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Urban Transport Systems

A Transport Australia Society Discussion Paper

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1. Introduction

1.1 Purpose

This discussion paper has been prepared by a working group of the Transport Australia Society (TAs). TAs is an Engineers Australia technical society and represents engineering and professionals working in transport infrastructure planning, design and operations in Australia. This discussion paper represents a consensus of the views of the working group and has been peer reviewed by a panel of national and international experts.

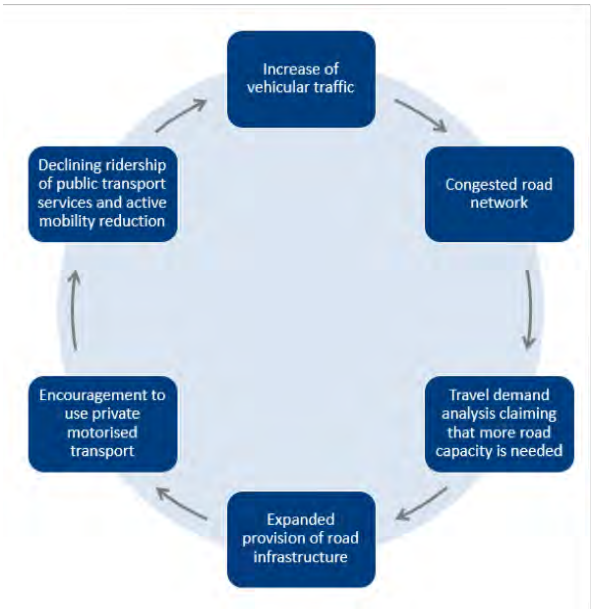
The discussion paper is intended to give guidance to policy makers and other stakeholders in planning and delivering Australia's Urban Transport Systems (UTS). The scope includes changes to the transport systems themselves and associated investment and decision-making processes. The recommended principles included are intended to inform discussion on how land use development can be better integrated with transport planning and infrastructure, to deliver sustainable outcomes for our communities. The paper does not represent a formal policy position of Engineers Australia.

The discussion paper will act as a catalyst for renewed dialogue with a wide range of stakeholders (planners, transport professionals, government departments, infrastructure advisors and providers, funders, community etc.), with a view of achieving consensus on our current status and consider policy reform towards better and more sustainable outcomes, for the long term.

2. The need for change

Over recent decades, the predominant urban transport policy in Australia has been to increase road capacity to accommodate growth. Despite, and in some part because of the high expenditure on road expansion, car ownership and congestion have continued to grow, greenhouse emissions from transport have increased, road safety targets have not been met and objectives to improve liveability have not been realised. In large part, these failures of policy are due to an increased dependence and use of cars for urban travel, and a funding bias in favour of road construction. The International Transport Forum (2021) has noted the "predict and provide" paradigm, that has existed since the 1950s, has had the effect of increasing capacity to keep up with demand growth and that this leads to higher levels of road traffic (see Figure 1).

Figure 1: "Predict and provide" cyclical process[1]



This paper argues that emphasis should be on reducing growth of traffic on the network, particularly where urban infill is planned, and increasing the capacity and level of service of other modes of transport such as public transport, cycling, micro mobility, and walking.

2.1 High cost with poor transport outcomes

Prior to the Covid-19 pandemic, the cost of importing crude and refined oil ($38 billion) and vehicles ($37 billion) were the second and third largest import costs in Australia's foreign accounts (ABS 2019). Transport infrastructure investment in Australia since the global financial crisis of 2008-09 has been high by OECD standards, averaging 1.2 per cent of GDP in 2017. Investment has been concentrated in cities, with most funding (76 per cent in 2017) spent on road projects rather than active or public transport projects (Elaurant, Currie and Wang, 2017). Despite this level of investment, the economic and transport outcomes have been poor as explored further in this discussion paper.

2.2 Questionable economic benefits

Most transport projects, particularly urban road upgrades, are typically justified on economic grounds. Project economic benefits are calculated based on assumptions that aggregated savings in travel time and vehicle operating costs create economic benefits to society. These are typically calculated over a 30-year period. This is despite research which shows that capacity increases are absorbed by additional induced demand within ten years or less.

[1] Source: International Transport Forum (2021)

There is little evidence to demonstrate increasing road capacity to reduce traffic congestion improves economic performance in cities (Sweet, 2011). A focus on changes in access times for catchments would be more reliable.

Over 80 per cent of Australia's GDP is produced in cities, while the total transport sector (all modes) represents 7 per cent of GDP (ABS 2018). In this context, the local economy in an urban area may be worth more than any travel time savings from road upgrading. The area of urban land occupied by roads is large and valuable. It should be optimised rather than maximised. Other jurisdictions have demolished urban freeway structures with high land value where transport network function could be delivered more efficiently or elsewhere. These projects have been shown to create economic regeneration without worsening road congestion (Cervero 2006).

