Securing Victoria's Future Prosperity: A Reform Agenda

More productive space and time

Prepared by AECOM for the
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Executive Summary

Productivity: the challenges for Melbourne and Victoria

Cities are engines of growth and innovation, so enabling them to function better is a key driver of productivity growth. Urban and CBD space are so important to the whole economy that productivity of urban land and transport should be considered jointly.	1	Productivity growth provides the basis to improve living standards, invest in health and education, care for an ageing population, increase the variety and quality of employment opportunities and achieve long term sustainability. In Australia, productivity growth has been declining. In economies such as Victoria's, innovation is the key to developing new products and devising more efficient processes and practices to sustain productivity growth. Cities are engines of growth and innovation and enabling them to function better is an essential component of productivity growth.
	2	Our economy is increasingly dominated by knowledge-based service sectors in which peoples' skills and talents are the most important resource. Most growth in high-value employment in the services sectors has been in and around city centres, as evidenced by increasing employment density through the development of high rise office and residential buildings. Despite high rental costs, firms locate headquarters or regional offices in Central Business Districts (CBDs) in large cities, where access to customers, collaborating firms, suppliers and ideas is greatest. Moreover, city centres maximise access to labour thanks to the convergence of arterial road and rail infrastructure. Collectively these are known as agglomeration economies, and the benefits that flow from these are critical to growth.
	3	As in most countries, knowledge-sector activity is concentrated in a small number of large cities in Australia. The importance of urban and CBD space to the whole economy is such that there is a case to make spatial policy more central to governance and to appraisal and decision making. This paper argues that transport and the use of space are inseparable[1] and that productivity of urban land and transport should be considered jointly.

[1] The inter-relationship has been recognised since at least 1826 in Von Thunen's classic paper on location choice. A more recent analysis can be found in Vickerman R.W. (1980) *Spatial Economic Behaviour* Macmillan, London.

Transport and productivity

Access to the most productive jobs and movement of goods facilitates business in city centres.	4	Transport for people is a key enabler of productivity growth and labour force participation in the knowledge economy. Cities have grown around transport hubs which enable large numbers of workers to access the locations with the most productive jobs, most of which are in the CBD. Victoria also requires good freight access to facilitate the movement of inputs and final products, including movement through the port. International business and tourism requires easy airport access and movement within the CBD.

Growing productivity – the long run challenge

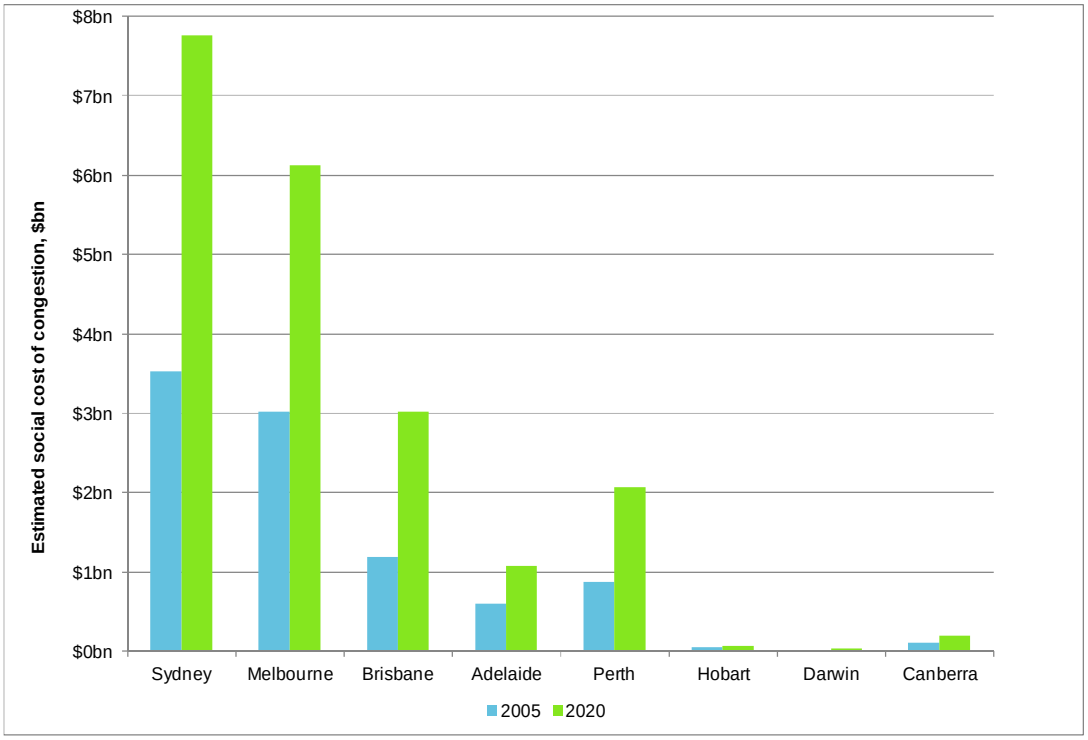
A challenge for Melbourne is to provide the transport capacity to support further growth. This will involve expanding transport's ability to move people efficiently between residential locations and economic centres, especially in peak times.	5	Melbourne is well placed to grow its economic base. As well as being one of the world's most liveable cities, Melbourne's city centre has space for new commercial and residential property developments, including the docklands areas, and has an excellent, well laid out, spacious and pleasant to use city centre with good access to sporting and cultural activities. This makes Melbourne distinctive, as many cities have very limited space for CBD expansion and even more limited scope to expand people movements. Good internal movement is enabled through car, bus, taxi, walking, cycling, train and the tram system. Melbourne's port has space to grow and the airport has 24 hour access.
	6	Melbourne's transport challenge is to enable an estimated 120,000 additional people movements per day to employment locations in the CBD in 2026.[2] One option could be to use planning controls to bring about development of one or more additional office locations away from the CBD; this carries the risk of losing the agglomeration benefits of a dense urban core, while also potentially generating more movements by car. The option favoured in this paper is to grow the existing CBD to secure the potentially significant agglomeration benefits arising from further densification of the CBD.
	7	The challenge for the future is to provide the transport capacity that will be required to make this scale of expansion feasible and economically sustainable. It will involve expanding transport's ability to move people between residential locations and economic centres, especially during peak times. It might also require future developments to be shaped by transport corridors.

