AN INTEGRATED APPROACH TO THE REGULATION OF HEAVY VEHICLES

Barry Moore
General Manager – Policy
National Transport Commission Australia
bmoore@ntc.gov.au
www.ntc.gov.au

This paper draws heavily on previous papers prepared by various colleagues, in particular: Kirsty McIntyre (compliance and enforcement), Rob Di Cristoforo and Peter Rufford (performance-based standards) and Jeff Potter (safety).

ABSTRACT

The aim of this paper is to propose a regulatory approach to enable the effective utilisation of heavy vehicles on road systems. Effective utilisation of these vehicles enables the achievement of economic competitiveness through efficient road transport whilst maintaining acceptable safety, environmental and asset standards.

Throughout the world there is a rapid expansion in freight, particularly road freight. This is leading to increasing conflict between heavy and light vehicles in urban areas and some congested inter-urban links. Community concern over noise, safety, environmental and amenity impacts of heavy vehicles is growing in the developed world and in many parts of the developing world.

This points to a need for innovative and imaginative approaches to vehicle design, regulation and access to best meet freight needs whilst addressing community concerns.

Using Australia as a case study, this paper will consider issues related to the regulation of heavy vehicles, including:

- freight needs
- safety requirements
- compliance and enforcement approaches that can be utilised to demonstrate to the community that these vehicles will comply with safety and environmental standards
- the value of performance based standards in preference to prescriptive standards, to allow vehicle designers and operators to innovate within defined safety standards.

1. INTRODUCTION

In common with many other countries, the present regulatory approach to vehicles and vehicle use across Australia uses direct government regulation through prescriptive tools. Rules applying to vehicles and their operation aim to achieve safety, environment and asset protection. In Australia, three main methods of regulation are used to protect public road infrastructure: road pricing, compliance and enforcement, and prescriptive standards for vehicle dimensions and masses.

Freight transportation now operates in a different contextual environment, which requires a more sophisticated regulatory response. Pressures on the road transport regulatory environment include:

- a rate of technological advancement which exceeds the capacity of the prescriptive regulatory environment to respond in a timely manner thus delaying potential productivity gains
- industry focus on outcomes for customers, which is stymied by the prescriptive approach to regulation.

A number of emerging regulatory issues also require further consideration. These include the impacts of:

- increasing concerns over the safety and environmental impact of road freight vehicles
- increasing congestion in urban areas
- cross-portfolio involvement in road safety, such as through occupational health and safety regulation
- technology and automation advances in areas such as vehicle design
- community attitudes towards freight movement.

Current regulatory, planning and investment approaches must adapt rapidly to deal with these and other previously unforeseen issues.

In the Australian federal system, regulation of road transport has been primarily the responsibility of the States and Territories. At the time of the creation of the National Transport Commission's (NTC) predecessor, the National Road Transport Commission (NRTC), in 1991, there was a widespread perception in the road transport industry and amongst transport policy makers that the efficiency of road transport was impeded by the differential standards and regulatory approaches applying in the States and Territories and that that these impediments had to be addressed to enable Australia to maintain a competitive position in an increasingly difficult world economic environment. The Commission was established to address these problems by developing nationally consistent regulatory and operational arrangements to improve safety, productivity, regulatory efficiency and environmental performance. In 2004, the Commission's charter was expanded to include rail and inter-modal transport reforms, as well as road transport reforms.

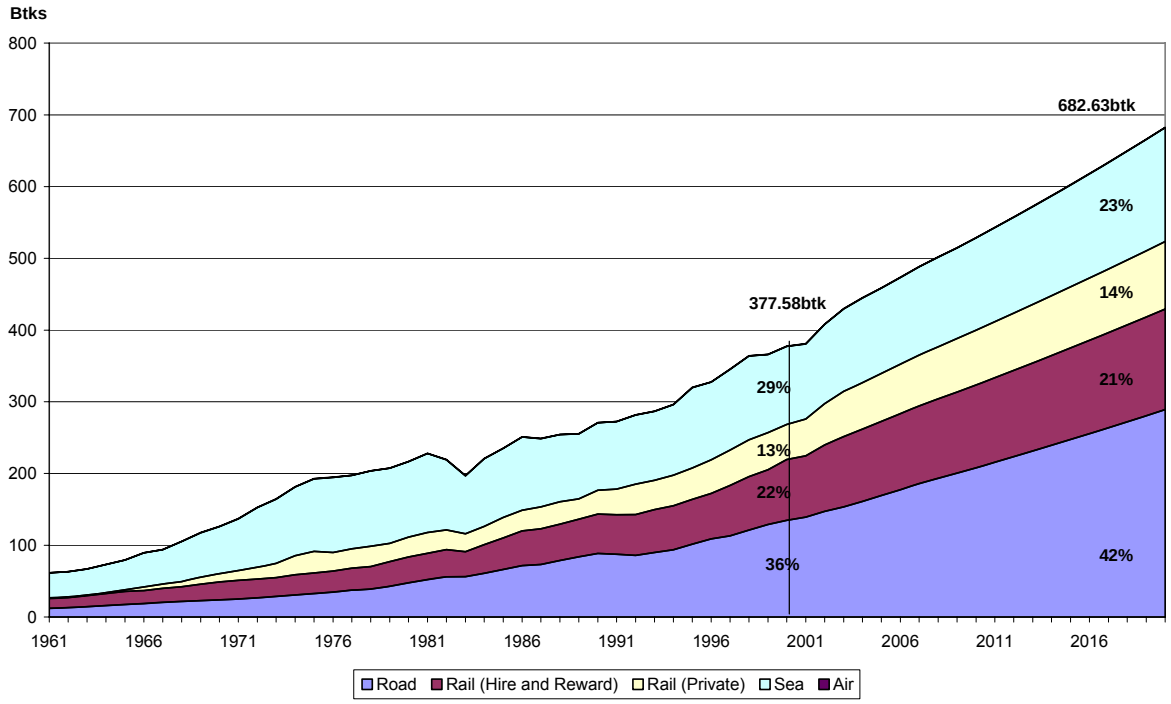
2. FREIGHT NEEDS

The most recent estimates from Australia's Bureau of Transport and Regional Economics (BTRE) indicate that between 2000 and 2020 the total Australian freight task (including by air and sea), as measured by tonne-kilometres, will almost double from 378 to 683 billion tonne-kilometres. The land transport task (encompassing road and rail transport) will come very close to doubling over the same period, increasing from 268 to 523 billion tonne-kilometres by 2020.

Within land transport, the BTRE forecasts suggest that the road freight task will double by 2018.

Figure 1: Total (bulk plus non-bulk) domestic freight task: modal split

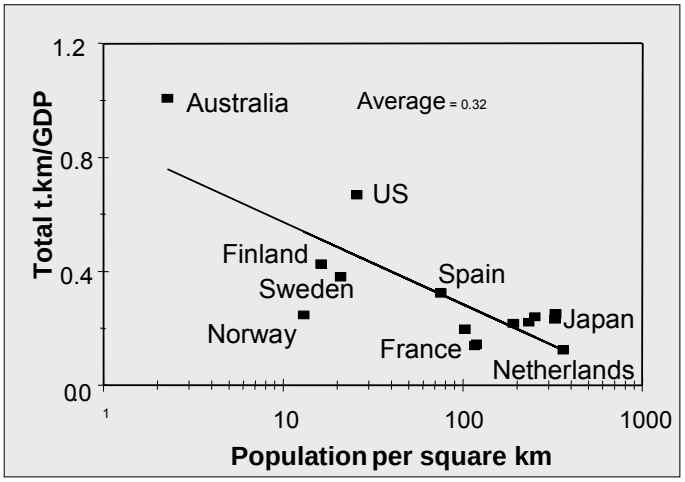
1960-61 to 2119-20



Source: BTRE (2005 to be published) *Freight Measuring and Modelling in Australia: Road, Rail, Air and Sea*

Due to its unusual geography and resource endowment, Australia is particularly transport dependent. However, the pattern of a rapidly growing freight task and particularly rapid growth in road freight is common through the developed and developing world.

Figure 2: Australia's transport dependency



3. SAFETY

3.1 Introduction

There is evidence of growing community concern over sharing roads with large freight vehicles. Surveys (eg, Austroads, 2005)demonstrate concern over aspects of the behaviour of heavy vehicles and the sheer size of these vehicles can intimidate. Incidents involving heavy vehicles frequently lead to extensive media coverage.

