs of providing the road network? Is it likely to under or over estimate capital costs of road? Why? Is the extent of over or under estimation likely to vary by major corridor or across sections of the network?

Conversely, to the extent that new road works may not always be optimally targeted, or are justified by social needs rather than by costs and benefits of road use, for some parts of the road network, PAYGO may overestimate capital costs. Some trucking industry representatives have long argued that there is waste in road construction and maintenance activities, sighting examples of pavements that have failed within a short period of their construction and road building equipment sitting unused for long periods. However, much road work is now done under external contracts through competitive tendering processes, and technical efficiencies (ie removal of wasteful practices) have probably been largely extracted in this process.

Variation of costs across categories

Type of Road

The need for closer examination of road wear relationships specific to different road types is becoming increasingly recognised. For example, one would expect significant differences between scarcely used unsealed roads compared with high-volume intercapital routes. This is because road owners might place special emphasis on durability for the high volumes of traffic these roads need to accommodate. It seems likely that they would be less subject to wear than the network as a whole. There are also physical differences between these roads that mean they behave in accordance with different engineering, and therefore cost, functions. The current system, whereby road wear relationships are based on average levels of durability, could potentially overstate the applicable costs for travel on well constructed high-volume roads.

Accordingly, the expenditure data (and correspondingly disaggregated vehicle usage data) relating to these specific road types would need to be obtained. Significant effort would need to be put in place in order to create the appropriate capture of this data, and this work is currently being scoped by the NTC as part of its investigations into possible future pricing arrangements.

Type of vehicle

As has been noted, cost responsibilities vary significantly between different classes of vehicles. This is illustrated by estimates of 2003–-04 costs (in 2006 dollar values) prepared as part of the 3rd Determination calculations. These are shown in Table 14.

Table 14. Illustrative Allocated Costs by Vehicle Type (2003-04 average, 2006 dollar values)

Vehicle class	Non-attributable	Attributable	Total Allocated Cost
Motor cycles	90	43	133
Passenger cars	263	127	390
Passenger vans & Light buses	388	188	575
4WDs: passenger	324	157	481
4WDs: light commercial	337	246	584
Light commercials & Other light vehicles	316	220	536
Light rigid trucks	347	292	639
Rigid trucks: 2 axle: no trailer: 4.5 - 7.0 t	283	287	570
Rigid trucks: 2 axle: no trailer: 7.0 -12.0 t	449	638	1,086
Rigid trucks: 2 axle: no trailer: 12.0 + t	422	1,392	1,813
Rigid trucks: 2 axle: with trailer	418	1,642	2,061
Rigid trucks: 3 axle: no trailer 4.5-18t	538	1,608	2,146
Rigid trucks: 3 axle: no trailer 18+ t	553	2,518	3,071
Rigid trucks: 3 axle: with trailer 18+	1,285	7,349	8,634
Rigid trucks: 4 axle: no trailer 4.5-25t	177	551	728
Rigid trucks: 4 axle: no trailer 25+ t	676	3,265	3,941
Rigid trucks: 4 axle: with trailer 25+ t	1,473	9,253	10,727
Heavy truck trailers	1,319	11,140	12,460
Articulated trucks: single trailer: 3 axle rig	377	1,030	1,407
Articulated trucks: single trailer: 4 axle rig	835	3,334	4,168
Articulated trucks: single 3 axle trailer: 5 axle rig	1,012	6,309	7,321
Articulated trucks: single 2 axle trailer: 5 axle rig	1,304	6,705	8,009
Articulated trucks: single trailer: 6 axle rig	1,998	12,729	14,728
Articulated trucks: B-double: <9 axle rig	3,729	34,130	37,858
Articulated trucks: B-double/triple: 9+ axle rig	3,770	36,170	39,940
Articulated trucks: Road train: 2 trailers	2,610	28,075	30,685
Articulated trucks: Road train: 3 trailers	3,709	51,777	55,486
Articulated trucks: 6+ axle rig (other)	2,020	16,173	18,194
Other trucks (non-freight carrying)	223	1,492	1,714
Buses: 2 axle: GVM 3.5 to 4.5 t	301	280	581
Buses: 2 axle: GVM 4.5 to 10.0 t	549	632	1,181
Buses: 2 axle: GVM over 10.0 t	774	2,101	2,876
Buses: 3 axle	1,211	4,317	5,528
Buses: articulated	826	2,351	3,177

Note: Estimated road train costs shown include costs of community service obligations (CSO) relevant to the roads these vehicles travel on. The 3rd Determination reduced the estimated costs for road trains to reflect an allowance for these CSOs.