[2] Department of Transport (2010) 'Small area land use projections'

Significant employment growth in the centre will require expansion in the people and freight moving productivity of transport corridors.	8	Forecast population and employment growth highlight the need to increase the people and freight-moving productivity of transport corridors, especially those connecting to the CBD and other areas of concentrated economic activity. If future land uses are planned around road use, peak time congestion on routes close to the city centre will increase in the absence of measures to balance demand and supply, which will impact negatively on productivity growth. Rail, tram and bus rapid transit systems offer the capability to move much higher volumes of people than car and conventional bus. Therefore the joint planning of residential development and new mass transit capacity could contribute to lower growth in car use, while enabling the levels of people movement needed to achieve higher levels of productivity growth through expansion and agglomeration in the CBD.
Mass transit is a more productive use of urban land than roads – on average, passenger rail moves about 3.7 times as many passenger kilometres per unit area in its land footprint than the road network - even including on-road public transport.	9	Mass transit development is expensive, however, and government could aim to maximise the leverage of private sector resources for its development. On average, passenger rail moves about 3.7 times as many passenger kilometres per unit area in its land footprint than the road network - even including on-road public transport. A statutory spatial plan – discussed below – could be part of a consistent long-term framework that might help to increase confidence among private sector investors in undertaking new developments and investing in transport infrastructure, including transit infrastructure that complements and enables developments.

Figure 1 shows the expected increase in costs from congestion over time. While it is anticipated that each Australian city will experience greater congestion costs in 2020 when compared to 2005, Melbourne is expected to have some of the greater increases in congestion burdens in the future. The Bureau of Infrastructure, Transport and Regional Economics (BITRE) estimates that the avoidable cost of congestion in Melbourne will increase from $3.0 billion in 2005 to more than $6.0 billion by 2020.

Figure 1 Projected avoidable costs of congestion by city



Source: BTRE, 2007.

Transport now

Melbourne's key transport problems are peak hour congestion and bottlenecks on the road system combined with overcrowding on its mass transit system.	10	Melbourne's problems are peak-hour congestion and bottlenecks on the road system, combined with overcrowding on its mass transit system. Additionally, Victoria's freight task is expected to roughly double over the next 20 years.[3] A key challenge will be determining how access to the road and rail networks is best managed. There are either limited or unpopular short-term opportunities to address either issue. Geographical barriers between the western growth areas and the CBD, together with the central location of the port, create additional challenges.
	11	Some locations in the road network in and around Melbourne are subject to peak period stress, and data show that the peaks have been lengthening as people avoid the extreme peak and change their time of travel. Recent research indicates that total car use in Melbourne (and other Australian cities) peaked in 2004 – 2005 and that

[3] Department of Transport and Department of Planning and Community Development (2011) Submission to VCEC Inquiry: State-Based Reform Agenda

		public transport use has increased markedly since that peak, accompanied by a slight increase in city population density[4] . This may be a short term respite in growth in car use, arising as a result of fuel price increases, an ageing population and the global financial crisis. However, the growth in public transport use has caused problems of overcrowding especially on the rail system. Looking ahead, congestion will almost certainly increase, and potentially by a significant degree, due to the effects of population growth, income growth through better productivity performance and any prolonged constraints on public transport capability. Added congestion will have a negative impact on productivity, but cannot be treated through road building alone. As the cost of owning electric and other low carbon vehicles falls, their low running costs could contribute to resurgence in car use and add to congestion. New car-based residential developments will also tend to exacerbate future congestion problems. The scale of the potential increase in travel demand is too great for a purely roads based solution, not least because roads make less productive use of the land needed for people movement and transit systems.
It is important to deal with causes not symptoms	12	The above symptoms have the following causes: - Inadequate price and other signals to road users - Lack of integration between transport and land-use planning - Too much focus on supply side measures, especially short-term and mode-specific - Limitations within appraisal and related practices

Roadmap for reform

In the medium to long term, greater use of market mechanisms could better balance demand with supply, to address the deadweight costs of congestion on the economy. These mechanisms already work well in other network industries.	13	Victorian governments have a strong record in fostering productivity gains through implementing market-based measures in the water and energy sectors (Victorian Government, 2004). Market mechanisms can also be used to achieve higher productivity from resources used to deliver transport infrastructure and services. Victorian governments have made substantial progress in involving the private sector to design, finance, build, and operate a range of infrastructure and services, including franchising of public transport operations and innovative use of private finance.

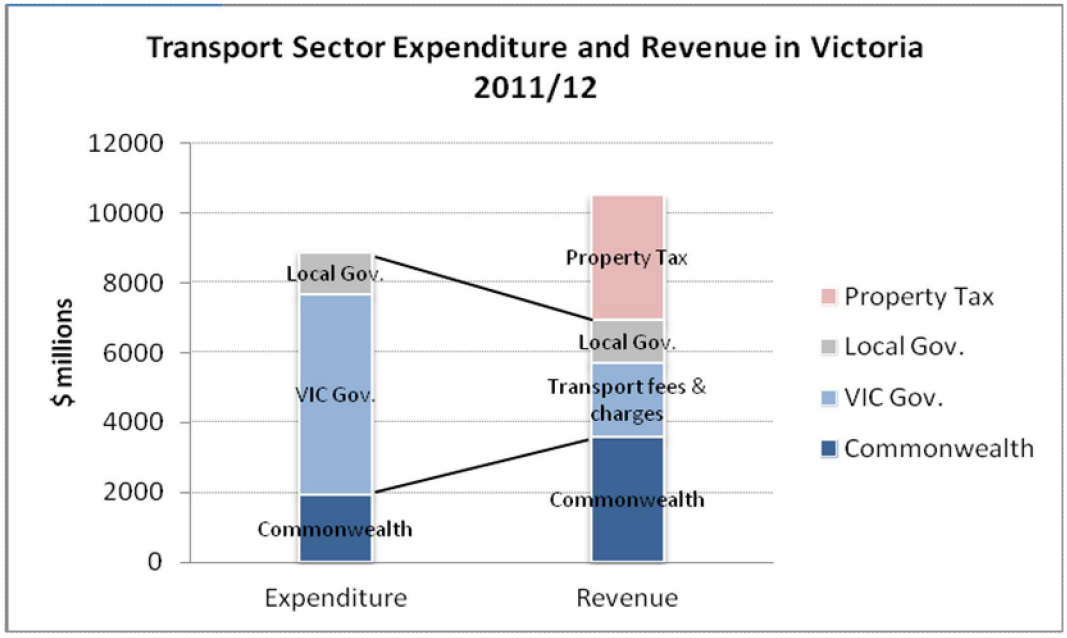
[4] Newman, P & Kenworthy, J (2011) 'Peak Car Use' World Transport Policy and Practice 17.2 p.31-42

