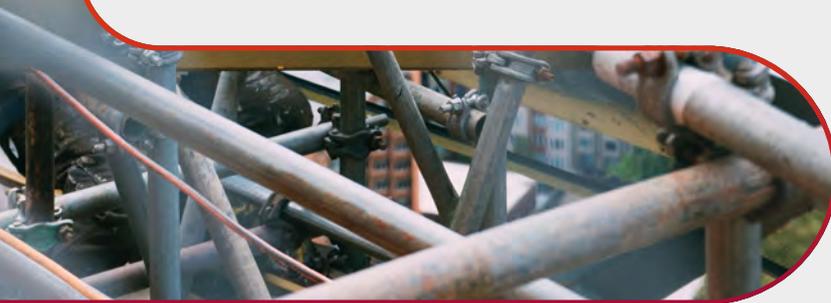




Commonwealth Budget Submission 2020-2021

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INTRODUCING ROADS AUSTRALIA

Roads Australia (RA) is the peak body for roads within an integrated transport system, representing an industry that contributes \$207 billion annually to the economy and supports 1.3 million jobs. RA brings industry, government and communities together to lead the evolution of Australia's roads, integrated transport and mobility.

RA welcomes the opportunity to make a submission for consideration in the formulation of the 2020-21 Commonwealth Budget.

NINE KEY RECOMMENDATIONS

RA recommends the 2020-21 Commonwealth budget deliver:

1.

Funding to accelerate the essential micro-economic reform process in road-user charging and investment.

2.

Funding for pilot, multi jurisdiction/university/industry collaborative transport research projects.

3.

Funding to accelerate initiatives to improve market capacity, procurement processes, approaches to risk allocation in the transport infrastructure sector.

4.

Matching funding to support and accelerate state jurisdiction investments in mass transit solutions.

5.

Funding to implement a national road worker safety program, a national road worker safety awareness campaign and to support the AAA Reviving Road Safety policy priorities.

6.

Grant funding to support and accelerate state and territory government, and industry, initiatives that advance the National Hydrogen Strategy.

7.

Funding for the establishment of a small-scale vehicle manufacturing Co-operative Research Centre.

8.

Funding to support research and development of national guidelines and specifications on use of recycled materials in roads.

9.

Funding to fully establish and facilitate the operations of the *Office of Future Transport Technologies*.

RECOMMENDATION 1

INITIATING THE CASE FOR ECONOMIC REFORM IN ROAD-USER CHARGING AND INVESTMENT

It is imperative that we move to a more equitable and efficient road pricing and investment model. All road users should contribute according to how, where and when they travel and the impact they have on the road network.

The RA *Future Transport: Smart Cities*¹ 2019 international study visit report concluded that the days of traditional fuel taxes and excises are numbered. North American government organisation visited by the RA delegation, expressed concerns about shrinking fuel tax revenue and the implications for funding and maintaining infrastructure. The system of funding roads through fuel taxes in North America is similar to that in Australia – so we face the same dilemma, with little evidence that there is a solution being developed that will be equitable for all road users.

RA recommended in the report that Australian governments should urgently consider a transition away from the fuel-based road user charging system currently in play.

*The Parliamentary Budget Office*² (PBO) reports that excise on petrol and diesel, as the largest component of fuel excise, was levied at a rate of 40.9 cents per litre in 2018. RA believes that this is a blunt and inaccurate instrument for recovery of revenue to support building and maintaining Australia's road networks. Inequities in the system, where vehicles with lower fuel efficiency pay a higher distance-based road-user charge, need to be removed. Most concerning is that the impact of the present system is often most disadvantageous to lower socio/economic sector vehicle owners, who are more likely to own older, less fuel-efficient vehicles.

The PBO reports that fuel excise, as a percentage of GDP, was around 1.0% in 2016/17, representing 5% of Commonwealth receipts. There has been a steady decline from the 1.7% of GDP level in 2001, with increased fuel efficiency of passenger vehicles a significant contributor to the decline.

The PBO considers that continued improvements in the fuel efficiency of the passenger motor vehicle fleet in Australia are likely to contribute to a further slowing of the growth in total fuel consumption - further constraining growth in fuel excise revenues. They highlight that the uptake of electric vehicles could further accelerate the rising fuel efficiency of the passenger motor vehicle fleet in Australia.



Electric vehicles are only a small proportion of the market and are therefore having little effect on fuel excise receipts at the present time. However, under the **Australian Energy Market Operator**³ neutral scenario for electricity consumption, electric vehicles are projected to represent around 19 per cent of the light vehicle fleet in Australia by 2036–37 (AEMO 2018). The impact on fuel consumption of an increasing uptake of electric vehicles would further erode the fuel excise revenue base.

Consequently, RA believes that fuel excise revenues will be increasingly inadequate to fund the required investments in, and maintenance of, Australian road networks. We are concerned that electric vehicles will make no contribution to fuel excise, and therefore to road investment, in the current system.

Australia has the opportunity to lead the world in innovative and equitable micro-economic reform in road transport, by accelerating the market reform work being overseen by the Transport and Infrastructure Council (TIC). To maintain the confidence of industry and road users, it is essential that road pricing and investment reform models are transparent and equitable for all road users. Direct hypothecation of revenues, collected for the primary purpose of road investment and maintenance, to road network operators, and linked to clear infrastructure investment plans, is a critical missing link in the present system that needs to be addressed.

As pointed out in the recent Productivity Commission Report into **National Transport Regulatory Reform**⁴, the model of road funding and management should seek to strengthen links between road related revenue to road related expenditure. This would help to determine road users' preferences and willingness to pay for road infrastructure services and require the adoption of well-designed institutional and governance arrangements.

RA understands that the reform process will be challenging, with potentially up to a decade of concerted collaborative effort required. However, the potential benefits to the Australian economy, and all Australians, from successful delivery of what many see as the missing link in major micro-economic reform for this country, are enormous. The Commonwealth must take the lead (including ensuring that any State initiatives are harmonised) to ensure that the momentum does not stall, as in previous attempts – so that genuine road pricing and investment reform can be implemented within the 2020–2029 decade.

RECOMMENDATION 1

That the Commonwealth provide sufficient funding in the 2020-21 budget to accelerate the essential micro-economic reform process in road user charging and investment.

RECOMMENDATION 2

THE FUTURE TRANSPORT NEEDS OF AUSTRALIA'S GROWING POPULATION CALLS OUT FOR MUCH IMPROVED COLLABORATIVE EFFORT.

All levels of government, academia and industry will have to adapt their ways of thinking and be prepared to collaborate if we are to prepare the nation for the major transport changes on the horizon.

The RA *Cities for the Future 2018*⁵ report outlined the Japanese and South Korean government's strong collaborative approach with industry and academia in developing and implementing their national transport strategies.

The collaboration theme was also prominent in the recent RA study visit to the USA and Canada, which is summarised in the RA *Future Transport: Smart Cities 2019*¹ report. The study visit delegation saw some very productive transport research projects in North America, where universities are more active on the transport front, engaging with industry, government and each other in ways not seen in Australia. Universities encourage their professors to work with industry and to bring in business collaborations and partnerships, which are in turn supported by the US federal Department of Transportation (DoT). The DoT allocates around \$300 million USD annually for transport related research and development, with a pre-requisite for private-sector involvement. This seed funding is provided on condition that private partners and universities contribute the bulk of funds, with clear criteria for local and state level government involvement.

The study visit report concludes that there were many opportunities for Australia's world-class universities to be more engaged in new transport technology research and development. However, RA believes that the current funding model for Australian universities promotes competition at the expense of collaboration, creating a potential barrier to research into transport technology.

A prominent collaboration example was the *Smart Belt Coalition*⁶. In this dynamic and proactive collaboration for the development of connected and automated vehicles in Michigan, Ohio and Pennsylvania, State governors and city mayors support the work of universities and industry at a multi-state level.

RA believes the widespread collaboration seen in North America should be fostered in Australia, enabling inherent individual strengths to be increased by greater co-operation and less competition between universities. The Federal Government funding criteria should be modified to provide seeding money for transport research which is conditional on both attracting private funds and requiring involvement of more than one university, with encouragement for more industry and state or city government involvement.

Collaboration between cities in the USA has accelerated learnings, with a focus on social impact and customer acceptance. Finding new ways to learn, develop and exchange ideas internationally can also support Australia in responding well to the opportunities that connected and automated vehicles provide. The recently signed *Memorandum of Understanding*⁷ between the Australian Government and the State of Michigan is a great example which should be leveraged, potentially through establishing a facility based on the *Michigan PlanetM*⁸ model in Australia.

RECOMMENDATION 2

That the Commonwealth provide funding in the 2020-21 Budget for pilot, multi jurisdiction/university/industry collaborative transport research projects.

RECOMMENDATION 3

DELIVERING PRIORITY INFRASTRUCTURE PROJECTS

The increasing size and complexity of the pipeline of investment in road and related transport infrastructure will require new approaches if they are to be effectively delivered.

The Infrastructure Australia *Australian Infrastructure Audit 2019*⁹ points out that by global standards, Australian infrastructure industry capacity and capability is relatively strong, and the efficiency of the sector is high. The Audit also points out that each decision to build or upgrade infrastructure can impact on taxpayer and user bills for generations, conversely every dollar of public infrastructure investment can generate GDP increases that can add up to \$4 of value over the life of the asset. It is therefore essential we get these decisions right to improve the quality, affordability and access to our infrastructure.

The Infrastructure Audit shows there is considerable room for improvement in how we plan, fund and deliver infrastructure in Australia. It concludes that, while both the public and private sectors generally perform well, infrastructure projects are increasing in size and complexity, and will require new approaches if they are to be effectively delivered. The Audit emphasises that how the public sector make decisions, handle procurement, select contract models and handle risk will have significant impacts on the functionality and efficiency of our infrastructure. Alongside these challenges, new demands for sustainability, resilience and security will provide opportunities to achieve better outcomes - however, this makes the planning and management of industry capacity more complex.

The importance of a strong and consistent pipeline to our industry cannot be underestimated, with the record level of current and planned investment in critical transport providing a catalyst for strong growth in the Australia engineering and construction sector.



Australia is now well placed to invest in infrastructure that will underpin the economic growth of the country. For the first time in decades, RA members are able to contemplate a new graduate or apprentice entering the workforce, with the certainty that projects will be available to give them the variety of experience they require to develop into our next generation of nation builders.

The RA Capacity Policy Stream has been very active in support of the Australian Government roundtables with industry to get a better understanding of the construction and procurement issues in the context of the multi-billion-dollar, decade-long, infrastructure investment pipeline. RA strongly supports the key take-out in the ensuing **Roundtable Report**¹⁰ - that the consequence of current, non-collaborative procurement approaches is that government is currently not maximising industry participation and competition in construction procurement. With the further finding that the use of prescriptive and increasingly complex contractual approaches has seen an unsustainable transfer of risk to the private sector, impacting on broader industry profitability and its ability to invest in capacity and capability.