At the aggregate level, growth in productivity in Australia peaked in 2005, and has declined since, despite the highest percentage infrastructure investment in the OECD (Martin 2021). While this outcome relates to many factors besides infrastructure policy, it challenges the belief that building urban roads propels the overall economy.

2.3 Congestion-continues to increase

Attempts to "bust congestion" with major road widening projects have generally been unsuccessful. Average travel time for commuter journeys has increased from 44 minutes to 54 minutes per weekday in the past two decades (HILDA surveys, 2002 and 2019). Average car travel speeds have declined in all cities measured. This suggests investment has been poorly targeted.

Increasing capacity for urban road networks induces demand and is a major reason for increased traffic on the network. Evidence of induced traffic demand has existed for more than 20 years. A useful summary of the impacts of induced demand is provided in "Induced Traffic in Urban Areas - Technical Report 397" (Department of Transport, Perth, 1999). Many researchers and practitioners have provided definitive proof that building urban roads to increase road capacity induces more traffic.[2]

Cairns, Atkins and Goodwin (2002), have shown traffic reduction occurs when road space has been reduced while shifting towards pedestrianisation, public transport priority or for place-related reasons. Improvements to public transport also induces additional levels of patronage (Richardson and Burgess, 2005). Richardson and Burgess have demonstrated that to sustain public transport patronage from induced demand, the public transport system must be improved continuously at a rate greater than the improvements for car traffic on the road system. Similarly, induced demand applies to cycling when the quality of cycling routes is improved and made safer. Regardless of the mode of travel, improvements to that mode relative to others, will increase usage by that mode and vice versa. This makes attempting to "bust traffic congestion" through road construction, self-defeating. In this context, Australia's past transport investment strategy may be seen as questionable.

The economic costs of urban transport have continued to increase, with congestion forecast to increase in cost to $19 billion in 2016 (BITRE, 2015).

Figure 2: Annual cost of traffic congestion in Australasian cities ($M/year), 2016[3]

Sydney	Melbourne	Brisbane	Perth	Adelaide	Hobart
$6,100M	$4,600M	$2,300M	$2,000M	$1,100M	$160M

2.4 High levels of transport emissions

Transport is the second largest cause of anthropogenic greenhouse gases (GHG) in 2020, causing 19% of national GHG emissions, excluding infrastructure construction. Urban car travel creates the bulk (>55%) of direct GHG emissions from transport.[4] The rate of increase of GHG emissions from transport in Australia (60% since 1990) does not meet Paris accord targets and is not in conformity with reductions in GHG emissions in other sectors (Engineers Australia, 2020). The Australian Government's target to reduce total GHG emissions by 28%, from 2005 levels by

[2] Refer, for example, to Sloman, Hopkinson and Taylor, 2017; Duranton and Turner, 2009; Noland and Lem, 2001; and SACTRA, 1994).
[3] BITRE, 2015
[4] ibid

2030, is too small to avoid significant, damaging effects from climate change. Achieving higher reductions in GHG emissions will only be possible if the current increase in transport emissions is reversed and strong targets are set for a reduction from that sector. While the transition from internal combustion engines (ICE) to electrical powered vehicles will be essential to meet net zero targets in the longer term, reduced reliance on and reduced use of cars in urban areas will be needed in the short to medium term.

More people die in Australia due to air pollution from motor vehicles, than from road crashes (Electric Vehicle Council and Asthma Australia, 2019). The 1,715 Australians who died because of air pollution from vehicle emissions, is 40% more than the 1,209 people who died from road crashes that year. In the absence of national data, NSW reported 21,000 serious health impacts in 2005, or 32 times the deaths from pollution that occurred that year. Vulnerable people in society, including unborn babies, children, the elderly, and people with pre-existing health conditions are disproportionally affected by air pollution. The cost to society in the Sydney-Newcastle-Wollongong region alone was estimated to be $3 billion in 2005, or over $7,000 per vehicle over a ten-year lifetime.[5] Measures that can be used to reduce GHG emissions such as the limiting use of cars and transition to electric vehicles are also applicable to decreasing other emissions. There is also scope to introduce stricter regulations on vehicle emission standards and on fuel quality. For example, the allowable sulphur content in Australian petrol is up to 15 times the sulphur content allowed in Europe, the USA or Japan (RAC, 2021).

The need for change is evidenced by the failure of past transport policies to address the challenge of climate change, deaths, and serious illness from vehicles emissions.