Exclusions from the costs

Specific expenditure items excluded

Part of the total road agency expenditure is not considered relevant to road charging. Some of the expenditure reported is recovered through separate fees, and other expenditure does not provide road services for motorised road users (between whom the current

methodology shares expenditure). For arterial roads, unallocated expenditure amounted to $756 million of the $5 962 million in the number relating to the 3rd Determination. Costs removed from the cost allocation process are presented in Table 15.

Table 15. Expenditure Excluded from Allocation Process (2005/06 $ million)

Expenditure Type	Arterial Roads	Local Roads	Total
Total Road Agency expenditure 2005/06	5962	4433	10394
Deductions			
Expenditure recovered through other fees			
Administration of vehicle registration	313		313
Administration of licensing	193		193
Loan interest[1]	157		157
Council expenditure providing for all-weather access, amenity and non-motorised road users[2]		2870	2870
Enforcement Expenditure	93		93
Total deductions	756	2870	3626
Remainder to be allocated	5206	1562	6768

.. not applicable
1. See text for explanation.
2. See text for explanation.
Note: Figures may not add to totals due to rounding

Costs were excluded from the cost allocation process because:

1. they were recovered by other fees; or
2. they did not reflect the costs of providing and maintaining roads for motorised road users.

Costs of administering vehicle registration and driver licensing systems are included in the expenditure reported by State and Territory road agencies. However these costs are recovered from road users through a series of administrative fees set by the road agencies. These fees include administrative fees for number plates and processing of renewals, and apply in addition to the national heavy vehicle road use charges.

Expenditure on roads being financed through tolls is not included in the expenditure reported, and should be excluded from the national heavy vehicle charges calculations in order to avoid double counting.

Loan interest is only incurred by some State and Territory road agencies, with other governments not funding expenditure from loans or taking out loans centrally, rather than by line agencies. Loan interest payments reported only include payments made directly be road agencies, and therefore are not consistent between jurisdictions. Further, under PAYGO, all capital expenditure is recovered in the year in which it is incurred. To avoid over-representing costs of capital expenditure, capital expenditure would need to be depreciated and smaller amounts recovered each year in the future if interest on loans were to be included.

In addition, in new residential developments, costs of building roads are often met by developers. Including this expenditure in the cost-recovery target would be regarded as double counting. In some cases developers construct roads themselves, in which case it is not part of the expenditure reported. In other cases they provide a contribution to local councils who then construct the roads. It is not possible to separately identify expenditure met by developer contributions from other expenditure on the local road network.

Local road expenditure – Estimation of proportion relating to amenity and motorised road use

Only part of local road expenditure is included in the cost allocation process. This is in recognition that a significant proportion of local road expenditure is not directly related to road use, being attributable to the social cost of access and related amenity services, including for non-motorised road users.

This is especially the case in urban areas where the construction standard of many local roads is driven more by amenity reasons and ease of construction than by use-related factors. For example, curbs and gutters are not provided to meet the needs of motorised road users, but to ensure safe and healthy run-off from roads. Expenditure on footpaths and bike paths are also included in the expenditure reported, but is not necessary to provide or maintain roads for motorised road users.

In rural areas, all–weather access and sealed roads are often provided to meet the access and amenity needs of local communities (for example, sealing to reduce dust levels). Many rural local roads do not carry traffic volumes which justify this construction standard.

To date, a separate cost allocation template (shares of expenditure attributed to road use) has not been developed for local roads. Clearly, this is preferable in the longer term. Instead the NTC has applied local road engineers' estimates of the proportion of local road expenditure that is not likely to relate to motorised road use (or is already met by developer contributions), and applied the arterial road cost allocation template to the remainder.

In previous determinations, the NTC has assumed (based on a survey of local government road engineers) that 75 per cent of urban local road expenditure and 50 per cent of rural local road expenditure exists solely to provide access, amenity, or provide for non-motorised road users and hence is not related to motorised road use. In the Third determination calculations, this resulted in $2,870 million of expenditure on local roads being excluded from the cost-allocation process (conversely, $1,560 million is included).