3.2 Truck Safety Benchmarking Study

The Truck Safety Benchmarking Study was completed for the NRTC in February 2002 (Howarth et al). The study was carried out to benchmark the safety performance of Australia's road transport industry against that of similar industries in a range of OECD countries. Comparisons were made of truck fatalities in Australia, the United States of America, Canada, New Zealand, the United Kingdom, France, Germany, and Sweden.

The study found that Australia's heavy vehicle fatality rate per kilometre travelled is significantly higher than the USA and UK, comparable to Germany and Canada, and lower than Sweden, France and New Zealand.

The report focused on a range of areas that have the potential to improve the safety performance of the heavy vehicle industry. These included road standards, targeted low cost road safety treatments, single vehicle crashes, day and night time driving, measures to improve the safety of truck occupants, front and rear underrun protection, appropriate speed limits, and data collection.

International comparisons must be treated with caution: the 2002 benchmarking study indicates, for instance, that correction for kilometres driven on divided highways explains most of the difference between the Australian and the United States statistics. Nevertheless, the conclusions that can be drawn from the study are that the number of heavy vehicle crashes in Australia is too high and needs to be reduced and that the community's perception of the safety of heavy vehicles needs to be improved.

There are multiple and inter-related reasons for heavy vehicle crashes. These include the condition of road infrastructure, speed, the design and maintenance of vehicles, fatigue and human factors including the health of road users and the risks some operators take in overloading vehicles and on the road. Street and Chow (1997) argue it is not very useful to

assign a single fault or immediate cause to a crash, as a crash should be seen as 'a chain of critical events leading to a catastrophic outcome': a more constructive and proactive approach is to identify the steps that could be taken by the various parties in the chain to prevent a similar event occurring in the future. Of all of the complex factors that contribute to heavy vehicle crashes, the evidence in Australia points to fatigue and speed as the two key causes. 'The highly competitive nature of the road freight industry may create the incentive for drivers to take such risks.' (Ironfield, 2001).

3.3 Heavy Vehicle Safety Strategy

In Australia, the rapid growth in the road freight task could result in an extra 50,000 trucks on the road network by 2020, with one in every four vehicles on urban roads being a truck. The task of improving heavy vehicle safety is essential to cope with the impact of this forecast growth. Following the Truck Safety Benchmarking Study, the NRTC worked with other agencies and the road transport industry to develop a National Heavy Vehicle Safety Strategy. This strategy has been endorsed by the Australian Transport Council (State, Territory and Commonwealth transport ministers) and is being implemented through a series of Action Plans. Through the development and implementation of the Strategy and associated Action Plans, the NTC is actively pursuing safety improvements to match the growth of the freight task. The Action Plans set out the priorities for delivering safer heavy vehicles, safer roads and safer drivers for the remainder of the decade.

The strategic objectives contained in the strategy are:

- increased seatbelt wearing by heavy vehicle drivers
- safer roads
- more effective speed management
- reduced driver impairment
- safer vehicles.

The strategy also identifies three areas to provide cohesion to ensure the outcomes are maximised. They are:

- enhanced driver and industry management
- effective enforcement
- targeted research and education.

The actions that have been and continue to be undertaken by NTC, in conjunction with road agencies and the road freight industry, aim to reduce the involvement of heavy vehicles in road trauma, reduce the severity of crashes in which they are involved, and improve the compatibility of heavy vehicles and the road network. These actions include packaging of safety environmental and productivity measures (for example underrun protection, low emission engines and increased axle mass limits) to promote the introduction of safer vehicles without the need to wait for regulation to mandate safety features; developing advice for fleet operators on the selection and purchase of safer vehicles; supporting projects with other stakeholders to identify effective interventions for heavy vehicle driver mental health and wellbeing; and undertaking in-depth case controlled crash investigation of heavy vehicles.

As part of the Heavy Vehicle Safety Strategy, work is also underway to develop a strategy to improve the braking standards and performance of the heavy vehicles fleet, particularly

as it relates to compatibility between prime mover and trailer braking setups. This is a particular problem for Australia, as significant numbers of prime movers are sourced from Europe, North America and Japan, while these source areas have different philosophies on braking regulation, resulting in potential truck-trailer brake incompatibilities.

3.4 Fatigue

The NTC has recently undertaken a comprehensive review of the regulatory approach to heavy vehicle driver fatigue (NTC, 2004). This has led to approval in February 2007 by the Australian Transport Council of a package of model legislation, accreditation, guidelines and training. The approach developed by NTC recognised fatigue as a key safety issue in the heavy vehicle industry. The existing Australian regulations were made nationally consistent in the late 1990s, but are based on legislation which dates back to the 1930s and were developed without fundamental consideration of safety issues. The precise contribution of fatigue to heavy vehicle crashes is difficult to isolate but is likely to be in the order of 20% to 30%.

The fatigue package was underpinned by advice from fatigue experts which places emphasis on restorative rest, fitness for duty, body clock factors and the influence of the many parties in the supply chain on driver fatigue (Bottomley et al, 2001). It was recognised that simply setting prescriptive hours of work and rest is a poor means of managing driver fatigue. In addition to setting maximum hours of work and minimum hours of rest, this reform places duties on all parties in the transport supply chain. Once implemented in 2008, this approach will take the emphasis off the driver and ensure other parties take responsibility for their role in managing driver fatigue. This new approach is designed to drive cultural change through the entire supply chain.

The approved policy covers some important fundamentals in managing fatigue including:

- a three-option approach that links increased flexibility with increased responsibility by operators to manage fatigue:
    - Standard Hours, which provides up to 12 hours of work per day or 72 hours per week
    - Basic Fatigue Management (BFM), which provides up to 14 hours of work per day or 72 hours per week, on average for accredited operators
    - Advanced Fatigue Management (AFM), which provides additional flexibility for accredited operators who can demonstrate the effective management of all factors which affect fatigue
- a general duty to manage fatigue to minimise road safety risk and achieve much greater consistency with occupational health and safety requirements
- a fatigue code of practice
- strengthened chain of responsibility provisions consistent with the approach under the national model Compliance and Enforcement Bill
- strengthened record keeping provisions
- a revised range of sanctions
- enhanced enforcement powers for police and transport inspectors.

The model legislation applies to trucks over 12 tonnes and buses with more than 12 seats. It aims to change the culture in industry to ensure that all parties in the chain are responsible for managing fatigue – not just drivers. It is consistent with occupational

health and safety approaches in other industries and seeks to allow increased flexibility where increased accountability can be demonstrated.

3.5 Speed

Speeding heavy vehicles have been a public concern for many years, primarily from a safety perspective. A recent survey found that speeding of heavy vehicles is ranked as the highest public concern about the road transport industry (Austroads 2005).

Since July 1990, the Australian Design Rule 65 – Maximum Road Speed Limiting for Heavy Goods Vehicles and Heavy Omnibuses has required all heavy trucks over 12 tonnes gross vehicle mass and all buses over five tonnes gross vehicle mass to be fitted with a speed limiter and that it be set to no more than 100 km/h. The aim of the Australian Design Rule was to limit the maximum speed of these vehicles.

It is estimated that tampering of speed limited heavy vehicles is in the range of 10 to 30 per cent, and for some heavy vehicle classes it may be even higher (NTC 2005c).

Although there is much data for speeding heavy vehicles on open roads, available data for urban areas is limited. From such data as is available, it appears that heavy vehicles show better compliance with limits in 60 and 70 km/h speed zones compared to cars. In 80 and 100 km/h speed zones, the proportion of heavy vehicles by class that exceed the limit ranges from 12 to 27 per cent. Speeding by 10 km/h or more is most prevalent with heavy vehicles in 80 km/h speed zones. This limited data indicates that heavy vehicle speeding occurs on urban roads, hence strategies to control heavy vehicle speed should include urban areas as well as open roads.