2.5 Road fatalities and serious injuries

The continued predominance of road transport in Australia has worsened road safety outcomes. While the introduction of safer vehicles and improved medical procedures should be reducing road fatalities and serious injuries, growing numbers of vehicles more than cancel out that benefits. Between 1970 and 1990 Australia was a world leader in reducing road crash casualties. However, Australia's road crash casualty rate has plateaued after falling for three decades and is now midfield among OECD nations. A focus on road capacity has distracted from improving road safety, even though the latter is a more serious problem, with crashes costing $31 billion in 2016.

Based on Austroads standards, design speeds in Australian road design practice are typically set at speeds 10 km/h higher than the posted speed limit. This differs from European countries that have changed urban road design practices to use a design speed that corresponds to the intended (lower) speed limit of the road. New road design manuals were introduced in many European countries more than a decade ago to reflect the new philosophy to road design (see for example UK Department of Transport, 2007 and Chartered Institution of Highways and Transportation, 2010). European cities have achieved the highest reduction in fatalities and serious injuries. The focus on achieving lower urban speeds through road design, instead of relying entirely on speed limits, has been widely acclaimed in Europe, yet seldom applied in Australia.

2.6 Erosion of liveability and place benefits

Over the years, roads have been widened to create additional traffic lanes, to widen intersections or for car parking. This has reduced the space available in adjacent verges for tree planting, on-street place-related activities, cycling paths and footpaths. While there is growing resistance to this practice from residents and community groups, they are frequently overruled by road authorities. This erosion has been allowed to occur in parts of our cities due to planners and engineers placing greater importance on movement networks than places.

2.7 Accessibility and social inclusion

Urban road planning has proceeded on the assumption that access to cars is universal. This assumption is false, and the proportion of the community without car access is substantial. People without a driving license in Victoria include 100% of people 17 and under, 36% of 18 to 24 year-olds 17% of 25 to 29 year-olds and 23% of people aged 70 or over

[5] Electric Vehicles Council and Asthma Australia (2019) Cleaner and Safer Roads for NSW , Sydney.

(RACV, 2017). The proportions without a driving license were higher in Melbourne than in Victoria as a whole. Failure to plan for the proportion of the community without car access greatly reduces accessibility and social inclusion for that demographic.

2.8 Funding inequity

The high level of funding provided for road widening and construction in urban areas has resulted in reduced funding of other important programs that are often lower cost and/or have a higher benefit cost ratio, such as:

- Active and public transport infrastructure
- Asset maintenance in both urban and rural areas
- Road safety improvement programs, in both urban and rural areas.

3. Sustainable mobility management

3.1 Need for a new paradigm

TAs considers a new paradigm is necessary for transport planning in Australian cities. Whereas the previous system was based on a repeating cycle of more road capacity that induced more traffic, the proposed new approach aims to decrease the level of road traffic, or at least lower traffic growth, particularly during peak periods. TAs believes it will not be possible to limit growth of congestion and other associated negative impacts (e.g., growth of greenhouse gas emissions) if traffic is permitted to increase and even encouraged as a result of government policies and infrastructure delivery programs. At the heart of the proposed new paradigm, is the need to reduce dependence on cars for travel in urban areas by encouraging travel by alternative modes.

Figure 3: Virtuous cycle – transport demand management and smart growth[6]

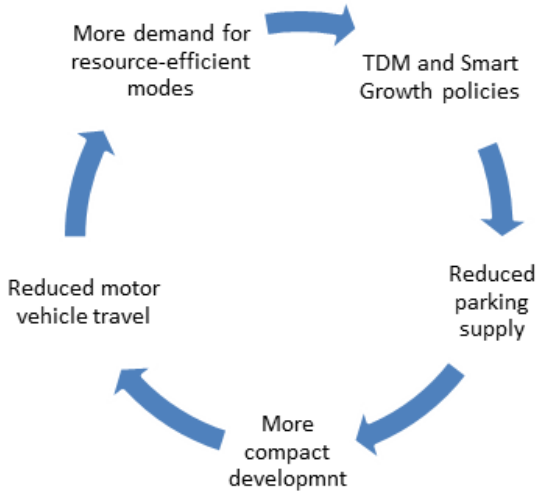
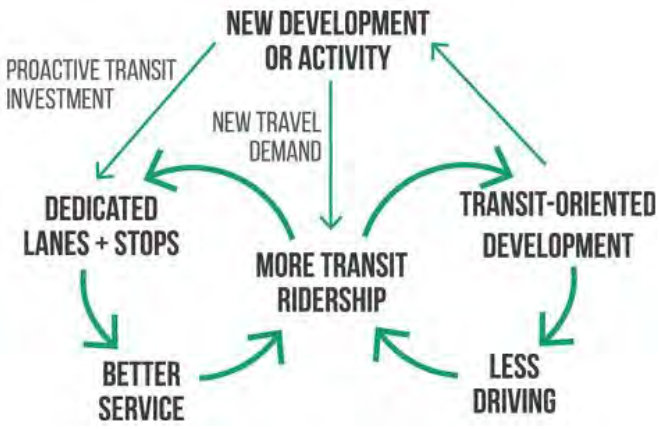