Each year, RA hosts an executive workshop of private and public sector leaders to discuss and steer RA's activities on key issues, with the purpose of enabling a positive impact on how Australia successfully delivers and operates its transport networks. In the 2019 **RA CEO Workshop**¹¹, Industry leaders acknowledged the universality of the '8 P's' - *Proper Prior Preparation and Planning Prevents Poor Procurement and Program Outcomes*. They agreed that the roads industry needs to invest more time in preparation and planning – and stated their willingness to do so.

In accordance with state, COAG and CILF (Construction Industry Leaders Forum) stated principles, industry leaders agreed that the industry needs a transparent pipeline of work to have certainty to make business decisions - industry cannot increase capacity without this. Part of this transparency is the early planning and sharing of project information - the pipeline serves as the catalyst for reform and investment. The CEOs confirmed RA's endorsement of the **NSW/CILF ten-point plan**¹² including collaboration in contract and design, early bids on capped price with list of exclusions and Early Contractor Involvement (ECI's) / Alliances.

Transport and Infrastructure Council (TIC) Ministers have acknowledged issues raised by industry, including the importance of developing market capacity, improving procurement processes, adopting more market-responsive approaches to risk allocation and improving skills and training regimes. RA recommends that specific funding should be allocated in the 2020-21 budget to provide expert advice and support to accelerate the industry and government's efforts in these critical areas of concern.

RECOMMENDATION 3

Commonwealth provide funding in the 2020-21 budget to accelerate initiatives to improve market capacity, procurement processes, approaches to risk allocation in the transport infrastructure sector.

RECOMMENDATION 4

SUPPORT FOR STATE JURISDICTION INVESTMENTS IN MASS PUBLIC TRANSPORT

Strategic investment by State governments in suburban rail is already high on the agenda. The reality is we will need exponential investment to cope with the expected population growth that could see Melbourne and Sydney reach 8 million people in each city by 2050.

Delivery of equitable transport solutions to meet the demands of rapidly growing Australian cities presents huge challenges for our governments and societies. The RA *Cities for the Future 2018*⁵ study visit report offers insights into the strategic approach to mass transport and mobility challenges in major Asian city transport networks.

The report highlighted that Australia can learn from our regional neighbours, where public transport thinking, investment and culture has dominated the strategic agenda in major Asian cities for generations. Today they have modern, strongly interconnected transport networks, with high frequency, fast, affordable, safe and reliable services. In contrast, Australia's major city rail networks, with foundations in the 19th century, have struggled to provide the interconnectivity, frequency, speed and reliability required to make them attractive as the commuter mode of choice. Lack of connectivity detracts from the unique advantages that our cities have in their transport mix, such as Sydney's ferries and Melbourne's trams.

Despite the support by Federal, State and Territory governments for public transport investment over the past decade, the challenge ahead is neither easy nor short-term. Recognising that solutions will need multi-generational thinking, RA is therefore heartened by the significant number of projects and potential infrastructure solutions identified in the Infrastructure Australia (IA) *Infrastructure Priority 2019 List*¹³. The IA report notes that congestion not only has significant consequences for our national economy, it also has direct impacts on communities, reducing people's access to education, health services, employment and other opportunities.

Looking towards 2050, rapidly growing Australian cities will need massive investment in the renewal and expansion of their public transport systems to maintain the livability we cherish. The listed projects will go some way to address the need for frequent and accessible public transport to reduce congestion and maintain the liveability of Australian cities.

RECOMMENDATION 4

That the Commonwealth provide matching funds in the 2020-21 budget to support and accelerate state jurisdiction investments in mass transit solutions.

RECOMMENDATION 5

ROAD AND ROAD WORKER SAFETY

The unprecedented scale of the national road and related infrastructure pipeline brings with it increased need for works to be carried out in an active traffic environment – increasing the risks faced by road workers.

RA's recent **Roadworker Safety Workshop**¹⁴ brought together more than 60 industry leaders to consider how best to manage the risks posed to road workers (considered as vulnerable road users), while providing a safe road environment for all road users. Working on roads and roadsides poses significant risks to workers and motorists due to changed roadway conditions, disrupted traffic flow, limited working space, and movement of construction and public vehicles in close proximity to workers and worksites.

Key themes from the workshop included: raising the credibility and respect for road workers; improving public social awareness and driver compliance behaviour at work sites; a collaborative role for government and industry to improve awareness/education; concern that the low tolerance of occupational health and safety risks generally, does not flow through to our standards for road workers; the need for regulatory change to improve pre-qualification standards; and opportunities to improve uptake of technology and innovation to remove workers from danger.

The RA **Future Transport: Smart Cities 2019**¹ report highlighted that like Australia, USA road safety statistics are trending negatively after years of consistent decreases in fatalities and serious injuries. The American Road and Transportation Builders Association (ARTBA) indicated that roadwork zones in the USA account for 15,000 road worker injuries and 135 road worker deaths. ARTBA's aim was to head towards zero deaths through their Safety Certification for **Transportation Project Professionals Program**¹⁵. This on-line safety centre has a focus on training candidates to attain the skills to identify temporary traffic control occupational, health and safety hazards, and to develop a safety planning culture and climate, with thorough incident investigation.

While Australia appears more advanced in its application of the safe system approach to road safety and traffic management around roadwork sites, the RA report recommended that Australian authorities should take a close interest in the ARTBA Program.

Austrroads¹⁶ has acknowledged that working on roads and roadsides poses significant risks to workers and motorists, through changed roadway conditions, disrupted traffic flow, limited working space and movement of construction and public vehicles in close proximity to workers and worksites. A four-part Austrroads project is underway to facilitate the introduction of a harmonised approach to temporary traffic control at road worksites across Australia. However, RA believes that this project will need to be supported by broad public awareness-building and industry-wide training and compliance monitoring.

To contribute to these aims it is recommended that funding be allocated to: evaluate the ARTBA's *Safety Certification for Transportation Project Professionals Program*; to support implementation of a national road worker safety training program; and to further develop and expand nationally the **Traffic Management Association of Australia**¹⁸ (TMAA) public campaign highlighting road worker safety awareness. This would also be consistent with one of the stated themes ('Safe Road Use') for the next National Road Safety Strategy, as recently outlined by the Transport and Infrastructure Council (TIC) in their **Communiqué**¹⁷ dated 22 November 2019.

RECOMMENDATION 5.1

That the Commonwealth provide funding in the 2020-21 budget to implement a national road worker safety program and a national road worker safety awareness campaign.

RECOMMENDATION 5

ROAD AND ROAD WORKER SAFETY (CONTINUED)

The Federal Government should strongly link infrastructure funding to road safety outcomes to combat Australia's rising road toll.

Recently, the Australian Automobile Association (AAA) brought together twenty-three national and state organisations to develop the **Reviving Road Safety**¹⁹ policy priorities document, calling for urgent Federal Government action to combat Australia's rising road toll.

The AAA has undertaken extensive consultation with a wide range of experts and organisations. There is a consensus that the Australian Government can make the nation's roads safer by using its powers and responsibilities in several crucial ways. RA supports the four broad priorities in the policy and calls on the government to:

1. Develop a National Road Safety Data Hub within the National Office of Road Safety. This would coordinate and analyse the collection of road infrastructure safety data to help develop future policy and investments.
2. Link infrastructure funding to road safety outcomes, and use incentive payments, to ensure road funding proposals are tied to safety standards.
3. Encourage the uptake of safer vehicles and work towards targets to lower the average age of Australia's vehicle fleet.
4. Ensure the new National Office of Road Safety has genuine authority to oversee the development and progress of the next National Road Safety Strategy, which will take effect from 2021.

Furthermore, it is anticipated that these priority areas would be consistent with the three stated themes (Safe Roads, Safe Vehicles, Safe Road Use) anticipated for the next National Road Safety Strategy, as described by the Transport and Infrastructure Council (TIC) in their recent **Communiqué**¹⁷.

RECOMMENDATION 5.2

That the Commonwealth provide funding in the 2020-21 budget to support the AAA Reviving Road Safety policy priorities.



RECOMMENDATION 6

LOOKING TOWARDS A POTENTIAL HYDROGEN FUTURE

Australia can be a leader in hydrogen fuel development and production - the National Hydrogen Strategy is our opportunity to ensure we are positioned to grasp this opportunity.

The RA *Future Transport: Smart Cities 2019*¹ report highlights that the momentum for hydrogen fuel cell vehicles is building in the US and Canada. There are over 5,000 Toyota and 1,000 Honda fuel cell family cars already on the road in the USA. While fuel station infrastructure has been recognised as an impediment to growth, the state of California alone is spending more than 2.5 billion USD in clean energy funds to accelerate sales of hydrogen and battery vehicles, including 900 million USD earmarked to complete 200 hydrogen stations and 250,000 charging stations by 2025.

A global initiative of leading energy, transport and industry companies, the **Hydrogen Council**²⁰, was launched at the Davos World Economic Forum 2017. This growing coalition of CEOs has ambitions to accelerate significant investment in the development and commercialisation of the hydrogen and fuel cell sectors. It encourages key stakeholders and policy makers to increase their backing of hydrogen as part of the future energy mix.

The Hydrogen Council's *Hydrogen Scaling Up*²¹ report sees the hydrogen economy as a central pillar of the energy transformation required to limit global warming. The report proposes that the transportation sector, through hydrogen-powered fuel cell electric vehicles (FCEVs) could combine with battery EVs to achieve a deep decarbonisation of all transportation segments. It believes FCEVs are best suited for long-range, heavier payload applications where trucks and buses alone could potentially achieve more than 30 per cent of hydrogen's total transport sector CO2 abatement potential. The report predicts that by 2030, one in 12 cars in Germany, Japan, South Korea, and California will be powered by hydrogen - resulting in 10 to 15 million cars and 500,000 trucks worldwide potentially powered by hydrogen. The Hydrogen Council vision for 2050 sees up to 400 million passenger vehicles (~25 per cent), 5 million trucks (~30 per cent), and more than 15 million buses (~25 per cent) running on hydrogen, worldwide.

A *Future of Hydrogen - Seizing today's opportunities*²² report, prepared by the International Energy Agency for the recent G20 meeting in Japan, highlighted 2019 as a critical year for hydrogen. With unprecedented momentum around the world, the report predicts that hydrogen is finally on a path to fulfilling its longstanding potential as a clean energy solution.

To this end, RA strongly supports Australia's significantly accelerated consideration of hydrogen for transport opportunities through the COAG Energy Council National Hydrogen Strategy development, *Hydrogen for Transport*²³ working group. The momentum is also building through recent significant hydrogen initiatives by state and territory governments across the country.

RECOMMENDATION 6

That the Commonwealth allocate grant funds in the 2020-21 budget to support and accelerate state and territory government, and industry initiatives that advance the National Hydrogen Strategy.

RECOMMENDATION 7

ADVANCED MANUFACTURING COULD CHANGE THE LANDSCAPE.

Micro-factories and small scale “bespoke” production techniques could see new vehicle technologies produced in Australia.

A case study in the RA *Future Transport: Smart Cities 2019*¹ report highlighted the development by the **Local Motors Company**²⁴, of Olli, a crowd-sourced 3D printed, electric and automated shuttle. This vehicle is made from recycled, low-grade thermoplastic reinforced with carbon fibre and is already registered to operate in road trials in the US state of Maryland.