Sensitivity tests were also undertaken, where the proportion of excluded local road expenditure was varied. Where only 50% of urban local and 25% of rural local expenditures were excluded, the total allocated cost applying to heavy vehicles increased by $210 million. The impact of this variation was proportionally larger on the smaller heavy vehicles, who travel on local roads proportionally more of the time than the larger heavy vehicles. Considering that the smaller vehicles are the ones that tend to over recover due the constraint of their registration charges not being able to fall, the overall charges do not vary significantly. The NTC has therefore been comfortable that its assumptions about local road expenditure are not particularly distortive.

APPENDIX B: CRITIQUES OF THE COSTING METHODOLOGY

A number of comments have been submitted and published in relation to NTCs methodology and alternatives which could be adopted. In many cases little information is provided to support cost allocation rules used in other road cost allocation studies, making it impossible to assess how relevant they are to Australia. No comprehensive studies have been made of the full social costs of road and rail infrastructure use using Australian data.

Are there other studies the Commission should be aware of?

Do participants have any comments about the analysis or methodologies used in these studies?

This appendix summarises some of the key criticisms of the NTC costing methodology. However, it is important to note that in responding to the NTC's proposals for the Third Determination, most stakeholders indicated that they agreed the estimates were the best that could be made with the information available. However, there were reservations from some road authorities that there is unfunded maintenance work required to parts of the road network (mostly rural arterial and local roads), the costs of which are not assessed under the PAYGO assumption. It was also noted that the costs considered are only those directly linked with providing and maintaining roads. Other costs were not included (eg costs of enforcing heavy vehicle regulations, externalities).

Road transport industry representatives raised concerns about the allocation of pavement maintenance costs, and a number of minor issues about the consistency of the expenditure used. More fundamentally, they noted concerns that inefficient practices and investment decisions were reflected in the expenditure recovery target.

Rail industry representatives expressed concerns about the level of estimation involved in assessing the costs that were not attributable to road use and indicated they felt that pavement maintenance works should be allocated to the heavier vehicles by treating it in the same way as repair of worn out pavements (that is, rehabilitation and reconstruction of pavements).

Unduly conservative estimation of road access costs

Recently, the Australian Railway Association (ARA) released "The Future of Freight", a report prepared for them by Port Jackson Partners (PJP) to review road access charging and some other aspects of road and rail intermodal competition. The report concluded that investments in rail infrastructure are necessary to deliver service quality improvements required to maintain and perhaps lift mode share. It suggested that the key barrier to this was the current heavy vehicle pricing system.

The NTC requested that Maunsell Australia Pty. Ltd. undertake a review of the PJP work, and this report has recently been made public. This work found that optimistic forecasts of freight growth and mode share were used in the PJP assessment, in combination with conservative estimates of a number of elements of road costs. The Maunsell report reinforces the suggestion that service quality differences are much more important than price in determining changes in mode share. The review prepared by Maunsell indicated that there are a number of areas where the approach taken in the PJP analysis could be queried, all of which suggested road costs could be lower than the levels estimated.

Road train travel on unsealed roads

In the Third Determination, the NTC adopted the view that a significant proportion of Road Train travel is conducted on unsealed roads. As a consequence of this, it was seen as inappropriate to allocate pavement costs to these vehicles. Accordingly, these costs were eliminated from road train allocated costs, and re-allocated across the fleet on the basis of vehicle kilometres travelled (VKT). This was consistent with treating the expenditure that was inappropriately allocated to road trains as either a servicing and operating cost for the network or as a non-allocable cost. Both of these are allocated on the basis of VKT.

In addition to disagreement about the proportion of road train travel on unsealed roads, questions were also raised as to the validity of applying the remaining road wear relationships for travel on unsealed roads, since the established relationships are based on sealed roads. This is an area that would benefit from further investigation. It accords with the need identified in section to refine cost estimates and cost allocation methodologies by road type.

Pavement maintenance

The NTC has made four separate attempts to establish a reliable statistical relationship between road use and pavement maintenance expenditure. Despite these efforts, some uncertainty remains about how pavement maintenance expenditures should be allocated amongst the vehicle fleet. The only one of the analyses able to establish relationships that appeared to have any statistical reliability suggested that all pavement expenditure could be related to road use (measured by tonne-km and passenger car unit km). This does not accord with general engineering understanding and experience, which suggests that road building materials deteriorate with age and weather regardless of the presence of traffic. The NTC judged that pavement maintenance should be allocated between road users through a mid range approach, in which some pavement maintenance expenditure is non-attributable.