Figure 4: Virtuous cycle – transit passenger increase[7]



Infrastructure Australia (2019) is one of many organisations that has recognised the need to move away from the traditional planning approach of "predict and provide", based largely on an extrapolation of past trends, to a more forward looking "vision and validate" model. The International Transport Forum (ITF, 2021) has noted the "predict and provide" paradigm, that has existed since the 1950s, has the effect of increasing capacity to keep up with demand growth and that this leads to increasing levels of traffic on the road network (see Figure 1). The International Transport Forum (2021) has noted there has been a weakening of the connection between road traffic and economic activity and that a new transport planning paradigm "decide and provide" is emerging. Others, including Engineers Australia (2016), have long been calling for comprehensive and integrated land use and transport infrastructure planning, to ensure scarce funds are directed to projects with the highest potential returns.

There is a high degree of uncertainty about future travel due to the rapid evolution of digital connectivity and disruption from new technologies. Under these circumstances, the rationale of continuing to plan based on past practice, or even an evolution from past practice is flawed. The decide and provide approach to transport planning is vision led and offers an alternative, improved planning paradigm (Lyons, 2019 and TRICS, 2021). This approach relies on modelling and assessment to determine what needs to be incorporated in the vision-led option to ensure it is plausible, prior to approval of a preferred option. This is the approach that has been taken on climate change. Rather than accept the laissez faire approach, which would lead to up to 4 degrees centigrade of global warming, a preferred option of limiting global warming to 1.5 degrees has been proposed by scientists. Assessment and modelling is being undertaken to assist in reaching agreement on a preferred option.

[6] Image source: Litman, 2021
[7] Image source: NACTO, 2016

During the next 30 years to 2050, the population of Australia is expected to grow by 40 per cent.[8] However, with increased urbanisation, population growth in our biggest cities is estimated to be between 50 and 60 per cent, with Adelaide at the lower end and Melbourne, Brisbane, and Perth at the higher end. If we were to continue using transport modelling with existing traffic generation rates embedded in the models, then we would be predicting traffic growth in our capital cities of 50 to 60 per cent on average, with higher levels of growth in some areas, for example where urban infill is planned. Whilst 30-year planning is considered long term, it is short in the context of the historical growth of major cities.

It is likely that Australia's capital cities will continue to grow beyond the 60 per cent envisaged over the next 30 years. For example, the fast-growing cities of Perth and Brisbane may well double in size between 2050 and the end of the 21st century, to a population approaching 8 million. This would result in an increase in the demand for travel (by all modes) in the order of three times the current travel demand. Thus, the transport infrastructure we provide in the next 10 to 20 years, particularly rail, will need to offer high capacity to cater for movement and access needs well beyond 2050. When we look at successful cities of comparable sizes internationally, most have high-capacity rail systems.

The International Transport Forum (ITF, 2021B) has noted there is a need for "more efficient, less damaging and fairer use of scarce space". It supports a range of policy options to reduce car driver mode share, including the re-allocation of space from general road use and parking, with the aim of improving car free accessibility rather than mobility.

Urban transport policy has significant impacts on city shaping and travel behaviour in the long term. In France, where policies favouring urban rail transport development were adopted in the 1980s, 25 light rail systems have been built since 1985. By 2020, 27 of the 30 largest French cities had light rail or heavy rail systems. The World Bank has identified the development of passenger rail systems in growing cities as one of the most critical infrastructure issues for prosperous and sustainable urban development in the 21st Century (World Bank IEG, 2017). The strategy is referred to as "Sustainable Mobility for All".

3.2 Sustainable Mobility Management

It is clear, that as a society, we must seek a new vision for our cities. One in which our streets are not clogged with more and more cars competing for limited road space and one in which the environment, community health and overall liveability is not compromised. Sustainable Mobility Management (SMM) is the recommended alternative approach to urban transport planning. It utilises demand management and multi-modal transport and land use planning to manage car use to levels that are more compatible with road network capacity and sustainability in the long term. A major objective of SMM is to improve transport efficiency by reducing the volume of low occupancy vehicles in the traffic stream by a variety of means, including provision of priority lanes for high occupancy public transport, bicycles, micro mobility vehicles and high value trucks, where the circumstances warrant it. A more comprehensive overview of the SMM approach can be found in "Delivering Sustainable Urban Mobility, ACOLA, Melbourne, 2015".[9]

[8] 'Australia to 2050: future challenges' (2010) *Australian Government* https://treasury.gov.au/sites/default/files/2019-03/IGR_2010_Overview.pdf

[9] For an international perspective on Sustainable Urban Mobility Planning (SUMP) refer to Rupprecht Consult (2019).

