COAG Road Reform Plan

Phase I Report

May 2009

Australian Transport Council Report to
the Council of Australian Governments

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Abbreviations

ATC	-	Australian Transport Council
COAG	-	Council of Australian Governments
CPRS	-	Carbon Pollution Reduction Scheme
CSO	-	Community service obligation
CRC	-	COAG Reform Council
IAP	-	Intelligent Access Program
MDL	-	Mass distance location charging
NTC	-	National Transport Commission
OBM	-	On-board mass monitoring
OBU	-	On-board units
PBS	-	Performance based standards
PC	-	Productivity Commission
RIS	-	Regulatory impact statement
TCA	-	Transport Certification Australia
WIM	-	Weigh in Motion technology

Executive Summary and Recommendations

1. On 13 April 2007, COAG agreed to a three-phased reform program (Road Reform Plan) in response to the Productivity Commission (PC) Inquiry on Road and Rail Freight Infrastructure Pricing. Phase I of the Plan included a number of research elements targeted at setting the foundation for later decisions on the merits of more direct heavy vehicle charging arrangements, including incremental charging and mass distance location (MDL) charging.

2. ATC has been charged with managing the reform program. This Phase I report outlines the pricing research undertaken, key findings[1], options for further consideration (where applicable), and next steps. The report works sequentially through the pricing research undertaken. It also outlines other work being undertaken within Transport portfolios which, although not directly specified by the Road Reform Plan, will be necessary for assessing direct charging.

3. ATC supports proceeding to Phase II of the COAG Road Reform Plan and notes that this report makes an initial identification of the further research elements needed to meet COAG's requirement of a feasibility study of MDL based charges by December 2011. ATC considers, however, that the critical next step is preparation of a detailed work plan and has put this work in hand. ATC intends to provide this plan to COAG by December 2009 for its consideration.

Externalities

4. National direct pricing of externalities for all heavy vehicles as part of a heavy vehicle charging arrangement is not considered optimal at this time. The analysis suggests the best approach would be local level assessments of the cost-effectiveness of additional externality treatments in locations where the impacts of externalities are concentrated and are of a level that suggest abatement measures might be worthwhile. Pricing may be one tool in these circumstances, particularly should a MDL based road user charge be introduced for cost recovery of road costs. As such, development of a new national charging regime for externality valuation and pricing need not be considered at this stage. If a direct charging system is established in the future, this issue should be reassessed.

Current charging system

5. The current charging system has evolved over time but has limitations. It does not send appropriate price signals to operators and it provides disincentives to road managers to extend access. Phase I of the Road Reform Plan has identified some possible refinements that may address some of its disadvantages. These refinements are evolutionary rather than revolutionary and should be considered in more detail if a further Determination of heavy vehicle charges is required using the existing system.

6. However, these changes will not address the fundamental shortcomings of the system. A more direct charging system would be needed to achieve that outcome. Prices in the system need to be more reflective of the road wear impact of vehicles, revenues need to be better directed to road managers to ameliorate the impact of that wear and only efficient investment expenditure should be recovered/funded through charges.

[1] The full research reports are available to COAG, central agencies and the COAG Reform Council (CRC).

Mass distance location charging

7. The advantages of a complete replacement of the existing charging system with a MDL system is that it could better align charges and impacts for users. This would improve charging equity and price signals to operators and potentially reduce the number of pricing components and collection costs over an incremental charging scheme (refer paragraphs 12 to 15). It would also provide detailed road use information for road planning purposes and enable better alignment of revenue with road wear impact.

8. A number of the initial steps towards developing a new charging system may also be useful inputs towards refining the existing charging system. For these reasons, it is recommended that analysis of future MDL charging options continue in Phase II. Indeed, there appears to be no practical alternative but to continue with this work. The current arrangements are unsustainable in the longer term and also do not provide governments with a practical tool to deliver emerging policy objectives.

Community service obligations

9. The research highlighted that defining CSOs in a road context is problematic because it is not a concept that translates well to a non-commercial environment and roads are primarily provided by non-commercial government road agencies. In addition, none of the quantification approaches trialled were ideal due to a lack of data, the resources required to implement them and the uncertainty and range of results obtained in testing different valuation approaches. This makes retrospective network wide valuation of CSOs (ie for past road expenditure) impractical.

10. Work could be done to improve new project assessment processes so that costs and benefits for heavy vehicles are quantified and distinguished from those for other beneficiaries only paying through the tax system. In effect, these processes could provide an indicative value of CSOs in future highway and arterial road expenditures (if the beneficiaries which represented road CSOs were defined – a process which would necessitate central agency involvement). However there would be no early benefits from this approach. Preferably, the need for the measure should be considered as part of institutional arrangements to better link revenue and investment.

11. The CSO work to date has also not provided clear options for taking account of CSO expenditure in the existing network in future charging arrangements to reduce the potential distributional impacts of a move to direct charging. It is proposed that this issue be further considered in the development of future heavy vehicle charging options.

Incremental pricing

12. An incremental charging system is a form of MDL charging where additional productivity benefits (generally additional mass limits) are granted to heavy vehicles at a cost, additional to existing charges, which varies depending on the additional access rights granted. The development of an incremental pricing scheme has the potential to provide productivity benefits for the road transport industry, as well as to address some of the deficiencies in the existing system. States which grant access that may cause additional road wear can get compensation to support rehabilitation of that wear.

13. The states that agreed to undertake incremental pricing trials are continuing to consult with potential trial participants and develop their schemes which will assess different aspects of incremental charging. These trials may generate access to the network for higher productivity vehicles earlier than they might otherwise, so are likely to produce some productivity benefits in their own right. They will also directly expose the industry to the concept of paying for additional access and may contribute to final industry acceptance of incremental charging, either in an incremental or MDL format. Work done in the context of incremental pricing is also a valuable input for many of the same issues which need to be addressed in the development of MDL based pricing.

14. Research to better understand road infrastructure capability (particularly bridges and pavements) and investment to strengthen some bridges is also likely to be required, in some jurisdictions at least, before access can be relaxed sufficiently to obtain the maximum benefit from incremental pricing. In addition, some of the more sophisticated pricing approaches, such as identifying large numbers of road classifications, may not be cost effective or achievable in the short term.

15. As work has commenced on incremental pricing, it has become increasingly apparent to both jurisdictions and industry that much of the work required to be undertaken for incremental pricing also needs to be undertaken for MDL pricing. Further, it is also clear that there is considerable technical detail to be worked through before an incremental pricing scheme could be broadly implemented. As a result, it is considered more appropriate and efficient to develop incremental pricing as part of the MDL pricing framework. For these reasons, ATC is not currently in a position to identify specific timing for when a broad-based incremental pricing scheme may be achievable. (Any scheme will, of course, be subject to a supportive RIS and COAG agreement.) ATC will keep COAG informed of further developments in its regular semi-annual reporting process.

International experience with direct user charging systems

16. While the present charging system is very simple and low cost to administer, it has limited capacity to pursue specific government transport objectives. In addition, diversification of transport fuels and fuel efficiency improvements have the potential to further reduce its effectiveness. As a result, there is wide international interest in distance time place charging for road infrastructure to better pursue priority transport objectives.

17. However, there are few successful network-wide examples of successful introduction. Even relatively less complex distance charging schemes are generally applied only to major highway and arterial freight routes. Variable mass or marginal cost charges linked directly to infrastructure wear are not being widely pursued. Nevertheless, Australian policy objectives and road conditions (higher mass limits on thinner pavements) appear to justify an analysis of these more difficult options despite the lack of wider international interest.

Mass distance location charging options

18. The following components will be common to all future reform options:

- Charging – comprising pricing policy, the charging structure, the systems for monitoring the charging variables and the methodology for calculating the charges;
- Data and fee collection – comprising technical aspects of road use data and fee calculation and collection from individual vehicles, audit of monitoring systems, governance and enforcement arrangements; and
- Revenue distribution and road spending – comprising the policy, institutional and governance arrangements for funds distribution and linking revenues to road spending.

19. Each of these components represents a necessary stream of future work that was not fully recognised by the PC. These need to be built into subsequent phases of the COAG Road Reform Plan or the new charge implementation period. There will also need to be additional research work undertaken progressively through the different Phases to inform a feasibility study to assess the relative costs and benefits of different direct charging models, as well as the charge calculation process.

Charging

20. Pavements across Australia vary widely in strength and quality. Road pavement and bridge performance varies with construction specification, age, source/specification of construction materials, climate and traffic and maintenance history, making derivation of road use/cost relationships challenging. There is also currently a lack of data and systems in road agencies to provide the long term cost data needed to satisfy government and industry that

knowledge of the costs of road use presents no barrier to allow MDL pricing to be developed. Empirical research to improve knowledge is necessarily long term given the length of road life and the number of axle passes needed for sufficient data for modelling impacts.

21. Detailed network disaggregation of road costs to derive individual charges for individual roads would be very complex and is unlikely to be justified by the benefits. However, development of a limited number of road classifications for charging purposes, at least initially, would simplify the charging system, data requirements and increase industry acceptance.

22. More detailed knowledge of marginal costs of different heavy vehicle types/loads using different parts of the network will contribute to the work of classifying roads for charging purposes and considering MDL charging options. It will also inform how any new cost base should be apportioned to and between heavy vehicle users.

23. Technical work has commenced to develop short run marginal costs for incremental increases in mass by axle and road type. Initial work was focussed on pavement performance for vehicles wishing to carry mass above current limits to support the analysis of incremental charges. Initial results indicate that costs for different road surfaces and axle combinations can be developed, that the variation between roads can be very large and that current charges for vehicles close to maximum axle loads may not fully recover short run marginal costs for most road classes. More work is required during 2009 to extend the cost analysis and to assess the degree of confidence in the results. This uncertainty may not preclude commencement of MDL charging. Like the evolution of the existing charging system, refinement can be pursued after introduction of a new charging system.

24. While significant work remains to refine road use/cost relationships, it is possible that an economically viable charging solution based on early results may present in the short term and provide an option for a new charging system that can be progressively refined beyond the timeframe of the Road Reform Plan.

Fee collection

25. The fee collection and enforcement arrangements (business policy and administrative arrangements) will largely depend on the pricing arrangements adopted. A key issue will be consideration of a single national collection authority or jurisdictional collection functions. Some consideration of these issues is proposed to commence in Phase II through an Austroads project to consider business system options for a new MDL pricing framework (including incremental pricing). This work will inform an assessment of the costs and benefits of different charging options. Development of the detailed systems themselves would need to be undertaken between a decision to proceed and commencement of new charging arrangements.

Revenue distribution, road spending and institutional reform

26. The current system is one based on cost recovery of past expenditure. This revenue is not distributed to road managers in proportion to the road wear attributable to heavy vehicles. Rather, distributions reflect historic revenue share. The PC advised a clear preference for user rather than budget funding. The implication of the PC recommendation is that road user needs should drive investment decision making. However, heavy vehicle charges provide only a small proportion of current network expenditures. Consistent with the Guidelines for Transport System Management, Transport decision makers take other beneficiaries into account.

27. There is recognition in the Road Reform Plan that more should be done to link road freight revenue with future road investment. The current COAG commitment in Phase II is that each jurisdiction consider examining alternative institutional arrangements to better link road freight revenues to road investment and enhance decision-making. A national

framework and a common set of objectives to be achieved to maximise the benefits of charging reform may assist jurisdictions in their analysis.

28. The nature of road spending is also a consideration. The PC queried whether it would be worthwhile targeting charging revenue spending at freight favouring initiatives or recognised freight corridors. In some respects this occurs currently with Commonwealth funding concentrated on the AusLink network. Policy options for revenue investment, including what might be an appropriate balance between freight favouring and general investments, are important considerations for COAG.

29. It is proposed that jurisdictions meet their commitment to consider their institutional arrangements when future heavy vehicle regulatory and charging arrangements are more certain. Phase II should consider common objectives from institutional reform and institutional arrangements which would support particular charging options. This would enable jurisdictions and COAG to assess their preparedness to commit in principle to foregoing historic revenue distributions in favour of aligning revenue with road wear or expenditure. Accommodating freight growth is most likely if jurisdictions are able to recover additional costs imposed by meeting this growth.

Forward Work program

30. Phase I outcomes indicate that there are a number of issues that will be challenging to pursue without a better understanding of the main objectives sought from the charging system and the particular heavy vehicle charging options being considered to deliver those outcomes. The road classification system for charging purposes, the mechanism for ensuring that the interests of rural, regional and remote Australians are taken into account and the allocation mechanism adopted to set a price all have the potential to vary with the charging structure. This requires the Road Reform Plan to consider charging options.

31. Development in Phase II of the charging options to be assessed in a Phase III feasibility study (should COAG agree to proceed to stage III) will also enable specification of data collections required to enable the feasibility study to be undertaken. A key element of work to develop charging models should be to refine and prioritise outcomes that can reasonably be pursued by changes to the charging system.

32. Work has not yet been commissioned to consider how any new cost base should be allocated to heavy vehicles. Allocation arrangements for new charging options will need to have regard to the specific charging options to be tested in Phase III and so will need to be considered after development in Phase II of the charging options.