While testing on this autonomous shuttle is still a work in progress, the key observation by the RA delegation was that new business models, such as the Local Motors approach, could be a major disrupter to traditional vehicle manufacturing. Local Motors designs bespoke mobility vehicles, to meet community needs, which can be printed and constructed using a 3D printer in 44 hours in local micro-factories. The company believes it is conducting world-leading research into material strength and structures and anticipates opening between 50 and 100 micro-factories in the next decade. Each tool-less factory costs approximately USD\$20 million to build – a fraction of traditional automotive manufacturing plant costs.

RA believes that the “Olli” case study points to a significant pending disruption to traditional vehicle manufacturing scale and delivery timing. There is an opportunity for micro-factories and small scale “bespoke” production techniques producing new vehicle technologies in Australia.

The RA report recommended that the Federal Government should develop a business case for the establishment of a small-scale vehicle manufacturing Co-operative Research Centre (CRC) in Australia to explore this exciting opportunity. This could potentially see the establishment of a pilot micro-factory by the CRC.

RECOMMENDATION 7

That the Commonwealth allocate funds in the 2020-21 budget for the establishment of a small-scale vehicle manufacturing Co-operative Research Centre.



RECOMMENDATION 8

OPTIMISING RECYCLED MATERIAL USE ON OUR NATIONS ROADS.

The Transport and Infrastructure Council should facilitate discussion with all governments, on the need for a national approach to the use of recycled material in roads.

RA strongly supports the recent announcement by the **Prime Minister**²⁵ on the steps toward a cleaner environment through a new \$20 million commitment for innovative projects to grow our domestic recycling industry. Prime Minister, Scott Morrison, announced that the funding was part of his Government's commitment to work with the states to establish a timetable to ban the export of waste plastic, paper, glass and tyres.

Many successful trials of recycled materials in road construction have been conducted in Australia in recent years. RA is keen to see the full realisation of the benefits of these trials, which have generated significant experience within industry and state road and transport agencies to be drawn on. The recent press release by the **Australian Council of Recycling**²⁶ (ACOR) highlights the potential opportunities, based on independent research, to use recycled material in road construction.

RA and the Australian Road Research Board (ARRB) held a recent Roundtable on the use of recycled materials in Melbourne. The key message from Roundtable participants was the need to review all current standards and specifications, in order to facilitate the widespread use of recycled materials in roads in Australia. There was strong support for a coordinated and collaborative approach from industry, key stakeholders, and governments take this opportunity forward. The Roundtable recognised that supporting additional research, testing, and data will be required give governments confidence to optimise the use of recycled content materials in roads projects.

In line with the Prime Minister's commitment to engage with industry and researchers, RA believes the Commonwealth Government can take a lead role, in this process. The Transport and Infrastructure Council (TIC) should facilitate discussion with all governments, on the need for a national approach to the use of recycled material in roads. A key outcome should be endorsement of the need for national guidelines and specifications on use of recycled materials in roads and support for funding to progress this work.

RECOMMENDATION 8

That the Commonwealth allocate funds in the 2020-21 budget to support research and development of national guidelines and specifications on use of recycled materials in roads.

RECOMMENDATION 9

CO-ORDINATING FUTURE TECHNOLOGIES

Roads Australia welcomes the announcement in October 2018 of the Federal Government's decision to establish an Office of Future Transport Technologies – to provide the strategic leadership necessary to facilitate the operation of automated vehicles and other transport innovations in Australia.

RA believes that Australia's productivity and road safety outcomes can be strongly improved by the introduction of autonomous vehicles, firstly in the heavy freight sector, then through the light vehicle fleet with driverless capability. However, we remain concerned that the lack of a nationally coordinated and integrated system, ambivalent to jurisdiction borders, will delay these benefits, potentially for many years.

Better coordination of Australia's autonomous vehicle trials, enabling law and regulatory processes is therefore essential. Our governments should be acting collectively and engaging on strategies to help remove consumer and societal barriers to the introduction of new autonomous driving technologies.

RA believes the Office of Future Technologies can play a pivotal role in avoiding a potential fragmented approach to automated vehicle introduction through uncoordinated, state-by-state approaches. It is incongruous that our national highway system could see markedly different network control and management systems in place as vehicles transverse state and territory borders. Alternatively, we could be faced with the dilemma of accepting staggered jurisdictional implementation or significant delays until all states and territories have adequate systems in place.

The Department of Infrastructure, Transport, Cities and Regional Development **fact sheet on Automated Vehicles**²⁷ acknowledges that there are differing views about when developments in automotive technology will enable more sophisticated automated vehicles to be ready for use on our roads. There is further uncertainty about when these vehicles will be commercially available in Australia, and when they may represent a significant part of our vehicle fleet. However, while noting this uncertainty, Australia's transport ministers have agreed to a phased reform program to enable Level 3 'conditionally automated' vehicles to operate safely and legally on our roads by 2020.

The Office of Future Technologies can assist in delivering the governments immediate and long-term objectives for transition to an automated vehicle future for all Australians. It is therefore critical that the Office of Future Technologies is properly funded so it can attract the technical skills necessary to allow the Australian Government to provide leadership for the uptake of automated vehicles in a uniform manner across the country.

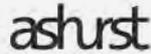
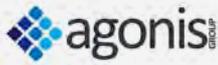
RECOMMENDATION 9

That the Commonwealth allocate funds in the 2020-21 to fully establish and facilitate the operations of the Office of Future Transport Technologies over the full forward estimates period.

REFERENCES

1. RA Future Transport: Smart Cities 2019 Report https://roads.org.au/Portals/3/FutureTransport%20SmartCities_Final%20Report.pdf?ver=2019-10-24-103121-610
2. Parliamentary Budget Office - Trends affecting the sustainability of Commonwealth taxes Report 02/2018 www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Budget_Office/Publications/Research_reports/Trends_affecting_the_sustainability_of_Commonwealth_taxes
3. Australian Energy Market Operator www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/NEM-Electricity-Demand-Forecasts/Electricity-Forecasting-Insights/2018-Electricity-Forecasting-Insights/Assumption-Changes
4. Productivity Commission National Transport Regulatory Reform draft report 12 November 2019 www.pc.gov.au/inquiries/current/transport/draft
5. RA Cities for the Future 2018 report www.roads.org.au/LinkClick.aspx?fileticket=j7u2FMiSICg%3d&portalid=3
6. Smart Belt Coalition www.detroitdriven.us/assets/Smartbeltcoalition.aspx
7. Michigan Economic Development Corporation www.michiganbusiness.org/press-releases/2018/10/global-cooperation-australia-and-michigan-sign-transportation-mou
8. Michigan Mobility Initiative www.planetm.com
9. Australian Infrastructure Audit 2019 www.infrastructureaustralia.gov.au/sites/default/files/2019-08/industry_efficiency_capacity_and_capability_-_2019_australian_infrastructure_audit.pdf
10. Construction Roundtables finding report October 2018 https://investment.infrastructure.gov.au/files/reports_and_key_studies/Construction-Roundtable-Report-BIS-Oxford-Economics.pdf
11. RA CEO Workshop 2019 www.roads.org.au/Portals/3/WEBSITE/CEO%20Workshop%20Outcomes.pdf?ver=2019-07-01-163201-700
12. NSW Government Action Plan - June 2018 www.infrastructure.nsw.gov.au/media/1649/10-point-commitment-to-the-construction-industry-final-002.pdf
13. Infrastructure Australia - Infrastructure Priority 2019 List www.infrastructureaustralia.gov.au/sites/default/files/2019-07/ia18-4005_priority_list_2019_acc_L0.pdf
14. RA Roadworker Safety Workshop Outcomes, Sydney, 17 July 2019 www.roads.org.au/Policy/Safety/Presentations-and-Reports
15. ARTBA Safety Certification for Transportation Project Professionals Program www.artba.org/2016/10/12/life-saver-industry-launches-safety-certification-for-transportation-project-professionals-program-through-artba-foundation
16. Austroads <https://austroads.com.au/network-operations/network-management/safety-at-road-worksites>
17. Transport and Infrastructure Commission, Communiqué, Melbourne 22 November 2019 www.transportinfrastructurecouncil.gov.au/sites/default/files/documents/12th_transport_and_infrastructure_council_communique_22nov_2019.pdf
18. TMAA – Media <https://tmaa.asn.au/media/>
19. AAA Reviving Road Safety policy www.aaa.asn.au/wp-content/uploads/2019/09/AAA-Reviving-Road-Safety-2019.pdf
20. The Hydrogen Council <https://hydrogencouncil.com/en/>
21. Hydrogen Council - Hydrogen Scaling Up report <https://hydrogencouncil.com/wp-content/uploads/2017/11/Hydrogen-scaling-up-Hydrogen-Council.pdf>
22. International Energy Agency www.g20karuizawa.go.jp/assets/pdf/The%20future%20of%20Hydrogen.pdf
23. National Hydrogen Strategy <https://consult.industry.gov.au/national-hydrogen-strategy-taskforce/national-hydrogen-strategy-issues-papers>
24. Local Motors Company <https://localmotors.com/meet-olli>
25. Prime Minister media release www.pm.gov.au/media/greener-recycling-industry
26. Australian Council of Recycling media release www.acor.org.au/uploads/2/1/5/4/21549240/acor_media_release_recycled_roads_21102019.pdf
27. DITC&RD Automated Vehicles fact sheet www.infrastructure.gov.au/transport/land-transport-technology/files/FAQ-connected_and_automated_vehicles.pdf

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2019 Future Transport: Smart Cities

Regulatory and
Technological
Innovation



Introduction

Roads Australia (RA) is the peak body for roads within an integrated transport system. It brings industry, government and communities together to lead the evolution of Australia's roads, integrated transport and mobility networks.

RA's 150+ members include all of Australia's road agencies, major contractors and consultants, motoring clubs, service providers and other relevant industry groups. A list of RA Members is included as an Appendix to this Report.

RA led a delegation of senior industry and government leaders on a study visit to North America in July 2019. The delegation gained invaluable insights into collaborative approaches, strategies, innovative thinking and solutions that can be adopted to meet Australia's future transport and city planning challenges.

The visit built on previous study visits in 2018 and 2019 to Europe/United States and Asia which focused on the [Driverless Revolution](#)¹ and [Cities for the Future](#)² respectively.



The delegation was privileged to be given access to the highest-level government and industry players in the USA and Canada. This report reflects the deeper understanding we gained into the progress, challenges and emerging trends in regulatory and technological innovation for future transport and smart cities. Key findings highlight emerging developments and approaches that will clearly impact Australia, and for which Australian transport providers and communities need to prepare.



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2019

Key findings



1

The future transport needs of Australia's growing population calls out for much improved collaborative effort.

- All levels of government, academia and industry will have to adapt their ways of thinking and be prepared to collaborate if we are to prepare the nation for the major transport changes on the horizon.

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2

Big changes are coming – is Australia ready?

