Queensland Transport Strategy

OUR 30-YEAR PLAN FOR TRANSPORT IN QUEENSLAND

Queensland
Government

Foreword

Safe, efficient, accessible and sustainable transport benefits every Queenslander. We all rely on our transport system, whether it be to access jobs and services, connect us with family and friends or to move goods around the state. It sustains our economy, brings us together and contributes to the liveability of our communities.

Transport in Queensland is changing. New transport services are emerging and innovative technologies, like automated vehicles (AVs), are already being tested on our roads. Over the next 30 years, the pace of change will only increase.

As a result, long-term planning is vital to ensuring we have the best possible transport system. We need to be clear on what Queenslanders want from the transport system so that new services and technologies are harnessed for the maximum benefit of all.

The transport sector has an opportunity to carry its weight and contribute to achieving emissions reductions. The decisions we make today will shape the transport system of the future.

The *Queensland Transport Strategy* is the Queensland Government's 30-year vision for the transport system. At the centre of our strategy are Queenslanders, with five customer-focused outcomes and that will guide how we respond to future change:

1. Accessible, convenient transport

2. Safe journeys for all

3. Seamless, personalised journeys

4. Efficient, reliable and productive transport for people and goods

5. Sustainable, resilient and liveable communities.

These outcomes are important for guiding what we do as a government and for the many industry partners who have a growing role in developing and operating transport services and infrastructure.

This strategy will also be complemented by an Action Plan, due for release in 2020, detailing how we are working towards achieving our vision for the Queensland transport system of the future.

The Honourable **Mark Bailey** MP
Minister for Transport and Main Roads

Executive summary

Queensland is on the cusp of exciting changes in our transport system, with significant opportunities within our grasp to harness emerging technologies and services to improve the use of existing roads and transport systems. New ways of transporting people and goods, such as electric vehicles, low and zero emission vehicles, demand responsive transport, automated vehicles and drones will contribute to a safer, greener and more efficient future.

We need to respond to these changes now, to position Queensland to make the most from new technologies and services to reduce congestion, improve reliability and achieve emissions reduction. Our future direction depends on the choices that we make for transport today.

More people are choosing to call our state home, which is helping to grow our economy. It's expected that Queensland's population will grow from 4.8 million in 2016 to 7.1 million by 2041. In South East Queensland, the population is predicted to grow by 56.2 per cent between 2016 and 2041, over twice the rate of the rest of Queensland. This growth will have significant impacts on our transport system.

In 2019, South East Queenslanders took about 520,000 public transport trips every day. This is anticipated to grow to about 1.6 million trips per day by 2050. As the proportion of older Queenslanders increases, there

will be more urgency to ensure accessible services are available. Public and shared transport modes will play an increasingly important role, particularly demand responsive transport services and high frequency, high capacity links, such as Brisbane's Cross River Rail, to provide the access to the jobs and services of tomorrow.

An accessible, safe and efficient transport system will be supported by the government increasingly acting as an enabler and regulator of transport and mobility, supporting new and innovative services and technologies.

The *Queensland Transport Strategy* provides a 30-year vision for the transformation of the state's transport system that will have flexibility in responding to customer preferences, global trends and emerging technologies. It puts customers first and articulates our plan for maximising the benefits of future changes for all Queenslanders. It is aligned to the *State Infrastructure Plan* and *Our Future State: Advancing Queensland's Priorities*.

An Action Plan will be developed to accompany the Strategy, detailing initiatives that are being explored and currently underway. This will ensure that our work continues to support a customer and future-focused transport system.

Personalised and accessible trips

Highly accessible demand responsive transport will enable people to travel in their local area, to transport hubs and local amenities. Rather than being set to a timetable, these shared services are personalised and are available when they are ordered. Dynamic services like these have the potential to significantly enhance transport coverage and access in outer suburbs and regional centres. Demand responsive transport is currently being trialled in Logan, with more trials to be held soon.

Through smart use of new technologies, we can provide a convenient, efficient and accessible transport system that meets the diverse needs of all Queenslanders. It will be seamless, integrated and anticipate – rather than just respond to – those needs.

Transport will be safer and more efficient. Improved use of smart technologies and access to real time information will enable customers to make more informed transport choices. Optimised transport network operations will lead to reduced congestion and improved transport reliability. Innovative technologies will be used to optimise freight journey times and keep costs low, particularly by improving first- and last-mile access.

The transport system will provide improved and affordable transport access options for people with disabilities, older Queenslanders and people who do not have a driver's licence. These improvements will be underpinned by automated vehicle technologies and emerging service models, such as demand responsive and shared transport services.

Safe roads and efficient delivery

Vehicle technology has become increasingly advanced to improve safety. In future, many vehicles will be partially or completely self-driving. This will greatly improve safety and efficiency, through reducing the potential for crashes related to driver error and fatigue, which account for approximately 90 per cent of road incidents in Australia. In 2020, Queensland will be home to Australia's largest connected vehicle trial – the Ipswich Connected Vehicle Pilot – which will involve up to 500 participants, with their own vehicles retrofitted with Cooperative Intelligent Transport Systems (C-ITS) technologies.

Using AVs to deliver freight will lower the cost of transporting goods, as well as improving access to international markets.

Queensland is also leading the way in drone development and has attracted major international investment to establish this innovative industry in the state. While they already play an important role in road maintenance and operations, in the future drones could also be used for everything from food to spare part deliveries and will handle an increasing amount of first- and last-mile freight.