Conclusion

33. Work done in Phase I towards direct pricing suggests that it is worthwhile to proceed to Phase II. However Phase II, as identified in the April 2007 COAG Road Reform Plan, does not currently identify any specific measures to progress MDL charging. It is therefore proposed that the work program for Phase II be modified to better recognise work that will need to be undertaken to facilitate achievement of later stages of the Plan, including:

- defining policy objectives, charging options (including development of a road classification system for pricing purposes) and institutional requirements required to support the achievement of those options;
- merging the work programs for incremental pricing and mass distance location pricing, recognising that there are considerable similarities in the two programs and that it will be important that they are aligned;
- assessing potential productivity gains through the deployment of trials for incremental pricing schemes;
- early identification of data requirements which will support later development of prices; and

- completing an analysis of the marginal costs of road use to assess the extent to which the costs of road use are sufficiently known to allow more direct charging and other components of the scheme to be developed.

34. Appendix A is an (initial) more detailed identification of heavy vehicle charging elements of Phase II, which will be developed further by ATC into a proposed detailed Road Reform Plan, with implementation milestones, for consideration by COAG.

35. Additional work will need to be undertaken in the lead up to Phase III to enable a feasibility study of MDL charging to be completed by December 2011. Appendix B outlines the range of work required to inform such a feasibility study. This will enable in Phase III (should COAG decide to proceed):

- an evaluation of the costs and benefits of the different charging options against maintaining the existing system;
- an assessment of the distributional impacts of each charging option and how those impacts could be managed; and
- an assessment of monitoring costs to industry and collection costs to government and how they could be constrained to levels that are acceptable.

36. There has not yet been any consultation with industry on the impacts of MDL charging, although there has been consultation on incremental charging. Industry is interested in heavy vehicle arrangements that enable them to improve productivity provided that the productivity gain outweighs any increased access cost. Preparation of the MDL feasibility study will involve ongoing consultation with industry.

List of Recommendations

It is recommended that:

1	the merits of national charging treatments for externalities be re-examined following the introduction of location based charging	Paragraph 37
2	a Phase II priority be to complete NTC/Austroads work towards deriving cost curves for marginal mass for different road types by axle group	Paragraph 91
3	work commence in Phase II on options to reduce the extent to which bridges are an impediment to improving network access for higher productivity vehicles and to assess options for charging arrangements to take account of bridge wear	Paragraph 92
4	the benefits of improved transparency of CSO funding be considered further in conjunction with the review of institutional arrangements in Phase III of the Road Reform Plan	Paragraph 120
5	the development of options to take account of CSO expenditure within the heavy vehicle charging framework be considered concurrently with the development of future heavy vehicle charging options	Paragraph 124
6	jurisdictions support the continuing development of incremental pricing trials	Paragraph 145
7	the work program for incremental pricing is merged with that of MDL pricing, while allowing for early implementation of incremental pricing if appropriate (subject to a supportive RIS and COAG agreement), noting that it is not possible to currently identify specific timing for such an outcome	Paragraph 148
8	work to develop charging models be accompanied by work to refine	Paragraph 178

	and prioritise the objectives of MDL	
9	work occur in Phase II on settling charging models to be assessed in any Phase III MDL feasibility study	Paragraph 179
10	work in Phase II to develop charging options also consider possible institutional arrangements and mechanisms required to better link revenue and investment and maximise the benefits of each option	Paragraph 190
11	a detailed work plan be developed, based on the above recommendations, and drawing on Appendix A and B	Paragraph 197
12	COAG to agree to proceed to Phase II of the Road Reform Plan, noting that ATC will provide its detailed work plan to COAG by December 2009 for its consideration	Paragraph 197

1 Introduction

1. The ATC is pleased to present the Phase I report on the heavy vehicle pricing research program, which forms part of the COAG Road Reform Plan.

Background

2. On 13 April 2007, COAG agreed to a three-phased reform program (Road Reform Plan) to, inter alia, provide better price signals for transport freight infrastructure providers and users to enable Australia to meet more efficiently the forecast growth in the national freight task. The Road Reform Plan was made in response to the Productivity Commission (PC) Inquiry on Road and Rail Freight Infrastructure Pricing, and formed part of a broader announcement on the National Reform Agenda. The ATC has been charged with managing the research program and providing advice to COAG on possible reform options.

3. Phase I of the COAG Road Reform Plan comprised a number of elements, including:

- Implementation of the National Guidelines for Transport System Management;
- A revised heavy vehicle pricing Determination to apply from 2008;
- Continued implementation of agreed regulatory reforms, including Performance Based Standards (PBS);
- An independent review of (pricing) policy relevant externalities of heavy vehicle road use;
- An independent review of heavy vehicle road use and costs;
- Government research to identify road spending to meet Community Service Obligations; and
- A detailed review, including trials, to assess the impact and feasibility of incremental pricing schemes.

4. The first three dot points above have been reported on separately by ATC through its regular bi-annual reports to COAG on current transport reform. This report focuses on heavy vehicle road pricing reform, the last four dot points above.

5. COAG also agreed that progress with pricing reform beyond Phase I requires a later decision-making process that draws on the assessment of the costs and benefits of reform options developed through the Road Reform Plan. The full text of COAG's response to the PC Inquiry, incorporating the current phasing schedule of the Road Reform Plan, is provided at http://www.coag.gov.au/coag_meeting_outcomes/2007-04-13/docs/coag_nra_competition_reforms.pdf.

Report Scope

6. The outcomes of the pricing reform research will inform COAG decisions on the future of heavy vehicle charging. A key component of the Road Reform Plan is a phased assessment of the potential merits of moving to a system of direct pricing, culminating in the introduction of MDL based charging for heavy vehicles by 2014 if the benefits are clearly expected to outweigh the costs. This approach focuses on research laying the foundations through improved data, information and demonstration projects for considering alternative models of road pricing.

7. This Phase I report outlines the pricing research undertaken, key findings, options for further consideration (where applicable), and next steps. The report works sequentially through the pricing research issues identified in the last four dot points in paragraph three above. The report also outlines other work being undertaken within Transport portfolios which, although not directly specified by the Road Reform Plan, will be necessary for the preparation of a feasibility study into direct charging in Phase III. It also incorporates an update on international pricing and technology developments and, as requested by COAG, provides advice on whether to proceed to Phase II of the COAG Road Reform Plan. In this

context, the report identifies implications for future phases of the COAG Road Reform Plan, including key policy issues to be considered and the scope of work this may entail.

Policy Context

8. COAG recognises that efficient, safe and sufficient transport and export infrastructure is critical to the economic future of Australia, particularly given the long distances between its production units and major domestic and overseas markets. This requirement, and the continuing rapid growth in the freight task, are the key policy drivers for heavy vehicle pricing reform.

9. The expected increase in the volume of freight movements and the mass and size of freight vehicles using the network, especially in combination with the growth of other traffic, contributes to safety and community acceptance concerns, and pressures for upgrading of infrastructure. It has become increasingly difficult for the road network to accommodate freight growth without appropriate infrastructure investment and other measures to improve the efficiency of its use.

10. The calculation of heavy vehicle charges under the existing heavy vehicle pricing scheme is based on average road usage within vehicle classes and does not adequately incorporate the diversity and variability that exists within the heavy vehicle fleet, freight task, road types or investment needs. Infrastructure providers are also constrained in their ability to upgrade infrastructure and extend access for the freight sector by uncertainty that funding will be provided for additional maintenance and investment to support higher road impacts and address community and other concerns. This could lead to decisions by infrastructure providers to preserve an asset at the expense of enhancing freight access. In summary, the current scheme does not provide effective pricing or investment signals between suppliers and consumers of road infrastructure.

11. These issues and their impacts were well documented during the PC Inquiry, and prompted COAG to commission the Road Reform Plan.

Guiding Assumptions

12. To assist in assessing reform options and identifying pricing policy issues arising from the research program, it is helpful to apply a number of guiding assumptions on the outcomes to be sought from the charging system. The following assumptions are drawn from the pricing principles within the existing Heavy Vehicles Agreement and also take into account COAG reform decisions. Heavy vehicle charges should:

I. continue to fully recover the share of road costs that are attributable to heavy vehicles, reflect road use/vehicle activity and minimise over or under recovery between and within vehicle classes;
II. maintain a common national methodology for calculating charges;
III. determine and collect charges in a way that is administratively simple, cost effective, user-friendly and transparent;
IV. improve pricing signals to road users and infrastructure providers to promote more efficient, productive safe, sustainable and timely provision and use of road freight, including:
    - charges that reflect the relationship between the cost of road use and characteristics of the vehicle and its operation, to send appropriate price signals that facilitate productivity improvements by heavy vehicle operators within the capacity of the network through heavy vehicle innovation;
    - incentives to road managers to improve access to higher productivity vehicles;
    - better link road freight revenues and future road investment to enhance decision making;

- improve revenue certainty/security for road managers to enhance maintenance planning and provide a revenue stream that is able to increase infrastructure funding options for road authorities; and
- ensure appropriate consideration of the interests of rural, regional and remote Australians are taken into account.

13. The above assumptions include some desirable outcomes from a new pricing system under Item IV. The absence of these characteristics is seen as a limitation of the current system. The most substantial differences to the current pricing principles is the desire to better align prices with vehicle activity, improve revenue certainty and link road freight revenues to future investment decisions. It is recommended that the pricing principles and above assumptions be reviewed as part of Phase II (refer Chapter 7).

Fit with Recent Transport Policy Developments

14. In May 2008, the ATC adopted the National Transport Plan and Policy Framework. The Framework identified a range of issues that contribute to the competitiveness and sustainability of the transport sector, the priority areas for national policy cooperation and the challenges ahead. Transport ministers have taken responsibility for developing and coordinating aspects of the Framework to date around the following work streams: an economic framework for an efficient transportation marketplace; infrastructure planning and investment; capacity constraints and supply chain performance; urban congestion; climate change, environment and energy; safety and security; strategic research and technology; and governance. The COAG heavy vehicle pricing reform research program has fallen within the work stream on an economic framework for an efficient transportation marketplace.

15. This broader National Transport Plan and Policy Framework process through 2008 led to ATC proposing to COAG that a critical current focus for transport reforms is the delivery of single national regulatory frameworks for heavy vehicles, maritime safety and rail safety and investigation. COAG has agreed that RISs should be brought forward on these issues in 2009 to facilitate COAG decision making. The heavy vehicle pricing reform research has continued against this background.

2 Externalities

COAG Request - Independent review of policy-relevant externalities of heavy vehicle road use and cost-effective policies for attaining efficient abatement of external costs

Policy Context for this Request:

16. The costs that heavy vehicles impose on other road users and local communities reduce community well being. Where these external costs and/or benefits are not reflected in the costs of freight, the decisions made by both operators and the people impacted may be distorted.

17. A range of approaches are in place to help address heavy vehicle externalities (for example, insurance for accident costs and regulation for noise and air quality). These measures 'internalise' costs on industry and go at least some way towards ensuring that externality costs are included in the cost of freight.

18. The PC considered these issues and concluded that efficient levels of externality will rarely be zero because of the costs of abatement and the benefits derived from transport activity. They consider that the efficient level will occur where the marginal cost of reducing the externality equals the marginal benefits of doing so. At this point the externality is said to be efficiently internalised and no longer policy relevant. Appendix C explains this concept.

19. The PC also concluded that it is unlikely that a uniform national tax on all road freight vehicles, regardless of where they travel and when, would be either an efficient or effective remedy to deal with inadequacies in existing measures. While direct (variable) pricing may offer the potential to achieve efficient abatement for some externalities, the variability in the costs of externalities by location and time, and the difficulties in measuring the costs and degree to which those costs are already internalised into freight rates, would challenge the cost benefit of this approach.

20. COAG, in their response to the PC Report, agreed to commission an independent review into the nature, extent and mechanisms for addressing heavy vehicle externalities to further consider whether the costs of freight transport externalities are adequately and efficiently addressed.

21. Consequently, Phase I of the COAG Road Reform Plan includes "an independent review of policy-relevant externalities of heavy vehicle road use and cost-effective policies for attaining efficient abatement of external costs".

Research Undertaken:

22. Work was commissioned to assess the costs and benefits and advantages and disadvantages of different externality treatment mechanisms. The research was undertaken by Maunsell Australia Pty Ltd, independent consultants not involved in advocating government policy on transport charges[2].

23. The work was an initial strategic analysis with the aim of identifying optimal treatment mechanisms for each externality. It was also intended that, for those externalities where direct pricing may be the optimal treatment mechanism, the charging parameters and data availability would also be assessed to enable later work on quantification. The report aimed to consolidate and evaluate existing information on mechanisms for internalisation and abatement of externalities rather than attempt a quantification of externalities.

[2] The consultancy report can be made available to COAG, central agencies and the CRC.

24. An assessment framework was developed to identify the optimal treatment mechanisms for each externality. It involved a review of:

- the causes and parameters that affect that externality;
- existing treatment mechanisms;
- alternative treatment mechanisms;
- the costs and benefits of existing and alternative treatment mechanisms; and
- the advantages and disadvantages of existing and alternative treatment mechanisms.

25. Externalities for which analysis was undertaken include congestion, air pollution, greenhouse gasses, crashes, road wear, noise, intrusion, water run-off, dust, vibration, visual impact and severance.

26. The results of this work have been analysed, also taking account of other research available in the externalities area.