- The transition to zero emission vehicles; the introduction of connected and autonomous vehicles; and greater use of mass data and interconnectedness to drive more efficient use of existing infrastructure will challenge us.

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3

It is time for a customer focussed end-to-end journey approach.

- The American public and private sectors are changing their thinking. Forward thinking transport agencies are increasingly looking at transport from the customer's perspective.

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Making connections is the key to mobility success.

- Mobility as a service is emerging as a much more efficient way of moving people and freight and to help meet the transport needs of the young, elderly and disabled.

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More collaboration is needed in infrastructure decisions.

- Transport bodies are challenged by the infrastructure required to enable automation benefits.

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Regulators are struggling to understand the plateau in road safety improvement.

- Emerging vehicle technologies offer hope of a next step in road safety improvement but e-commerce has introduced new hazards to be addressed.

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Smart Cities work together to share experiences.

- Collaboration between cities in the USA has accelerated learnings, with a focus on social impact and customer acceptance.

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Advanced manufacturing could change the landscape.

- Micro-factories and small scale "bespoke" production techniques could see new vehicle technologies produced in Australia.

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The future transport needs of Australia's growing population calls out for much improved collaborative effort.

All levels of government, academia and industry will have to adapt their ways of thinking and be prepared to collaborate if we are to prepare the nation for the major transport changes on the horizon.

The Roads Australia delegation saw some very productive transport research projects in North America, where universities are more active on the transport front. They engage with industry, government and each other in ways not seen in Australia. Universities encourage their professors to work with industry and to bring in business collaborations and partnerships.

The US federal Department of Transportation allocates around \$300 million annually for transport related research and development, with a pre-requisite for private-sector involvement. This seed funding is provided on condition that private partners and universities contribute the bulk of funds, with clear criteria for local and state level government involvement.



As a leading example, at the Carnegie Mellon University in Pittsburgh, the delegation heard that universities carrying out community 'test-bed' research works out well for transport. Smart City research at Carnegie Mellon's Metro Lab Network involves 50 university-city pairs across the country, sharing best practice, in collaboration with industry. With the support of

the governors and mayors of the [Smart Belt Coalition](#)³, universities working at a multi-state level assists industry in their efforts to convince the public that new vehicle technology is safe.

This approach provides cities and states with greater confidence to invest in new technologies, without the inherent compatibility and lack of scale concerns in other approaches.

Roads Australia recommends that the widespread collaboration seen in North America should be fostered in Australia, enabling inherent individual strengths to be increased by greater co-operation and less competition between universities

The delegation concluded that there were many opportunities for Australia's world-class universities to be more engaged in new transport technology research and development.

However, the current funding model for Australian universities promotes competition at the expense of collaboration, creating a potential barrier to research into transport technology.

In Australia, the Federal Government funding criteria should be modified to provide seeding money for transport research which is conditional on both attracting private funds and requiring involvement of more than one university, with encouragement for more industry and local city government involvement.



Big changes are coming – is Australia ready?

The transition to zero emission vehicles; the introduction of connected and autonomous vehicles; and greater use of mass data and interconnectedness to drive more efficient use of existing infrastructure will challenge us.



It has been said that the future rate of technology change will never be as slow as it is today!

History shows that Australians are early adapters of new technology, accelerating its introduction and the displacement of earlier technologies. The study visit raised concern for delegates that government and industry are not as ready as the public to adopt new vehicle and transport innovations.

As we have seen from the introduction of disruptive business models such as ride-share, regulators can be caught short by ignoring or resisting change, rather than facilitating it by actively engaging with communities in the change process and embracing the opportunities offered.



RA Delegation and Elaine Chao,
United States Secretary of Transportation



The days of traditional fuel taxes and excises are numbered.

Every North American government organisation visited by the RA delegation, expressed concerns about shrinking fuel tax revenue and the implications for funding and maintaining infrastructure – a direct result of vehicles becoming more fuel-efficient and as more hybrid, electric and other zero emission vehicles enter the fleet. The system of funding roads through fuel taxes in North America is similar to that in Australia – so we face the same dilemma, with little evidence that there is a solution being developed that will be equitable for all road users.

In Vancouver, Canada and Contra Costa County, California, the delegation heard that local/city government authorities were allocating a portion of property and sales taxes to transport infrastructure investment. However, they also acknowledge that electric and other non-fossil fuel vehicles will cause a problem for revenue and a replacement for the important fuel tax component will have to be found – particularly in view of the long-term prospect of having 100 per cent zero emission vehicles.

Funding for infrastructure and providing new infrastructure to support new technologies were the key discussion points at a delegation meeting with US-based Australian officials and US transport industry leaders.

Australia's Deputy Head of Mission at the Australian Embassy, Katrina Cooper, joined a roundtable with Austrade, former Transport and Infrastructure Committee Chairman, The Hon William Shuster, former U.S. Secretary of Transportation, The Hon Rodney Slater, members from the mobility industry and the Roads Australia delegation for a briefing on US transport policy and issues.

Participants heard that the USA needs to spend more than \$1 trillion USD urgently to return key transport infrastructure to good repair. However, the Highway Trust Fund (set up in the 1950s from fuel levies, topped up by the Fixing America's Surface Transportation (FAST) Act funds) had not been raised in a quarter of a century – reducing funding by 40 to 50 per cent in real terms. Additionally, we learned that private sector (market) led proposals for funding, developing and operating infrastructure were constrained by policy uncertainty and as a result was a largely under-utilised alternative solution in the USA.

The American Road and Transportation Builders Association reinforced the belief that the USA would face a road-funding crisis in the next two years. They indicated that static funding at around \$44 billion USD per year would result in a shortfall of investment of \$15 billion by 2022, rising to \$23 billion per annum by 2026.

The overall impression from the delegation was that Australia's transport infrastructure was in much better shape than the US highway network, and that recent national and state government infrastructure spending commitments were likely to keep us ahead.

Roads Australia has long been an advocate for sensible transport reform. As outlined in the RA submission to the [2019 Commonwealth Budget](#)⁴, it is imperative that we move to a fairer, more efficient road pricing and investment model where road users pay according to where and when they travel. To be truly effective, road reform will ultimately have to apply to all vehicles, not just heavy vehicles.

Roads Australia recommends that Australian governments urgently consider a transition away from the fuel based road user charging system currently in play.

Any change would require examination of the related constitutional issues – where there is potential for road-user charges to be levied by state governments as an alternative to fuel excises collected by the Commonwealth.

In Australia, there is an opportunity to leverage the advanced work by the NTC and state governments to pave the way for accelerated electric and zero emission vehicle penetration of the Australia market.

Readiness for an autonomous and zero emission vehicle future is hindered by lack of inertia by legislators.

A key concern raised in the USA was the political difficulty in getting legislators and city authorities to embrace new technologies. However, there were examples where local initiatives were setting an example for others to follow.

In contrast, our delegation reflected on the significant program of work on regulatory processes for the introduction of connected, automated and electric vehicles in Australia. In particular, it was highlighted that the suite of investigations that the Transport and Infrastructure Council had initiated through the National Transport Commission (NTC), were well ahead of the USA.

California is the exception in the USA by taking a lead in promoting the introduction of electric vehicles. For example, Contra Costa County in California has completed an electric vehicle readiness plan, with an outlook that shows shared autonomous vehicles as the way of the future for air quality and mobility. They believe this will help the ageing population and avoid the problem of having to "take the keys away" from elderly drivers.

Tesla's Daniel Wohl stressed to the delegation the importance of California's regulatory schemes of credits and debits on carbon. Tesla believes California is doing more than any other entity to accelerate sustainable transport, where the carbon credit and debit scheme in effect acts as a fuel tax because producers who pay into the scheme pass costs on to consumers.

The major national effort in electric vehicles in the USA is in the transition to electric buses. The National Highway Traffic Safety Administration (NHTSA) reported that there are five active American bus manufacturers, with over 6,000 electric buses already estimated to have been sold to date. These buses are seen to have the biggest potential for use in Mobility as a Service (MaaS) operations.

Government initiatives in Australia, such as the South Australian government consultation on development of an [electric vehicle strategy](#)⁵, which was supported by Roads Australia, are to be commended.

Hydrogen as an alternative fuel is gaining attention

In the USA, the NHTSA and the US Department of Energy, together with four transit agencies, are in the early stages of experimenting with three different models of fuel cell buses. Recognising that Japan is well advanced in refuelling technology, NHTSA is also working with Japan to conduct demonstration projects in Michigan, New York and California.

NHTSA expects that deployment of alternative fuels in the USA will be gradual, and via the introduction of designated alternative fuel corridors to allow public engagement with new technologies. The global standard for hydrogen fuel, currently in development for expected release in 2021, should be a catalyst for further development.

However, a [CNBC report](#)⁶ indicates that the momentum for hydrogen fuel cell vehicles is building in the USA. It reports that Toyota has found 5,000 buyers for the Mirai hydrogen fuel cell family car model since it was introduced in 2015. There are also around 1,100 Honda Clarity fuel cell vehicles on the road in the USA. Fuel station infrastructure has been recognised as an impediment to growth. There are currently 39 public hydrogen fuelling stations in California (with another 25 in development), plus a handful of stations operating in New York, New Jersey, Massachusetts, Connecticut and Rhode Island, with more in development.

In California, the State is spending more than \$2.5 billion USD in clean energy funds to accelerate sales of hydrogen and battery vehicles. This includes \$900 million earmarked to complete 200 hydrogen stations and 250,000 charging stations by 2025.

In Canada, the City of Vancouver is well advanced in the adoption of hydrogen as a fuel of the future. For the 2010 Winter Olympic Games in British Columbia, the Government added 20 fuel cell buses to Vancouver's transit network. This experimental venture ran until the end of the program in 2014. Canada's commitment to trialling sustainable future technologies has continued through the Department of [Natural Resources Green Infrastructure Fund](#)⁷, launched in 2017, to support the efforts of industry and government entities to deploy clean energy infrastructure solutions. In June 2018 the fund supported establishment of Canada's first retail hydrogen station in Vancouver, at an existing Shell service station.

The early work on hydrogen in the US and Canada, including collaborations with Japan, reinforces Roads Australia's position that Australia can be a leader in hydrogen fuel development - the National Hydrogen Strategy is our opportunity to ensure we are positioned to grasp this opportunity

The [Hydrogen Council](#)⁸ is a global initiative of leading energy, transport and industry companies launched at the Davos World Economic Forum 2017. This growing coalition of CEOs has ambitions to: accelerate significant investment in the development and commercialisation of the hydrogen and fuel cell sectors; and to encourage key stakeholders and policy makers to increase their backing of hydrogen as part of the future energy mix.