Increased use of market mechanisms

Greater use of market mechanisms (as applied in the energy sector) to balance demand to achieve optimal levels of congestion offers a solution to the related problems of excessive congestion, lack of resources for investment in road and public transport infrastructure and overcrowding on public transport.	14	In the medium to long term, greater use of market mechanisms (as implemented in the energy sector) to balance demand to achieve optimal levels of congestion offers a solution to the related problems of excessive congestion, lack of resources for investment in road and public transport infrastructure and overcrowding on public transport, while providing the information that will enable better and more integrated land use and transport planning. With community acceptance a key issue, viable alternatives to peak car use could be a pre-requisite to greater use of market mechanisms. A market-based approach will also achieve a better spatial allocation of activity than one based on planning restrictions. Business activities that gain least benefit from agglomeration economies will tend to relocate to out-of-centre locations and free up space in the centre for the most productive activities.
The elements of pricing are already in place. However pricing is not well linked with benefits or costs and is highly inflexible, so does not send useful signals. *Better market mechanisms are needed for transport usage (mobility) as well as location (accessibility).*	15	The elements of pricing are already in place. - Users pay fuel excise, which is a reasonable proxy for pricing distance and environmental externalities. However fuel excise is a poor way of pricing congestion. - The value of location is already priced in the land market, along with amenity. Land-related taxes, such as stamp duty, capture some of this value as a contribution to funding improvements in transport. Better market-based arrangements could involve more dynamic pricing, relating prices for transport usage (mobility) to travel conditions. These vary by time of day and location, and charges could link to conditions as well as to distance. Dynamic pricing for accessibility (location) already exists in the land market.

Figure 2 shows the sources of revenue and expenditure for the road and public transport sector in Victoria in 2011-12. It shows clearly that revenue from transport based instruments is insufficient to account for all the expenditure on transport, requiring top-up from other sources of revenue. Although there is no explicit hypothecation at the state level, we have shown the top-up as coming from property based instruments, consistent with previous discussion that transport and land use are different sides of the same coin.

Figure 2 Transport sector revenue and expenditure in Victoria



Source: AECOM analysis from various sources.

Evolution to better pricing

Experience from reforms in other industries shows that considerable time and effort will be needed to evolve from the current arrangements, in which government has a leading role, to more market-based arrangements.	16	Experience from reforms in other industries shows that considerable time and effort will be needed to evolve from the current arrangements, in which government has a leading role, to more market-based arrangements. The pace of reform will depend on stakeholders' appetite for change and degree of consensus. In the interests of promoting discussion, this paper outlines a ten-year program of evolution. In the next few years, it should be possible to make more productive use of existing assets and increase contestability. Within five years, productivity improvements could be achieved from investments in more productive infrastructure. There could also be some clear productivity benefits from better governance of integrated land use and transport. Within ten years, considerable progress could have been made towards pricing mobility (road usage) and rebalancing mobility and accessibility as a means of influencing urban form.

Agenda for reform

The themes for reform are listed in the reverse order of implementation, to keep the focus on the longer term objectives.	17	An agenda for reform comprises: - Increasing use of usage (mobility) pricing and viable alternatives to peak time car use - Improving frameworks for governance and decision making - Improving appraisal - Investing in productive infrastructure and in real options - Increasing contestability - Making more productive use of existing infrastructure.

Improving usage (mobility) pricing and viable alternatives to peak time car use

Improving usage pricing is a key market reform. It offers a solution to: • *Problems of excessive congestion* • *Lack of resources for investment in road and public transport infrastructure* • *Overcrowding on public transport.* *It also provides a wealth of information that will enable better and more integrated land use and transport planning.*	18	For the longer-term agenda, the key market reform is to improve usage (mobility) pricing for passenger vehicles. Progress is already being made to apply road usage charges to heavy vehicles from 2013. Providing viable alternatives to peak time car use, however is one option for addressing the key issue of community acceptance of broader implementation of pricing. A crude mechanism already exists, in that people take time delays into account. This is however an ineffective and unreliable measure as it does not account for the impact of driving on others. Transport demand is subject to pronounced and lengthening peaks, which give rise to congestion where demand exceeds capacity. Excessive congestion[5] is inefficient in transport terms and harms productivity by imposing costs on business and reducing the efficiency of the labour market. Conventional demand management measures can treat the symptoms and can extract more productivity from parts of the network, but do not treat the root cause, which is the lack of market arrangements to balance supply and demand so as to minimise the deadweight or avoidable costs of congestion[6]. When a road is congested, users impose external impacts on others as one more user slows down everyone else, adding to their travel time. However, the additional user

[5] In principle there is an optimum level of congestion where demand equals marginal social cost, beyond which there is a deadweight cost: for a general discussion see Button, K (1993) *Transport Economics* 2nd Ed. Edward Elgar Publishing.