Research Findings:

27. Direct pricing for all heavy vehicles as part of a national heavy vehicle charging arrangement is not considered optimal at this time for any of these externalities.

- *Congestion* – Congestion is very location and time specific and dependent on traffic levels, flow patterns, and duration of peaks. The likely success of different measures is location specific and will be influenced by issues such as alternatives to travel and the reasons for travel. While individual heavy vehicles have a higher impact than individual light vehicles due to size and different braking and acceleration characteristics, they already have a commercial incentive to avoid peak travel times where possible. Moreover, light vehicles contribute significantly more to overall congestion because of their much higher numbers.

  Direct pricing is only considered to be an optimal treatment mechanism to address location specific congestion if it is applied to all vehicles and the local traffic and planning environment has been considered with the measure tailored to reflect local characteristics and priorities. Thus, a uniform national direct heavy vehicle pricing scheme is not considered optimal (as noted above, urban congestion issues are being separately addressed through another ATC Working Group).

- *Air pollution* – Costs per vehicle of air quality emissions are higher for heavy vehicles than light vehicles but the overall light vehicle contribution is higher. The emission performance of individual vehicles varies significantly with vehicle technology, maintenance and loading. A portion of air pollution externality costs are internalised through the additional costs of emission reduction technologies in vehicles and the additional costs of fuel resulting from fuel standards. Non-vehicle sources often contribute significantly to air pollution loads.

  Measures singling out heavy vehicles would need to be justified. Direct pricing for air pollution may become the optimal treatment mechanism if the monitoring of mass and location of individual vehicles is implemented for other reasons and the capital costs for the technology are incurred in any case. Even then, the variation in performance of individual vehicles would detract from the performance of the measure unless individual vehicle emissions were monitored for charge calculation purposes.

- *Greenhouse gasses* – Emissions per vehicle are higher for heavy vehicles but light vehicles contribute 80% of transport emissions. The emission performance of individual vehicles varies significantly with vehicle technology, maintenance and loading. Non-vehicle sources contribute 85% to total greenhouse emissions.

  Given the small proportion of emissions attributable to the sector, inclusion of transport in the national Carbon Pollution Reduction Scheme (CPRS) is considered a preferable approach to address the greenhouse gas externality.

- *Crashes* – Costs per crash are higher when involving a heavy vehicle but again light vehicles contribute a larger proportion of overall crash externality costs. Costs vary with road classification and conditions. Significant internalisation currently exists through insurance premiums, though averaging detracts from the measure reflecting the actual heavy vehicle performance. The policy relevant externalities are the non–insurance covered costs such as emergency services, police and traffic delay costs.

  Pricing and charging of policy relevant crash externalities would involve significant averaging which would be reduced by taking into account how much a vehicle is used and the roads on which it travels. More differentiated insurance is considered to be the most appropriate mechanism together with a range of regulatory mechanisms. The extent to which this is occurring is limited by the capacity for the insurance industry to monitor variables that impact on their risk.

- *Road wear* – These costs are largely internalised through recovery from heavy vehicles through the existing charging system. A move to more direct charging would facilitate more direct and reflective charges for road wear. Policy relevant externalities include additional costs imposed on other vehicles from road wear caused by heavy vehicles. To abate these impacts more regular road rehabilitation would be required. Road authorities already have incentives to optimise maintenance and rehabilitation timing to minimise costs (though data limitations may inhibit their capacity to achieve this objective).
- *Other externalities* - The report suggests that noise, intrusion, water run-off, dust, vibration, visual impact and severance externalities are very location specific, difficult to quantify and to determine an appropriate price for a national charging response. Local project level assessment of measures to abate the externalities is the optimal response. These are usually managed through road agencies and in these cases costs are already a component of the cost base and charges.

28. The assessment of the optimal treatment was considered at the strategic national scale. While pricing is not considered cost-effective at this scale, there may be particular circumstances in which pricing may be optimal at a smaller scale. This might, for example, be in situations where there are a limited number of operators, enabling more direct measures to be negotiated to abate or recover externality impacts.

29. The optimal package of treatment mechanisms for heavy vehicle externalities is likely to change over time as technology advances, the costs of technology decrease and the deployment of monitoring technologies becomes widespread among vehicle operators.

Conclusions:

30. The analysis suggests that the main gaps in externality treatments are in the areas of greenhouse emissions and congestion. However:

- draft legislation for the commencement of the CPRS in 2010 is scheduled for introduction in the 2009 winter sitting of Parliament. Complementary measures directed at improving the emissions performance of the vehicle fleet are being considered through a joint ATC/Environmental Protection and Heritage Council process that will also report to COAG in mid 2009; and
- as noted earlier, a separate ATC work stream is also considering congestion treatment options and the scope for national measures. This includes urban congestion pricing options.

31. Many existing national externality treatments are not differentiated by location or time. In some locations and/or times, they over-recover the costs and at other locations/times they under-recover. For example, the costs of engine technology imposed on all heavy vehicle operators to comply with emission standards are less relevant for rural roads, where air quality is not an issue.

32. Location-specific assessments could be applied to assess the cost-effectiveness of additional externality treatments in locations where the impacts of externalities are concentrated and are of a level that suggest abatement might be worthwhile. These are best undertaken at the local level rather than through a national assessment. Local measures should be able to be considered and implemented by any level of government where demonstrably cost effective and contributing to efficiency.

33. A number of localised, project based treatments involve expenditure by road authorities (for example sound or safety barriers, sediment capture, etc). It is appropriate that the costs internalised by road agencies through expenditure on these measures be included in the cost base for recovery through heavy vehicle charges. These measures are generally already included in the cost base.

34. Some road authorities are required to implement other measures towards treatment or reduction in externality costs, for example undertaking or marketing road safety programs. These costs may not currently be included in the cost base and are candidates for inclusion. The section of this report on the cost base (part of the road use and cost chapter) considers these issues in more detail.

35. For a number of externalities, heavy vehicles are only one source of the total impact. For example, sources of air pollution include industry, light vehicles and domestic activity such as heating. Treatments in other sectors may be lower cost than heavy vehicle externality treatments. Where externality costs are high, there is merit in considering externality abatement across sectors to ensure lowest cost measures rather than singling out heavy vehicle measures.

Options for Further Consideration:

36. Quantifying externalities and the costs of treatments are problematic. This is because the base case or normal practice is rarely clear. For example, the impact of removing Euro emission standards for heavy vehicles are unlikely to lead to vehicle manufacturers returning to pre Euro emission standards, particularly if only Australia deregulated in this area. While quantification of policy relevant externalities at a local level may be justified where particular local regulatory and externality treatment options are being considered, work to date supports the conclusion that no national externality valuation exercise appears worthwhile.

37. Because externality charging could take the form of a supplementary add on charge to a road access charge, and is likely to cover only a small part of the network, externalities should not drive analysis of more direct forms of heavy vehicle charging. However externality recovery opportunities should be monitored further after future charging reforms. In particular, should time and location based charging be introduced nationally, then a further review should be undertaken at that time to assess whether technologies associated with the new pricing arrangements provide an opportunity to enhance externality treatments. **It is recommended that the merits of national charging treatments for externalities be re-examined following the introduction of location based charging.**

38. It is also worth noting that, should an externality charge be introduced in the future through the heavy vehicle pricing process, revenue obtained would need to be accounted for separately from revenue from the road wear charges that recover the expenditures of road authorities. Different issues would be involved in considering an appropriate distribution mechanism for these separate components of revenues.

3 Heavy Vehicle Road Use and Costs

COAG Request - Independent review of heavy vehicle road use and costs to refine PAYGO[3], improve investment decision making and provide an information base for examination of location-based charging

Policy Context for this Request:

39. Successive Governments at federal and state level have maintained a policy requiring recovery from the heavy vehicle industry of the costs that they impose on the community from their use of the road network. The existing cost recovery system is composed of fixed registration charges based on the vehicle classification (generating around one third of recovery revenue for the States) and a variable charge based on a fixed charge per litre of heavy vehicle fuel use (generating around two thirds of recovery revenue for the Australian Government).

40. While the existing system recognises the differences in the impact of the 'average task' for different vehicle classes, it is less effective at identifying particular vehicles that, through the nature of their activity, impose the greatest cost on the road system. Because the fixed charges are high and the variable charges do not increase at the same rate as road wear, vehicles in each class travelling less than the average distance for the class, or that are operated at less than the average mass for the class, are disadvantaged relative to heavier and more widely utilised vehicles. Similarly, vehicles that travel on high strength roads are disadvantaged over those travelling on easily damaged road surfaces.

41. The introduction of higher mass limits and other more productive heavy vehicles onto the national road network has flow on impacts to system maintenance and rehabilitation needs. Under the current system, improving access to the network for vehicles that cause more road wear would increase recovery from all vehicles in that class rather than just those that cause the additional wear. This is neither equitable nor efficient.

42. Governments have approved a research and policy reform agenda to lay the foundations for considering alternative models of road pricing and funding that more directly reflect vehicle activity. Being able to fairly recover the costs of additional road wear resulting from vehicle activity will send more appropriate cost signals to the operators of these vehicles on the impact of their operational decisions. Direction of those revenues to road managers responsible for road maintenance will remove one impediment to approving wider access to the network for vehicles that increase road maintenance costs and further road access reform.

43. The Productivity Commission considered that more fundamental reform of road infrastructure pricing and provision towards commercialisation could deliver larger benefits, but at higher cost and with implementation challenges. COAG agreed a strategy to continue to update the existing system while developing the research building blocks to enable the merits of MDL based charging to be assessed.

Refinements to the existing charging system

44. The existing heavy vehicle road infrastructure charging and provision arrangements have some shortcomings.

- Network averaging is a source of cost transfer. While the latest charging Determination has made significant steps towards removing over and under-recovery between vehicle

[3] The current approach to setting heavy vehicle charges (registration and fuel charges) involves establishing a PAYGO (Pay-As-You-Go) cost base, which is based on estimating the annual cost of road service provision through the collection of historic expenditure data for the whole road network across Australia.

classes, there remains over and under-recovery within vehicle classes and according to location, nature and volume of travel.

- Within the heavy vehicle charging, there is essentially an arbitrary division of the charge between fixed and variable components and of the revenue allocation through setting the diesel fuel excise and heavy vehicle registration fees to broadly maintain historic revenue relativities between the Australian and State/Territory Governments. The division between states and territories also reflects the garaging of the heavy vehicle fleet rather than infrastructure use.
- The current method of allocating costs to heavy vehicles is conservative (discussed further below), resulting in charges lower than might be required for full cost recovery and returning to jurisdictions a sustainable level of funding (discussed further below).
- Road charges are based on recent road spending and do not necessarily reflect future road spending needs. Road charges are determined by Ministers (following preparation of a RIS) while investment is budget funded rather than internally funded from user charges. Heavy vehicles are the only road users that pay an amount related to use of the road, while road investment is determined on the basis of community wide cost benefit rather than benefit to heavy vehicles.

Building blocks towards a new charging system

45. A more direct charging system would replace existing charges with a system where the price is more reflective of the activity of the specific vehicle and its interaction with the infrastructure. MDL based charging is a form of direct charging which recognises the major variables that differentiate the cost of infrastructure use. Mass, distance and location may be measured variables used to determine a price and reduce cross subsidies within vehicle classes from averaging. As such, it could partly or largely replace the existing NTC derived road user, registration and potentially any incremental prices introduced prior to MDL. A basic registration charge may remain, recognising roadworthiness and other safety access issues, or to contribute towards fixed costs, however it would be unlikely to approach the current 35 to 40 per cent of heavy vehicle charges[4].

46. The mass variable would recognise the vehicle configuration and mass, which determine the pavement impact of the load. The distance variable recognises the extent to which that vehicle or load is used across the network. The location variable could play a range of purposes in a new pricing system including:

- referring to differential charges depending on location, for example to recognise road type;
- identifying charged vs uncharged parts of the network;
- enabling a location specific externality or CSO charge adjustment; and/or
- road agency identification for data and/or revenue distribution purposes.

47. The NTC Incremental Pricing Scheme Feasibility report[5] outlines a framework for an incremental pricing scheme (refer Appendix D section 4). A framework for a new charging system ideally should be based on the same components, though without the need to mesh with an existing system. This would involve a legislative framework covering road access arrangements, the fee collection, enforcement and revenue allocation arrangements and the charging/pricing system.

48. Access would be determined on the same guiding principles as for the existing system and for any incremental charging, to:

- ensure the widest possible access of productive vehicles to the network consistent with the safety of heavy vehicle operators and other road users; and

[4] Of course, current revenue from registration flows to states and territories and from the road user charge to the Commonwealth. Such changes would alter revenue flows in the absence of a separate process of agreement on revenue shares between governments (delivered through funds transfers if necessary).

[5] Available at http://www.ntc.gov.au/DocView.aspx?DocumentId=1812

- utilise as fully as possible the productive capacity of the infrastructure (for example the vehicle mass or length capacity, and or the road load capacity) with an appropriate buffer to manage the uncertainty surrounding quantification of the maximum capacity.

49. Work to ensure more efficient utilisation of the road network is proceeding as the heavy vehicle productivity component of the Road Reform Plan (including PBS), separate from the pricing agenda. These productivity measures will be sought irrespective of the method of pricing used and are independent of pricing reform, though pricing reform may facilitate productivity enhancements.