NTC has recommended that a significant body of research should be undertaken to resolve this issue. It has noted that it has a significant impact on the estimated costs of infrastructure use for heavy vehicles, and therefore warrants further work.

ESA predictive formulae

Equivalent Standard Axle (ESA) loads are a recognised measure of the relative road wear of different loads on different axles, and are critical in the allocation of heavy vehicle costs. ESA are measured by calculating the ratio of the actual load to a reference load for the type of axle configuration and the type of tyre. This ratio is then raised to a power, the value of which depends on the form of pavement distress that has/is expected to occur. For network wide analyses, ESA are usually calculated using a power of 4, which is widely considered to be representative of long-term wear of pavements on average across the road network.

The Third Determination incorporated predictive formulae based on the most up to date fleet information and larger number of observations than previous estimates. These formulae were considered to be more appropriate than previous estimates. However, some care must be taken in how these formulae are applied, particularly for vehicle classes that are not directly comparable to those used in preparing the formulae. The NTC anticipates that further work will be needed to refine these estimates, and in particular to take account of variations in loads.

Local road use by heavy vehicles

Local road use estimates have always been difficult to obtain. In the Third Determination, a major study was undertaken by ARRB with a view to providing reliable data. However there was concern that the selection of traffic count sites resulted in a bias towards recording more of the larger vehicles, NTC, (2005b). The NTC view is that the type of survey used was inadequate to reliably estimate distributions by vehicle type with low volume roads. For this reason, the result of 16 per cent local road use by heavy vehicles was revised downwards to 10 per cent, which compares with 5 per cent in the Second Determination. While there remains uncertainty over the amount of use of local roads by heavy vehicles, and how this might vary by vehicle type, the estimates prepared provide a defensible set of information for the first time. Previous estimates had little reliability.

APPENDIX C: HOW PAYGO COMPARES TO OTHER APPROACHES

Issue: What are the main capital costs for each mode?

It is a common misconception of the current heavy vehicle charging scheme that only the cost of road maintenance is included in the cost base. However this is incorrect, as capital costs of roads are included in expenditure category F: "Asset Extension/Improvements". This comprises the sub-categories of pavements, bridges, land acquisition, earthworks and other expenditure. For the Third Determination they comprised about 50 per cent of costs allocated to vehicle use and 45 per cent of the costs allocated to truck use. A number of other expenditure categories might also be considered capital, including low cost traffic and safety improvements and pavement rehabilitation.

In theory, rail access prices are based on full economic costs. Capital is optimised with respect to the expected future demand (use of the infrastructure) and depreciation and return on capital are included in the cost base.

To replicate the cost base calculation used in rail, these capital costs for roads would need to be excluded from the existing base. This would significantly reduce the unit costs from the cost allocation process in with the effect that the costs allocated to trucks are estimated to reduce by about 45 per cent. Capital costs would then need to be calculated on the same basis as rail access charges, requiring at the least:

- an estimate of the optimised replacement cost (ORC) of road assets for the expected future demand. ORC is intended to represent the cost of replacing existing assets with current technology for the forecast future demand;
- depreciation to the current value or depreciated replacement cost (DORC) on the basis of the actual expired/remaining life of assets; and
- a rate of return appropriate to the provider of road services.

Estimating ORC and DORC

The calculation of ORC and DORC for roads would involve engineering assessments and many assumptions and forecasts that would require significant resources. In addition, ORC, as the name implies, only includes assets on which a return can be earned and that may not apply to much of the road system because charges are not specifically related to use and many roads are built despite having costs greater than benefits of use.

Austroads publishes a value of the arterial road system, the last being 2001. However, the value is calculated on an accounting basis which reflects depreciated value on a time basis, rather than the condition of the asset. It is most unlikely that the value would represent ORC or DORC.

There may be a case to restrict the calculations to the intercapital highways used to carry freight in competition with rail[22]. It is likely that the marginal cost of use for these routes would be significantly lower than those of the road network as a whole. This is due to the differing design standards between local and arterial roads, and the subsequent maintenance cost associated with heavy vehicle usage.