[6] BTRE (2007) 'Estimating the urban traffic and congestion cost trends for Australian cities" WP.71

There is a case to be made for well-designed usage charging.	19	does not consider this in deciding whether to travel or when to travel[7]. This is a market failure[8] and the remedy is to use mechanisms that balance demand and supply so that an optimal amount of congestion exists on the network. Congestion itself manages demand through creating queues which deter some travel, but queues are wasteful: in principle, in congested conditions people could trade road space with each other depending on their value of time on a particular journey and overall they would be better off. No market mechanism exists to achieve this trading, but well-designed usage charging would have the same effect.
Market mechanisms have been accepted and shown to work in other sectors – energy is a prime example.	20	There is no need to reinvent congestion management in transport networks: however, user acceptance is a key issue. Congestion is an issue typical in all growing networks where peak use significantly exceeds average use. Electricity network businesses (privately owned in Victoria) have generally managed congestion by increasing network capacity, subject to independent economic regulatory scrutiny of demand forecasts. Energy networks can manage their use by charging customers: this generates revenue for investments and provides signals about the cost of using the network.
More dynamic usage pricing remains an unpopular measure with the public. *Melbourne has an opportunity to lead the way in transport reform Australia.*	21 22	However, more dynamic usage pricing for example, variable by travel conditions, remains an unpopular measure with the public, partly because of natural resistance to change and partly because mechanisms to use revenues generated from the market require considerable development[9]. Experience of popular voting on charging indicates the importance of offering the public a package of measures that are acceptable. This might involve some redistribution of revenues through lower taxes and investment in public transport. This is a complex area[10], and it may be that more cities will have to prove the benefits of this model before Melbourne adopts it, but at present there is an opportunity to be at the leading edge in this area of transport reform. Victoria has already implemented one pricing measure to

[7] Vickrey, W (1969) *Congestion Theory and Transport Investment.* American Economic Review also points to the fact that in urban areas roads use between 15 and 30% of urban land area, and questions whether long run welfare could be increased by reducing road space in favour of transport modes which make more productive use of land: our work supports this view especially in the context of future employment growth in the city centre. Button ibid also notes that the costs of private car use are misperceived by many users, which means consumption is higher than it would be if prices were accurately perceived: replacing overhead costs with higher operating costs would be a step towards addressing this issue.

[8] Market failure is the standard rationale for government intervention in the economy: see UK Treasury Green Book.

[9] See IMPRINT-NET: Implementing Pricing Reforms: Revenue Raising and Use 2008, also contains a discussion of expenditure issues in relation to securing public assent to a charging system.

[10] IMPRINT-NET ibid

		reduce traffic congestion in the CBD and inner Melbourne and encourage a greater use of public transport. The Victorian Government has imposed a city centre congestion levy[11], whereby a charge ($880 in 2011) has been applied to long stay, off street parking spaces in CBD (both privately owned and public car parks). However, a review[12] suggests that this cost is not passed onto car drivers: it is generally paid by the employer for private spaces, while for public car parks, massive discounting for commuters has limited the pass through of the levy. Public parking can be as low as $8 for all day parking, which is cheaper than a Zone 1+2 train ticket. Therefore there are presently limited price signals to drivers to encourage mode shift. However the levy has raised $40m per annum for City of Melbourne Council, which could be used for transport improvements.
The technology is now available to deliver charging related to levels of congestion in specific areas: at present the main barrier is public acceptability.	23	Currently there is only limited public acceptance of the case for charging road users for their use of the road network when congested. Even though the evidence on transport efficiency is positive[13] only a few jurisdictions have introduced market measures to address road congestion. London's congestion charge scheme is one; others include Stockholm, Singapore, Milan and some specific high occupancy / toll (HOT) lanes in the USA[14], some of which vary the price to guarantee minimum speed.
	24	There has been some progress in Australia towards price-based incentives to change time, and perhaps other attributes, of travel. For example, in January 2009 the NSW Government varied tolls on the Sydney Harbour Bridge by peak, shoulder and off-peak times, which has reduced peak traffic[15].
	25	One challenge in pricing usage has been metering road use by time of day and location, as well as distance. Usage of toll roads is currently metered at tolling points, using transponders or number plate recognition – there are only two cash toll roads left in Australia[16]. Interestingly, the market has delivered interchangeability of transponders – one transponder can be used on all toll roads in Australia

[11] http://www.sro.vic.gov.au/sro/SROnav.nsf/childdocs/-3A87315B22BC23FFCA2575A100441F59-EFC160ABBE873990CA2575B70020FC3B?open , accessed 7 Oct 11

[12] By Hamer Currie & Young: see http://www.transport.vic.gov.au/__data/assets/pdf_file/0003/33897/Exploring-travel-and-parking-impacts-of-the-Melbourne-CBD-parking-levy.pdf

[13] Morisugi (2005)

[14] See, for example, http://www.metro.net/projects/expresslanes/expresslanes_us/

[15] http://www.rta.nsw.gov.au/usingroads/motorwaysandtolling/tod_tolling/index.html

[16] http://www.its-australia.com.au/Main/LinkClick.aspx?fileticket=l4tJGPmsPqs=&tabid=36&language=en-AU

		and billed through the provider.
	26	The COAG Road Reform Plan[17] is considering a range of alternative charging models for heavy vehicles, aimed at better aligning road prices charged with the actual costs imposed by a vehicle on the roads (based on the mass carried, distance travelled and types of roads used). Government support of a charging regime for heavy vehicles could lead to more productive use of vehicles and provide incentives for changing access times to the port. There is also a clear precedent from energy sector reform of retail contestability.
	27	Where there is scope for more flexibility in pricing, oversight of pricing might need to pass from the Government to an independent economic regulator.