Case control studies to estimate the relationship between relative crash risk and travel speed for individual vehicles were undertaken in Australia by the Centre of Automotive Safety Research at Adelaide University. One study was in metropolitan Adelaide for speed zones of 60 km/h (Kloeden 1997 and 2002) and the other study was in rural South Australia with speed limits ranging from 80 to 110 km/h (Kloeden 2001). In the urban study, crash risk roughly doubled with each additional 5 km/h above 60 km/h; in the rural study, the crash risk doubled with each additional 10 km/h. A rule of thumb that fits the results quite well is that a 10% increase in travel speed roughly doubles casualty crash risk.

Brooks (2002) combined the crash risk versus speed relationship from the rural case control study with the distributions of speeding heavy vehicles for 100 and 110 km/h speed zones to investigate the extent to which speeding contributed to heavy vehicle crashes. Considering all heavy vehicle types combined, it was estimated that 100 per cent compliance with speed limits would result in a 29 per cent reduction in heavy vehicle crashes. It was further estimated that the 87 per cent of speeding heavy vehicles with an excess speed of less than 10 km/h were responsible for 33 per cent of the crashes attributed to speeding.

NTC is currently developing regulatory proposals to extend Chain of Responsibility obligations (see Section 4) to speeding offences and speed limiter tampering offences. This will provide a stronger incentive to vehicle operators, consignors and maintainers to ensure driver compliance with speed limits and the correct functioning of speed limiting devices.

3.6 Safety of high-productivity vehicles

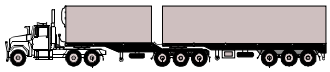
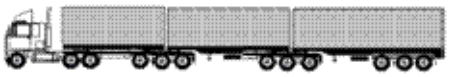
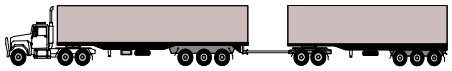
The introduction of regulations for heavy vehicles based on their safety performance rather than prescriptive mass and dimension limits is a major initative to drive the overall

improvements in the safety of the Australian heavy vehicle fleet (see Section 5).

NTC is leading Australia's involvement in the OECD/International Transport Forum working group on *Heavy Vehicles: Regulatory, Operational and Productivity Improvements*. This project will be a major input to identifying new directions to continue improving heavy vehicle safety in Australia.

Evidence from Australia and Canada suggests that larger heavy vehicles are safer and that shifting road freight to larger vehicles will lead to improved safety outcomes. This results both from the safety performance of heavier vehicles and a net reduction of the number of heavy vehicles, for a given level of freight task.

Figure 3: Selected Australian road freight vehicles

Vehicle Type		Maximum Length (m)	Maximum Gross Mass (t)	
			General Mass limits	Higher Mass Limits*
3-axle rigid truck		12.5	22.5	23.0
Truck and dog		19.0	50 (with jurisdictional variation)	
6-axle semi-trailer		19.0	42.5	45.5
9-axle B-Double		26.0	62.5	68.0
12-axle B-Triple		36.5	82.5	90.5
Double road train		36.5	79.0	85.0
Triple road train		53.5	115.5	124.5

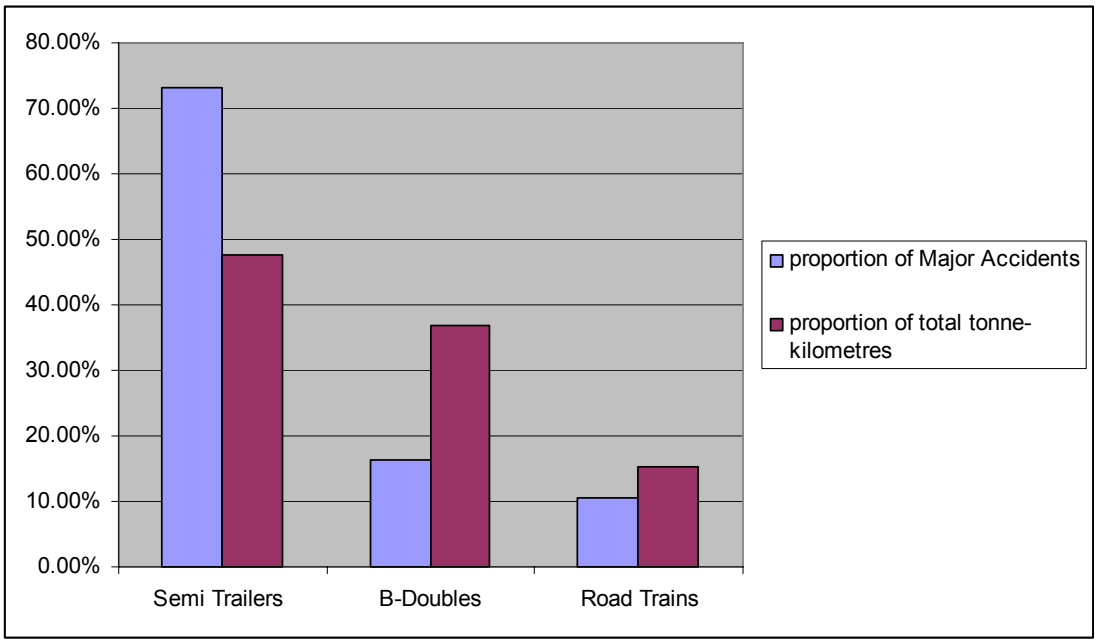
Notes:

(i) Higher mass limits are permitted for vehicles with certified road friendly suspension systems, determined from a performance test.

(ii) Rigid trucks, truck and dog combinations and semi-trailers are general access vehicles. B-doubles and road trains have restricted access to the road network.

Insurance industry data, see Figure 4, demonstrates that the crash involvement of high-productivity vehicles is low in relation to the proportion of the freight task they undertake.

Figure 4: Crash involvement by vehicle type, 2005



Source: Driscoll, p.5

Similarly, a recent Canadian analysis found:

> *…Turnpike Doubles [a Turnpike Double is a prime mover with two trailers, each 14.65 or 16.15 metres in length] are in the order of two to three times safer than the overall tractor-trailer population currently operating on Ontario's multi-lane highways on a per vehicle-kilometre basis.* (L-P Tardif et al, 2006, p.21)

4. COMPLIANCE

4.1 Introduction

Traditional regulatory responses to road transport breaches in Australia have been oriented towards enforcement rather than compliance, tending to be overly reliant on the physical detection and prosecution of offenders and on increasing the level of monetary penalties. As well, the driver and vehicle owner have been the 'soft' and usually, the only, targets of heavy vehicle enforcement policies. To achieve the beneficial outcomes of compliance with the road transport laws – safety, productivity, asset and environmental protection and competitive equity – a more strategic and comprehensive approach is needed.

In the Australian national arena, the NTC is working collectively with government and industry to develop reforms involving a suite of complementary compliance strategies. This section presents an outline of the Australian national compliance reforms and shows how these can improve heavy vehicle safety by increasing compliance and accountability – all the way along the transport chain, and up and down the corporate chain of command.

At the heart of these reforms is the concept of Chain of Responsibility and new Australian compliance and enforcement legislation that will give the concept teeth.

4.2 Previous compliance and enforcement regulation in Australia

Before explaining what is meant by the 'Chain of Responsibility' concept, it is useful to consider how Australian heavy vehicle regulation has traditionally addressed the notions of

responsibility and compliance, to explain the rationale for this concept and provide a comparison between the existing laws and the new approach to compliance and enforcement that is now being implemented across Australia.

Road transport is regulated to maximise road safety while allowing for transport efficiency and minimising un-recovered infrastructure cost and adverse impacts on the environment. A supplementary objective is to provide competitive equity, so that industry participants who breach legislative requirements do not achieve competitive advantage over those with higher levels of compliance.

In general, existing heavy vehicle legislation in Australia imposes liability for breaches of the road transport requirements only on drivers and/or operators and owners of heavy vehicles. The role played by other parties in the transport chain is usually not addressed, other than by way of indirect 'cause or permit' and 'aid or abet' style offences, which are not only difficult to prove, but which lack sufficient specificity to be effective as deterrent measures (McIntyre, 2000). Hence existing road transport legislation tends to have little, if any, deterrent effect on those other parties, many of whom may have a significant bearing on the activities that affect compliance with the road laws.

As well as a lack of national consistency, road transport legislation in many Australian jurisdictions had not been fundamentally reviewed for decades and had not kept pace with other forms of regulation such as occupational health and safety laws and environment protection laws in terms of compliance and enforcement mechanisms. In road transport, the 'compliance' debate has traditionally focused on increased on-road enforcement and ramping up penalty levels (McIntyre and Moore, 2002).