50. The incremental charging report discusses access issues because that scheme is predicated on payment for expanded access. A new, more direct charging system would adopt existing general vehicle access arrangements as well as the access arrangements for any incremental charging system adopted as an interim charging arrangement (including payment for additional access). Ongoing access enhancement work and incremental charging evaluations are expected to sufficiently inform access for a new charging system.

51. The fee collection, enforcement and revenue allocation arrangements (business policy and administrative arrangements) will depend on the pricing arrangements adopted. An Austroads business systems project to consider business arrangement options for direct charging (incremental and MDL charging) is proposed to commence in Phase II and run parallel to the charging policy development, incremental charging trials and the Phase III MDL charging feasibility study.

52. The majority of work in developing the building blocks for a new charging system in Phase I of the Road Reform Plan has been directed at enabling later consideration of charging/pricing system options.

Research Undertaken:

53. Heavy vehicles are the only sector directly charged for their use of the road system, that is, where charges are linked directly to overall heavy vehicle road use and government road spending. In deriving recommended charges for heavy vehicles, the NTC undertakes three major steps. It first estimates the total cost base, then estimates the portion of the base that should be apportioned to heavy vehicles and finally recommends how that apportioned cost should be distributed between heavy vehicle users.

54. A key component of both the existing and any new pricing system is a determination of the cost base to be recovered from heavy vehicles. Accordingly, Phase I of COAG's Road Reform Plan included a project to explore options for defining and calculating the cost base for heavy vehicle charging. The project:

- considered the range of cost base approaches, including the existing cash accounting of previous and current road agency expenditures, forward costing approaches such as a lifecycle optimised cost/building blocks approach, as well as hybrid schemes;
- evaluated the cost base element of the existing charging system, taking account of approaches used in other infrastructure charging arrangements;
- considered improvements to the existing system; and
- proposed a preferred approach for consideration of future charging systems.

55. A GHD/Meyrick Alliance undertook the work[6], which included a workshop with jurisdictional experts in the area of road asset costing and cost allocation to understand the 'cost-drivers' associated with providing, managing, maintaining and replacing the road asset, including any legislative or central agency conditions influencing these functions.

56. This project did not consider the merits of including externality costs imposed by heavy vehicles within the cost base, except to the extent that they are internalised by road providers as specific interventions to mitigate the externality, for example addressing climate change

[6] The consultancy report is available to COAG, central agencies and the CRC.

impacts, or the cost of road design and construction to improve road safety. Consideration of the inclusion of other externalities in road pricing (addressed through a different payment) is considered in Chapter 2 of this report.

57. There has been considerable past analysis of the NTC methodology which estimates the portion of the base that should be apportioned to heavy vehicles and these have consistently concluded that the current method of allocating costs to heavy vehicles is conservative. The Productivity Commission summarised this work as follows:

> *"… given the limitations in data and engineering knowledge, determining the appropriate cost allocation to heavy vehicles necessarily involves a series of judgements and assumptions. The NTC adopts a conservative approach to its judgements, which it acknowledges. While the Commission considers that most of the assumptions made are, of themselves, reasonable, the cumulative effect is to produce an allocation of costs to heavy vehicles at the lower end of the plausible range of values." (Road and Rail Infrastructure Pricing, p.112)*

58. Considerable expense could be incurred in obtaining further independent analysis. However, it is unlikely that this would provide definitive advice on what is the appropriate apportionment to heavy vehicles without improved information on local road spending and the relationship between road use and wear. Accordingly, it was decided not to commission any new work in this area in advance of an audit of current data and engineering knowledge and limitations.

59. The NTC and Austroads have recently completed research to establish an improved local roads expenditure database which provides nationally consistent data on local road expenditure based on a finer breakdown of road expenditure that is more consistent with that currently available for arterial roads. Analysis of this work will enable review of the share of local roads expenditure that is allocated to heavy vehicles.

60. Robust information regarding the costs of different types of heavy vehicles using different parts of the network is essential to the development of a road freight infrastructure pricing system that more closely reflects the costs of road use.

61. The road wear impact of a heavy vehicle depends primarily on the gross vehicle mass, vehicle axle configuration, vehicle suspension and tyre type characteristics, loading characteristics, road strength, composition and condition and climatic conditions. However, there has been limited quantification of the contributions of the different variables to the pavement impact of different axle group combinations. Work has been undertaken through Austroads on a stocktake of the existing knowledge of the use/cost relationship. Research was also commissioned to supplement this knowledge through the use of predictive models to distil the cost impacts of incremental mass increases by road type by axle group.

62. The NTC has been managing a project to derive marginal costs for increments of mass on a heavy vehicle. This project was conceived to inform an analysis of the potential to redefine regulated axle mass limits by road type for PBS. A revision to current axle mass limits could have an impact on the limit above which incremental charges apply and also to the current PBS which apply the current mass limits as part of one of its standards (the vertical loading standard). However, the project was modified following approval of the Road Reform Plan to also provide marginal costs information to inform the development of incremental pricing schemes and the evaluation of MDL charging.

63. The marginal costs project has two stages with the first stage involving the development of short run marginal costs by road type. This analysis is represented by a number of marginal cost curves by axle and road type. This stage is almost completed for incremental charging (ie for higher masses), although the analysis has taken a number of iterations and has proven more complex than originally contemplated. The second phase will be undertaken during 2009 and involves:

- further building the capability of the model to allow for long-run marginal costs;

- modelling axle groups for lower masses to complete the cost curves, as well as "stretch" higher mass levels not modelled in stage one;
- building into the model other variables that impact the marginal costs that were not modelled in phase one; and
- undertaking sensitivity analysis of key variables.

64. This research is expected to inform ongoing incremental pricing trials. Expansion of this work will provide more detailed knowledge of marginal cost curves, contributing to work towards classifying roads for charging purposes and considering MDL charging options. Improved knowledge of road use, costs and the relationship between use and cost will also inform how any new cost base should be apportioned to and between heavy vehicle users.

Research Findings:

Cost base

65. The cost of providing road services involve road planning; corridor acquisition and management costs; road construction, capacity enhancement and maintenance costs; access management costs; traffic management costs; and other non-infrastructure costs to ensure the network is used and maintained consistent with community standards and regulations.

66. Because the focus of the current process is on producing charges only for heavy vehicles, in practice some costs that are considered irrelevant to the achievement of this goal are omitted from the estimation of the cost base. This is true, for instance, of the cost of light vehicle enforcement. One consequence is that the current process of estimation of the cost base is ill suited to any future extension of the road user charging system to embrace other users.

67. This narrower approach is not consistent with infrastructure costing principles used in other infrastructure sectors. A broader approach is warranted to ensure that the cost base reflects the full cost of the provision of road services. This would involve including all resource costs of road agencies in the cost base and allocating costs explicitly to appropriate beneficiaries with specification of the source of funds for those expenditures. While this would be consistent with costing principles advocated by the Productivity Commission, it represents a fundamental review of the allocation process.

68. It is not clear that a more inclusive cost base would result in any material change to the final heavy vehicle cost base. This is because the additional costs are likely to be allocated to other (light vehicle) road users and those that benefit from the access that the network provides.

69. The existing heavy vehicle charging system principles are not clear regarding what is a legitimate cost to be incorporated in the cost base and which of those costs should be retained in the allocable cost base. Similarly, the emphasis of the principles is towards pricing to shape efficient use of road infrastructure, without addressing efficient infrastructure investment.

70. The network investment assumptions underpinning the current approach include:

- the network is reasonably mature, with no major expansion or contraction;
- there is no deterioration in pavement or bridge condition across the network;
- lumpiness in investment is limited and the amount spent on each type of road work does not fluctuate markedly across the network;
- traffic growth is relatively small and steady; and
- the roadwork undertaken and the road network itself is optimal.

71. The validity of current assumptions is dubious, with indications of increasing maintenance debt caused by trends in infrastructure provision and use. This implies that there is scope to improve the current cost base. To do so is unlikely to be cost prohibitive.

72. Future cost base options include cash accounting approaches; discounted cash flow approaches; building blocks/lifecycle costing or rate of return approaches; and benchmark or standardised cost approaches. Each of these approaches could be based on historic or forward looking estimates. Although these approaches are conceptually different, there is scope for hybridisation, and blending does occur in other infrastructure sectors.

73. The GHD/Meyrick research suggests that discounted cash flow and building block approaches are likely to have significant implementation costs and transition issues for road authorities. The benefits of these approaches for a mature road network are likely to be modest and comparable benefits are potentially available through the existing cash accounting approach at lower cost. Consideration of approaches purely based on historic estimates of cost would continue to be plagued with the issues inherent in the current approach and may not satisfy COAG objectives to better link road charge revenue with future road spending.

74. The GHD/Meyrick research also suggests that considerations of future cost bases concentrate on cash accounting and standardised cost approaches and hybrids of these systems. In particular, it considered that a standardised cost approach may suit local roads, where availability and variability of road cost data is most problematic.

Road use and cost

75. The level of detail of road cost data collected is inconsistent across road authorities and local governments. There are variations in the level of disaggregation of road expenditure and different accounting approaches to recording road construction and maintenance activities. Contracting processes and reporting requirements reflect the different road agency approaches. For example, regional road maintenance contracts can span different road types and attribution of costs to particular roads may not be required.

76. Whilst some progress towards consistency may be made with initiatives such as the national pavement management database, the costs of standardisation are likely to be significant, particularly if requiring changes to accounting systems. A totally differentiated MDL charge reflecting the actual expenditure on each stretch of road (no averaging) would require a level of disaggregation of costs that would need to be supported by new accounting and recording systems. Contracting processes would need to be altered, with flow on cost impacts to road agency operations as well as implementation time impacts.

77. Funding for the cost of implementation of these changes would compete for priority with direct road investment in an environment where road authorities are facing road maintenance pressures. Without a significant benefits stream to provide justification, network wide disaggregation down to individual roads is unlikely to gain the level of acceptance across jurisdictions necessary to support this level of disaggregation.

78. Utilising a limited number of road classifications for charging purposes, at least initially, would simplify road cost data requirements, but introduce new boundary issues between road classifications. Standardised road costs for those classifications based on best available current information may be a viable option. These costs could be refined over time as disaggregation of costs to match the charging categories is undertaken (where justified). The NTC is undertaking research on road classification options and the marginal cost research outlined above will also help inform the development of classification options for charging purposes.

79. Similarly, heavy vehicle road use data is variable. Survey & weigh in motion (WIM) Stations are the primary currently available data collection sources.

80. The Surveys of Motor Vehicles and Vehicle Use provide a time series describing changes in the heavy vehicle fleet and its use. These surveys cover the whole vehicle fleet including heavy vehicles but have significant limitations. Nevertheless, given the lack of other network wide use data, these surveys are fundamental to heavy vehicle charging Determinations and to indexation of charges to ensure ongoing full cost recovery. The ABS

has announced that, for budgetary reasons, these surveys will no longer be run annually. This will make it difficult to maintain even the existing charging system.

81. Sufficient data to support heavy vehicle charging reform may be available for the major interstate and arterial roads, where WIM are concentrated. However, data quality rapidly falls off with the road classification, particularly by mass. Survey and WIM are unrealistic mechanisms for obtaining comprehensive network wide use data as this would be very high cost. Comprehensive use data may be a product of MDL charging rather than available to inform introduction.

82. Recently completed research by the NTC and Austroads on improving local road expenditure data will enable the NTC to more confidently disaggregate and model local road expenditure, enhancing their capacity to allocate local government expenditure to heavy vehicles. It will also inform consideration of future charging options.

83. Further road cost or use data disaggregation or collection is likely to be needed, for example, to inform road classification or calculation of charges. However, given the likely costs of undertaking that exercise, it needs to be targeted to specific data needs identified to fulfil charging system development needs.

Road use/cost relationship

84. Pavements across Australia vary widely in strength and quality with many sections which are fragile, particularly during wet periods. Road pavement and bridge performance varies with construction specification, age, traffic and maintenance history, source of construction materials and climate, making engineering analysis and overall conclusions challenging. Road use/cost relationships are complex and not well understood. Empirical research to improve knowledge is necessarily long term given road life and the number of axle passes needed for sufficient data for modelling impacts.

85. The research to derive marginal costs discussed above has produced its first draft outputs. The primary cost impact of higher mass is to bring forward road rehabilitation schedules. Modelling needs to cover a long enough time period to detect this change and the modelling complexity has meant that this work is yet to be completed.

86. Initial work was focussed on pavement performance for vehicles wishing to carry mass above current limits to support the analysis of incremental charges. Initial results indicate that cost curves for different road surfaces and axle combinations can be developed. More work is required to extend the curves to increments below current limits and to assess the degree of confidence in the results. Longer term work on the durability of pavement materials and load sharing performance of different axle combinations is likely to be required to reduce uncertainty.

87. A large remaining gap in this area is knowledge about bridge cost impacts. Variations in bridge design and construction make generalisation about the marginal cost impacts of additional mass on bridges problematic. The capacity of bridges is often the factor limiting the allowable mass on a stretch of road. The resource implications of individual bridge assessment is significant and may not produce usable marginal cost curves by mass.