Figure 5: Sydney light rail: high-capacity transit to UNSW

TAs believes there are important strategies that we will need to consolidate in the SMM approach, including, those outlined below.

3.2.1 Develop short, medium, and long-term Integrated Transport and Land Development Plan

An integrated transport and land development plan should have a timeframe well beyond 2050.This will better reflect the longevity of both transport and built form assets and be capable of implementation in stages. Most cities have urban development plans through to 2050, that cater for increased levels of urban infill, with a view to slowing down urban sprawl. The need for urban infill in mixed use areas, where more people will be able to live closer to where they work and use a variety of public and active transport modes for more trips is clear. However, while land development plans exist, they have mostly been developed with insufficient attention to travel requirements and transport infrastructure funding. TAs believes the following important changes are necessary to better integrate transport, urban (re)development and funding, financing and investment in transport infrastructure:

- Ensure the majority of future development land is in mixed use centres and corridors. Plan for medium density (4-6 storey) development in these areas. This form of development will encourage and facilitate greater use of public transport without significantly changing development density, that is remote from planned rail stations in centres and corridors.
- Develop transport strategies that incorporate high-capacity rail options to meet long term demand and enable reduced travel by car. The transport strategies should be approved at the same time as land use development strategies and funded as one plan. Both the transport and the land use development strategies should be implemented together in stages. The transport strategies should consider metro rail options for linking outer areas with central areas along strategic corridors and light rail solutions for other high demand urban arterial roads.
- True success on integrated urban development and transport planning is dependent on design, funding, and delivery of transit systems, particularly high-capacity rail, including light rail. Newman et al (2016) have proposed an “Entrepreneur Rail Model, to deliver urban rail infrastructure and urban re-generation through land development, as a basis for financing”. This model proposes the private sector is involved in transport and development planning at an early, strategic stage, before transit routes, station locations and design are agreed. A key objective of the approach is to add value to development around transit stations, often under conditions of uncertainty, thus enabling the private sector, including investors such as superannuation funds, to invest in rail. Newman et al (2021) builds on the Entrepreneur Rail Model and discusses the need to

regenerate main road corridors by providing higher density, mixed use development along activated high-capacity transit corridors.

- Modify the local street network in the medium density residential areas to ensure it remains connected and safe for travel by active transport users, local bus, and shared use public transport, micro mobility users and delivery vehicles. Local streets should be re-designed over time to be as self-explaining as possible and to encourage lower speeds and greater use of streets by people. Safe, well connected bicycle paths and bicycle boulevards should be designed to connect to and provide safe access to the lower density residential areas surrounding the medium density precincts.
- The same principles of integration of transport, land development and funding / financing, that are applicable in inner metropolitan areas, should be applied to outer growth areas. Buxton et al (2020) provides a case study of the planning challenges that are evident in Melbourne's outer growth areas. The case study assessed two new urban growth areas in outer Melbourne, where construction and occupation occurred in 2019/20 against the Victorian Government's precinct structure plan objectives. Performance against the objectives showed more than two thirds were assessed as "failed to achieve". This included all of the transport objectives:
    - efficient public transport, direct connections to activity centres
    - efficient and adequate bus services
    - urban form designed for walking, cycling, public transport, car
    - encourage walking, cycling, public transport to reduce carbon emissions

3.2.2 Manage travel demand

Travel demand management (TDM) measures are used in cities around the world to optimise traffic on the network and reduce dependence on cars. It is now widely recognised by infrastructure planners and providers that TDM can delay or defer costly road infrastructure, particularly where the network as a whole is close to capacity and where induced demand from road expansion can limit benefits from such projects to the short term. Some successful TDM strategies include:

- Behaviour change programs such as TravelSmart that have reduced car travel by about 10%
- Travel plans for centres and corridors
- Parking policies for city centres, activity centres and corridors.
- Road user pricing. Deloitte (2013) produced a discussion paper on the need for reform on road pricing and transport infrastructure funding, that advocated in favour of variable road pricing scheme with higher charges being applied when congestion is highest.
- Adjust planning to recognise reduced travel demand post-Covid from increased working from home.

Further discussion on the benefits of TDM measures can be found in PATREC (2016).

3.3 Benefits of Sustainable Mobility Management

SMM benefits people, and the cities and environments they inhabit in several important ways. Not only does SMM support greater safety outcomes but promotes benefits across the triple bottom line.