These traditional road transport regulation and enforcement approaches have not proved effective in producing long-term compliance improvements.

Traditional enforcement and monetary penalties are patently inadequate to protect safety and address these systemic problems:

- fines, no matter how high, will not have a sufficiently deterrent effect when the chance of detection is slight and the potential profits from offending are high - 'more law enforcement may detect more offenders, but this tends to treat the symptoms rather than deal with the fundamental problems.' (Freiberg, 2000)
- targeting only the driver and vehicle owner has no deterrent impact on the many 'off-road' parties who have a significant influence on on-road compliance and leads to a perception amongst drivers and owners that they are being treated unfairly
- in an industry characterised by high levels of competition resulting from low barriers to entry and a large number of small operators, the survival of operators who attempt to achieve levels of compliance higher than industry standards will be threatened
- a culture founded on confrontation between the regulator and the regulated is not conducive to promoting voluntary compliance (McIntyre and Moore, 2002).

Further, by failing to provide regulators and the community with the necessary degree of compliance assurance, traditional enforcement approaches have not been conducive to enabling productivity advancements in road transport.

4.3 A new approach

From its establishment and for most of the 1990s, the National Transport Commission's priorities had been to achieve national uniformity or consistency in vehicle standards and operating conditions. In more recent years, with the progressive completion of the Commission's initial work program, the focus of the Commission has shifted to a more fundamental review of the method of regulation of road transport in Australia (McIntyre and Moore, 2001). This shift in emphasis in the Commission's work is most apparent in the areas of compliance and enforcement and, more recently, in the development of performance-based standards.

Initially, the Commission regarded the task of producing compliance and enforcement laws as little more than an effort to achieve consistent (and higher) penalties for breaches of vehicle standards and road use requirements (McIntyre, 2000). However, as the work progressed, it became apparent for the reasons already discussed, that higher penalties for breaches of the road transport law would not equate with achieving the benefits of compliance with those laws. The new approach to heavy vehicle compliance and enforcement in Australia involves a much broader, nationally consistent compliance regime comprising 'conventional' (or sanctions-based) legislation complemented by a range of other strategies, including:

- nationally consistent legislation that introduces 'Chain of Responsibility' provisions to ensure the accountability of all responsible parties in the logistics chain
- a hierarchy of innovative sanctions that address persistent offending and illegal profits
- nationally consistent enforcement practices
- training and education-based strategies, including nationally-endorsed competency standards for officers undertaking heavy vehicle compliance and enforcement
- a range of industry-specific codes of practice
- privileges and incentives-based compliance strategies, such as accreditation-based compliance schemes, performance-based standards, and telematic monitoring of route compliance through the Intelligent Access Program.

In developing this approach, the Commission has consulted widely with government agencies and industry for over a decade. It has drawn on appropriate elements of criminological theory and Australia and overseas road transport regulation, as well as models operating in other regulatory areas. Effective elements of the different schemes were included, where judged to be potentially effective in the Australian road transport environment.

Included in the options that the Commission examined were operator licensing systems in the United States, Canada and the United Kingdom. In general, the Australian road freight sector is currently not subject to operator licensing. Such systems rely extensively on high-risk operators or drivers being identified before a fatality or safety breach occurs. However, the early conclusions were that the benefits of those approaches in the Australian context may not be outweighed by the costs, and that the resources that would be expended in establishing such approaches might better be directed towards increasing accountability along the whole logistics chain, and improving the targeting of enforcement. Operator licensing requires extensive and up to date databases on all operators, their vehicles, their drivers and any breaches of road transport law. Australia does not currently collate any of the necessary data at the national level and does not yet have adequate

national data collation, storage and retrieval systems in place. A study undertaken for the NTC found that:

> *Certainly, licensing road freight operators imposes additional compliance costs on businesses and requires substantial public resources, both financial and human. The extent of the additional compliance costs will depend on the complexity of the licensing processes, the nature of the information to be collected and assessed and the compliance effort required. Importantly, in federal jurisdictions the costs and threats to the effectiveness of operator licensing systems seem to be amplified.* (Ironfield, 2001, Summary).

In addition to 'borrowing' from existing models, the Commission has also shaped novel compliance and enforcement measures for the policy 'gaps' and longstanding compliance problems in road transport law that current regulatory approaches both in Australian and overseas do not appear to address adequately for the Australian context. The Chain of Responsibility principle is such a measure.

4.4 Chain of Responsibility

The Chain of Responsibility principle, simply stated, is:

> *all who bear responsibility for conduct which affects compliance should be made accountable for failure to discharge that responsibility*.

According to the principle of the Chain of Responsibility, the consigner who demands that trips be completed in unreasonable timeframes can potentially be held legally accountable for fatigue and speed-related violations, as can the operator of the poorly managed wholesale distribution centre, the person who understates the weight of an inter-modal freight container, the company director who allows short cuts to be taken with vehicle maintenance and the grain receival depot that knowingly rewards overloading by paying for weight delivered in excess of legal payloads.

To turn the principle into practice, it needs to be backed up by legislative duties and appropriately deterrent sanctions, strategically enforced by appropriately trained officers, and well publicised so that all responsible parties in the chain understand their compliance duties. As part of the agreed compliance and enforcement package, new national legislation, enforcement approaches, training and communications will be implemented in each jurisdiction in Australia to give 'teeth' to the Chain of Responsibility concept.

4.5 Model Compliance and Enforcement Bill

The new model legislation that will give effect to the Chain of Responsibility principle is entitled the Road Transport Reform (Compliance and Enforcement) Bill. The Bill was developed by the National Transport Commission over some years in close consultation with transport agencies from all jurisdictions, the road transport industry, the Transport Workers' Union, and many others and was approved unanimously by the Australian Transport Council at the end of 2003.

The Bill's general offences, enforcement powers and sanctions will apply to most areas of heavy vehicle regulation - heavy vehicle standards, registration and licensing, speeding heavy vehicles, truck driving hours and fatigue management, mass, dimension and load restraint, restricted access vehicles, oversize and over mass vehicles. The model Bill also contains a set of special compliance and enforcement requirements for heavy vehicle mass, dimension and load restraint. These requirements will apply over and above the new general offences, powers and sanctions in the Bill, to address Chain of Responsibility duties, roadside powers and monetary penalties specific to heavy vehicle mass, dimension

and load restraint.

In the future, further sets of special provisions will be included in the model Bill to address additional Chain of Responsibility duties, powers and penalties specific to the remaining areas of heavy vehicle regulation (including speed and vehicle condition) as well as to ensure compliance with and accountability for the emerging performance-based standards and Intelligent Access Program reforms.

The Bill expressly states that one of the particular objects of the model legislation is 'to recognise a Chain of Responsibility of parties who have a role in the transport of goods or passengers by road and to make the parties accountable for their acts and omissions'.

The Bill introduces the concept of the 'responsible person' who is defined as 'any person having, at a relevant time, a role or responsibilities associated with road transport'. Included within this concept are parties such as vehicle drivers and operators, consignors, packers, loaders, receivers of goods, weighbridge operators, intelligent transport system service providers, and those who audit vehicles under approved concession schemes.

In its specific application to heavy vehicle mass, dimension and load restraint, the Bill also imposes potential liability on all parties, including 'off-road' parties, who exercise control over the essential activities in the road transport task. In this model, any person involved in consigning, packing loading, carrying, driving or receiving has responsibility in respect of compliance with the mass, dimension and load restraint requirements. Joint and several liability applies, so that each and every party who commits a breach may be held accountable, irrespective of the liability of any other party.

An additional responsible party and additional offences have been included in the Bill to address, legislatively, the long-standing problem of overloaded trucks carrying intermodal freight containers. The party in Australia who offers the freight container for road transport will be liable under the new provisions if that party fails to first provide to the road carrier or the driver an accurate declaration of container weight. This communication requirement provides a potentially effective solution that empowers the road carrier and the driver with accurate information about the load prior to the commencement of its carriage by road. This enables the correct choice of vehicle to collect the container, leading to improved compliance with the mass laws.