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[22] Not all National Highways are economically justified. Perhaps they could be regarded as grant funded on the same basis that much rail improvement is being funded. It seems that a return on grant funded infrastructure is excluded from the ARTC cost base.

Determining an appropriate valuation for existing assets is extremely difficult. The most significant consideration in the valuation of assets is the degree to which existing road assets are considered sunk costs. Arguably, a movement towards a capital approach to road pricing would result in an asset base with a relatively low value, reflecting the fact that the current methodology reflects capital costs being recovered in the year they are incurred.

Rate of return

Under the PAYGO approach, there is no need to place a value on assets or to depreciate them, as is normally done in an accounting system. This is because capital expenditure is fully recovered in the year in which it is spent. Providing the PAYGO assumptions discussed in Section 9.2.1 are met, the accounting approach and PAYGO approach should arrive at the same result. This is because the level of the rate of return is based on the level of risk associated with recovering costs associated with an investment.

Issue: What are appropriate required rates of return on road and rail infrastructure?

Should they be the same? If not, why not?

Comparing rates of return between rail and road is difficult. The primary reason for this is the fact that the rail freight network can, generally, be separately valued, whereas road freight infrastructure can generally not be separated from the broader freight network. Beyond this, with externalities and Community Service Obligations addressed through other means, the only differences in rates of return might be to reflect difference in risk levels on different components of both the road and rail networks.

APPENDIX D: NTC RESPONSE TO PC ISSUES

The PC raised a number of issues which they have sought stakeholder views on. This appendix contains NTCs response to those issues.

1. The Commission sees value in exploring mechanisms and institutional arrangements that would better integrate infrastructure supply and demand. *Do participants agree with this approach? Given the terms of reference, where can the Commission's inquiry add most value?*

   NTC Response: See section 2.1.

2. *Do participants agree that the Commission should focus on economic costs as the relevant measure of the costs of providing transport infrastructure?*

   NTC Response: See section 2.1.

3. *Are these [capital] approaches appropriate for each mode? Why or why not? What are their advantages and disadvantages? Are there other approaches that would be more appropriate?*

   NTC Response: See section 7.2.2.

4. *In particular, how well does the PAYGO approach capture capital costs of providing the road network? Is it likely to under or over estimate capital costs of road? Why? Is the extent of over or under estimation likely to vary by major corridor or across sections of the network?*

   NTC Response: See Appendix A.

   NTC has initiated a piece of work to help assess the extent to which the results of PAYGO may differ from alternative approaches to estimating road infrastructure costs. The results of this work will be passed on to the Productivity Commission once they are available.

5. *What difference do the two approaches make to relative prices charged for road and rail?*

   NTC Response: See section 7.2.2.

6. *Should the same methodologies for assessing capital costs be applied in each mode?*

   NTC Response: See section 7.2.2

7. *What are appropriate required rates of return on road and rail infrastructure? Should they be the same? If not, why not?*

   NTC Response: See Appendix C

8. *What are the main capital costs for each mode?*

   NTC Response: See Appendix C. No comment on rail

9. *How should land be valued?*

   NTC Response: No comment except to note this is a difficult area.

10. *How do capital costs differ across different types of road or rail or across different corridors?*

    NTC Response: NTC has not done this work for road. It would be expected that capital costs would be higher, and maintenance costs per unit of use lower, for key routes (which are generally those which compete most directly with rail). They will also be very different for different types of vehicles (and therefore the freight that they carry). We have calculated average unit costs across four generic road categories and these show considerable variation. For example, costs per ESA-km vary between 2.7 cents and 5.1 cents for the limited disaggregation available currently for the road network (ESAs are a measure of relative pavement wear and vary considerably between different types of heavy vehicles. All of the ESA costs could be considered capital, but are only a subset of the total capital cost).

    A proportion of the costs of providing and maintaining both road and rail networks is likely to be incurred regardless of the level and type of use, including whether for freight or passenger transport.

11. *What are the major common (non-separable) costs of providing road and rail infrastructure? How significant are they?*

    NTC Response: See section 9.2.3.

12. *Given a requirement for full recovery of freight infrastructure costs, how should common costs be allocated across freight and passenger uses? What are appropriate criteria? For example, should common costs be allocated on the basis of 'fairness' or of efficiency? Should common costs of road and rail be allocated in the same way?*

    NTC Response: See page section 9.2.3.