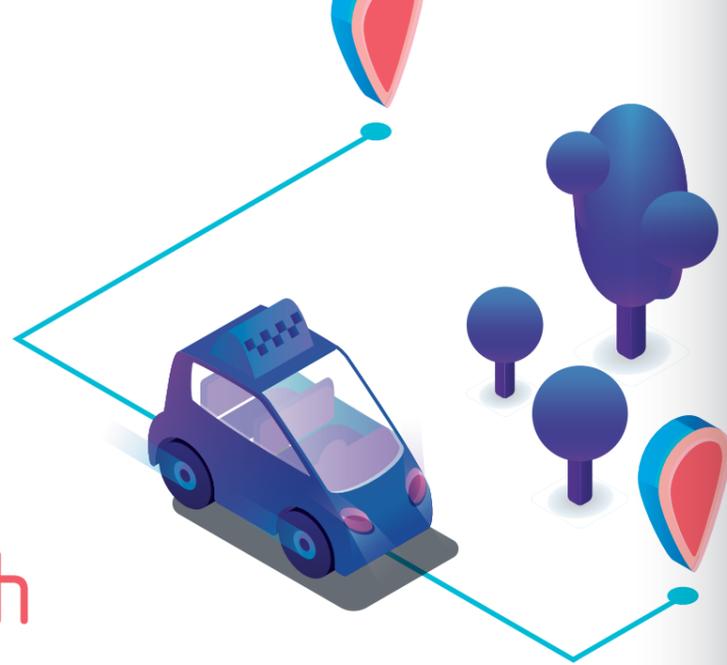
The Hydrogen Council [Hydrogen Scaling Up](#)⁹ report "vision for 2050" sees the hydrogen economy as a central pillar of the energy transformation required to limit global warming. The report proposes that the transportation sector, through hydrogen-powered fuel cell EVs (FCEVs) could combine with battery EVs to achieve a deep decarbonisation of all transportation segments. It believes FCEVs are best suited for long-range, heavier payload applications where trucks and buses (while accounting for only five per cent of all projected FCEVs in 2050) could potentially achieve more than 30 per cent of hydrogen's total transport sector CO₂ abatement potential.

The report predicts that by 2030: one in 12 cars in Germany, Japan, South Korea, and California will be powered by hydrogen; with 10 to 15 million cars and 500,000 trucks worldwide hydrogen powered. The Council vision for 2050 sees up to 400 million passenger vehicles (~25 per cent), 5 million trucks (~30 per cent), and more than 15 million buses (~25 per cent) running on hydrogen, worldwide.

Hydrogen applications for material handling have had the largest uptake so far. The [US Department of Energy](#)¹⁰ reports that fuel-cell powered forklifts already outperform battery powered alternatives, resulting in more than 15,000 fuel cell forklifts operational in global warehouses in 2017, including major users such as Amazon and Walmart in the USA. A [Future of Hydrogen Report](#)¹¹ – *Seizing today's opportunities*, prepared by the International Energy Agency for the recent G20 meeting in Japan, highlighted 2019 as a critical year for hydrogen. With unprecedented momentum around the world, the report predicts that hydrogen is finally on a path to fulfilling its longstanding potential as a clean energy solution.

To this end, our delegation noted that Australia had significantly accelerated consideration of hydrogen for transport through the COAG Energy Council National Hydrogen Strategy development, [Hydrogen for Transport](#)¹² working group. The advancement of hydrogen as the potential future fuel of choice by the Japanese Government was a key finding from the Roads Australia 2018 Cities for the Future Report.

It is time for a customer focussed end-to-end journey approach



The American public and private sectors are changing their thinking. Forward thinking transport agencies are increasingly looking at transport from the customer's perspective.

The Roads Australia delegation was impressed by the range of customer oriented thinking being exhibited in many of the transport authorities they visited. For example, the National Highway Traffic Safety Administration indicated that they are currently working with over 3,000 transit agencies across the USA, with a budget of \$150M USD, to conduct automated research demonstrations, integrated mobility (mobility on demand), and environmental and regional research. The key aim was to improve the quality of life for US citizens by looking at transport from the customer's perspective.

With respect to new vehicle technology and services:

- Planning must recognise that it is the customer who makes a journey. Providers of all the modes in that journey should co-operate, relate and form partnerships so that the customer journey is as seamless as possible.
- Mobility must be seen as a service for all, including the young, the elderly and people with disability.
- Mobility must be provided equitably because everyone has an interest in the efficient movement of people and freight. If people cannot get to and from places of health, education, retail and commerce, it eventually costs everyone.

Seamlessness can only be enhanced if providers work together to consider the human synergistic and technological assistance needed at interface points to facilitate connection without excessive waiting time. There is also a focus on advances in the design and security of payment systems that are easy to use, through mobile devices and apps, moving towards single payment options across the journey.

This approach was reinforced in Canada, where private company Cubic aims to have a single charge for the whole customer journey, including parking. Cubic develops public transport and fare reading and payments systems that integrate multiple back-end systems, rather than providers working in silos. The Mobility as a Service (MaaS) operation model is supported by building on existing technologies, layered to provide an overall solution.



3D printed vehicle at Local Motors, Washington

In Contra Costa County, engagement with the community has been dramatically increased by the introduction of telephone town hall meetings. This technology has improved the level and quality of response, compared to a conventional town hall meeting where typically 40 or so people, mainly with complaints, attend. The wide networking introduced in the County enables collection of a broader spectrum of ideas and valuable engagement. Without input from the community, they believe a lot of planning and environmental work is potentially wasted and construction is often impeded by community objection or lack of need. When people take ownership they take better care of the system and give better information.

There are many opportunities for Australian companies and transport providers to collaborate and harness and/or develop new technologies and applications for whole of journey information, optimisation and payments.



New approaches, players and partnerships are emerging

The delegation saw cutting-edge developments in connected electric and autonomous vehicles by private and public-sector entities, and an enthusiasm for them because of their economic and environmental benefits. Newer information technology companies are playing a greater role in transport than ever before.

In North America, the role of government in transport is changing. Local and regional governments are taking a more active and integrating role. For example, Vancouver's city government agency, Translink, runs trains, buses, ferries and sky-trains as well as planning and constructing roads and railway lines.

Translink aims to reduce congestion, but has a challenge similar to Australian cities, with 57 per cent of journeys in Vancouver taken by car. However, active transport initiatives, such as the introduction of bicycle lanes, are becoming more accepted. Taking road space away from cars originally faced significant public discontent, however, five years after introduction the initiative is now accepted and working.

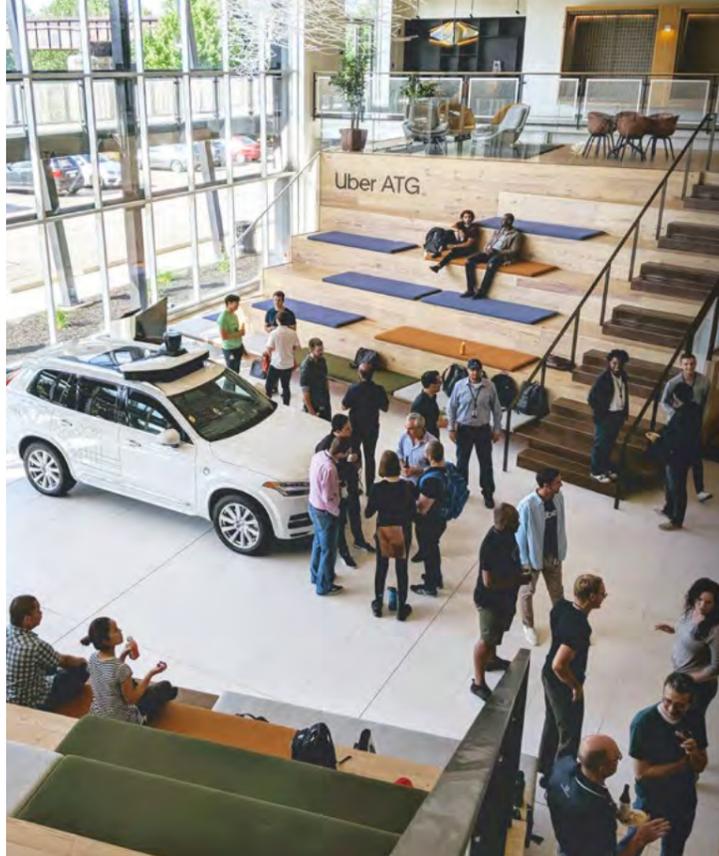
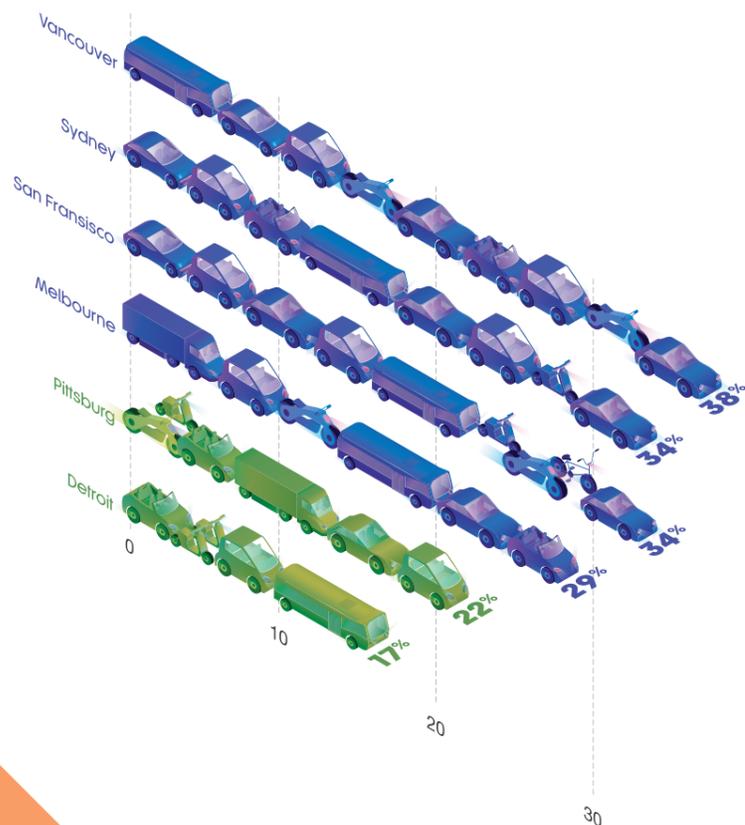
Faced with city population growth similar to major Australian cities, Vancouver, which expects to grow by one million people in the next two decades, recognises that it must make public transit easier. It is looking to information technology as a strong facilitator of change in travel mode preferences. Transport planners see the information being collected from every tap by a customer, as vital in system use analysis and forward planning decisions. The future potential for increasing customer travel information and options, and improving dynamic network operating control cannot be underestimated. The use of coordinated transport data control and management was highlighted by a high strategic focus in Asian countries in the RA [Cities for the Future report](#)². City governments, like Vancouver, while not yet at the same level of public transport focus as leading Asian cities, are recognising the advantage of building strong capability in collection of data on the end-to-end customer journey.

The strong message for Australia remains that access to data for all transport modes will be essential for managing demand and delivering customer focused services across an expanding range of mode choices.

Environmental and urban development issues are high on the agenda

Governments in North America, especially city governments, are looking at alternative ways to raise money for infrastructure investment. At the same time they are looking to new technologies in their efforts to discourage peak-time travel, and to reduce congestion through better use of existing infrastructure. This is similar to the increased awareness in Australia on the importance of being ready to develop, adapt and apply new technology to network management.