The Bill also provides that each director and any person concerned in the management of a body corporate that has committed a road law offence will be deemed to have committed the offence in question, and may be punished in their individual capacity. As well, any person who causes or permits the commission of an offence or coerces, induces or offers an incentive to a person to commit an offence may be held legally accountable for that offence.

4.6 Strategic enforcement

Previously, Australian road transport legislation has provided little scope to take action beyond the roadside and beyond the driver or truck owner.

The powers in the new Bill provide enforcement personnel with the necessary authority to pursue their investigations in appropriate cases to other relevant parties in the Chain of Responsibility, including the 'off-road' parties such as consignors and consignees. These powers have recently allowed the Victorian road authority, VicRoads, to obtain receival records from a logging mill to support allegations that the company is persistently accepting grossly overloaded trucks, and to obtain wage records from a transport operator to contradict the understated work hours recorded on its drivers' log books.

To ensure the effective and appropriate administration of the Compliance and Enforcement Bill, the association of Australian road agencies, Austroads, has funded a series of national enforcement projects which produce practical guidelines specifying best practice in the application of the model provisions. The results will be greater administrative efficiency and clarity and more effective national deterrents. In the longer term, further development and implementation of the guidelines and recommendations will support cross-jurisdiction enforcement action. Key projects in this series include guidelines for the application of enforcement powers along the Chain of Responsibility, guidelines for the development of industry compliance codes, an implementation strategy for the nationally consistent introduction of the new regime (including organisational change, communications and education) and the development of appropriate performance measures.

As well, the Commission has recently completed new Chain of Responsibility legislation that will build on the Compliance and Enforcement Bill and give effect to the national Intelligent Access Program (IAP). The IAP will allow operators greater access to the road network on condition that their vehicles are monitored for route compliance and other aspects of vehicle behaviour through vehicle telematics. The new legislation will ensure that data in relation to any contraventions of the operating conditions are reported by IAP service providers to the relevant road authorities for action, and that each party in the IAP chain – from the body that accredits the IAP service providers, right through to the road authorities - collate, use and disclose the data generated by the technology in accordance with information privacy laws. The smarter compliance and enforcement arrangements under the IAP signal the shift from compliance mechanisms as a 'preventer' to compliance as an 'enabler' of productivity and flexibility (McIntyre & Moore, 2002).

4.7 Sanctions and penalties

A hierarchy of escalating and responsive sanctions and penalties is contained in the new Bill, addressing a number of important sanctions strategies, and based on the pyramid model of sanctions developed by Ian Ayres and John Braithwaite (Ayres and Braithwaite, 1992). In addition to the usual fines and orders affecting licences and registrations, there are new sanctions and penalties that have been designed to target particular forms of offending. These include:

- improvement orders (based on similar orders in occupational health and safety legislation) which aim to assist offenders improve their compliance performance
- formal warnings and infringement penalties (both of which are administrative, rather than court-based) when leniency is appropriate for minor breaches
- commercial benefits orders, which are designed to target offenders who reap large profits from overloading and other road transport offences, and allow a court to impose a penalty of up to three times the amount that the offender gained or stood to gain from committing the violation
- supervisory intervention orders that require systematic or persistent offenders to do, at their own cost, such things as the court considers will improve their compliance performance
- prohibition orders which address those systematic and persistent offenders for whom no other sanctions are appropriate and allow a court to exclude such offenders from participating in the road transport industry.

4.8 Nationally-endorsed competencies for enforcement officers

The development of national competency standards, qualifications and training guidelines for officers administering the powers and functions under the new national Compliance and Enforcement legislation is another key reform in the Commission's compliance work programme. The new nationally endorsed competencies which have been developed have been strongly endorsed by transport agencies, enforcement personnel and the road transport industry. Reflecting the change in mindset away from a confrontational, road-side enforcement-orientated approach towards a compliance focus, officers who gain the new qualification will be 'Road Transport Compliance Officers' (rather than 'enforcement officers' or 'inspectors').

4.9 Industry compliance codes

To assist in defending certain offences under the new national Compliance and Enforcement legislation, a responsible party may choose to show compliance with all relevant requirements of an industry-specific compliance code that has been registered with a road authority. This is one possible way of establishing that the party took all reasonable steps to avoid the offence in question, but not the only way. The purpose of using compliance with a registered industry code to help establish a defence is to encourage the development and maintenance, by all industry sectors involved in the road transport of freight, of best practice compliance systems particular to their own operations. Also, this is likely to raise compliance with the road transport law as a conscious consideration for industries that might otherwise ignore the adverse impacts of their operations on-road safety, infrastructure, and road transport competitive equity.

The use of industry compliance codes to provide guidance on matters covered by general duties in legislation is common in Australia in occupational health and safety and building regulation. Codes can provide more flexibility and have the advantage of being industry specific. Because they are developed by industry, they are more likely to be accepted and observed. An additional advantage is that off-road parties − consignors, loaders, packers and receivers − who develop such codes, will be required to do so in consultation with the road transport industry and road authorities, thereby ensuring negotiated outcomes that meet the needs of the drivers and carriers who service their operations.

Recently, peak Australian industry associations representing shipping lines, freight forwarders, customs brokers and stevedores, as well as ports authorities, developed a pilot code of practice in conjunction with the road transport industry and the Transport Workers' Union and with funding from the National Transport Commission, that sets out agreed means of achieving compliance with the new requirements in the Compliance and Enforcement legislation for the mandating of the provision of accurate container weight declarations. This code of practice will be put to the test, when the new legal requirements are introduced around the country.

4.10 Will the new laws work?

For the Chain of Responsibility provisions to work, there needs to be commitment from all key parties in the transport chain, ministers and enforcement agencies.

The Chain of Responsibility principle and all essential elements of the new Bill have received strong endorsement from the road transport industry. However, some other industry sectors have expressed equally strong concerns about the extension of liability for road transport-related breaches to parties further along the logistics chain, such as consignors and loaders. This is to be expected - although existing occupational health and safety laws already extend to these parties and it is possible that they are risking liability

under those laws if they are not meeting their duty of care obligations.

There is good evidence that the Chain of Responsibility message is already having a positive impact on many transport customers, who are reviewing their loading and unloading practices and even, in some cases, refusing to pay for freight delivered in excess of the legal payload. These customers have cited concern about their potential liability under duty of care and Chain of Responsibility and their heightened awareness of the risks to drivers as the primary motivations for change.

The Chain of Responsibility message is changing the way that road transport enforcement agencies see themselves and their role. Only four or so years ago, some agencies were expressing strong misgivings about the national Chain of Responsibility proposals. The Chain of Responsibility concept was supported in principle, but concern was expressed the increased resources that could be needed to conduct more complex investigations, to apply the more sophisticated enforcement tools and to train their enforcement personnel. However, over the course of the last few years, the regulatory mindset in Australia has shifted and transport agencies now regard Chain of Responsibility, rather than increased enforcement powers or stronger penalties, as the most powerful element of this legislative package for effecting improvements in compliance.

5. PERFORMANCE-BASED STANDARDS

5.1 Introduction

The National Transport Commission is developing a new regulatory approach to facilitate road network access for safer, more productive and more environmentally friendly heavy vehicles. The new approach is based on performance-based standards (PBS). Rather than indirectly attempting to control vehicle safety and infrastructure impact through traditional 'prescriptive' mass and dimension limits, PBS directly controls how well a vehicle must perform with respect to a set of defined benchmark standards. Standards can have a range of benchmarks that are matched to different road design standards. This means that, depending on their safety performance, PBS vehicles are granted access only to roads that have characteristics suitable to accommodate them. A safer vehicle is therefore granted access to a greater portion of the total road network, while a vehicle that only requires access to specific, high-standard routes may be able to significantly increase its mass and dimensions, hence its productivity, without exceeding the capacity of the particular routes.

This section describes the PBS approach and progress with its introduction across Australia, and draws on two case studies to demonstrate how all parties might achieve a positive outcome.

Heavy vehicles in Australia are currently regulated by inflexible mass and dimension limits that have evolved over a long period. Needless to say, there are differences in regulations between jurisdictions. The NTC was established to achieve national consistency in road and rail transport regulation. As a general principle, the NTC's preferred approach is to harmonise transport regulation nationally through the establishment, over time, of a performance-based regulatory reform environment.