Improving frameworks for governance and decision making

Governance changes are ongoing.	28	Governance refers to the objectives, roles and responsibilities of institutions such as government agencies and regulators, and to decision makers. Governance therefore involves setting frameworks and making decisions, including decisions based on technical appraisal[18]. The Victorian Government is currently reforming governance arrangements: these changes are ongoing, so the paper identifies desired outcomes rather than how to achieve these. The principal desired outcomes are: - A long-term spatial plan - Planning for productivity outcomes - Mode neutrality - Re-balance of revenue and incentives between usage (mobility) and from location choices (accessibility) - Informed markets.
A long-term spatial plan		
The Metropolitan Planning Strategy could provide a consistent long-term planning	29	Submissions and stakeholder consultations, and in particular that of DOT/DPCD, make the case that land use and transport planning should be integrated. This is also a requirement of the Victorian Transport Integration Act

[17] http://www.ntc.gov.au/ViewPage.aspx?DocumentId=02114

[18] We make the distinction between appraisal as a process of analysis that provides information for decision making, and the actual making of decisions which, as part of the democratic process, may not be based solely on appraisal information.

framework.		2010. The Victorian Government is currently developing a Metropolitan Planning Strategy to guide the future spatial development of Melbourne: Transport Solutions and Moving Freight on Rail are the supporting transport strategies. The content of the Metropolitan Planning Strategy is not yet known, but it might provide the consistent long-term spatial and transport planning framework to guide new residential and commercial developments and investment in new transport corridors. Melbourne's growth and development over the next 30-40 years will be enhanced by having a consistent framework shaped by the market. One immediate rationale for changes in governance is to give some teeth to the Transport Integration Act, to enable a long term perspective to be taken and sustained, and to bring greater accountability to decision making, which itself needs to be based on better appraisal information. A statutory spatial plan could be an important part of a consistent long-term framework that might increase confidence among private sector investors. To provide the resources for growth, investment by the private sector will play a key role both in new residential and commercial developments and in transport infrastructure. This investment could include transit infrastructure that would complement and enable new property developments.
Creating confidence for private sector investment in infrastructure.	30	A statutory spatial plan could be an important part of a consistent long-term framework that might help to increase confidence among private sector investors. Investment will be needed by the private sector both in new residential and commercial developments and in transport infrastructure, including transit infrastructure that complements and enables property developments. As predictability helps investor confidence, it will be important that future spatial and transport plans are not subject to significant short term modifications or to poor integration of planning and delivery of land use and transport interventions[19]. Development of the integrated plan will benefit by working with the property sector, given the role of the market in identifying locations for new development. Subject to environmental considerations, planning could favour areas which will be attractive for development activity, and could take due account of where transport infrastructure

[19] Dodson, J. (2009) 'The Infrastructure Turn in Australian Metropolitan Spatial Planning', International Planning Studies, 14(2), pp. 109-123) was highly critical of swings between land use and transport driven approaches to planning.

		exists and where new infrastructure, and especially mass transit infrastructure, can be developed in the future.
Plans for productivity outcomes		
There is a need for clear objectives, which could include productivity outcomes.	31	Currently many transport agencies set objectives for transport outputs, such as passengers by mode. This approach is useful for setting performance indicators for monitoring, but not for appraisal, as it pre-determines solutions and fails to assess the costs and benefits involved. The use of outcome-based objectives[20] would be more consistent with transport's role as an enabler of economic activity and growth of productivity. A mode-based, target-driven approach is likely to lead to less attractive outcomes, because scarce resources such as land may be used for one mode when another mode may be more productive. There is merit in requiring proposals for transport interventions to recognise their productivity outcomes, and for productivity outcomes to be a criterion in appraisal. There may also be merit in setting outcomes that are independent of mode and facilitating trade-offs between modes. The implementation of Transport for NSW aims to take the strategic role in co-ordination, funding allocation, policy and planning of transport services and transport infrastructure.
Mode neutrality		
An objective based approach should encourage broader thinking about options rather than solutions	32	An objective based approach to planning ensures mode neutrality by requiring planners to consider options, including different modes, when addressing transport problems. This may require a fundamental change in approach, so that both planning and appraisal start by setting desired outcomes that are independent of mode and do not pre-determine solutions. For example, establishment of Transport for NSW aims to improve strategic co-ordination, funding allocation, policy and planning of transport services and transport infrastructure. The DTF management process through the '16 questions' should encourage an objective-based approach which facilitates thinking about outcomes and alternative ways to achieve them, rather than the solutions.

[20] An interesting approach to objectives is used in Scottish Government appraisal: the proposer of an intervention has to define specific objectives usually at a local level and has to show that the proposal best achieves these objectives. However, the appraiser tests against a consistent set of government objectives to ensure the proposal is a good use of government resources. See Transport Scotland (2008) 'Scottish Transport Appraisal Guidance (STAG)'

Re-balance of revenue and incentives between location (accessibility) and travel (mobility)		
The funding mix for transport *There is a case for concentrating sectors that interact to generate agglomeration effects in a single large centre, provided transport can deliver the required people movements.*	33	Figure 2 shows government expenditure on transport is partly funded by mobility charges (fuel excise and fares) and partly by accessibility (property taxes). An important task to improve integration between transport and land use will be to analyse the impact of changing these proportions. A paper by Ahlfeldt [21]shows that urban form is sensitive to the relative costs of mobility and accessibility, so changing the balance could become an important tool for urban planning. The location and nature of future land uses will have significant long-term effects on travel patterns and mode share, as well as on productivity. A fundamental issue that will affect productivity, transport and land use planning is whether the Greater Melbourne area might be planned around a single large CBD (mono-centric model) or a polycentric one with one or more additional major office locations. Provided there is enough capacity to enable people movements, development with a single large and dense CBD is likely to be best for productivity because of agglomeration and job-matching benefits. It will also make best use of existing and future transport infrastructure, especially mass transit public transport services along key arterial routes. A more dispersed model for knowledge industry employment locations is likely to sacrifice agglomeration and labour market benefits, while also requiring a higher proportion of commuting movements by car[22]. A model which facilitates relocations of activities that do not benefit from agglomeration economies out of the existing centre could enable further CBD expansion, but could also reduce travel demand to the centre[23].
A good range of residential and other development locations are needed to attract new people and	34	Any approach to spatial planning must recognise that cities must offer a choice of residential locations to attract new people and that some people enjoy the amenity and space afforded by living in more remote, less dense locations. A plan that restricts choice could have a negative impact on

[21] Ahlfeldt (2008) 'if Alonso was Right: Residual Land Price, Accessibility and urban Attraction' Munich personal RePEc Archive, Paper No. 11707

[22] See for example Bertaud (2004), Clark and Kuijpers-Linde (1994), Cervero and Wu (1998), Schwanen et al. (2004), Meijers, E and M. Burger (2009). A similar point was made by an academic reviewer of this paper.