- It will bring about a reduced level of traffic on crowded streets, reducing congestion, improving safety, and increasing amenity and liveability.
- The development of an integrated and sustainable transport system with greater travel choices for more people will deliver improved accessibility for all, global and local environmental benefits, and more equitable society and tangible community health benefits.
- The proposed high-capacity public transport routes will provide higher transport system capacity that cannot be provided by the current car based system and will future proof city growth, urban infill and more vibrant communities.
- Planning for reduced levels of traffic will enable public funding of infrastructure to be re-directed to areas where there has been significant under-investment over many years.

4. Institutional change

The historical forms of governance for transport and land use planning in Australia have worked against efficient urban transport. Taxation collection and allocation occurs primarily at the Federal government level. Transport planning and delivery occurs primarily at state level. Land use planning and approvals occur primarily at local level, or by a state department that operates independently from the transport department. This lack of alignment between funding, transport planning, and land use planning leads to conflicts, inefficiency and inconsistency in objectives.

Funding imbalances have led state agencies to focus on cost reduction. This has reduced state technical capability. Federal funding mechanisms have encouraged a focus on a small number of large infrastructure "mega-projects". This has lowered industry productivity (Infrastructure Australia, 2021). Mega projects often have lower benefit to cost ratios than smaller projects and typically deliver less jobs per dollar spent than packages of smaller projects.

It would be desirable to reform transport and land use governance in Australia so that accountability for transport, land use planning, and project delivery and funding, occurred at the same level of government with the other levels contributing. Responsibility for transport and land use planning being splintered across different levels of government ought to end. Restructuring government departments and re-allocation of responsibilities between different levels of government, that would be required to satisfactorily resolve this problem, is outside the scope of this paper.

Assuming changes to government structure are outside the scope of this discussion paper, the most efficient reforms would be:

- Ensure land use, roads and public transport are planned together within each community.
- Avoid allocating large amounts of government funding directly to State Road Authorities. Provide a mechanism for allocating transport funds across differing needs such as roads, public transport, walking, cycling, amenity and safety on a predictable and equitable basis.
- Undertake land use and transport planning scheme development simultaneously. Consider area-led approaches, that address all needs of the area in a holistic manner and are planned with community's inputs. Cross border issues should be managed by policy direction from higher level government.

5. Recommended directions

This section outlines a set of guiding principles by which the new paradigm identified for urban transport may be implemented in Australian practice. The objectives are:

- reduced levels of congestion
- reduced deaths and serious injuries from road crashes
- improved community fitness and health from more people walking and cycling for more trips
- improved environmental outcomes
- improved outcomes for local economies and social cohesion.

5.1 Guiding principles

The future urban transport system should:

- Be environmentally sustainable
- Be accessible to all and socially equitable
- Be economically sustainable and accountable
- Have clear steps to achieve zero fatality target
- Promote high level of amenity and liveability
- Develop transport systems that are integrated with land use planning considerations
- Invest in space efficient transport modes
- Provide for efficient movement of goods
- Develop policy for transformational technological change.

Future transport policy and transport infrastructure should be assessed against these principles. Explanation of the principles is provided below.

5.2 Be environmentally sustainable:

Work towards net zero greenhouse (GHG) and harmful transport emissions by 2050

Set interim targets for GHG emission reduction from transport for 2030 and 2040 to provide a roadmap to the 2050 net zero target:

- Adopt a multi-pronged approach – "Avoid, Shift, Improve" – to reduce transport GHGs.
- Avoid the need for motorised trips through better urban land-use.
- Shift to low emission modes – from car to active and public transport.
- Improve the emission intensity of trips through use of technology.
- Encourage a rapid shift to zero emission vehicles in the Australian market. Aim for new car sales to be 100% EVs (Battery Electric, BEV, or Fuel Cell Electric, FCEV) by 2030 and a vehicle fleet of 100% EVs by 2050.
- Adopt best practice road construction methods to reduce construction GHGs by 50 per cent.

For guidance on how GHG emissions from transport can be reduced, including the "Avoid, Shift, Improve" approach refer to "Climate change and transport", Transport Australia Society discussion paper (Engineers Australia, 2020).

Plan, design and regulate the transport system to reduce emissions harmful to health.