5.2 The PBS approach

The performance-based approach to mass and dimension regulation directly specifies the required performance outcomes (in terms of safety and infrastructure impact) without unduly restricting vehicle design, whereas the traditional approach specifies inflexible vehicle design parameters (such as maximum trailer length) that indirectly attempt to

control performance outcomes without guaranteeing them. Performance-based regulation allows design flexibility while ensuring that performance outcomes meet at least a minimum acceptable level.

The PBS project has developed the desired performance outcomes as a set of 15 safety-related and four infrastructure-related performance standards. These will act as an alternative to existing mass and dimension limits and will introduce new safety performance requirements that could not be regulated previously. The PBS standards align the performance capabilities of vehicles with those acceptable by the road network on which they may operate. This approach aims to improve safety and provide for productivity increases without unduly increasing infrastructure costs for a specific transport task.

A comprehensive set of administrative and technical guidelines, rules and codes forms the PBS regulatory framework. With various aspects of the reform yet to be finalised, implementation has proceeded on an interim basis for the past two years.

Without PBS, trucking operators will be required to operate under the existing regulations, increasing the number of vehicles servicing the freight task and detrimentally impacting on other road users. If there are significant additional costs involved in operating within the existing regulations, the transport operator will pass these on to the freight customer. Freight customers may then need to relocate their operations to minimise transport costs, resulting in job losses within the community.

5.3 Performance standards

Through a rigorous process of technical design, expert consultation and independent review, the performance standards have been developed to provide precise definitions that are objective and absolute. Rules have been developed to set out how accredited assessors must assess vehicles against these standards using either numerical modelling or field testing or a combination of both.

The 15 safety-related standards and measures are:

- *Startability* - ability to commence forward motion on a specified grade
- *Gradeability* - ability to maintain forward motion and minimum speed on a specified grade
- *Acceleration Capability* - ability to accelerate on a flat road
- *Tracking Ability on a Straight Path* – the total swept width while travelling on a straight path
- *Ride Quality* – level of vibration to which a driver is exposed (standard still to be developed)
- *Low-speed Swept Path* – the maximum width of the swept path in a prescribed turn
- *Frontal Swing* – the maximum lateral displacement in a prescribed low-speed turn
- *Tail Swing* – the maximum lateral movement of the rearmost point on a vehicle in a prescribed low-speed turn
- *Steer-tyre Friction Demand* – the maximum friction level demanded of the steer tyres of the hauling unit in a prescribed low speed turn
- *Static Rollover Threshold* – the steady-state level of lateral acceleration that a

vehicle can sustain during turning without rolling over

- *Rearward Amplification* – degree to which the trailing unit(s) amplify of exaggerate lateral motions of the hauling unit
- *High-speed Transient Offtracking* – the lateral distance that the last-axle on the rear trailer tracks outside the path of the steer axle in a sudden evasive manoeuvre
- *Yaw Damping Coefficient* – the rate at which 'sway' or yaw oscillations of the rearmost trailer decay after a short duration steer input at the hauling unit
- *Handling Quality* – rate of response of steering to steering wheel input (standard still to be developed)
- *Directional Stability Under Braking* - the ability to maintain stability under braking.

The four infrastructure-related standards and measures are:

- *Pavement Vertical Loading* – degree to which vertical forces are applied to the pavement
- *Pavement Horizontal Loading* – degree to which horizontal forces are applied to the pavement (a prescriptive requirement has been retained as an interim measure)
- *Tyre Contact Pressure Distribution* – the maximum local vertical stress under a tyre's contact patch for a given vertical load tyre and tyre inflation pressure (a prescriptive requirement has been retained as an interim measure)
- *Bridge Loading* – the maximum effect on a bridge relative to a reference vehicle.

5.4 Network classification

Many of the safety-related standards specify four different performance levels - 'Level 1' through 'Level 4' - where Level 1 is most difficult to achieve. The purpose of providing the various performance levels is to make more optimal use of available capacity in the network (i.e. on routes that are more capable of accepting larger, heavier vehicles, the performance standards should be relaxed to allow greater opportunity for productivity improvement).

The NTC has developed Network Classification Guidelines that assist road owners (ie, State/Territory road agencies and local governments) in classifying routes into one of the four levels. While the guidelines are based on technical assessment of route capability, road owners should also consider local policy issues and limitations (e.g. proximity to schools) when classifying roads.

With vehicles assessed as meeting one of the four performance levels, network access may be granted to the corresponding network level. Approximate descriptions of the four levels of road classification are: Level 1 - General Access; Level 2 - B-double routes; Level 3 - Double Road Train routes; Level 4 - Triple Road Train routes.

It is intended that the majority of major freight routes in Australia (i.e. B-double and road train routes) are classified and mapped for publication. Vehicle operators seeking access to particular routes are then able to design vehicles to meet the performance levels required for access to those routes. While state government will be primarily responsible for the mapping process, there will be cases where PBS vehicle operations require access to local government owned roads. It will be the responsibility of local governments to determine access to these roads using the Network Classification Guidelines.

Progressive mapping of the PBS road network is expected to commence in 2007, and to be continually updated subsequently.

5.5 Institutional arrangements

The PBS institutional arrangements provide a framework within which PBS vehicles are considered for access to the road network. The institutional arrangements discussed below will be operational from late 2007.

All PBS vehicle applications will begin with an accredited PBS assessor making an assessment of the proposed vehicle design against the performance standards. However, as final access approval may be affected by local policy issues and limitations, applicants will be encouraged to first consult with jurisdictions (both state and local governments) to ascertain attitudes towards the granting of access for the proposed vehicle to the requested routes.

The assessor will 'score' the vehicle against the four performance levels and recommend the corresponding level of network access. Details of the assessment and the recommendation will be included in a formal application to the PBS Review Panel via a dedicated secretariat, housed initially within the NTC. The PBS Review Panel will be a national body representing all States and Territories and the Commonwealth, led by an independent chairperson and deputy chairperson. The Panel will be charged with the responsibility of determining vehicle performance against the standards, based on the assessor's recommendation, and consequently determining the level of network access to which the vehicle is entitled - all within a statutory timeframe of approximately 30 days.

Determination by the Panel will not mean that access is granted. Final access approval will be determined by the relevant jurisdiction (state or local government), considering the decision of the panel and any local policy issues and limitations.

5.6 PBS case studies

Since mid 2005, the PBS regime has progressed on an interim basis. By mid 2007, forty applications for PBS vehicle permits had been submitted to an interim panel. Of these, 28 had been considered and 12 were found to satisfy all of the required safety-related and infrastructure-related standards.

Of the 12 'successful' applications, most eventually met with difficulties in gaining access to the road network. In many cases the pertinent issues were with local government. Some cases have taken more than 12 months to be resolved, which has placed significant financial burdens on the applicants.

About one half of the applications have been for 'Level 1', or 'General Access', vehicles (typically variants of the common semi-trailer and truck-trailer configurations) and about one third of the applications have been for 'Level 2', or 'Restricted Access', vehicles (B-double equivalent). The remaining applications have typically been for road trains in remote areas.

5.6.1 Transport of timber in Western Australia

The south-west of Western Australia presents a case study in which a council is actively supporting the local timber industry to improve transport efficiency. Plantagenet Shire is currently negotiating with Main Roads WA to permit road train access on all of their local roads providing access to the timber plantations.

Road train access to the Mirambeena chipping mill or the Albany Port is required at the

end of the 10 year growth cycle on every local road where timber is planted. Strict application of existing regulatory rules to the local roads restricts heavy vehicle access and severely disrupts the transport task by requiring a greater number of smaller vehicles to service the freight task. This has major cost implications for the industry.

The trucking operators could use PBS to design more productive vehicles that meet the safety standards applicable to the roads of interest. This would result in fewer vehicles to service the freight task, mitigating the potential impact on other road users. This may require the adoption of special operating conditions depending on the number of heavy vehicles per day and the time of year. Examples might include advertising in the local paper when the transport is likely to take place on individual roads or restricting the speed of the vehicles over specific sections of road.

Council has already negotiated an arrangement with the timber industries to restore the local roads (mainly gravel) at the completion of transport on each road. This arrangement has worked well now for some years and demonstrates the goodwill that has developed between the council and the industry.