City traffic congestion level 2018 (TomTom)



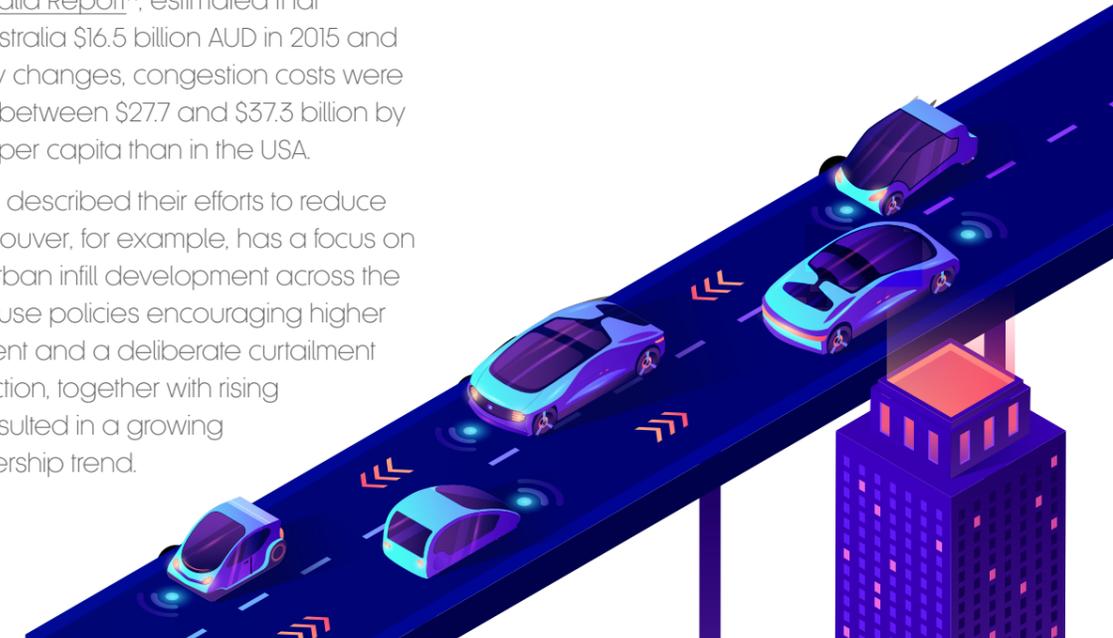
California, both as a state and through its municipal authorities, is pushing as quickly as possible towards 100 per cent low or zero-emission vehicles in a connected environment that will allow for autonomous vehicles.

Australia shares a common urban congestion problem with the USA, where it is growing as a major issue and is estimated to cost \$305 billion USD a year.

The TomTom Traffic Index¹⁵ measures international city congestion levels as a percentage of extra travel time experienced by drivers across the entire year, compared to a baseline of travel times during uncongested, free-flow conditions. While not in the highest, 'red zone', of the TomTom index, some of the cities visited by the delegation appear with Sydney and Melbourne in the "yellow" (25 to 50 per cent) congested range. It is interesting to note the Pittsburgh and Detroit, both with active smart city programs, have significantly less comparative congestion.

The Australian Automobile Association 2018 Road Congestion in Australia Report¹⁴, estimated that congestion cost Australia \$16.5 billion AUD in 2015 and without major policy changes, congestion costs were predicted to reach between \$27.7 and \$37.3 billion by 2030. This is higher per capita than in the USA.

Several jurisdictions described their efforts to reduce urban sprawl. Vancouver, for example, has a focus on high density and urban infill development across the city. The city's land-use policies encouraging higher density development and a deliberate curtailment of freeway construction, together with rising fuel prices, have resulted in a growing public transport ridership trend.



Contra Costa County, in California has agreed with 21 of its municipalities not to approve development beyond a defined urban boundary, with penalties through fuel-tax allocation cuts to fund the extra infrastructure burden, for development approved outside the zone.

To meet community environmental concerns, Vancouver has the intention of converting TransLink's 1500 strong public transport bus fleet to electric operation, with the long-term aim to have 100 per cent renewable energy running all transport modes.

The National Highway Traffic Safety Administration reported on similar moves across the USA for buses to go electric. This is seen as an easier transition to EVs than for private cars because buses can be charged at the depot and distances between charges are a known quantity due to set routes. While installing of remote charging stations to expand the network for buses can be expensive, as was seen in Vancouver where a typical remote site costs C\$1m, passengers have indicated a preference for electric buses because they are smoother, quieter and have no fumes.

North America is certainly not as advanced as our Asian neighbours in the integration of transport and land-use planning, as seen in the 2018 Roads Australia study visit². However, the cities visited by the 2019 delegation have commenced this important journey. A significant point of difference to Australia is the high involvement of city and municipal governments in taking a lead on these issues. While it is pleasing to see the development of a solid investment pipeline for public transport upgrades in Australia, more strategic engagement with city and large urban local government authorities is needed to integrate transport investment with land use and urban development planning.

The challenge remains for the three tiers of government in Australia to achieve much stronger collaboration in the integration of transport and land use planning.

Making connections is the key to mobility success.

Mobility as a Service (MaaS) is emerging as a much more efficient way of moving people and freight and to help meet the transport needs of the young, elderly and disabled.

The Roads Australia delegation was impressed that the government authorities visited were placing less emphasis on cost of service and cost recovery, and more emphasis on overall customer value propositions. They emphasised that specific cost recovery for each transport leg may be counter-productive if the broader societal cost is greater – for example, if a person can't get cheaply and efficiently to his or her doctor's appointment or to engage in a commercial transaction.

Both private and public sector entities stressed to delegates the importance of safety and privacy in the development of autonomous and connected vehicles, but were equally concerned that over-regulation might stifle innovation.

Mobility as a disability reducer

At the Robotics Institute at Carnegie Mellon University delegates discussed advances in thinking on accessibility. The Institute's research shows that traditional transport for people with disabilities costs up to 10 times that of regular transit rides. They believe the untapped demand for mobility would be huge if people could get a CAV and go places without a driver.

Carnegie Mellon University has been developing autonomous driving technology for more than 30 years, and the University's expertise and graduates have attracted a number of self-driving car companies to Pittsburgh. Argo AI was founded in 2016 by a team of Carnegie Mellon alumni and experts from across the industry.

In June 2019, Carnegie Mellon and Argo AI announced a five-year, \$15 million sponsored research partnership. The self-driving technology company will fund research into

advanced perception and next-generation decision-making algorithms for autonomous vehicles, to help self-driving vehicles to operate in a wide variety of real-world conditions, such as winter weather or construction zones.

There is solid evidence that mobility providers such as Uber and Lyft are responding to city government and society demands that they must serve people with disabilities, by development of applications that can be used by deaf and blind customers.

CAV developers also see the writing on the wall, and whether by regulation or fear of regulation, the likelihood is that more accessible CAVs will be developed to service the needs of people with disabilities, whether in wheelchairs, with impaired mobility or blind. The transition to driverless CAVs will include consideration of many factors, including provision of a remote presence – someone to talk to clients, or non-driving attendant.

Mobility provider perspective

Global ride-share company Uber views mobility as a huge, complicated equation. There are one billion plus cars in the world, which spend on average 95 per cent of their time parked. So society is spending money on a lot of infrastructure to do nothing. Sixty per cent of private vehicle travel distance is by a single person, which is very inefficient.

Uber believes the future benefit of autonomous vehicles is in giving the public wider access to transport options, integrated with public transit – in effect moving our transport culture from single-occupant vehicle ownership to shared vehicles. "We do not see a future where privately owned vehicles are replaced by more expensive privately owned electric/self-driving vehicles. The fleet-based, mobility as a service model, will replace private vehicle ownership". There is potential for each shared vehicle to replace 10 privately owned cars.

The company believes the move to electric vehicles will help the environment through reduced emissions, combined with the inherent safety benefits from automated vehicles. As a Mobility as a Service option, EV/AV vehicles are also more efficient, because they can be on the road moving more people for a greater percentage of their time, and more equitable because they provide mobility for people who cannot afford and/or have no access to a car.

However, Uber highlights that the transition to autonomous vehicles will not be without challenges. AVs deal in absolutes, while human driving is much more nuanced. For example drivers of non-autonomous vehicles may be frustrated with the strict adherence of AVs to road laws, such as speed limits.

There has been a setback to Uber on-road testing since the fatal crash involving a trial vehicle in 2018. However, while trials have been gradually and methodically returning to public roads, the upside has been greater industry co-operation and information sharing with government on development of universal operating standards.

As a strong advocate for the academic/government collaborations with industry, such as the Pittsburgh example, Uber believes this approach will accelerate AV acceptance in the community. It highlights that it is easy to test a self-driving car on a highway or test track, but in reality vehicles have to work in complicated city environments. Pittsburgh's complicated network of tight turns, bridges, trees and messy streetscapes, combined with the opportunity to draw on some of the best robotic minds in the world at Carnegie Mellon University, makes it an ideal testing ground. Uber has discussed with Pittsburgh City the idea of 'calmed city streets' to provide a safer environment for its citizens and a more consistent environment for autonomous vehicles to operate.