[23] For example, relocation of some types of businesses from the centre could have minimal or no impact on aggregate productivity: if the vacated space is used as open space, travel demand would be reduced, which would enhance transport efficiency; alternatively the space might be used for service activity that generates and benefits from agglomeration economies. This use would increase aggregate productivity.

industries.		the city's ability to attract people and skills. However, public transport networks in remote, less dense areas are 'thin', and consequently provide an ineffective substitute for car travel, including travel to work. More remote residential areas therefore tend to be strongly car-based unless developments have good access to rail networks: bus travel times are not competitive with car in areas that are more remote from the centre. Building new developments around existing and new transit systems could ameliorate growth in car commuting, while building new road infrastructure to serve new developments will tend to induce further car travel, including car travel by existing public transport users[24].
Informed markets		
Information is critical to planning and appraisal but comes at a cost at present.	35	Planning for transport is currently government-led and most of the information is held by governments. However, over time, direct inputs of resources from government could reduce, with increasing use made of market mechanisms to shape plans, manage resources and generate revenue streams for new infrastructure and services. A key point is that market mechanisms generate information and that government planning for transport has limited information, for example from occasional surveys, traffic counts and ticket information. Both government and the private sector could beneficially share the information generated by market mechanisms, especially road metering, enabling fuller participation of the latter in shaping future planning.
Improving appraisal		
Over time, government's role in transport provision could diminish, with greater private sector involvement. Market mechanisms could generate the information needed for planning and appraisal, while greater predictability might enable a more sustainable business model that attracts	36	Even with greater use of market mechanisms, there will remain a need for spatial and strategic transport plans to be developed and appraised. With better and more widely available information, planning and appraisal could benefit from greater private sector participation, especially in shaping (integrated) strategic land use and transport plans. Opening up planning to greater external scrutiny and debate might contribute towards a more stable framework for planning. To do so, models and data need to be available on the DOT website to interested parties to enable external scrutiny of plans in general and of decisions based on project appraisals[25]. The future framework for governance could be planned to

[24] SACTRA ibid: it has not been possible to undertake independent modelling tests as part of this work: however, the VAGO 2011 report also pointed to the issue of induced traffic growth.

greater private sector investment.		migrate towards a more market-based model; creating a stable framework for planning is an early reform that could enable greater private sector participation in the provision of transport infrastructure.
While markets are developing, implementation of better planning and appraisal processes could ensure transport projects have a clear rationale for intervention. *Key areas for reform include:* • *A market-based framework to assess the appropriate role of government* • *Inclusion of the impact on productivity of time and land use as well as wider environmental and social impacts* • *Better information on travel demand and use of infrastructure and services* • *Better collection and use of evidence on the impact of projects.*	37	The paper identifies options to enhance technical areas of appraisal. Some of these are already foreshadowed in a new management model which the Department of Treasury and Finance (DTF) is implementing across public spending management and planning. This uses a '16-questions' pre-funding assessment model. At present this aims to ensure proposals address problems, that options have been looked at and that proposals can be delivered. In time it is expected to develop as a planning[26] and appraisal framework. Implementation of better planning and appraisal processes could ensure that transport projects have a clear rationale for intervention, are developed through an objective-led approach and are the outcome of consideration of genuine options, including alternative forms of public transport and demand management options. A market failure-based framework is needed when considering the provision of infrastructure and in managing the delivery of facilities and services. This is similar to practices in Europe, such as the UK Treasury *Green Book*[27]. A critical element in these appraisal systems is the need to provide a rationale for government action before committing resources to developing proposals for expenditure. As well as requiring a clear rationale for intervention, development of the DTF '16 questions' process could address the problem of planning being subject to short term pressures such as windows of funding availability. The Victorian Auditor General's Office report (VAGO, 2011) on major road projects, for example, highlights the dangers inherent in a "funding driven" approach to planning and implementing major road schemes, where the response to a funding window led to a focus on single solutions and inadequate appraisal in order to secure funds. A further step could require clear evidence that the benefits of an intervention are greater than the costs.
	38	The paper suggests that all appraisals could include impacts

[26] Planning in the sense the action taken by a sponsor in choosing to develop a specific proposal from a range of viable alternatives to address an identified problem: this can be thought of as the element immediately prior to appraisal.

[27] An excellent summary of European practice can be found in the HEATCO report: Developing Harmonised European Approaches for Transport Costing and Project Assessment: HEATCO 2006

		upon productivity, including the productivity of land use as well as time, plus wider environmental and social impacts. Comprehensive appraisals will require the development and use of leading edge modelling tools, which need to be addressed in the wider context of improving appraisal. Appraisal will also benefit from better information on travel demand and use of infrastructure and services, which can most efficiently be generated by using market mechanisms. A 'Productivity Impact Report' could provide decision makers access to information on predicted impacts of alternative proposals on the productivity of labour, capital and land. Including additional information on impacts such as Gross State Product would provide decision makers with a different 'lens' through which to assess outcomes.[28] To support improvement in the quality of appraisal, more use could be made of ex-post evaluation evidence: some expenditure could be allocated to gathering more ex-post evidence on local projects and to doing so as a matter of routine rather than by exception.
Appraisal of both travel volume (mobility) and land use (accessibility) outcomes could better capture the impacts of major transport projects.	39	Transport investment appraisal could evaluate both travel volume (mobility) and land-use (accessibility) outcomes. As large transport investments are expensive, land use appraisal could also consider mechanisms for value capture, as the benefits of greater accessibility are manifest in the land market (see below). Sound theoretical reasoning points to the insufficiency of analysing only travel (mobility) benefits for projects that change the equilibrium in the land market[29]: large transport projects do change that equilibrium and so require more comprehensive analysis[30].
Enhanced technical areas of appraisals include use of leading-edge modelling and forecasting tools; e.g. introduction of land use-transport interaction (LUTI) modelling in Australia.	40	Both transport and land-use planning could benefit from improved modelling and forecasting, including the introduction of new tools. A specific enhancement involves introducing the use of land use – transport interaction (LUTI) modelling into Australia. If this were adopted as an approach, the first step could be the assessment of alternative interaction models. Following the assessment, a suitable model could be used for both strategic spatial and transport planning and in the appraisal of any large infrastructure project[31].