Options for Further Consideration:

88. Research to improve and refine our knowledge of road costs by road type and the cost impact of heavy vehicle road use is necessarily long term and is required for both refinements to the existing system and to enable the merits of more direct charging to be assessed.

89. The current charging system has evolved over time with the cost base, the system of attribution of charges to heavy vehicles and the allocation between heavy vehicle classes all being refined. A number of further possible refinements to the existing charge system were identified which could be considered by the NTC. These include:

- averaging over a period partly historical and partly forward-looking;
- developing and applying standardised costs to the local road network as an option to improve information on the level and structure of local road costs; and
- testing with Ministers policy approaches to be adopted for the allocation of costs to heavy vehicles in those areas where NTC research indicates a range of allocation options could be justified, for example, options might include adoption of a point or midpoint of the allocation range.

90. The cost of providing road services should be based on efficient provision of both infrastructure and road system management, and should reflect the full economic cost of providing both. This approach should be supported with more transparency in the allocation of costs to all beneficiaries as well as how that cost allocation flows through to the heavy vehicle cost base and heavy vehicle prices. Work in a later phase of the reform process could consider options for a broader approach for a future cost base to ensure that the cost base reflects the full cost of the provision of road services. This could concentrate on full cash accounting and standardised cost approaches and hybrids of these systems.

91. Robust information regarding the costs of different types of heavy vehicles using different parts of the network will also inform both refinements to the existing charging system and any new charging system. NTC/Austroads work towards deriving initial cost curves for marginal mass for different road types by axle group is a key piece of work to inform consideration of MDL charging options and road classification for charging purposes. **It is recommended that a priority for Phase II be to complete this work.** This will involve extending the marginal cost curves to increments below current mass limits, assessing the degree of confidence in the results and analysing the implications for charging.

92. Investigation of options is also needed to reduce the extent to which bridges are an impediment to progress in improving access to the network for higher productivity vehicles and to assess options for charging arrangements to take account of bridge wear. **It is recommended that this work commence in Phase II.**

93. Additional disaggregation and collection of road use and cost data to inform road classification or calculation of charges needs to be targeted to specific data needs. This requires Phase II of the Road Reform Plan to consider charging and road classification options for charging purposes. Development of the charging options to be assessed in the Phase III regulation impact statement feasibility study will enable specification of data collections required to enable the feasibility study to be undertaken.

94. Work has not yet been commissioned to consider how any new cost base should be allocated to heavy vehicles. Allocation arrangements for new charging options will need to have regard to the specific charging options to be tested in Phase III and so will need to be considered after development in Phase II of the charging options. The outcomes of the current Austroads/NTC marginal cost research are also expected to inform the cost allocation analysis.

4 Community Service Obligations

COAG Request - Government research to identify road spending to meet Community Service Obligations (CSOs) to assist transparency of funding for CSOs and help inform future charging arrangements

Policy Context for this Request:

95. Roads provide economic and social benefits to a range of beneficiaries, including heavy vehicle operators and users, light vehicle users as well as network and access benefits to residents and business. Some road investment generates additional benefits, such as safety benefits, to society as a whole. Road spending to provide community benefits should be identified to assist transparency of funding decisions and so that it can be appropriately taken into account for charging purposes.

96. The analysis of the PC on CSO spending was relevant in progressing this task. Key observations in the PC Report were:

- Infrastructure costs of providing CSOs should be excluded from the cost base to be recovered from heavy vehicles. These costs are notionally recovered through expected community benefits and should be explicitly funded through governments from general taxation rather than from heavy vehicle charges.
- Local access costs should be recovered from rates and charges.
- Road expenditure, whether for user benefit or societal benefit, should be efficient (ie least cost to meet objectives).
- CSO expenditure should explicitly and transparently relate to a government policy objective (otherwise it is more appropriately viewed as an operator subsidy). The distributional impacts of more direct road charging regimes should be managed through transparent CSO funding rather than through cross-subsidies.
- It is important to separate CSOs (expenditure for broader community benefits), operator subsidies (expenditure not recovered), positive externalities (expenditure to meet defined and transparent objectives, including CSOs, and for which there is incidental ancillary positive benefits) and inefficient expenditure (not justified commercially or on the basis of community benefits).
- Freight infrastructure users should at least pay for the marginal costs of their own infrastructure use, whether or not that infrastructure has been provided for non-economic reasons and financed through CSOs.

97. The COAG Road Reform Plan recognises that the development of a future road freight infrastructure pricing system would seek to more closely reflect the costs of road use. COAG therefore requested research to identify road spending to meet CSOs to both enhance transparency of funding and to inform consideration of future charges.

Research Undertaken:

98. A study was commissioned to define road-related CSOs and develop possible quantification methods. The research was undertaken by NERA[7], independent consultants not involved in advocating policy in transport charging.

99. The CSO report provided a review of CSO policy and its applicability to the provision of road services. It described how CSOs are treated and quantified in other sectors and used this to suggest a draft definition of a road-service CSO. A number of possible approaches to quantifying road service CSOs (cost benefit approach, actual cost approach using registration as a proxy for the economic benefit derived, and marginal cost pricing based on

[7] The consultancy report can be made available to COAG, central agencies and the CRC.

incremental impacts) were developed. The quantification approaches were then evaluated through case studies.

100. The implications of the findings of the study for transparency of funding and for informing charging were then considered. The findings of this research and policy analysis are presented below.

Research Findings:

CSO Application

101. The study found that CSO policies have principally applied to government trading enterprises and commercialised/privatised services under a user-pays framework. In commercial infrastructure industries, distinguishing between services that are justified based on the demand of users and services provided to deliver other community benefits is more straightforward than it is for roads. In commercial infrastructure sectors, the scope of non-commercial obligations is narrowly and clearly defined (ie it is commonly more akin to essential or minimum service obligations, which guarantee users access through legislation to a basic level of service that would otherwise be unprofitable to provide).

102. Developing a definition and methodology for road-related CSOs is particularly problematic because roads are primarily provided by (non-commercial) government road agencies, and there is no direct link between revenue from users and investment. Heavy vehicles are the only group that pay road charges linked to their use of the infrastructure (and benefits to these vehicles are not the principle driver of investment decisions. As non-commercial providers, road agency expenditure decisions are focussed on achieving a broad range of government objectives (both social and economic), and not just on user needs.

CSO Valuation

103. Despite these challenges, the following possible definition was developed drawing on the original definition adopted by COAG in 1994: A road CSO is:

- a road service that promotes social objectives, or benefits the community at large; and
- would not otherwise have been provided by the road infrastructure provider acting commercially.

104. However, none of the quantification approaches trialled could deliver robust quantitative results against this definition, due to a lack of data and the uncertainty and range of results. Quantification attempts were also resource intensive.

105. The case studies highlighted that basic information on road costs was unavailable at a road segment level making retrospective valuation of CSOs (ie for existing roads) problematic. To the extent that the methodologies could be applied, they produced significantly different results and it was not clear which valuation was most accurate. The case studies showed that there was no robust or unambiguous way to determine the key objectives governing past expenditure decisions, with a broad range of objectives being documented. However, conclusions that could be made include that:

- CSOs are not limited to local roads and are likely to be significant, particularly outside the major metropolitan centres;
- there is considerable ongoing investment in meeting CSO objectives;
- it is not currently feasible (due to data availability and cost) to identify the CSO component of past road spending at the network level; and
- it would, however, be feasible to value CSO expenditure at the time of project assessment (ie prospectively) for asset renewals, extensions and upgrades. These typically are assessed through a cost benefit approach which, at some resource cost, could be extended to estimate CSOs associated with a project.

106. There would be some benefit in enhancing the cost benefit analysis of future expenditures to deliver estimates of CSOs. This would assist transparency of funding for CSOs and help inform future charging considerations.

Transparency of Funding

107. In other sectors, non-commercial infrastructure initiatives to support broader policy objectives (including improved level of service to users) are typically funded through budgeted grants and subsidies (albeit users are expected to make a partial or full contribution to on-going costs). This approach could potentially apply to roads, particularly given the proportion of costs already funded from government budgets.

108. However, delineating between commercial and CSO types of expenditure to improve transparency would not be a trivial exercise.

- There would be a number of boundary issues.
- The rationale for disaggregation is unclear (governments have previously opposed commercialisation of road services (road funds) and there is no policy commitment to assess direct road user charging of all vehicles. Commercialisation and user-pays charging are both key planks of CSO policies applied in other sectors.)
- There are likely to be significant data gaps, questions of data reliability and cost issues.
- Ensuring consistency of results would appear to require the development of national guidelines.
- Cost benefit analysis is not undertaken on a significant proportion of annual road expenditure, in particular, expenditures by local governments (around a third of total road expenditure) and expenditures on maintenance. To impose cost benefit requirements on the assessment of these expenditures would add to road administrative costs, may be beyond the capacity of a significant proportion of local governments and is unlikely to be cost effective.
- Improving transparency would require governments to commit to public reporting of the business case for funded projects, including detailed attribution of costs to beneficiaries.

Informing Charging

109. The research has shown that it is not possible to estimate the total value of CSOs in the existing network. The implication for road charging of any decision to focus CSO calculation on project assessments for asset replacements, extensions and upgrades is that it would take many years before a sufficient proportion of the network has been upgraded to make meaningful projections of the CSO component in the overall network valuation. This would require an extended transition period between the current charging arrangements and future charging practices that fully account for CSOs.

110. Against these observations, it would appear premature to commit to a process for calculating CSOs for charging purposes at this stage. Different heavy vehicle charging arrangements are likely to require different methodologies for accounting for CSO expenditure or may provide different alternatives for arriving at an appropriate cost base. For example, a differential charge by road type will need to estimate the average CSO in each road type, while an aggregate cost base for recovery approach would need an estimation of the network wide CSO. Similarly, short or long run marginal cost approaches may require quite different CSO treatments. As indicated above, the latter may not be practical or cost-effective.

111. Future attempts to cost road network CSOs and take account of them in the context of road charging would be a significant change to charging policy for roads, and the application of CSO policy as it has been applied in other sectors.

Universal Service Obligation

112. Separate consideration was given to the scope to improve the transparency of funding for CSOs by breaking the above CSO definition down further to delineate non-commercial essential services and broader community services required by government. For example:

- an essential or universal service obligation (USO) could provide accessibility to essential services where this access cannot be justified commercially at any standard (for example, roads providing access to sparsely settled areas or isolated communities may not be commercially justified but vehicle access to property is often a state legislated requirement for titling property);
- a community service obligation (ie a CSO) could occur where government requires supplementary road services on top of commercially justified services or a USO, to meet other community (both social and economic) objectives (for example, school bypasses, regional development where the benefits are not captured entirely by the road user or road standards higher than justified by the level of traffic).

113. There is a precedent (for example, within the telecommunications sector) for some basic USO type services to be funded through higher charges for road users as a whole, involving some cross-subsidies between users rather than through budget funding. This is prefaced on delivering additional network benefits. In the case of roads, there may be a network benefit (in effect a positive externality) from extending the network to non-commercial areas given:

- the potential value to the economy of additional goods transported on those roads;
- the reliance on traffic on feeder roads to generate sufficient traffic (or lower the marginal cost) for the provision of better quality (ie arterial) roads; and
- the potentially more efficient use of existing arterial roads in volumes sufficient to enable a commercial return.

114. It should be noted however, that the multiplicity of road owners may make the management of USO cross subsidies particularly problematic[8]. For example, roads that could be operated commercially are not generally owned/managed by the same authorities that own/manage non-commercial roads. There is also an argument that access USOs are funded from property rates rather than road user charges. However, local government funding is not hypothecated, making it difficult to calculate an appropriate 'share' of local road spending that should be sourced from rates.

115. It is not clear that the possible further break down of CSOs discussed here is helpful to either the transparency or the future charging arrangements debate.

Conclusions and Options for Further Consideration

Transparency of Funding

116. The analysis suggests that work could be done to improve project assessment processes so that costs and benefits for heavy vehicles are quantified and distinguished from those for light vehicles and other beneficiaries only paying through the tax system. In effect, these processes could provide an indicative value of CSOs in future highway and arterial road expenditures (if the beneficiaries which represented road CSOs were defined – a process which would necessitate central agency involvement) and it may be possible to use this to build a database on network wide CSO expenditure.

117. This measure is only likely to be cost effective for future major highway, arterial road and other project expenditures where a cost benefit analysis is already required. Cost benefit analysis is not normally undertaken on expenditures by local governments or on maintenance expenditures. The additional resource requirements of applying an analysis to maintenance expenditures, not currently subject to this level of scrutiny, may exceed any

[8] In the telecommunications sector responsibility for funding UFOs has been subject to legal disputation.

transparency benefits. Without these expenditures included, it will take some years before data will provide substantial network coverage.

118. A commitment to prospective quantification of CSOs would require:

- The Guidelines for Transport System Management (ie the investment assessment guidelines) to be amended to include instructions for CSO calculation to facilitate consistency of results across jurisdictions, and to be applied to agreed categories of roads. The cost of amending the guidelines in this way and of requiring this additional obligation within cost benefit analysis would not be trivial, but is unlikely to be prohibitive, especially if limited to asset renewals, extensions and upgrades;
- Local roads could be exempted due to their principal role of providing local access. The major source of funds for these roads is rates. Given these factors, and the additional costs associated with accounting for CSO expenditure, it would be inappropriate to impose extensive cost benefit calculation obligations on local government. However, should information on these roads be necessary, a sampling approach could be taken.
- These initiatives may only be worthwhile if there is a commitment by governments to public reporting of the project assessments at the time of announcement of investment decisions. Mandatory reporting may be necessary.