13. *In assessing the direct costs of providing road and rail infrastructure, the Commission is asked to take account of other studies, including by the NTC and the Bureau of Transport and Regional Economics (BTRE). A selection of published studies is presented in box 2.*

    Are there other studies the Commission should be aware of?

    NTC Response: See Appendix B. The NTC has already provided access to a wide range of relevant studies, both of its own and by other organisations as input to the Inquiry.

14. *Do participants have any comments about the analysis or methodologies used in these studies?*

    NTC Response: See Appendix B.

15. *For example, do participants agree with the NTC's Third Determination estimates of variable road costs attributable to different classes of vehicle?*

    NTC Response: See section 9.2.3.

16. *Do they agree with the NTC's estimates of common costs and the way in which they are allocated? Why or why not?*

    NTC Response: See section 9.2.3.

17. *Do they agree with the exclusion of some costs, such as enforcement costs, from the cost base for road charges?*

    NTC Response: See section 9.2.3.

18. *Do participants agree with the costing methodologies employed and estimates made by rail regulators? Why or why not? What are the major differences across jurisdictions? What are the implications of any differences?*

    NTC Response: No comment on the costing methodologies or differences between jurisdictions. Through a general methodology of a floor of marginal cost and a ceiling of market return on assets, and an actual charge set below the top of the band, to allow viability of rail freight operators (ie, set in relation to road freight charges), current rail pricing arrangements do not provide for a sustainable rail freight system. Increasing the price of road freight to provide sustainable rail freight would lead to economic inefficiency due to unwarranted increases in costs for road freight. The alternatives are to allow the rail system to run down, leading to the possible withdrawal of rail links, or to subsidise rail through operating subsidies on infrastructure provision.

Full economic and social costs of road and rail freight

19. *What are the major externalities associated with road and rail freight infrastructure use?*

    NTC Response: See section 6.2.1.

20. *How are these externalities related to road or rail use? For example, do the impacts vary by vehicle type, mass, distance travelled, location and type of road? What role do other factors play, such as vehicle age, or driver behaviour and ability?*

    NTC Response: See section 6.2.1.

21. *Are any of these external effects already incorporated in freight costs? By what mechanism? To what extent do existing mechanisms adequately address the externalities? What are the costs of these mechanisms?*

    NTC Response: See section 6.2.1.

22. *Are there other Australian or overseas studies estimating external costs of freight transport? How well do results from overseas studies translate to Australia?*

    NTC Response: See section 6.2.1.

23. *How should greenhouse gas emissions be valued?*

    NTC Response: See section 6.2.1.

24. *How should a quality-adjusted life-year be valued? What discount rates are appropriate?*

    NTC Response: The issue for transport regulation is not the specific valuation of a life-year but to apply consistent valuation across regulatory applications, across transport and all other regulatory areas. NTCs view is that we should use valuations developed through broader mechanisms. There is considerable attraction of moving to a willingness to pay approach to valuing a life-year, but a number of difficulties as well. Consistency between valuations of different factors (eg value of travel time savings and a life-year) applied in investment evaluations is possibly more significant.

Options for pricing reform

25. *The Commission interprets consistency as requiring the same pricing principles to be applied to, and within, both principal modes of freight transport.*

    Do participants agree with this interpretation? If not, how should 'consistency' be interpreted?

    NTC Response: See section 7.1.

26. *The Commission's preliminary view is that competitively neutral pricing implies an absence of differential subsidies (implicit or explicit) between transport modes or within them.*

    Do participants agree with this interpretation? If not, how should 'competitively neutral pricing regimes' be interpreted?

    NTC Response: See section 6

27. *Are rail and road network charges broadly covering their aggregate costs? If not, why not?*

    NTC Response: See section 7.2.1

28. *To what extent are there divergences from full cost recovery between and within freight transport modes?*

    NTC Response: See section 7.2.1.

29. *How efficient are current charging arrangements for use of rail infrastructure? What criteria are used to allocate fixed costs of infrastructure across rail users? Are these appropriate criteria? Would alternative allocations be more appropriate? If so, why?*

    NTC Response: No comment.

30. *How closely do variable rail charges align with the marginal costs of using rail infrastructure? Would it be feasible to align variable rail charges more closely with marginal costs? How, to what extent, and at what cost?*

    NTC Response: No comment.