[28] Note, however, welfare and wider economic benefits are usually not added together. An additive approach could potentially be developed, as cost benefit analysis can in principle comprehend changes in productive potential as an impact.

[29] Mohring, H. (1961). Land Values and the Measurement of Highway Benefits. Journal of Political Economy , 69, No. 3, 236-249

[30] Martinez, F., & Araya, C. (2000). Transport and Land Use Benefits under Location Externalities. Submitted to Environment and Planning , 32

[31] Some models attempt to incorporate productivity and GDP outcomes as well as land use. A comprehensive review of available models is suggested.

Making transport models and data sets more widely available for use, and to publish the technical results of appraisals, could enable wider and more fully informed analysis, discussion and scrutiny.	41	A further useful reform could be to make transport models and data sets more widely available for use, and to publish the technical results of appraisals, to enable wider and more fully informed analysis, discussion and scrutiny. The VAGO performs an extremely valuable role in auditing after the event, but a similar, forward looking process might be useful for assessing appraisals prior to the commitment of resources[32].

Investing in productive infrastructure and real options

High-level analysis indicates mass transit is a more productive use of land.	42	A broad analysis indicates that mass transit makes more productive use of limited space for transport corridors. Greater reliance on mass transit alongside appropriate market mechanisms should enable significant city centre employment growth without excessive congestion.
Some infrastructure investment will be needed to meet the future transport needs of Victoria.	43	Effective action to accommodate future growth will almost certainly require the generation of additional funding streams to meet future infrastructure requirements. Charging for usage (mobility) is a potential source of a revenue stream that could be allocated for transport and other investment. The most effective outcomes for government and the best prospects for securing private sector participation in transport investment are likely to be achieved where there is a consistent long-term plan with clear objectives. As outlined above, an integrated spatial and transport plan could potentially provide the required framework for investment. Such mechanisms could also generate revenue streams for transport and other investment, which could increase the private sector's appetite for participation in transport investment. As the city grows, new transport infrastructure will be needed. The balance of investment between road, rail and other transit systems is a matter for detailed modelling, but the evidence on resource productivity and the scale of potential future travel demand points strongly to an emphasis on public transport and especially mass transit systems. In developing the integrated plan, it will be important to recognise the existence of financial constraints on government, physical constraints on construction, the

[32] DOT own and maintain VITM (Victoria Integrated Transport Model). At present permission is required to use the model and its use is limited to work for government, and not for the private sector. This limits transparency and the scope for scrutiny by interested parties, which could include members of the public or the media.

		longer term impacts of allocating additional space to car use [33] and the problem of induced travel growth, especially by private car. In the short term, investment can enhance public transport's service capability to meet future demands.
Building roads will be necessary, but allocating too much space to roads could reduce productivity and represent a poor use of valuable land.	44	Some road infrastructure will be required, but meeting all future demand by enabling greater levels of car use is a poor use of productive land. It will therefore be increasingly necessary to manage growth in car use to make better use of both existing and new road space at peak times. A challenge is to devise and implement mechanisms and infrastructure that enhance transport efficiency, support productivity growth and address deadweight congestion costs[34] while being acceptable to the public. Some systems of demand management have marginal efficiency effects and some can have negative effects, which underlines the challenge in the context of expansion of the business and population base. Examples include bans on traffic in city centres and badly designed road space re-allocation schemes, traffic calming and other measures which simply aim to make car use less attractive. A well planned and managed transport system will therefore be needed to contribute to the growth of productivity. This is now well documented in the transport research and appraisal literature, which links marginal improvements in transport to productivity growth in developed economies[35].
More consideration could be given to the optimal timing of interventions and use of real options.	45	Pressures on the government's budget can in part be addressed by optimising the timing of major investments: a one-year delay in building a metro tunnel, for example, can have save hundreds of millions in net present value terms. More sophisticated tools are available, such as real options. Real options, or adaptive planning, incorporates into planning and procurement processes: - risk and the probabilities of different scenarios (such as mode share and economic growth)

[33] Vickrey, W (1969) *Congestion Theory and Transport Investment.* American Economic Review.

[34] There is an optimal level of congestion, beyond which there are deadweight costs: it is not efficient to eliminate all congestion, as there would be excessive spare capacity outside of peak periods. For a discussion of this see Button K (1993) *Transport Economics* 2nd Ed. Edward Elgar Publishing.

[35] See for example the UK transport appraisal guidance at: http://www.dft.gov.uk/webtag/documents/expert/unit3.5.14c.php

		- the value to consumers and suppliers of flexibly managing the timing and selection of supply and investments from a portfolio, as transport growth scenarios are revealed over time. The portfolio of options include: • supply augmentation • demand-side management[36].

Increasing contestability

There are opportunities to achieve more operational efficiency and lower costs of delivery through reforms of bus contracting.	46	There are opportunities to increase contestability in the delivery of some existing transport services. Train and tram operations already have contestable franchises, and consultation has suggested that more operational efficiency and lower costs of delivery might be achieved through reforms of bus contracting. Opportunities exist to broaden the scope of competitive tendering for Victoria's bus services further. Many bus contracts were renewed in 2007 and the Victorian Auditor General's Office reported in the contract renewal process noting that the Department of Transport "viewed the absence of competitive tendering as the main weakness of the previous contracts" and "made significant but partial gains" in addressing these in the contract renegotiation process".[37]
There are also opportunities to broaden contestability in maintenance and management of existing road transport infrastructure, perhaps through performance-based contracting.	47	Another step is to consider broadening contestability in maintenance and management of existing road transport infrastructure. In the 2010-2011 financial year, VicRoads spent $409 million on maintaining Victoria's road network[38]. The Victorian Auditor-General's Office (VAGO) report in 2006 reported that of the three VicRoads regions analysed in this audit, 56% of maintenance/repair work was contracted out to private operators, with 35% undertaken by in-house teams [39]. Given the level of private sector involvement in both project procurement and maintenance, there appears to be sufficient market interest to further engage the private sector in the operation and maintenance of roads, perhaps through performance-based contracting. A logical extension of the concept of private sector-led consortia providing road maintenance and construction