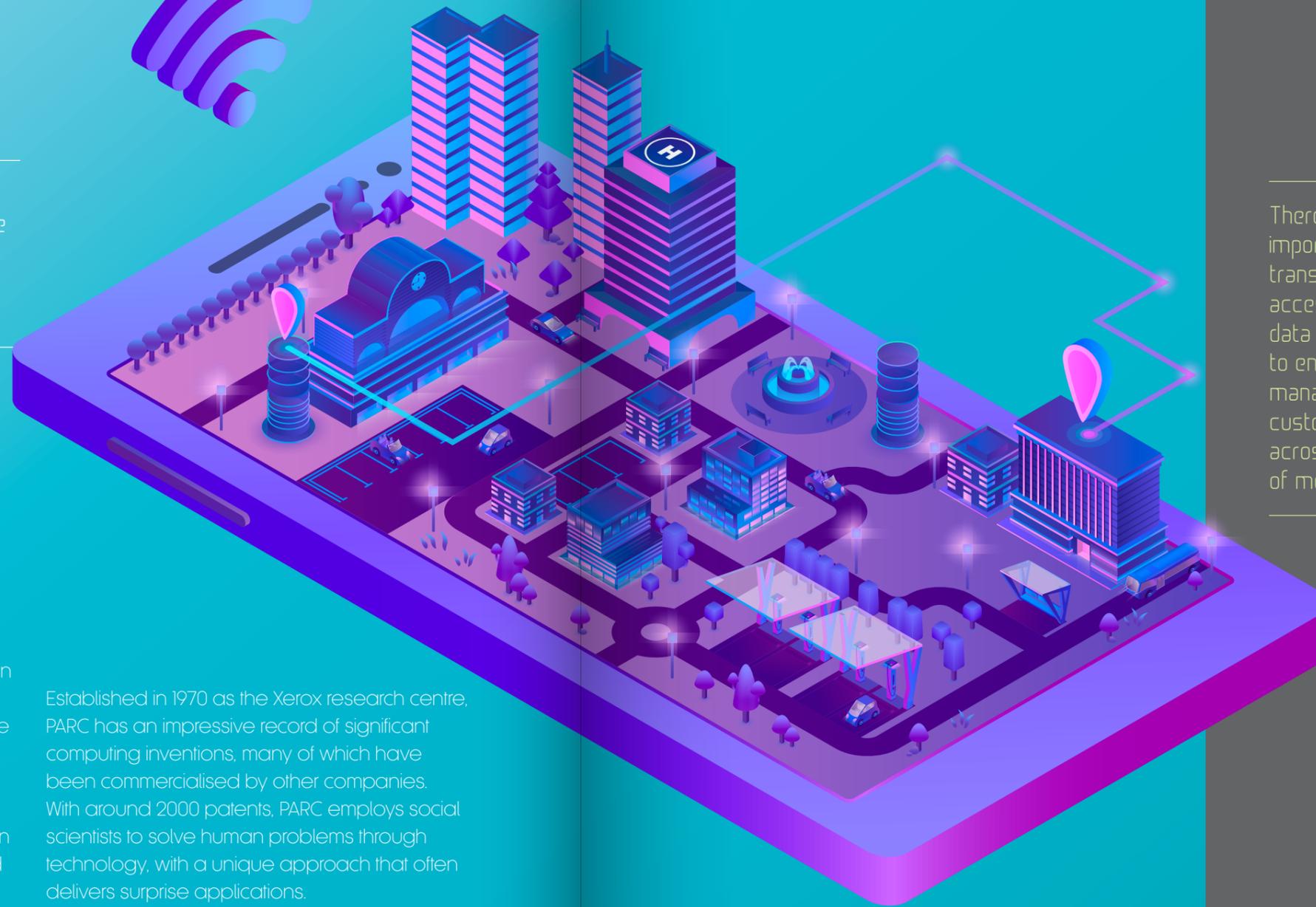


The challenge for all governments will be to strike the right balance between appropriate regulation and gaining societal advantage from emerging driverless Mobility as a Service operations.

Mobility Research and Development

In California, the Roads Australia delegation visited the Navya headquarters and production facility. Navya is responding to an increasingly urbanised market, which it believes will drive the demand for Mobility as a Service and green transport solutions, to reduce congestion and emissions. The delegation was also treated to an inside insight into transport research in Silicon Valley, at Palo Alto Research Centre (PARC) and Neo4j, before visiting EV manufacturer Tesla.

Established in 1970 as the Xerox research centre, PARC has an impressive record of significant computing inventions, many of which have been commercialised by other companies. With around 2000 patents, PARC employs social scientists to solve human problems through technology, with a unique approach that often delivers surprise applications.



There has never been a more important time for Australian transport agencies to have access to customer travel data for all transport modes - to enhance demand management and to deliver customer focused services across an expanding range of mode choices.



In a project sponsored by the Victorian Government's public sector innovation fund, PARC is currently working with VicTrack¹⁵ on a Phase 2 trial of Moxi Fibre Optic Sensors. The project aims to optimise bridge maintenance and management costs by placing sensors on bridges to measure stress, strain and movement against various traffic loadings.

Neo4j, a Swedish start-up company, explained to the RA delegation how work with graphic databases can make use of masses of data to give insights into human behaviour and decision making.

These visits emphasised to the delegation the breadth of possibilities from the 4th Industrial revolution, where there is no doubt that automation, artificial intelligence and the analysis of mass information will have a dramatic impact on future transport.



More collaboration is needed in infrastructure decisions.

Transport bodies are challenged by the infrastructure required to enable Automation benefits.

At the National Highway Traffic Safety Administration the delegation discussed the significant work to be done on how AVs will interpret the road environment. Lane markings, for example, might have to be wider or shorter and be better maintained. Road constructors will have to engage in more collaboration with vehicle developers to find out what infrastructure changes are needed to enhance the ability of AVs to interpret the environment.

There is a strong view in the USA that industry needs to set the standards for AVs to meet the safety requirements of regulators and the public. The role of regulators is to determine the threshold for safety. US administrators counselled that if you are relying on infrastructure to meet certain standards and be maintained to ensure AV safety in all circumstances, you are setting yourself up to fail. Autonomous vehicles will need to prove their technology is inherently safe, whatever the environment.

North American entities have an emphasis on trying to predict future transport expectations to inform project options and solution choices. When looking at infrastructure priorities, the delegation discussed the need to look at consequences of introducing new technologies so that new infrastructure can be future-proofed.

Planning should be directed at the interconnectedness of things, with greater community engagement and big picture thinking rather than a project by project approach.

This discussion raised concerns by the delegation that Australia may need to consider whether existing legislation passed in the 1980s and 1990s might inadvertently be inhibiting innovation in transport. The work by the NTC in reviewing regulatory issues relating to the introduction of AV/EV technology, combined with the review of associated national road laws is strongly supported. At a national level, this approach is well ahead of the relatively hands-off approach by US regulators.

While acknowledging that Australia has taken many positive steps in the autonomous journey, the lesson from North America is that the Federal Government needs to give more support to state efforts.

Roads Australia is concerned that state jurisdictions are required to do the heavy lifting on infrastructure readiness for AVs. Without strong national leadership, support and investment commitment, the burden on states will be too great and impede the roll-out of new, safer mobility solutions.



Asset Data Capture

Rapid data capture of road assets and condition is seen as essential for US road owners to ready themselves for the onset of AVs. Drive-past capture technology is being used at cost of around \$40 USD per kilometre, in many cases replacing the need for expensive manual inspection.

Asset data capture company, Roadbotics, argues that replacing human inspection with artificial intelligence technology avoids the inherent frailties of limited human attention span. The captured data can be used to verify maintenance contractor delivery performance, to establish benchmark standards and to validate expenditure effectiveness.

While the technology offers a fast, low-cost baseline for pavement condition, it doesn't seek to replace the sophisticated and detailed road pavement diagnosis offered by engineering consultants or organisations such as the Australian Road Research Board.

At Translink, the delegation heard that Vancouver is one of the first cities in North America to open its transport database. This means, for example, that trucking companies can log in and do their own route planning.

The delegation discussed the challenges facing Australian road authorities in capturing sufficient asset data to prepare for AV introduction. While State and Territory road authorities are well advanced and have processes in place similar to the US authorities, there is significant concern as to the readiness of local government road authorities.

Local Government Association¹⁶ figures show that our approximately 550 local government councils are responsible for 75 per cent of the Australian road network. Our delegation is concerned that the local government road and street networks, combined with scarce resourcing to deal with the complexity of asset data capture, could be a major impediment to AV introduction in Australia.

Roads Australia sees lack of involvement by local government authorities in infrastructure readiness as a critical risk to transition to an autonomous vehicle future.

Regulators are struggling to understand the plateau in road safety improvement.

Emerging vehicle technologies offer hope of a next step in road safety improvement but e-commerce has introduced new hazards to be addressed

The delegation visit to the Federal Motor Carrier Safety Administration discussed the agency's concern with a recent increase in truck crashes in the USA, indicating that this could result in calls for more mandated rules by Congress. There has been an explosive growth in contract deliveries due to e-commerce, now estimated to represent 10 per cent of the US economy. This is seen as the likely cause of the trend in increased fatalities involving smaller trucks.

At the National Highway Traffic Safety Administration (NHTSA) the delegation discussed how autonomous vehicles will disrupt and challenge the human oriented regulations. The agency sees engagement with all technology development companies as essential in finding solutions to emerging issues and to help set standards.

NHTSA's work with over 3,000 transit agencies includes a number of behavioural change programs with the aim of addressing impaired driving from distraction, driver drowsiness and seat belt use. NHTSA's four key areas of current focus are all related specifically to automated vehicles.

- 1 Current confusion as to what is an automated driving system.** SAE levels are great for engineers but are difficult for the public to interpret. Work is underway to better understand how to communicate so that the public better understand what is expected of them in the role of driver, particularly throughout the transition to fully-automated Level 5 vehicles.
- 2 Vehicle assessment and assurance.** Recognises that the traditional way of assessing vehicles for use on US roads may not be practical for automated vehicles. Balancing regulatory assurance with industry validation responsibilities through seeking agnostic solutions to this challenge.
- 3 Safety assessment tools and scenarios.** The methods of safety assessment for automated vehicles will need to be very sophisticated and be co-ordinated so that the right test is conducted in the right manner. There is concern that testing on a test track may not be adequate for the assurance system. The question, 'How can the system assess risk in an objective manner?' is guiding this work.
- 4 Protect the occupant.** While the plan for automated vehicles is that they don't crash, the NHTSA continue to research the behavioural aspects of the driving task to progress their investigations. For example, 'What do humans do that an automated vehicle needs to replicate?', 'How do we train humans to drive an automated vehicle when needed?' and 'How do drivers deal with conservative automated vehicles and share the road in traffic?'

Like Australia, U.S. road safety statistics are trending negatively after years of consistent decreases in fatalities and serious injuries. The NHTSA suspects human behavioural activities, such as distraction, are a major contributor to crashes. It believes there is a hard-core group of people who are not getting the message about driving under the influence of drugs and alcohol, which contributes to a third of deaths. There is also concern with the increase in bicycle and pedestrian deaths. Not wearing seat belts, also a key issue in Australia, is a contributor to around 50 per cent of fatalities. In a similar trend to Australia, US fatalities are 2.6 per 100,000 in urban areas compared to 12 per 100,000 in rural areas.

Contra Costa County believes the present measure of road safety performance (deaths per 100 million miles travelled) is a reactive measure that waits for the crashes before doing anything. It sees that the evolving 'big data' landscape will provide lead indicators such as near misses and skidding incidents, and allow for proactive intervention.

US regulators see the introduction of autonomous vehicles as the next step in road safety. While they are technology neutral, administrators have to make sure they are not behind the curve of technological development. Regulators believe companies should be working on the basis that the roads will be as

they are and their AVs will have to be good enough to cope with existing assets. Safety is number one, but administrators do not want to stand in the way of innovation. Governments in the US are focussed on creating a safety assurance framework for AV introduction - finding a balance to avoid prohibiting market entry by modifying existing regulatory standards so that they can apply new technologies. This will require a balance between adequate risk mitigation and cost and complexity of regulations.

The American Road and Transportation Builders Association (ARTBA) indicated that roadwork zones in the USA account for 65,000 crashes and 48,000 injuries (15,000 of them road workers), and nearly 800 deaths (135 of them road workers). The aim was to head towards zero deaths through their [Safety Certification for Transportation Project Professionals Program](#)¹⁷. An on-line safety centre has been established, with a large group of industry partners, with a focus on training candidates to attain the skills to identify temporary traffic control occupational, health and safety hazards, and to develop a safety planning culture and climate, with thorough incident investigation. Over 84 companies in 37 states have engaged this valuable service to date.

While Australia appears more advanced in its application of the safe system approach to road safety and traffic management and control around roadwork sites, it is recommended that Australian authorities should take a close interest in the [Safety Certification for Transportation Project Professionals Program](#)



Smart Cities work together to share experiences.