31. *How efficient are current charging arrangements for heavy vehicles? What are the major sources of inefficiency? Would changing the weight attached to registration fees, on the one hand, and fuel levies, on the other, result in more efficient pricing of heavy vehicle road use? How, and to what extent?*

    NTC Response: See section 9.4

32. *What are the key attributes of road use likely to affect road infrastructure costs (for example, vehicle and load mass, the distance travelled, the location and type of road)? What is the nature of the linkages?*

    NTC Response: See section 9.2

33. *How accurately can road use by trucks be linked to generation of infrastructure costs? How does the type of road affect these costs?*

    NTC Response: See section 9.2

34. *How should additional revenue be collected? For example, via uniform or differentiated access charges (such as registration fees or charges for using certain corridors), average-cost pricing, discriminatory prices or some combination of these?*

    NTC Response: See section 10.2.1

35. *What criteria should determine how much each user contributes above marginal cost? Should every user contribute the same amount? Should recovery be based on principles of efficiency? Of equity?*

    NTC Response: See section 10.2.1

36. *Should costs of some or all external effects associated with freight transport be incorporated in road and rail charges? Which ones? Why or why not? Is it feasible to incorporate costs of some or all externalities in road and rail prices?*

    NTC Response: See section 10.2.1.

37. *Would incorporation of externalities in road and rail user charges lead to the efficient abatement of some or all externalities? Why or why not? For example, to what extent would imposition of congestion charges on heavy vehicles ease urban congestion in the absence of charges on passenger vehicles? By what mechanism would road or rail charges encourage reductions in noise and air pollution?*

    NTC Response: See section 10.2.1

38. *What other instruments are available and how efficiently would they address externalities?*

    NTC Response: Direct regulation is currently used to address externalities. For emissions, this regulation generally applies to new vehicles only, so takes a long time to permeate the fleet. A range of regulatory requirements is used to address safety, along with a range of infrastructure approaches. As stated above, road transport regulation will become more effective through the implementation of tougher compliance and enforcement provisions.

At present, rail safety is regulated, but environmental regulation in relation to rail is inconsistent.

39. *Are some externalities already being addressed by other mechanisms? For example, through liability laws, infrastructure construction (including, for example, safety features and noise barriers), vehicle standards and regulations, road rules (for example, speed limits, driver fatigue regulations), or by actions of individuals affected? Are these the best feasible ways of 'internalising' the externalities?*

    NTC Response: See above. None of these is completely effective. Road transport externalities are generally being reduced, but are still generally above rail. Road transport externalities, both safety and environmental, are generally higher for tasks for which rail is not competitive, ie in urban areas.

    In the rail sector, there is a requirement on infrastructure providers to manage safety outcomes. The same does not apply in a regulatory sense in the road sector, where infrastructure providers are largely government agencies. Infrastructure measures have been judged to have significant potential to improve road safety outcomes (see for example the National Road Safety Strategy).

Impacts of different pricing regimes

40. *What are the likely resource impacts of a shift to pricing regimes that better reflect marginal costs of using road and rail infrastructure?*

    NTC Response: See section 10.1

41. *How would such pricing affect use of existing infrastructure? Would impacts vary across corridors? If so, why?*

    NTC Response: See section 10.1

42. *What are the likely efficiency impacts of different allocations of non-separable costs?*

    NTC response: See section 9.2.3

43. *How could individual user charges for road use improve modal and network investment decisions?*

    NTC Response: See section 10.3.1

44. *What would be the impact of different pricing regimes on costs and use of different truck types and the overall level of road freight if mass–distance and/or location-related prices were imposed? How would this affect transport operators? How would they respond? What would be the effect on road freight prices?*

    NTC Response: See section 10.3.3.