5.6.2 Exports through the Port of Sydney

The proposed expansion of a local industry's operations near Tumut, New South Wales, will significantly increase the number of trucks on the regional road network. The use of higher productivity PBS vehicles would introduce major efficiencies to the transport task and reduce the number of trucks on the access roads linking the region to the Hume Highway (the road route between Australia's two major cities).

The upgrading of operations and consequent growth in related industries will have a major impact on the volume of heavy vehicle traffic, particularly as much of the growth will translate into export products destined for the Port of Sydney. Forecasts suggest that truck traffic will increase from the current average of 234 B-double trucks per weekday to 402 B-double trucks per weekday.

Under a PBS regime, trucking operators estimate that the use of high-productivity 'Super B-doubles' for this task could cut the number of truck trips by 12%. This would reduce the impact on other road users and would reduce the transport costs to the industry.

Safety would be enhanced, with the company being able to load their product into two 40-foot export containers at their Tumut plant, which could then be transported by the vehicle to the port, rather than loading the containers at the port. Containers are a much more secure way of transporting this product, resulting in safer on-road operations.

The Super B-double would bring safety benefits to road users and cost efficiencies to the company. The additional work in loading the containers in Tumut would also create more jobs for the regional economy.

Provided the relevant roads were assessed to be able to accommodate the heavier and longer PBS B-doubles, the use of these vehicles represents a win-win outcome for the industry, other road users and the Tumut community.

5.7 Will a performance-based standards approach work?

The Australian road transport industry is a progressive and dynamic industry that is always keen to investigate new technology to improve productivity. PBS is a regime that will encourage innovation through flexibility, while guaranteeing safety and infrastructure impact outcomes. PBS is able to control outcomes that cannot be controlled with existing prescriptive regulations.

State regulatory bodies need to create an environment that encourages this innovation to meet the future transport task. Local government is not only part of the transport chain but also part of this environment. Local government needs to find ways of achieving positive outcomes for their local industries and communities.

A key issue in the implementation of PBS is the establishment of binding and effective national decision-making mechanisms. Whilst power over road transport in Australia lies with State and Territory governments, productivity requirements point to the need for a national approach to road transport regulation. This outcome has generally been achieved for prescriptive requirements, but it has not yet been achieved for performance-based standards, which are seen as the key to freight innovation.

6. ROAD PRICING

An appropriate road pricing regime for heavy vehicles is seen by many as a key requirement in the development of an efficient land freight industry.

Heavy vehicle pricing for road access is currently determined by the Australian Transport Council following recommendations from NTC and is then implemented by jurisdictions. Charges are based on recovery of past road expenditure (including both capital and maintenance and averaged over the three previous three years) and are applied to vehicle classes on the basis of estimates of expenditure allocated to each vehicle type. The process is complex and involves judgements. The charging instruments are a registration charge (paid to State/Territory Treasuries) and a fuel charge, paid to Commonwealth Treasury through diesel excise. About 70 per cent of total cost recovery is through the fuel charge and 30 per cent through registration charges. The result is full expenditure recovery by vehicle class, but with some under-recovery within class for vehicles which are heaviest and travel the longest distances and over-recovery from vehicles which are lightest and travel the shortest distance.

This system is based around averages:

- for mass and distances for vehicles within a class
- for cost allocation relationships across road types
- for expenditure over a three year period.

The NTC is currently undertaking a new Heavy Vehicle Charges Determination, based on a set of principles developed by the NTC and endorsed by the Australian Transport Council in August 2004. These principles are:

> *National heavy vehicle road use prices should promote optimal use of infrastructure, vehicles and transport modes.*
>
> *This is subject to the following:*
>
> - *full recovery of allocated infrastructure costs while minimising both the over and under recovery from any class of vehicle*
> - *cost effectiveness of pricing instruments*
> - *transparency*
> - *the need to balance administrative simplicity, efficiency and equity (eg impact on regional and remote communities/access)*

- *the need to have regard to other pricing applications such as light vehicle charges, tolling and congestion.*

Note: These principles allow for the inclusion of variable mass distance charges and externality charges relating to noise and air emissions where:

- *there are clear net economic gains;*
- *the extent of effort is recognised; and*
- *transparency and more accurate pricing within the road mode are ensured*.

In Australia, there is little linkage of road charges with road expenditure, no provision for charging for externalities and no hypothecation of charge revenues to road expenditure (with the exception of one State where registration revenues are hypothecated to road expenditure at an aggregate level). Local government, although responsible for a substantial proportion of road expenditure, receives no revenue directly from the current charges.

Hence, it is not surprising that road agencies are reluctant to allow increased mass, knowing that this will lead to more rapid deterioration of their road asset without any direct linkage to the revenue required to maintain/enhance the asset. From the perspective of the transport industry, there is no mechanism to choose to pay for a higher level of asset consumption, irrespective of the potential productivity benefits.

Adoption of a new approach to road pricing for heavy vehicles would need to involve central agencies as well as road agencies, as it cannot be separated from current revenue and funding arrangements.

Whilst rail industry representatives have frequently expressed the view that heavy vehicles are undercharged for their use of the road network and that more sophisticated pricing arrangements would lead to modal shift from road to rail, it is not clear that this is the case. The effects of class averaging, which leads to under-recovery from the heaviest vehicles and those travelling the longest distances are generally small relative to total charges and to operating costs. Further, cost-averaging across road types may lead to under-recovery from the vehicles which use the most durable roads, and these are probably the vehicles that compete most directly with rail. Potential charges for externalities would be lowest in non-urban areas, where road and rail are most contestable, and greatest in urban areas where there is little substitution between road and rail transport.

Linkage of road use and road expenditure would enable road freight operators to choose and pay for a level of consumption of the road asset and pass that revenue on to road owners for asset maintenance, enhancement or expansion. If road owners were confident that would they directly receive infrastructure-related road revenues, they would have an incentive to respond to demands for the operation of higher mass vehicles. Provided compliance, safety and environmental standards were met, this would lead to improvements in efficiency (though more productive vehicles), safety and environmental sustainability (through reduced numbers of heavy vehicles).

In effect, more sophisticated pricing and funding arrangements would enable the replacement of prescriptive mass limits applied to vehicle classes by individual choice of operating mass by transport operators. Furthermore, the signals provided by such accurate pricing could encourage the optimal level of investment in roads.

Infrastructure related costs for road transport are generally low in relation to operating costs. For this reason, it is possible that greater accuracy and flexibility in road pricing, enabling road transport operators to choose (and pay for) the optimal level of asset

consumption would improve the competitive position of road in relation to rail. In addition, current rail access prices in Australia are often below a level which provides full recovery of infrastructure costs.

In order to optimise the efficiency of land transport in Australia, the primary objective of a more refined road pricing system would be to more directly link road use, road wear and road expenditure, particularly for freight vehicles.

Linkage of road wear and road use would potentially enable attribution of road costs by axle mass, road type and road condition. Attribution of these costs to individual vehicles would mean that they would be factored into route choice, vehicle choice, axle mass and vehicle configuration by transport operators and into mode choice by users of transport services. In the event of the application of similar methodology to other modes, this would assist optimisation of freight across transport modes.

Moving away from highly aggregated charges to a system where the charges more accurately reflect the costs of road use has the potential to yield efficiency gains. There is an unavoidable caveat – the cost of such a system. The main components of the cost would be ensuring reliable estimates of the costs of road use and the cost of introducing and running the system.

An advantage of the current system of fuel and registration charges is that administration and compliance costs are low (as the registration transaction is required for heavy vehicle compliance purposes, the addition of a revenue component adds little cost). Also, the informational demands of the current system are minor compared to accurate point-of-use pricing. The full costs of any alternative system would have to be assessed against the benefits.

Following a recent review of Road and Rail Freight Infrastructure Pricing by the Commonwealth Productivity Commission (PC 2006), the Council of Australian Governments has endorsed a Road Reform Plan which includes trials and assessment of incremental pricing schemes and a feasibility study of mass-distance location-based charges in addition to projects intended to refine the current heavy vehicle charges methodology.

In submissions to the Productivity Commission, the NTC made the case for incremental pricing for heavy vehicles as an initial step in the direction of mass-distance location-based pricing. Incremental pricing involves allowing road transport operators to pay a supplementary price for increased mass or network access, in addition to the standard fuel and registration charges. Incremental pricing would allow transport operators to choose and pay for the amount of the asset they consume, within performance-based safety standards, with the revenue flowing direct to the road owner. This would address the current incentive of some areas of road agencies to preserve the asset, rather than achieving socially optimal levels of consumption.