Collaboration between cities in the USA has accelerated learnings, with a focus on social impact and customer acceptance.

The US Federal Government actively structures funding mechanisms to facilitate partnerships across industry, community, academia and governments. The aim is to bring diverse players from across the transport system together to drive a common goal to enable a safe, connected and automated future.

After the US Department of Transportation Smart City Challenge, the cities of Pittsburgh and Detroit emerged as ambitious cities with similar challenges, which stimulated participation in the [Smart Belt Coalition](#)¹⁸ alongside their state counterparts, the private sector and academia.

The City of Pittsburgh participates as part of the Smart Cities Collaborative program which brings together 22 communities and cities to collaborate on the challenges related to implementing smart mobility policies and projects. The collaboration helps explore how emerging technologies and new mobility options can improve urban transportation, such as reshaping the use of the right-of-way and curb space and to ensure people and goods keep moving through Pittsburgh safely and efficiently.

Better to say Smart Communities rather than Smart Cities.

The City of Detroit admits that for too long the developers of future urban mobility solutions and those charged with overseeing its implementation have been in separate rooms, if not planets! A strong economic development strategy and brand campaign is now driving change. The Michigan Centre for Economic Development recently hosted [Detroit/Moves](#)¹⁹, a networking activity bringing mobility and technology providers together with government agencies to innovate.

The Detroit city vision is to bring the future of mobility to the people and to the streets of Detroit as a powerful component of the [smart economic stimulation strategy](#)²⁰ for a city in transformation.

This value proposition and branding is also a key strategy being implemented by the state of Michigan's Economic Development team to stimulate innovation in automated, electric, shared and connected transportation technology. [PlanetM](#)²¹ is Michigan's mobility initiative which connects companies (small and large) to government, academic institutions and other companies in the "mobility ecosystem" – the people, places and resources dedicated to the evolution of transport mobility.

Also known as Motor City, Detroit's PlanetM office space is an open space, collaborative environment where new initiatives such as [Project Kinetic](#)²² have developed. Bosch is one of the major global organisations already taking advantage of this collaborative environment.

The University of Michigan Transportation Research Institute (UMTRI) carries out world-leading research in state-of-the-art laboratories, investigating human to machine interfaces. This research aims to better understand how drivers (particularly vulnerable drivers, such as the elderly) learn and use automated vehicle technologies and systems. UMTRI has a large collection of naturalistic driving study data and one of the largest set of connected vehicle data in the world, assisting to inform manufacturers and policy makers to propel their pursuit to national AV deployment.

Australia has a lot to gain from mirroring the Michigan approach and the PlanetM model, and more generally the North American attitude to "Keep trialling". Trialling is undertaken with a give it a go attitude – "If it doesn't work, learn from it and move on to the next thing, without being scared of occasional failure on the way".

Finding new ways to learn, develop and exchange ideas internationally can support Australia in responding well to the opportunities that connected and automated vehicles provide. The recently signed [Memorandum of Understanding](#)²³ between the Australian Government and the State of Michigan is a great example.



Roads Australia recommends that the Federal Government, or an innovative state government, should consider establishing a facility based on the Michigan PlanetM model.



In Pittsburgh, the delegation discussed how the battle for the kerbside is playing out as new mobility innovation hits the streets. This city (in consultation with the community) has developed the Complete Streets Plan to rethink mobility and transportation, with the aim of improving the quality of life for citizens across its 1,300 mile road network. The initiative is supported by a self-organised collective of last mile and alternate commute mobility providers who are working together to develop Pittsburgh's mobility tool kit²⁴, and undertaking community-designed pilots to trial new urban mobility solutions.

The Pittsburgh model is an outstanding example of how micro-mobility is recognised as a fundamental component of a modern, urban transportation system. The city is exploring how to embrace an increased choice of mobility options to share existing infrastructure safely, while industry is working hand-in-hand to understand how existing infrastructure and urban mobility services might work best. While the engagement model ensures that citizens are able to design trials to understand the best way to adopt innovative first and last mile mobility options for their community needs.

Cities will need to adapt to their community's rapid adoption of new transport options. For example, electric scooter sharing company Bird, described to our delegation the huge growth in its electric-scooter use. While there have been acknowledged teething problems and varied acceptance in US cities, scooters are aimed at transforming urban mobility with safe, clean, affordable transport.

In one year shared electric scooter rides rose to 38.6 million from zero, surpassing bike share rides. Bird is now in 120 cities around the world. The growth trajectory is huge, meaning cities will have to rethink road design to accommodate more bike lanes – not just paint on the road, but rather protected bikeways. Bird believes that any city not thinking about changing its infrastructure would be falling behind.

There is strong evidence that city and state governments that develop strong connections with their communities will have the edge in the development of smart city solutions.

Advanced Manufacturing could change the landscape.

Micro-factories and small scale "bespoke" production techniques could see new vehicle technologies produced in Australia.

Case Study - LOCAL MOTORS, OLLI

Founded in Phoenix, Local Motors is a community co-design technology company that aspires to give people the opportunity to design and drive their own transport. After many trials working with the community to develop useful transport vehicles, Local Motors introduced Olli, a crowd-sourced 3D printed, electric and automated shuttle.

This small, stubby, bread-box styled vehicle is made from recycled low-grade thermoplastic reinforced with carbon fibre. Currently, Olli is permitted to operate on state roads up to 25 miles per hour, however in current trials in Maryland, Local Motors have adopted to travel at 12 miles per hour.

While testing on this autonomous shuttle is still a work in progress, the key observation by our delegation was that the business model could be a major disrupter to traditional vehicle manufacturing. Local Motors presents an alternative approach, designing bespoke mobility vehicles that can be printed and constructed using a 3D printer in 44 hours. The model invites collaboration in local micro-factories the size of grocery stores with vehicles then sold directly to consumers.

The company believes it is conducting world-leading research into material strength and structures and anticipates opening between 50 and 100 micro-factories in the next decade. Each tool-less factory costs approximately USD\$20 million to build, a fraction of the cost of traditional assembly line automotive manufacturing. Indicative break-even production costs, based on crowd-sourced designed vehicle, the Rally Fighter, can be achieved after only 60 units.

There are many challenges for regulators to consider when assessing the safety and access for these vehicles, and to sufficiently demonstrate acceptance to meet public expectations. However the improved transport accessibility offered by this alternative manufacturing approach, makes it an imperative for regulators to work with industry to develop standards that do not impede progress.

Roads Australia believes that the "Olli" case study points to a significant pending disruption to traditional vehicle manufacturing scale and delivery timing. There is no reason why micro-factories and small scale "bespoke" production techniques could not see new vehicle technologies produced in Australia.



Roads Australia recommends that the Federal Government should develop a business case for the establishment of a small scale vehicle manufacturing Co-operative Research Centre (CRC).

Summary of key findings and recommendations

1. The future transport needs of Australia's growing population calls out for much improved collaborative effort.

The widespread collaboration seen in North America should be fostered in Australia, enabling inherent individual strengths to be increased by greater co-operation and less competition between universities.

In Australia, the Federal Government funding criteria should be modified to provide seeding money for transport research which is conditional on both attracting private funds and requiring involvement of more than one university, with encouragement for more industry and local city government involvement.

2. Big changes are coming – is Australia ready?

Roads Australia recommends that Australian governments urgently consider a transition away from the fuel-based road user charging system currently in play.

In Australia, there is an opportunity to leverage the advanced work by the NTC and State Governments to pave the way for accelerated electric and zero emission vehicle penetration of the Australia market.

The early work on hydrogen in the US and Canada, including collaborations with Japan, reinforces Roads Australia's position that Australia can be a leader in hydrogen fuel development - the National Hydrogen Strategy is our opportunity to ensure we are positioned to grasp this opportunity.

3. It is time for a customer focussed end-to-end journey approach.

There are many opportunities for Australian companies and transport providers to collaborate and harness and/or develop new technologies and applications for whole of journey information, optimisation and payments.

The strong message for Australia remains that access to data for all transport modes will be essential for managing demand and delivering customer focused services across an expanding range of mode choices.

The challenge remains for the three tiers of government in Australia to achieve much stronger collaboration in the integration of transport and land use planning.



4. Making connections is the key to mobility success.

The challenge for all governments will be to strike the right balance between appropriate regulation and gaining societal advantage from emerging driverless Mobility as a Service operations.

There has never been a more important time for Australian transport agencies to have access to customer travel data for all transport modes - to enhance demand management and to deliver customer focused services across an expanding range of mode choices.

5. More collaboration is needed in infrastructure decisions.

Planning should be directed at the interconnectedness of things, with greater community engagement and big picture thinking rather than a project by project approach.

Roads Australia is concerned that state jurisdictions are required to do the heavy lifting on infrastructure readiness for AVs. Without strong national leadership, support and investment commitment, the burden on states will be too great and impede the roll-out of new, safer mobility solutions.

Lack of involvement by local government authorities in infrastructure readiness is a critical risk to smooth transition to an autonomous vehicle future.

6. Regulators are struggling to understand the plateau in road safety improvement.

While Australia appears more advanced in its application of the safe system approach to road safety and traffic management and control around roadwork sites, Australian authorities should take a close interest in the Safety Certification for Transportation Project Professionals Program.

7. Smart Cities work together to share experiences.

The Federal Government, or an innovative state government, should consider establishing a facility based on the Michigan PlanetM model.

There is strong evidence that city and state governments that develop strong connections with their communities will have the edge in the development of smart city solutions.

8. Advanced Manufacturing could change the landscape.

The Federal Government should develop a business case for the establishment of a small scale vehicle manufacturing Co-operative Research Centre (CRC).



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References

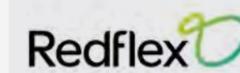
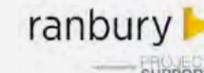
1. RA Preparing for the Driverless Revolution Report 2017 [📄](#)
2. RA Cities for the Future Report 2018 [📄](#)
3. Smart Belt Coalition [🌐](#)
4. RA Commonwealth Budget Submission 2019/20 [📄](#)
5. An Electric Vehicle Strategy for South Australia [📄](#)
6. CNBC Powering the Future Report [🌐](#)
7. Natural Resources Canada Green Infrastructure Fund [🌐](#)
8. Hydrogen Council [🌐](#)
9. HC Hydrogen Scaling Up report [📄](#)
10. US Department of Energy [📄](#)
11. IEA Future of Hydrogen Report [📄](#)
12. COAG Energy Council National Hydrogen Strategy [🌐](#)
13. TomTom Traffic Index 2018 [🌐](#)
14. AAA 2018 Road Congestion in Australia Report [📄](#)
15. PARC/VicTrack [🌐](#)
16. Australian Local Government Association [🌐](#)
17. Safety Certification for Transportation Project Professionals Program [🌐](#)
18. Smart Belt Coalition Presentation [📄](#)
19. Detroit Moves [🌐](#)
20. Michigan EDC [🌐](#)
21. PlanetM [🌐](#)
22. Center for Mobility Innovation [🌐](#)
23. Memorandum of Understanding Australia and Michigan [🌐](#)
24. Pittsburgh's mobility tool kit [🌐](#)

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