45. *If, for example, road user charges were directly related to the distance travelled and marginal damage to roads, including regional road networks, what implications might this have for regional and remote communities? What are the major constraints on modal choice in these areas (for example, access to rail or intermodal facilities)?*

    NTC Response: See section 10.3.2

46. *How sensitive are freight users to price changes?*

    NTC Response: See section 6.1.2

47. *What are the key drivers of their decisions to use either road or rail transport?*

    NTC Response: See section 10.1

48. *On which routes and for which freight tasks are road and rail more likely to compete? What are the key factors influencing contestability? Are these factors likely to change? What proportion of the freight task is contestable?*

    NTC Response: See section 6.1.1

49. *For which tasks and for what proportion of the freight task are road and rail complements?*

    NTC Response: See section 5.5

50. *Given scope for intermodal substitution and other adjustments, what would be the eventual impact of different pricing options on freight costs, output prices and output levels in user industries? What are key factors affecting this impact — for example, whether goods carried are exported and their prices set in world markets?*

    NTC Response: See section 10.3.3

Technical feasibility and costs of pricing options

51. *How well have distance and location pricing regimes performed overseas? What have been their objectives and have these been achieved? Are there lessons for Australia?*

    NTC Response: See section 10.4.1.

52. *What technologies have been used? Which have worked best? How practical are GPS systems? How complex are they and what are the compliance issues and costs?*

    NTC Response: Overseas (ie, European) distance pricing mechanisms have been applied in smaller and more densely utilised networks. Unit costs (ie, per vehicle, per km or per unit of freight) of these applications would be much higher in Australia and associated problems (traffic diversion) may be greater here. Whilst an evaluation has not yet been undertaken, it is likely that an IAP-type application would be most cost-effective for freight pricing in Australia.

It should also be noted that freight/heavy vehicle pricing has not yet been applied in an institutional environment similar to Australia's, where the relevant power is split between State and Territory governments.

53. *How cost effective are these technologies? To what extent are they susceptible to tampering/non-compliance? How secure are they? Are there privacy implications? What are the major risks?*

    NTC Response: Whilst the TCA will be able to provide more detailed information in this area, the NTC believes these issues should be considered secondary at this point. More fundamental issues such as what a pricing system should be designed to achieve and broad rules about how a pricing system would operate need to be considered first. It is enough at present to be aware that solutions to these issues have been found in non-pricing, regulatory applications in Australia and overseas in the pricing area. At this stage mass measurement remains problematic.

54. *What would be feasible timeframes for the introduction of some form of high-technology tracking system to Australia? To what extent are any of these technologies already in commercial use in Australia?*

    NTC Response: See section 10.4

55. *How successful have been trials of the Intelligent Access Program using weigh-in-motion telematics? Could this technology be useful in implementing mass–distance road pricing?*

    NTC Response: Whilst IAP forms a strong basis for direct pricing, currently there are limitations in weigh in motion telematics. TCA has indicated there are accuracy and tamper issues in relation to the technology and it is uncertain whether this would be addressed sufficiently for pricing purposes

56. *What technologies are available for real-time monitoring of above-rail use? How cost-effective are they? How widely are they being used in Australia?*

    NTC Response: No comment.

Design and implementation issues

57. *If mass–distance and/or location charges were deemed to be efficient and technically feasible, how quickly should they be introduced? What are the major implementation tasks and risks?*

    NTC Response: See section 10.4.

58. *What would be the best approach to implementation? For example, should any new regime replace existing arrangements across the board or be introduced on an incremental, 'opt in,' basis? Or should such charging be confined to major corridors or classes of truck? If so, which ones?*

    NTC Response: See section 10.4

59. *Would a system of incremental charging, as outlined by the NTC (2004a), provide a useful stepping stone to broader application of mass–distance charging? Are there drawbacks to such an approach?*

    NTC Response: See section 10.2.1

60. *How could or should any adverse impacts on transport operators and users, including those in remote and regional communities, be managed/minimised?*

    NTC Response: See section 10.3.2

Impediments to efficient pricing and operation of transport infrastructure

61. *Other than price, what are the major impediments to efficient use of road and rail freight infrastructure? These might include (but not be limited to):*

    - *prescriptive regulations;*
    - *differences in regulations across jurisdictions;*
    - *inadequate infrastructure investment decisions;*
    - *access impediments to rail track or intermodal facilities;*
    - *regulatory and planning impediments to private infrastructure investments; or*
    - *industrial relations issues affecting service levels.*

    NTC Response: See section 5

62. *How should these impediments be addressed? Which are the most important? Is there a preferred sequence of reforms?*

    NTC Response: See section 5

63. *How can infrastructure investment decision-making be improved? For example, through application of consistent and transparent cost–benefit methodologies? Or are institutional reforms also needed to promote a more commercial approach to road and rail infrastructure provision and pricing? What institutional reforms would be most effective or desirable?*

    NTC Response: See section 4.3