The implementation of incremental charges, as a step towards mass-distance location-based pricing, 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 PBS vehicles can deliver significant productivity improvements.

7. CONCLUSION

It is not difficult to demonstrate that the more widespread use of larger heavy vehicles has the potential to result in improved safety, productivity and environmental outcomes. Despite this, there is widespread community concern over the safety and amenity associated with larger heavy vehicles. In addition, network access for heavy vehicles presents issues for infrastructure providers and network managers.

The key to effective utilisation of heavy vehicles is to demonstrate to the community and their political leaders that these vehicles comply with route restrictions, and deliver high safety and environmental outcomes and recover all costs associated with their use of the network. The tools to deliver these requirements are available. The challenge for road agencies is to implement an integrated and effective approach to the regulation of heavy vehicles.

REFERENCES

Australian Transport Safety Bureau (2004) *Road Deaths Australia: 2004 Statistical Summary,* ACT, Australia.

Austroads (2005). *Community Attitudes to Road Freight Vehicles*, Publication number AP-R274/05.

Ayres, I. and Braithwaite, J. (1992), *Responsive Regulation: Transcending the Regulation Debate*, Oxford University Press.

Bottomley, B. et al (2001). *Options for Improving the Regulatory Approach to Fatigue in Drivers of Heavy Vehicles in Australia and New Zealand.* National Road Transport Commission, Melbourne.
http://www.ntc.gov.au/FileView.aspx?page=A023114064005200 20

Brooks, C. (2002). *Speed and Heavy Vehicle Safety.* Papers for the NRTC/ATSB National Heavy Vehicle Safety Seminar, Melbourne, October 2002.

Di Cristoforo, R., and Rufford, P.(2007) Performance Based Standards and Local Government. Paper presented to the IPWEA NSW Division Annual Conference

Driscoll, O. (2007) *Major Accident Investigation: Analysis of Serious Australian Truck Accidents Recorded in 2005*, National Centre for Truck Accident Research, National Transport Insurance.

Edgar J (2004). *Development of Performance Standards for Australian Heavy Vehicles.* Proceedings of the 8th International Symposium on Heavy Vehicle Weights and Dimensions. Gauteng, South Africa.

Freiberg, A. (2000) *Effective Compliance and Enforcement Policies*. Paper presented to the Smart Compliance for the New Millennium Conference, Adelaide, Australia.

Haworth, N., Vulcan, P., and Sweatman, P. (2002) *Truck Safety Benchmarking Study.* National Road Transport Commission. Melbourne, Australia.

Ironfield, D., (2001) *Options for Regulation of the Road Freight Industry.* National Road Transport Commission. Melbourne, Australia.

Kloeden, C., McLean, A. and Glonek, G. (2002). *Reanalysis of Travelling Speed and the Risk of Crash Involvement in Adelaide South Australia*. Australian Transport Safety Bureau, Report No. CR207.

Kloeden, C., McLean, A., Moore, V. and Ponte, G. (1997). *Travelling Speed and the Risk of Crash Involvement. Federal Office of Road Safety*, Report No. CR172.

Kloeden, C., Pont, G. and McLean, A. (2001). *Travelling Speed and the Risk of Crash Involvement on Rural Roads.* Australian Transport Safety Bureau, Report No. CR204.

L-P Tardif & Associates Inc. in association with Ray Barton Associates Ltd (2005) *Evaluating Reductions in Greenhouse Gas Emissions Through the Use of Turnpike Double Truck Combinations, and Defining Best Practice for Energy-Efficiency*, Canadian Trucking Alliance.

McIntyre, K. (2000) *National Compliance Approaches*. Paper presented to the Smart Compliance for the New Millennium Conference, Adelaide, Australia.

McIntyre, K, (2005) Chain of Responsibility: *Achieving Truck and Bus Compliance in Australia*. Paper presented to the International Truck and Bus Safety and Security Symposium, Virginia, USA.

McIntyre, K., and Moore, B. (2001) *The National Road Transport Commission: An Experiment in Cooperative Federalism*. Paper for the Public Law Discussion Group, Faculty of Law, Australian National University, Canberra, Australia.

McIntyre, K., and Moore, B. (2002) *National Road Transport Compliance and Enforcement Reforms: On the Road to a New National Culture of Compliance.* Paper presented to the Australian Institute of Criminology's Current Issues in Regulation: Enforcement and Compliance Conference, Melbourne, Australia.

Moore, B., and Starrs, M. (1993) *Road Transport Reform in a Federal System.* Paper presented to the Australasian Transport Research Forum, Gold Coast.

NRTC (2001). *Comparison of Modelling Systems for Performance-Based Assessments of Heavy Vehicles*. Report Prepared by Dr Hans Prem, (RTDynamics), Euan Ramsay (RTDynamics), Dr John de Pont, (TERNZ), Dr John McLean (Consultant) and John Woodrooffe (Woodrooffe & Associates Inc.). National Road Transport Commission, Melbourne. http://www.ntc.gov.au/DocView.aspx?page=A02302402400470020

NRTC (2002). *Performance Characteristics of the Australian Heavy Vehicle Fleet.* Report prepared by Dr Hans Prem (RTDynamics), Dr John de Pont (TERNZ), Bob Pearson (PTRC), and Dr John McLean(Consultant). National Road Transport Commission, Melbourne. http://www.ntc.gov.au/ViewPage.aspx?page=A02305401400900020

NRTC (2003). *Performance-Based Standards – PBS Phase A: Measures and Standards: Regulatory Impact Statement*. Report prepared by Economic Associates Pty Ltd, Pearsons Transport Resource Centre Pty Ltd and RT Dynamics Pty Ltd. National Road Transport Commission, Melbourne.
http://www.ntc.gov.au/DocView.aspx?page=A02209501300870020

NRTC (2004). *Interim PBS Road Classification Guidelines*. Report prepared by ARRB Transport Research Pty Ltd. National Road Transport Commission, Melbourne.
http://www.ntc.gov.au/DocView.aspx?page=A02210509300780020

NTC (2004). *Heavy Vehicle Driver Fatitue – Policy Proposal.* National Transport Commission. Melbourne.
http://www.ntc.gov.au/FileView.aspx?page=A02305401400630020

NTC (2005a). *Performance-Based Standards for Heavy Vehicle Regulation: Proposed Regulatory Framework and Processes: Regulatory Impact Statement.* Report prepared by Economic Associates Pty Ltd, Pearsons Transport Resource Centre Pty Ltd in conjunction with the National Transport Commission, Melbourne. http://www.ntc.gov.au/DocView.aspx?page=A02311407400060020

NTC (2005b). *Rules for Assessment of Potential PBS Vehicles* – Discussion Paper and draft Rules. Report prepared by Pearsons Transport Resource Centre Pty Ltd, Mechanical System Dynamics Pty Ltd and ARRB Group Ltd. National Transport Commission, Melbourne.

NTC (2005c). Heavy Vehicle Speed Compliance – *Review of Regulatory Approaches, October.*

NTC (2007) *Improving the Regulatory Framework for Transport Productivity in Australia*: Discussion Paper

Pearson, R., and Leyden, P., (2004). *Performance-Based Standards – Pitfalls in Developing Infrastructure Protection Standards.* Proceedings of the 8th International Symposium on Heavy Vehicle Weights and Dimensions. Gauteng, South Africa.

Productivity Commission (2006), *Road and Rail Freight Infrastructure Pricing.* Productivity Commission Inquiry Report No 41, Australian Government.

Street, J., and Chow, G. (1997) *The Prospective Cost-effectiveness of Safety Enforcement Measures for the Long-distance Road Transport Industry in Australia: with Observations from North American Experiences*. Paper presented to 21st Australasian Transport Research Forum, Adelaide, Australia.

Wilson, T., and Moore, B. (2006) Regulatory Reform in Land Transport, *Productive Reform in a Federal System*, Roundtable Proceedings, Australian Government Productivity Commission, pp277-301

National Transport Commission and National Road Transport Commission reports are available at www.ntc.gov.au.