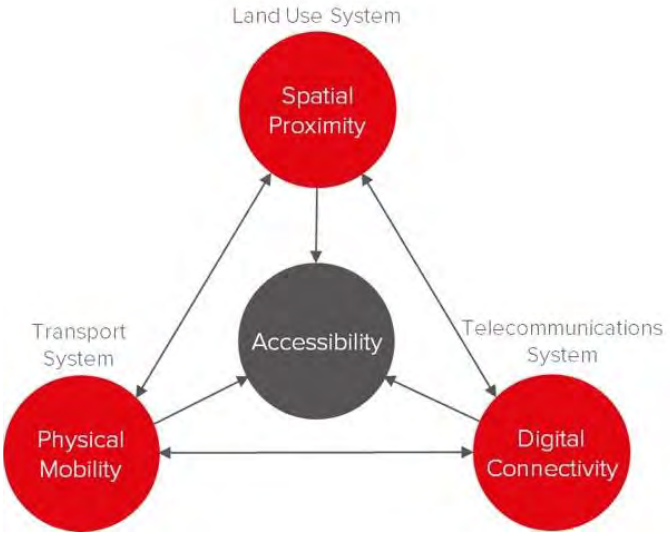
- Adopt Euro 6 emission standards for remaining internal combustion engine (ICE) vehicles as soon as possible. Shift Australian fuel sales to predominantly Euro-6 compliant fuel products as soon as practical. Fuel products meeting older standards would be sold while required and phased out during a transition period.
- Amend vehicle fuel economy and emission regulations for all new ICE vehicles sales to match the Euro 6 standard from now until new ICE sales cease in Australia, nominally between 2030 and 2035.

5.3 Be accessible to all and socially equitable

The transport system must provide safe, convenient and affordable transport for all in the community:

- Improve accessibility through spatial proximity and digital connectivity to services, as well as by improving accessibility for physical mobility (see Figure 6).
- Improve public transport networks and services and provide safe networks for walking and cycling, so people are not reliant on driving by themselves or by others.
- Plan the transport system inclusively for all demographics. Recognise that over 30 per cent of urban Australians do not have a current driving licence and an even higher proportion of people do not have access to a car at all times.

Figure 6: Triple access planning[10]



5.3. Be economically sustainable and accountable

Transport infrastructure investment should be economically justifiable, consistent with transport costs and revenues, and impartially allocated (Terrill, 2016).

- Focus transport planning on community activities and costs, not transport activities and costs. Recognise that transport is a means to an end.
- Scope transport projects so they demonstrate a net economic benefit to communities. Exceptions should only be made for transport projects that are required for essential accessibility reasons.
- Provide transparency in infrastructure decision making. Decisions of review authorities such as Infrastructure Australia on the eligibility of projects for funding should be tabled in Parliament and accepted by government unless it provides reasons for deciding otherwise.
- Make transport investments cognisant of the life cycle cost of supplying infrastructure.
- Adjust transport system pricing to be reflective of infrastructure supply costs and environmental impacts.

5.4 Have clear steps to achieve a zero fatality target

Work towards zero deaths and serious injuries from road crashes by 2050. Set targets for 2030, 50 per cent reduction in per capita fatalities and serious injuries by 2030 (may vary by State, depending on base level):

- Adopt the Vision Zero approach to road safety and enact it as law, as done in best practice countries. The Safe Systems policy for road safety adopted in Australia has not achieved intended benefits.

[10] Image source: Lyons and Davidson, 2016.

- Make road safety for all road users a higher priority than travel time concerns in all road system operations. Set Key Performance Indicators (KPIs) for road managers with safety as a primary consideration.
- Integrate Vision Zero safety principles into road design guidelines. For example, adopt 30 km/h design speed and speed limit on streets with a high number of pedestrians and vulnerable road users.
- Target delivery of a connected network of safe bicycle routes and improvements to pedestrian environments during the next 5 years (RAC, 2020-21).

For further information on measures to improve road safety, refer to "Road Safety, Transport Australia Society Discussion Paper" (Engineers Australia 2019), and "Reducing Road Trauma on Australian Roads" (Engineers Australia, 2021).

5.5 Promote high level of amenity and liveability

Road and street networks should move away from 'car centred' policies to transport systems that focus on enhancing liveability:

- Focus urban road network planning and decision-making on increasing liveability. Car journey efficiency should not dominate the road planning process. Future traffic forecasts are not more important than future active and public transport needs.
- Include liveability considerations, such as place quality, personal security, connectivity, access and social inclusion, in all road networks planning and project assessments.

Road networks should balance the needs for movement and places:

- Adopt the principles of Movement and Place (see Jones et al, 2009) in all road planning. Consider both functions (Movement and Place) at the time of planning and delivering street design projects. Recognise that the success of local places improves liveability and decreases the need to travel to destinations further afield. Therefore, place considerations are not subservient to movement needs.
- Recognise places of varying significance (from local to city-wide) exist everywhere along the urban road network. Therefore, the need for pedestrian accessibility and amenity is likely to also exist everywhere along the network (with exceptions only around urban motorways/highways).
- Incorporate Movement and Place indicators when appraising road network or assessing potential projects.