119. The Road Reform Plan incorporates a review of institutional arrangements within jurisdictions to better link road use and road use revenues to investment decisions. CSO transparency and better linking road use and investment decisions are both seeking the same outcome, ie better investment decisions. A decision by governments on institutional arrangements to better link revenue and investment may reduce the benefits of increased transparency. Further, as road budgets for major projects are significantly forward committed, there would be no project selection benefits from early introduction. As a result, no early implementation of this measure is recommended.

120. Accordingly, **it is recommended that the benefits of improved transparency of CSO funding be considered further in conjunction with the review of institutional arrangements in Phase III of the Road Reform Plan** (refer chapter 7).

Informing Charging

121. The CSO work to date has not provided a means for estimating the value of CSOs in the existing network. Nor has it suggested a cost effective mechanism for prospectively valuing the annual network wide CSO expenditure (although, at a lower cost, the extent of CSOs in major projects could be estimated prospectively).

122. The benefits of identifying the extent of CSOs for future charging arrangements is to enable them to be removed from the charging cost base. This would help to ensure that road users are not inappropriately charged for government funded road projects and reduces the distributional impacts of a move to direct charging.

123. How CSOs are taken into account in the calculation of a direct road user charge is likely to depend on the pricing policy and charge structure adopted. For example, the PC argues that, irrespective of the source of funding for roads (user revenue or government), users should pay at least the marginal cost of their use. A charging option may be to base charges on a direct estimate of the marginal cost of road use rather than to derive a cost base and allocate it to heavy vehicles. In this example, the need for estimating the level of CSO expenditure may be significantly reduced.

124. **It is recommended that the development of options to take account of CSO expenditure within the heavy vehicle charging framework be considered concurrently with the development of future heavy vehicle charging options** (ie as part of the assessment of charging options). At this time, the appropriateness of any further work in this area could be reviewed in the light of these options and other proposals that impact on funding decision processes.

5 Incremental Pricing Trials

COAG Request - Detailed review, including trials (building on the Intelligent Access Program) to assess the impact and feasibility of incremental pricing schemes for higher mass and other innovative vehicles which allow access to parts of the road network from which they are currently excluded.

Policy Context for this Request:

125. In its review in 2006, the Productivity Commission recommended that:

"Incremental pricing, building on the Intelligent Access Program, would provide a base for testing direct road user pricing and could deliver potentially large efficiency benefits in its own right. As provided for in Phase One of the Productivity Commissions' proposed reform agenda, COAG should sponsor further investigation of the feasibility of incremental pricing, focussing on:

- *how incremental charges would mesh with the PAYGO system;*
- *charging technologies; and*
- *a process for determining and applying incremental charges in a 'nationally consistent manner'.*[9]

126. The Council of Australian Governments (COAG) agreed with this recommendation and requested, as part of Phase I of the national road reform plan, that the feasibility of incremental pricing schemes be reviewed taking into account operational trials. Phase II of the Plan proposed an evaluation of incremental pricing schemes in 2009 and implementation of a scheme by December 2010, if benefits are expected to clearly outweigh costs.

127. The intention of an incremental pricing scheme is to establish a base mass limit, which reflects what operators currently pay for under the existing charging scheme. Operators would then be charged an additional amount based on the extra road wear caused by carrying mass above the base mass limit.

Research Undertaken:

128. NTC was asked by ATC to lead work on conducting the feasibility review of incremental pricing schemes, while a number of state governments (Queensland, New South Wales, Victoria and South Australia) volunteered to undertake trials. The approach that NTC has taken to prepare the feasibility report[10] has been to:

- develop guiding principles for an incremental pricing scheme; and
- outline possible options for each of the components involved in developing an incremental pricing scheme and potential feasibility issues with different options.

129. The components of a scheme have been defined as follows:

- safety assessment;
- infrastructure assessment and route definition;
- pricing and monitoring system;
- fee calculation and collection;
- funds distribution; and
- road spending.

130. The options for each of these components have been explored with reference to the progress of state governments in conducting trials. At this stage, none of the state governments has a trial which is operational, although WA has for some time had state

[9] Productivity Commission (2006) Productivity Commission Inquiry Report, Road and Rail Freight Infrastructure Pricing, recommendation 12.14.

10 Available at http://www.ntc.gov.au/DocView.aspx?DocumentId=1812

arrangements for selling permits for additional mass. Consequently, the report has been unable to include any post-trial assessment.

131. Nevertheless, a lot of preparatory work has been undertaken in moving towards an operational trial. This work has provided important information for scheme feasibility which has been taken into account in determining the key options and potential issues with their implementation.

132. In addition to the trials, NTC has investigated a similar international scheme and commissioned a broad survey to assess the level of interest in an incremental pricing scheme among businesses (both operators and non-operators) in the road freight industry. NTC has also undertaken targeted consultation with: infrastructure pricing and road engineering experts; transport industry representative bodies; and some private sector companies. This has enabled NTC to gain a broader perspective on the appropriate guiding principles and feasible options.

Research Findings:

133. The development of an incremental pricing scheme has the potential to provide productivity benefits for the road transport industry and the overall economy. Industry consultation, including a broad survey, has shown reasonably strong interest from transport operators in accessing additional mass. Indeed, 28% of survey respondents indicated that they were “very interested” in carrying mass above the current limits and more than 60% indicated at least some interest. There was broad interest across industry segments, vehicle types and geographical regions.

134. Many of the scheme components have options that are feasible to implement in the short term. In particular, options for developing the pricing and monitoring system, fee calculation and collection, funds distribution and road spending components of an incremental pricing scheme will all require some developmental work (for example, preparing a nationally consistent pricing methodology).

135. The short term feasible options tend to be more simplistic approaches to achieve the objectives of the scheme. For example, there are short term feasibility issues for one of the key scheme options, which relates to the measurement of mass via telematic on-board mass monitoring systems. The resolution of these issues requires further detailed research, some of which is already underway. However, other alternatives have been identified which can provide the basis for which mass can be monitored and/or reported for charging and compliance purposes. In addition, some of the more sophisticated pricing approaches, such as a large number of road classifications, may not be cost effective or achievable in the short term.

136. Of the other two scheme components (safety assessment and infrastructure assessment and route definition), a number of key feasibility issues have been identified that are likely to impact on the ability of incremental pricing to become an operational scheme or on the attractiveness of the scheme to road transport operators. Some of these issues can be resolved in the short term with policy development, whilst others can be resolved with further infrastructure investment and/or research.

- Issues in integrating the existing national safety assessment process[11] with an incremental pricing scheme need to be resolved for the safety assessment process to be timely and cost effective.
- There is limited existing information on the impact of higher mass loads on road pavement wear. In addition, not enough information is known about the capabilities of bridges for different vehicle types at high mass levels in order to make a reasonably quick and low-cost assessment of their capacity for extra mass. However, there is potential to allow incremental mass limits of around 10% above current mass limits

[11] This national process refers to Performance Based Standards (PBS).

based on road pavement capabilities. Further research in the short to medium term could potentially provide for access to higher mass increments than is available based on our current understanding of the capabilities of the road infrastructure.

- Poor quality bridge infrastructure may be a constraining factor on some key routes. However, some bridges could be upgraded (and the upgrade cost could potentially form part of the incremental price) to remove bottlenecks and create incremental pricing routes that provide strong productivity gains for industry.

137. Therefore, these issues do not represent an insurmountable constraint to the further development of a scheme. However, research on better understanding the capabilities of road infrastructure and improving the capability of some bridges would take time and require some initial investment.

138. Finally, the incremental pricing scheme should be able to "mesh" or align effectively with the current PAYGO charging system. This can be achieved through adjustments to the incremental pricing formula and the road use data that is used to allocate costs to develop current registration and fuel charges. In addition, to ensure that the incremental charge is not recovered twice from transport operators, any revenue received under an incremental pricing scheme would need to be taken into account in the setting of the PAYGO cost base.

Options for Further Consideration:

Incremental pricing trials

139. The States that agreed to undertake incremental pricing trials remain committed to the trials and are continuing to consult with potential trial participants and develop their schemes which will assess different aspects of incremental charging. Common outstanding issues include development of detailed fee structures, route assessments and consultation with other infrastructure managers (for example, local governments and toll operators where trials span road managers).

140. Trials are still considered relevant to provide a proving ground (of concepts, law, market acceptance and technology) for any future move to more direct user charging (for example, MDL charging). They may also generate access to the network for higher productivity vehicles earlier than they might otherwise, so are likely to produce some productivity benefits in their own right. They would also directly expose the industry to the concept of paying for additional access and may contribute to final industry acceptance of incremental charging, either in an incremental or mass distance location format.

141. Queensland Transport is assisting four freight companies to develop proposals for the trials. Due to the potentially small number of participants in the trial, it is envisaged that the trial will mainly be used to assess the willingness of road agencies (including local government) to 'open-up' some routes in return for certainty in funding the road infrastructure being used in the trials. The first proposal submitted for assessment was rejected in October 2008 due to the mass being too high and several vulnerable bridges being involved. Similarly the second proposal was rejected because the pavement of the proposed route was too thin to support the additional mass.

142. The New South Wales trial will be limited (as far as possible) to operations on state-owned roads and test the feasibility of implementing a direct road user charge to recover the cost of additional road wear associated with heavy vehicles operating at axle weights that exceed current statutory load limits.

143. The objective of the Victorian trial is to determine the feasibility and effectiveness of direct user charging for mass above the general mass or higher mass limits and test the administrative systems that are involved in implementing incremental pricing. In addition, the trial is also aimed at evaluating the commercial viability of the scheme from an industry perspective, taking into account the willingness of the road transport industry to pay for additional mass. VicRoads has received formal submissions from three operators to

participate in a trial in Victoria. The submission from one operator was rejected because of infrastructure issues, another is currently being assessed and the third operator has been assessed as suitable and an indicative price and contract has been provided to the operator to obtain formal agreement to participate in the trial. VicRoads is currently awaiting advice from the operator as to its willingness to proceed.

144. The South Australian trial will be focussed on providing additional mass for tri-axle B-doubles on pre-assessed routes that form a subset of the Higher Mass Limits network. This approach is being taken to minimise administrative costs and maximises synergies between the Higher Mass Limits scheme and incremental pricing (for example, in the areas of infrastructure and safety assessments). This trial may, subject to costs, utilise global positioning system satellite tracking for distance/location monitoring and on-board mass measurement technologies in parallel with self-reporting. Considerable work has been undertaken by DTEI in developing the legal and policy framework for a South Australian trial. Legislative amendments to the Road Traffic Act to enable fees to be charged for road use are anticipated in late 2009 with South Australia being in a position to implement a trial in early 2010.

145. Resourcing further development of incremental pricing trials is a matter for jurisdictions and will not impact on the NTC's development of a national scheme. In addition, given the resources potential participants have put into preparing for trials, it may be unreasonable to halt those trials. As such, **it is recommended that jurisdictions support the continuing development of incremental pricing trials.**

National incremental pricing scheme

146. Phase I of the Road Reform Plan has assessed the broad feasibility of incremental charges and concluded that the issues seem resolvable. The Road Reform Plan proposes that, where the benefits are clearly expected to outweigh the costs, the results of the Phase I and II work programs should be implemented by December 2010.

147. While there is reasonably strong initial interest in an incremental pricing scheme from the road transport industry, it has become increasingly apparent that incremental pricing has considerable complexity and technical detail. Further, many of these complexities are shared with a broader MDL pricing scheme.

148. Therefore, to ensure that an incremental pricing scheme is developed in a consistent manner with a possible mass distance location pricing scheme, **it is recommended that the work program for incremental pricing is merged with that of MDL pricing, while allowing for early implementation of incremental pricing if appropriate (subject to a supportive RIS and COAG agreement), noting that it is not possible to currently identify specific timing for such an outcome.**

6 International Experience in Road User and Heavy Vehicle Charging

149. A wide range of charging arrangements apply to heavy and light vehicles internationally. Like Australia, fixed road (registration type) charges have been a long-term feature in most countries. Differentiation has been on the basis of vehicle type, weight, engine size, environmental emissions and purpose (commercial/non-commercial). Extensive use is also made of fuel tax/excise as well as sales and stamp duties paid at the time of purchase and transfer of vehicles. Charging vehicles tolls to pay for road construction and upkeep is also an increasingly important infrastructure financing tool in some countries.

150. However, it is being increasingly recognised that the capacity to use these traditional measures to charge for roads in a way that reflects vehicle activity, or to pursue specific transport policy objectives, is limited. As a result, there is wide and growing international interest in reforming the structure of charges to better pursue priority objectives.

Rationale for Charging/Policy Objectives

151. The objectives and priorities of different governments in relation to heavy vehicles vary significantly. Common policy objectives include infrastructure funding (for network upgrading, capacity expansion and/or maintenance/rehabilitation), congestion control/reduction, other externality control, ensuring that foreign vehicles make a fair contribution towards the costs of the road network and to influence modal choice. The priorities accorded to such objectives vary significantly with local circumstances.