[36] Based on definition of real options in Productivity Commission, (2011) Australia's Urban Water Sector, pxxvi
[37] Victorian Auditor General's Office, (2009) Melbourne's New Bus Contracts. PP No 215, Session 2006–09

[38] VicRoads (2011) VicRoads Annual Report 2010-2011
[39] http://download.audit.vic.gov.au/files/Roads_maintenance.pdf

		projects under a performance based contract is to include aspects of the road network management functions that are the responsibility of VicRoads.

Making more productive use of existing infrastructure

Opportunities exist to make better use of existing transport assets through conventional demand management measures.	48	Opportunities exist to make better use of existing transport assets through conventional demand management measures, including applications of Intelligent Transport Systems (ITS). Successful use of these measures could delay or even avoid the need to undertake major infrastructure projects in the short term. ITS measures often increase transport efficiency and enable more cars to use a given amount of space. Measures include driver information systems and managed motorways. Other information measures have the potential to influence mode choice and time of travel, and presumably their provision could be outsourced, especially with greater public availability of underlying information.
Measures such as intelligent transport systems (ITS) could influence mode choice and time of travel.	49	As an example, Victoria has attracted international attention with the M1 Freeway Management System (FMS) which includes freeway ramp metering and Lane Use Management System (involving overhead gantry mounted lane message signs and speed limits), mechanisms to encourage higher occupancy and real-time information to road users on which routes are congested or not. Early evidence suggests the M1 FMS has resulted in increases in capacity of in excess of 1,000 vehicles per hour (approximately 10%) in peaks, increases in travel speeds and consequent reductions in delays of up to 70% (DOT & DPCD, 2011).
	50	The Commonwealth and state transport ministers on the Australian Transport Council (ATC) have agreed to the development of a policy framework to build ITS interventions into its vision of safe, sustainable, efficient, reliable and integrated transport. The recent Austroads initiative to create a Cooperative ITS Stream means that Australia is now well placed to leverage off international experience and expertise in this area.
Better use of infrastructure could benefit freight productivity, both within the freight sector and by reducing the scale of freight movements involving empty trailers, which will benefit other road users.	51	Freight is an area in which better use of infrastructure within Melbourne and nationally could benefit productivity, both within the freight sector and by reducing the scale of freight movements involving empty trailers, which will benefit other road users. Measures are being designed to achieve this, including the Smart Port Information Communications Technology project aimed at more efficient movements of containerised freight through ports. This will streamline and improve the efficiency and security of movement of freight through the supply chain, improve

		utilisation of existing infrastructure and remove the bottlenecks and gaps in information. Lower freight costs benefit consumers, manufacturers and exporters.
The rail network is operating at close to maximum capacity so it is essential to consider measures which that will enhance the capability of the existing infrastructure.	52	Rail services in Victoria have the potential to make a significant contribution to improving transport's capability in Victoria and Melbourne in particular. Recent reorganisation of rail timetables has improved the short term capability of the network to deliver enhanced services with improved levels of reliability, and changes to the operating philosophy governing the day to day delivery of V/Line and Metro Trains Melbourne rail services along with purchases of additional trains have allowed the network to absorb a 70% increase in patronage since 2000. Improving system capacity through greater efficiency is beneficial to both existing users and to the funders of services. Measures designed to deliver higher productivity from existing infrastructure, drive down service delivery costs and ensure efficient system utilisation could be ongoing and be incorporated into standard governance policies.
	53	The rail network is operating at close to maximum capacity, which limits the scope for new services. Measures to enhance the overall capability of the rail system and accommodate anticipated growth in passenger and freight traffic are needed. Given the costs and complexity of new infrastructure, in the short run it is appropriate to consider other intervention measures which enhance the capability of the existing infrastructure.

Summing up

The reform agenda brings together the critical and linked issues affecting the growth of Victoria and Melbourne. The challenges are to enable population and employment growth while increasing productivity growth. Transport's most direct impact on productivity is in reducing business costs, principally through congestion reduction. Transport can also help enable an urban form that supports growth in knowledge industry activities within a large and dense urban core, which is the basis of agglomeration economies and greater labour market efficiency.

Employment growth of an additional 120,000 jobs by 2026 in the centre highlights the challenge of moving more people without allocating valuable land to roads and to city centre car parking. It is likely that city centre growth implies growth in the use of mass transit: the development of new mass transit corridors could form the basis for future residential locations as part of an integrated strategy to enable growth in employment and reduce congestion.

In the short term, enhanced governance, integrated planning and improved modelling and appraisal will support key decisions for the longer term, while selective (conventional) demand management and use of existing market mechanisms will help alleviate short-term transport problems. The productivity benefits of these measures

could be limited, and are therefore best seen as stepping stones towards a full reform of transport provision and intervention based around greater use of market mechanisms. *Attaining the goals associated with population, employment and productivity growth ultimately requires more than marginal changes around the current model, and stronger market mechanisms have much to commend them, not least the success of market reform in other industries such as energy, in which Victoria was a leader of reform. Markets are efficient in providing incentives to travel (or not), in shaping where to locate business activity and in providing the information needed to determine where and when to invest in transport infrastructure.*
Victoria has a unique opportunity to lead the way in Australia in transport reform by developing effective market mechanisms and viable alternatives to peak car use. The challenges largely relate to public acceptability, specifically how best to reallocate or reinvest revenues that could accrue from the usage (mobility) and location (access) market. Experience from popular voting on charging indicates the importance of offering the public an acceptable package of measures. This might involve some redistribution of revenue through lower taxes and investment in public transport.