Road networks should be planned and designed to maximise amenity and health outcomes, and to minimise ecological impacts:

- Design urban roads to maximise amenity, liveability, and health outcomes, recognising they are integral parts of local communities. This should include maximising tree planting and landscaping (in verges and in medians), using water sensitive urban design approaches to planting.
- Roads should be designed to minimise impacts on ecology, hydrology, and wildlife.
- Design urban roads to be habitable spaces in the forecast range of future climatic conditions.

5.6 Develop transport systems that are integrated with land use planning considerations

Transport and land use planning must be undertaken together. Restructure urban development and redevelopment so that the majority of high and medium density development is provided in mixed use activity centres and along activity corridors where high frequency, high capacity public transport either exists now or is planned for implementation in the short to medium term:

- Support urban infill in areas that are well served by public transport.
- Support the redevelopment of industrial areas to create vibrant mixed use urban areas when industries close or are relocated. Design an integrated transport plan, that incorporates a well-connected street network for safe movement by pedestrians, cyclists and micro mobility users and a high frequency, high capacity public transport system, preferably rail based, for ample mobility at the time of the redevelopment.
- Increase density of development around rail stations and improve the connectivity of the street network, where possible, to provide safe direct access to the station for pedestrians, cyclists and micro mobility users.

- Develop parking policies in city centres, activity centres, activity corridors and station precincts with a view to encouraging sustainable modes of transport. Contemporary car parking policies should be rewritten to reflect maximum parking requirements as opposed to mini-mum requirements. An example is illustrated in Figure 7.

Figure 7: Example Parking Policies[11]

5.7 Invest in space efficient transport modes

Be cognisant of the space requirements of different transport modes when planning and designing urban transport systems:

- Give priority to the most space efficient transport modes wherever corridors are approaching capacity for current or likely future travel demands. Car travel is inefficient for high volume corridors. This applies to both space for car movements during peak periods and space for parking during off peak periods.

Figure 8: Transport mode space efficiency[12]

- Measure, analyse and report people movement demands from all modes in terms of person trips for each corridor, rather than vehicle trips to prevent the unconscious adopting of a specified number of traffic lanes as a default solution.

[11] City of Edmonton, 2020
[12] Image source: Cycling Promotion Fund, Canberra.

- Stop seeking to satisfy peak period demand with low efficiency high space per person transport modes
- Increase awareness among transport planners of the higher capacity limits of non-car modes (see Figure 8).

5.8 Provide for efficient movement of goods

Be cognisant of the need for efficient goods movement when the overall urban transport system is assessed.

- Adopt a demand management approach to urban roads that reduces car dependence and preserves accessibility and connectivity for goods movement.
- Consider the use of priority lanes for goods delivery vehicles in the case of high volume truck movements to ports and airports and major container facilities. Priority lanes are preferred to widening roads for general traffic, because the latter will deliver only short term benefits to freight mobility (less than 10 years), as it induces additional car traffic onto the road system.

5.9 Develop policy for transformational technological change

Technological change is delivering autonomous vehicles (driverless) (AVs) connected vehicles (CVs) and electric power vehicles (EVs). These necessitate changes to policy and infrastructure to ensure their impact does not induce more driving and exacerbate congestion.

5.9.1 Autonomous and Connected Vehicles

- Autonomous and connected vehicles (AVs and CVs) have the potential to result in major benefits to road safety, however, there may be issues with implementation in mixed traffic that will require government intervention and regulation.
- Monitor and research the impact of AVs and CVs on road network capacity, safety and infrastructure, such as parking and mode shift away from public transport. The impacts will vary depending on matters such as the percentage of AVs/CVs that are privately owned and operated. It should not be assumed that AVs/CVs will reduce road congestion.
- Match international approaches to government policy for introduction of AVs/CVs and engage with community on their acceptability. AVs and CVs will be an internationally developed and purchased product and Australian regulations need to facilitate local use.
- Encourage the use of a large proportion of AVs for shared use rather than private ownership. This will assist meeting other amenity, access and equity objectives.

5.9.2 Electric Powered Vehicles

- Encourage replacement of fossil fuelled vehicles with zero emission vehicles. Battery powered electric vehicles (BPEVs) are the most efficient option to reduce car GHGs in urban areas. Hydrogen fuel cell electric vehicles (FCEVs) may be beneficial for locations where range is critical.
- Install charging networks for BPEVs on all highways and in urban areas and FCEVs where demand requires.
- Amend vehicle charging regimes for BPEVs to incentivise purchase. BPEVs have higher capital costs but lower operating costs, which justifies market intervention. This needs to be done without encouraging an increase in overall car usage.
- Modify urban street design to incorporate safe micro mobility lanes suitable for the growing range of micro mobility options such as electric bicycles (eBikes) and electric scooters (eScooters). These new modes are healthy, efficient, and affordable options for short urban trips.

For a fuller commentary on the benefits of electric vehicles refer to the article by Whitehead (2019).

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