152. Examples of the different priorities and what different countries are trying to achieve follow.

- In the US, congestion pressure on infrastructure and historic budget arrangements for funding some road infrastructure provide a strong incentive to generate new revenue from road users and develop mechanisms to manage congestion. There is a widespread view that the current system cannot deliver future policy needs.
- In Europe, a key objective is to recover network costs from foreign trucks transiting the country. Vehicles equipped with long-range fuel tanks can fill with fuel in low excise countries and transit higher excise countries without contributing to their road budgets (in the absence of any tolling systems). Higher charges are also justified on externality grounds, such as congestion and explicit objectives of shifting freight from road to rail. In a number of Eastern European countries, revenue for network upgrades is also a key policy objective.
- Switzerland has the added objective of rationing access to the capacity of the Alps tunnels and to generate revenue to expand that capacity.
- New Zealand's policy objective is closest to Australian long-term objectives, with all commercial vehicles paying their share of the costs that they impose on the road network.

153. In contrast to the multiple policy objectives overseas, Australian heavy vehicle charging policy seeks simply to fully recover road infrastructure costs from industry. Any higher charges, without clear justification, would impose efficiency costs on the road transport industry, raising transport prices and damaging international competitiveness.

Emerging New Road Charging Arrangements

154. There are a range of new charge arrangements being developed and some examples are already in place.

- Germany has introduced distance based tolling of heavy vehicles over 12 tonnes on 12,000 km of major highways and arterials utilising satellite tracking. Charges depend on the route, the emission class of the vehicle, maximum gross vehicle mass, and the number of axles.
- Some European cities (for example, London and Stockholm) have introduced local congestion charges that apply to all vehicles (heavy and light).

155. Only Switzerland currently has a network-wide heavy vehicle distance charging scheme. The Swiss system applies to vehicles over 3.5 tonnes and similarly bases charges on maximum gross vehicle mass (so is not directly related to actual road wear), emission class and distance driven, calculated through use of an on-board unit or periodic declarations.

- The New Zealand national distance charging regime for freight vehicles utilises a hubdometer[12]. It features pre-purchases of licenses based on the expected distance to be travelled with licence costs based on gross vehicle mass (assuming an average loading) and the number of axles.
- Other system-wide charging proposals are still in development. The Dutch Government had, until recently, been proposing a scheme to cover all transport vehicles and the entire national network, commencing with heavy vehicles in 2011. The charges were intended to replace some existing vehicle-related charges/taxes (in particular, the 40 per cent sales tax on new vehicles), but not fuel excise. In early April, the Government announced that these proposals will need to be delayed, but has not yet indicated any alternate timing. Sweden is also investigating how to introduce a distance and location based network wide heavy vehicle charge, to operate on top of the current charges approach.

Observations From Overseas Developments

156. Network-wide mass distance time place charging for road infrastructure does not yet exist, although a few nations are examining these types of systems.

- Currently however, no other country is considering a variable mass charge based on actual vehicle loading (at most others use the maximum gross mass of the vehicle, or assume an average loading figure). Yet in Australia, higher mass limits and thinner pavements make this a potentially important charging parameter.
- No country has attempted direct charging based on a long or short run marginal cost.
- A common overseas experience has been that the complex nature of distance time place approaches, the need for stakeholder acceptance, and the advanced technology employed, has led to significant slippage in assessment and implementation timelines.

157. Many analysts suggest a key element of successful progress towards a usage based scheme is to define and specify the policy objectives prior to considering a collection system. Identifying technology first and then attempting to build a scheme around it has proved problematic.

158. Most schemes involving automated electronic monitoring involve roadside infrastructure which is suitable for charging on limited networks but would be prohibitively expensive if applied to extensive and remote networks (for example Australia). Collection costs can be significant (40% of revenue in the London cordon congestion scheme) but may decrease over time. The Dutch target is limiting costs to within five per cent of revenue, although many commentators consider this unlikely to be achieved.

[12] A hubdometer is a tamper-proof distance recording instrument mounted on a vehicle's or trailer's axle.

159. Highly varied international policy objectives and road conditions suggest that it is unlikely that Australia will be able to simply adopt an already developed scheme from overseas that will meet our objectives. To target Australian pricing priorities, internal development of elements of the scheme, such as pricing and monitoring, appear unavoidable. However, international experience and technological improvements are likely to provide ongoing lessons for Australia and may provide scheme components.

7 Other Issues for Consideration in later Phases of the COAG Road Reform Plan

160. The Phase I research program is an essential input to the subsequent phases of the COAG Road Reform Plan. While the pricing research components of Phase I were reasonably well defined, the identification of work necessary to assess the feasibility of MDL charging beyond Phase I is undeveloped. Phase II and III do not currently identify the additional work needed. Phase II currently comprises the following elements.

- An evaluation study of incremental pricing schemes.
- Each jurisdiction to consider examining alternative institutional arrangements to better link road freight revenues to investment and enhance decision-making.
- Reviews of road freight infrastructure regulation under general annual best practice regulation review cycles[13].
- Subject to subsequent COAG consideration, implementation of the results of Phase I and Phase II work programs where the benefits are clearly expected to outweigh the costs.

161. The work on Phase I has highlighted that the future work (including agreed milestones) requires fleshing out to provide information to enable a feasibility study on MDL charging to be completed by December 2011. The following components will be common to all future reform options:

- Charging – comprising pricing policy, the charging structure and the systems for monitoring the charging variables;
- Fee collection – comprising technical aspects of fee calculation and collection, governance and enforcement arrangements; and
- Revenue distribution and road spending – comprising the policy, institutional and governance arrangements for funds distribution and determining how revenues link to road spending.

162. Each of these components represents an important stream of future work that needs to be articulated and built into the COAG Road Reform Plan. The discussion below outlines work that is being pursued in these areas and our current assessment of the scope of these work-streams and the implications for Phase II priorities.

Charging

Research Context

163. Phase III of the COAG Road Reform Plan comprises a feasibility study of MDL charging. Establishing a charging policy and possible pricing structures is a necessary building block for a feasibility study of MDL charging.

164. Efficient charging requires that heavy vehicles should pay sufficient to at least pay the costs attributable to their use of the network, for example for the costs of providing deeper pavements and extra road wear necessitating more maintenance. They should also make a contribution towards the common costs of road provision.

165. The current charging system is a two-part tariff of a fixed registration charge (according to vehicle configuration) and variable (consumption-based) fuel excise road user charge. It is anticipated that MDL charging could lead to the replacement (in part or whole) of this pricing mechanism. As activity varies between vehicles, this implies that charges may also need to

[13] This element refers to the broader ATC road freight regulatory arrangements being progressed, ie it is broader than pricing research. Those broader elements are developed and reported through ongoing ATC reporting. The pricing research discussion of this report picks up only the road freight infrastructure regulations issue directly relevant to pricing.

vary to reflect different activity-related cost drivers, including vehicle mass, distance, location and road type.

166. The Road Use and Cost work suggested that a complete disaggregation, creating variable prices according to road type and condition is unlikely to be cost effective. However, it suggested that Phase II consider charging and road classifications options for charging purposes.

167. A key issue with location-based charging will be ascertaining the degree of disaggregation by location that is most practical and cost-effective, and determining appropriate pricing structures based on these options. For example, there are a number of possible ways of interpreting the "L" in location. It could apply to individual roads or routes, a subset of roads, by geographical area (for example, urban versus rural), by a national road classification system, or some combination of these.

168. The CSO work to date does not provide confidence that valuing CSOs would provide a sound basis for pricing local roads in a way that allows implementation of MDL charging with acceptable distributional impacts for people relying on these roads. On local government roads, land holder access will be a primary function, which may be appropriately funded from rates. Similarly, CSOs are the responsibilities of government and funding should be sourced from general government revenues. Irrespective of the source of funds for these roads, the PC contends[14] that vehicles using those roads should be charged for at least the avoidable costs associated with that use.

169. One prerequisite for a robust MDL charging regime is the ability to be able to determine mass. Basing charges on vehicle tare capacity is not ideal because it does not recognise that loading differences have a significant impact on road wear. Such systems could range from the provision of a basic self declaration of mass facility, through to regulated dynamic measurement of mass using sophisticated electronic on-board mass monitoring (OBM) systems to allow calculation of a charge (such as mass and distance by road classification).

170. A self declaration system would have significant administrative implications for vehicle operators and significant enforcement issues, particularly in remote areas where weighbridges may not be readily available. A regulated electronic system, on the other hand, may have significant cost and privacy/industry acceptance issues and would require detailed policy specification of the system.

171. Transport Certification Australia (TCA) is completing an assessment of the accuracy and robustness of existing OBM systems in Australia. Preliminary results have revealed that the systems are accurate to within +/-2.5% per axle group compared to a weighbridge. TCA has indicated that there is great potential for using this dynamic data in an evidentiary system. In conjunction with this project, the NTC is developing the policy to enable a technical specification to be developed for on board mass monitoring for pricing and compliance purposes.

172. The Intelligent Access Program (IAP) already makes use of the other technological components necessary for MDL, that is, the ability to measure time, distance and location to an evidentiary standard. Similar systems are also widely used across Europe. It would therefore be reasonable to assume that, from a practical point of view, the major barrier to implementing a regulated dynamic electronic MDL regime is not the state of currently available technology but rather one of cost. A further issue is the significant 'cultural' shift of using on board technology based systems for regulatory/pricing purposes. Some elements of the heavy vehicle industry are strongly opposed to this.

173. Since the IAP only currently tracks vehicle combinations for route compliance, vehicle operators only face the cost of an on-board unit (OBU) for the prime mover (which industry argues is not cost effective). The inclusion of OBM will require additional OBUs on each trailer, increasing unit costs for vehicle combinations.

[14] Ibid pg102

174. As an indication of cost, GPS-based OBUs (needed for accurate tracking, but without OBM facilities) used in Europe for charging heavy goods vehicles cost approximately $800. In comparison, OBUs used in IAP applications start from around $1,500, depending on the conditions of individual contracts. OBM units would add significantly to this. For air pressure transducer type OBMs, used in more modern vehicles with road friendly air suspension systems, approximate costs for semi trailers and B-doubles are $3,000 and $4,000 respectively. This escalates to around $10,000 and $15,000 respectively for load cell type OBMs to suit older vehicles utilising more traditional spring-based suspension systems. Future scale efficiencies may moderate these costs.

Implications for Future Research

175. A conclusion of the research work undertaken to date is that many of these issues need to be considered in the context of heavy vehicle charging options. The road classification system for charging purposes, the mechanism for ensuring that the interests of rural, regional and remote Australians are taken into account, and the allocation mechanism adopted to set a price, all have the potential to vary with the charging structure.

176. Investigating location-based charging options is an important area of future research and will not be a trivial exercise. The level of aggregation and classification types will need to provide an appropriate balance between simplicity and cost precision. Progressive implementation may be required to facilitate adjustment and understanding within the industry.

177. Research commenced in Phase I to identify the marginal costs of different types of heavy vehicles (by mass) using different types of road. This research, which will continue into Phase II, will inform analysis of appropriate road classifications and charging structures for charging purposes. There will invariably need to be additional research work undertaken progressively through the different Phases to inform a feasibility study to assess the relative costs and benefits of different direct charging models.

178. The Introduction to this report listed some assumptions on the outcomes that changes to the charging system should pursue. Different charging models will pursue those outcomes to different extents and so **it is recommended that work to develop charging models be accompanied by work to refine and prioritise those assumptions.**

179. Accordingly, **it is recommended that work occur in Phase II on settling charging models to be assessed in any Phase III MDL feasibility study.** This will enable later work on cost allocation and pricing structures, as well as any further research on cost or use data disaggregation, to be targeted to an evaluation of these charging options. The incremental pricing scheme feasibility report[15] explores these issues for incremental charging (refer section 6.1.1 of the report) and comparable issues will need to be addressed for a new MDL scheme.

Fee Collection

Research Context

180. The PC found that MDL charges have the potential to bring substantial efficiency benefits. However, they could also entail substantial costs and they pose some formidable implementation challenges. If the two-part tariff system of charges becomes no longer viable under MDL charging, it will be necessary to design a new system of fee collection and revenue distribution as a replacement, or as a supplement.

181. A fee collection system for most direct pricing options is likely to involve collection of usage/vehicle activity data, calculation of a charge, billing, collection, enforcement and distribution of funds collected. The more charging variables to be monitored and processed,

[15] Available at http://www.ntc.gov.au/DocView.aspx?DocumentId=1812

the more complex the fee collection task is likely to be. There are a number of options for dealing with these issues from central collection and redistribution of funds to incorporation into current heavy vehicle registration collection systems, or utilising other existing charging structures.

Implications for Future Research

182. This research on fee calculation and collection is a significant work stream not detailed by the COAG Road Reform Plan in its current form. The fee collection research can be separated into two components - the front end component to allow the calculation of the charge (identifying charging parameters for MDL charging) and the back office administrative process for billing the charge and collection of revenues. The incremental pricing scheme feasibility report explores these issues for incremental charging (refer section 6.1.2 of the report) and comparable issues will need to be addressed for a new direct charging scheme.

183. International experience suggests that the emphasis should be on establishing the policy parameters and requirements of the system. Preliminary options, incorporating indicative costing, will need to be investigated in later Phases for COAG to inform option development and cost benefit analysis of options. An Austroads project concentrating on parallel consideration of back office system options with consideration of incremental and MDL charging options is planned to commence in Phase II (should COAG agree to proceed). However, development of the systems to deliver those requirements can occur after an in principle decision to proceed. The investigation of options will need to take into account development cost, technical capability, level of risk, cost to operators and privacy issues.

Revenue Distribution and Road Spending

Research Context

184. The PC considered that the main efficiency benefits of MDL charging would come from improved signals to road users on the incremental costs their road use imposes and to road providers about the demand for road capacity and quality, potentially leading to more efficient road provision[16]. It stated that by linking revenues to road owners, location-based charging also would promote funding certainty and open up the prospect of commercially-oriented provision of roads.

185. The PC analysis implies that the price signal should play a linking role. The PC recommended establishment of road funds predicated on forward-looking charges, as a way of improving pricing signals (that is linking revenue to future investment) and funding certainty. While COAG did not support this specific recommendation, the Road Reform Plan identifies that each jurisdiction should consider alternative institutional arrangements to better link road freight revenues to investment.

186. The current system is one based on cost recovery of past expenditure. However, revenue is not universally distributed to road managers, nor distributed in proportion to their road expenditures attributable to heavy vehicle activity. From a policy perspective, this method of revenue distribution would appear to provide challenges for jurisdictions to meet their obligations under the Road Reform Plan. It does not provide an adequate pricing signal or promote funding certainty as there is no direct link between the road provider and the user.

- The Commonwealth receives around two-thirds of heavy vehicle revenue which is paid to general revenue. Budget funding for the AusLink network, which is the most densely trafficked freight route outside of urban areas, currently exceeds the heavy vehicle revenues. However, restrictions apply to how road agencies apply these funds with the proportion devoted to maintenance limited and the balance for network upgrading determined on the basis of societal cost benefit which may not reflect benefits to heavy

[16] Ibid pp 241

vehicle users. It also provides funds to local government for local roads to be used according to local priorities.

- A number of States hypothecate their registration revenues to road authorities. However there is a disconnect between, for example, access decisions impacting on costs and flow through impacts on revenue. A decision by a State road agency to open a new route to higher productivity vehicles is likely to expose that route to additional road wear costs. The revenue impacts will depend on the individual case (it may reduce or increase revenue) and the impact is diluted because revenue distribution is not based on location of vehicle use.

Implications for Future Research

187. Location-based charging, without providing an appropriate revenue stream to road owners, is likely to be sub-optimal as it would not enable market based demand signals to drive, or at least inform, investment, nor would it ensure that road agencies are compensated for decisions they make to improve heavy vehicle access.

188. The current COAG commitment in Phase II is that each jurisdiction considers examining alternative institutional arrangements to better link road freight revenues to investment and enhance decision-making. This could be accompanied by an assessment of governments' preparedness to commit in principle to changing the basis for revenue distribution and spending to enable revenue to return more directly to road owners to cover the cost of heavy vehicle road use.

189. It is clear from this discussion that there is likely to be flow on consequences for institutional structures from different charging structures. In addition, since the COAG Road Reform Plan was settled, jurisdictions have agreed to consider a national registration/regulation body for heavy vehicles. It is recommended that consideration of institutional structures occur in conjunction with consideration of national bodies and charging options. While decisions on institutional arrangements are ones for individual jurisdictions, a common set of objectives to be achieved to maximise the benefits of charging reform may assist jurisdictions in their analysis.

190. The nature of road spending is also an important consideration. The PC queried whether it would be worthwhile targeting the pricing system and revenue at freight favouring initiatives or recognised freight corridors. Policy options for revenue investment, including what might be an appropriate balance between freight favouring and general investments, could also be considered. **It is recommended that work in Phase II to develop charging options also consider possible institutional arrangements and mechanisms required to better link revenue and investment and maximise the benefits of each option.**

8 Conclusions

191. The existing charging system is poor at identifying particular vehicles that, through the nature of their activity, impose the greatest cost on the road system. Phase I of the Road Reform Plan has identified a number of refinements that could be made to the existing charges system to address some of its disadvantages. These are evolutionary rather than revolutionary and could be considered in more detail should a further Determination be required using the existing system.

192. A more direct charging system where the price is more reflective of the activity of the vehicle and its interaction with the infrastructure is needed to address the fundamental shortcomings with the existing system.

193. The development of an incremental pricing scheme has the potential to address some of the deficiencies in the existing system and provide productivity benefits for the road transport industry and the overall economy. However, it has become increasingly apparent that much of the work required for incremental pricing also needs to be undertaken for MDL pricing. Further, it is also clear that there is considerable technical detail to be worked through before an incremental pricing scheme could be broadly implemented. As a result, it is considered more appropriate and efficient to develop incremental pricing as part of the MDL pricing framework.

194. The complete, or even partial, replacement of the existing charging system with a MDL charging system will be challenging and international experience in attempting to develop what are, in effect, simpler systems (than the Australian objectives), have almost universally either not yet proceeded or have been delayed. Nevertheless, Australian policy objectives and road conditions are sufficiently different to mean that internal development of key elements of the scheme, such as pricing and monitoring, will be necessary. International experience and technological improvements are likely to provide ongoing lessons and scheme components for Australia.

195. Work done in Phase I suggests that the challenge will be to:

- satisfy government and industry that the costs of road use are sufficiently known to allow pricing and other components of the scheme to be developed;
- deal with any distributional impacts of changes to pricing structures; and
- to constrain monitoring costs to industry and collection costs to government to levels that are acceptable.

196. The Road Reform Plan currently does not identify any specific measures in Phase II to progress an evaluation of MDL charging. Additional work will be required so this can be delivered. Similarly, the need to ensure improved links between charge revenues and investment suggests that some additional work ahead of reviews of institutional arrangements would be beneficial.

197. ATC supports proceeding to Phase II of the COAG Road Reform Plan and notes that this report makes an initial identification of the further research elements needed to meet COAG's requirement of a feasibility study of MDL based charges by December 2011. ATC considers that the critical next step is preparation of a detailed work plan. **It is, therefore, recommended that a detailed work plan be developed based on this report's recommendations, and drawing on Appendix A and B. It is further recommended that COAG agree to proceed to Phase II of the Road Reform Plan, noting that ATC will present its detailed work plan to COAG by December 2009 for its consideration.**

9 Selected Bibliography

Australian Transport Council: National Guidelines for Transport System Management in Australia; 2004a

Austroads Report: ARRB: Cost Implications of Incremental Loads on Road Pavements, Austroads Project No. AT1394, (Draft) January 2009

Bureau of Infrastructure, Transport and Regional Economics (BITRE): Moving urban Australia: can congestion charging unclog our roads; Working paper 74, October 2008

COAG (Council of Australian Governments): Communiqué, Canberra; 13 April 2007

COAG Reform Council (CRC): CRC Report to COAG; March 2008

Maunsells: Report for the NTC; Review of policy relevant heavy vehicle externalities; Final Report; 22 July 2008

Meyrick and Associates; Alternative Approaches to Estimating the Road Cost Base; Final Report for the COAG Road Reform Taskforce; May 2008

National Transport Commission (NTC): Third Heavy Vehicle Road Pricing Determination: Draft Regulatory Impact Statement, Melbourne; October 2005

NTC: Incremental Pricing Scheme Feasibility; December 2008

NERA Economic Consulting; Defining and quantifying road-related community service obligations; A report to the COAG Road Reform Taskforce; 28 July 2008

Productivity Commission Inquiry Report: Road & Rail Freight Infrastructure Pricing; No. 41; 22 December 2006

Appendix A

Preliminary Phase II Heavy Vehicle Charging work program and milestones (pending development of detailed work program)

Action	**Possible Date for completion (subject to detailed work plan)**
Incremental Pricing	
Evaluation study of incremental pricing schemes.	Incorporated into feasibility study of MDL
Incremental pricing options and the potential implementation of an agreed scheme to be considered in the context of overall pricing work under the Road Reform Plan.	Ongoing
Direct Charging System	
Further refine pricing policy objectives and charging structure options (including specification of a road classification system for pricing purposes) to support the achievement of those options.	July 2010
Extend marginal cost analysis of incremental increases in mass by axle and road type to further build the capability of the model to allow for long-run marginal costs, modelling lower masses to complete the cost curves and undertake sensitivity analysis.	July 2010
Investigation of options to reduce the extent to which bridges are an impediment to progress in improving access to the network for higher productivity vehicles and to assess options for charging arrangements to take account of bridge wear.	December 2010
Institutional arrangements	
Consider common objectives from institutional reform and institutional arrangements which would support particular charging options (including options for funds distribution and determining how revenues link to road spending).	December 2010
Each jurisdiction will consider examining alternative institutional arrangements to better link road freight revenues to investment and enhance decision-making	Jurisdictions to consider these alternatives as part of the development of MDL
Regulation[17]	
Reviews of regulation related to heavy vehicle pricing	Ongoing
Implementation	
Subject to subsequent COAG consideration, implementation of the results of Phase II work program where the benefits are clearly expected to outweigh the costs.	Dec 2010

[17] The COAG Phase II work program also includes an item on reviews of road freight infrastructure regulation under general annual best practice review cycles that is not specifically related to the pricing research. That work is being progressed and reported separately by ATC. Any regulation issues directly related to heavy vehicle pricing that require consideration will be addressed in the action items included here.

Appendix B

Areas of work to develop, evaluate and implement direct charging

	Pricing Policy	**Fee collection**	**Institutional Arrangements**	**Technology**	**Supporting research**
Description	Clear definition of objectives to be achieved from pricing and priorities to guide development of charging options.	Specification and development of data requirements and Systems to enable calculation, payment and collection of the charge.	Specification of how revenues are distributed and the jurisdictional arrangements to improve the link between revenue and investment to maximise the efficiency benefits of a new charge system	Specification of minimum system outputs and development of those systems to meet fee collection requirements to avoid manual systems	Work to meet road use and cost data needs and technical work to improve knowledge of the use/cost relationship to allow calculation of charges.
Work underway or completed	• Current pricing principles (existing) • NTC Incremental charging paper (Phase I)	• Austroads feasibility and cost of business systems to manage the move to direct charging project (Phases II & III)		• IAP type Telematics applications (existing) • Assessment of dynamic mass monitoring (Phase I) • Assessment of speed and fatigue applications (partial link Phases I & II)	• Cost base, CSO and Externalities analysis (Phase I) • Road classification options (Phases I & II) • Marginal cost of road use by mass, road type and axle configuration (Phases I, II & III)
Other work required	• Development of pricing policy and charging options (Phase II) • Assessment of options (Phase III) • Statement of new pricing principles (Phase III)	• Specification of charging system data requirement and standards (Phase III & implementation period) • Assessment of revenue distribution options (Phase II) • Development of Audit/compliance arrangements (Phase III & implementation period)	• Assess arrangements to support a better link revenue to investment decisions (Phase II) • Jurisdictional assessment of their institutional arrangements (Phase III)	• Time for private sector to develop applications which will meet specifications for operators wanting electronic solutions (implementation period)	• Cost base refinement (PAYGO from Phase II, new charging system Phase III) • Bridge Assessment (Phases II & III) • Selected data collection as required (Phases II & III) • Allocation of costs to heavy vehicles

Appendix C

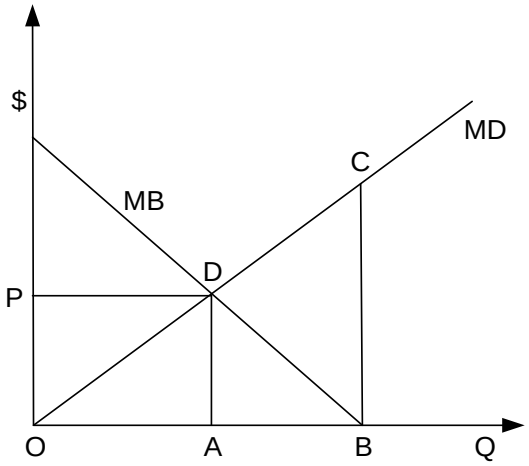
The economics of externalities

(from Productivity Commission, Inquiry Report, Road and Freight Infrastructure Pricing)

The 'optimal' level of an externality is unlikely to be zero, because the production generating the externality creates benefits (to the producer of the externality) at the same time as imposing costs on others.

Figure 3.1 is a stylised representation of the marginal road wear (MD) and (net) private marginal benefits (MB) flowing from generation of an externality, such as air pollution. Without intervention, the 'producer' of the externality produces to the point where the net MB to them of the activity is zero, that is, at output level B. At this point, MD exceeds MB (by BC) and the externality is said to be 'policy-relevant'. The optimal level of the activity (and externality) is at A, where MB and MD balance. Any further reduction in the activity (to a level less than A) would result in net social losses, because the loss of benefits (from otherwise undertaking the activity) would exceed the additional benefit from further reductions in road wear. At A, external road wear continues to exist, but is 'internalised' and is no longer 'policy-relevant'.

Figure 3.1 The optimal level of an externality (point D) is not zero



Efficiency requires measures that deliver the optimum externality level at least cost, such as a unit tax on the externality, equal to AD.

(Efficient pricing of land freight infrastructure, p.63)