More affordable transport options will be available, along with more payment options, providing customers with the ability to purchase monthly transport subscriptions across different transport services to meet their travel needs and suit their lifestyles. This emerging, subscription-based transport service – known as Mobility as a Service – will provide highly personalised and integrated journey planning, booking and payments. Services can be ordered online and will be available on demand. Journeys across car, bus, rail, bike, ferry and possibly even air travel will be seamlessly integrated.

This will greatly improve accessibility, convenience and affordability and will provide a viable alternative to costly car ownership for many Queenslanders.

The future of transport in Queensland is exciting. It will provide valuable outcomes for Queenslanders and improve the liveability of our communities. The transport network will be integrated, accessible, environmentally sustainable and more convenient, and we will all benefit from improved safety, efficiency and affordability.

Electric and green

The future is electric. Low and Zero Emission Vehicles (LZEVs), that is Electric Vehicles (EVs) and hydrogen Fuel Cell Electric Vehicles (FCEVs) present an opportunity for transport to contribute to emissions reductions and improved air quality. By 2050, internal combustion engines powered by fossil fuels will be in the minority, as people increasingly shift to more affordable and sustainable vehicles. The Queensland Government is partnering with industry to build capability, create new jobs and benefit the state with new low and zero emission technologies.

Through a Queensland Government partnership, Brisbane-based company Tritium has grown to be a global leader in electric vehicle technology, with chargers deployed in 26 countries. Tritium now employs more than 200 staff, with all research, development and manufacturing of electric vehicle fast chargers undertaken at the company headquarters in Brisbane.

Contents

Transport that puts Queenslanders first

Around the world, exciting changes are putting people at the centre of the transport system. New and innovative technologies are improving safety and accessibility, while also providing faster options for businesses to move their goods to markets and directly to customers. New services are also creating more personalised options for customers to plan their travel and access transport when and where they want it.

Throughout Queensland, people and businesses have embraced these changes through smartphone journey planning, new rideshare services and real-time freight monitoring. Journeys and freight movements are becoming faster and safer thanks to GPS vehicle tracking and smart highway signage technology.

As a society, we could not have imagined some of these changes or technologies three decades ago, but customers have embraced them and are already experiencing their benefits. International trends suggest more developments are around the corner, and while we cannot predict what all the changes might be, we can be ready to adapt and embrace them to support the creation of a single integrated transport network that is accessible to everyone.

The *Queensland Transport Strategy* is the Department of Transport and Main Roads' 30-year vision to meet the needs of Queenslanders and maximise the benefits of change for households, businesses and the wider community.

Queenslanders are at the heart of this strategy – the people who depend on our transport system for work, leisure, tourism and to access services, as well as the businesses that rely on it to move goods around the state and connect to overseas markets.

Five outcomes for a future-focused transport system

The *Queensland Transport Strategy* has been developed to ensure Queensland is ready to embrace the exciting changes for transport on the horizon.

We have developed five strategic outcomes to support a future-focused transport system over the next 30 years:

1. Accessible, convenient transport

2. Safe journeys for all

3. Seamless, personalised journeys

4. Efficient, reliable and productive transport for people and goods
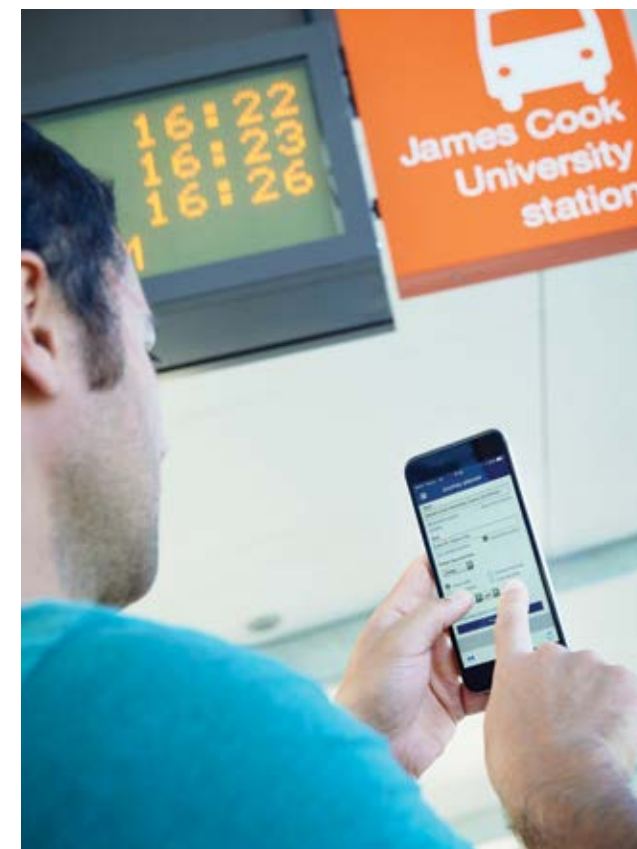
5. Sustainable, resilient and liveable communities.

Our Future State: Advancing Queensland's Priorities (Figure 1) has been used to guide the development of the strategic outcomes. Each of these outcomes is supported by directions, which explain how the outcome will be achieved over the next 30 years (Figure 2).

The five strategic outcomes are also aligned to the medium-term transport system objectives detailed in the *Transport Coordination Plan 2017–2027*.

To achieve these outcomes, government will increasingly need to partner with industry and other stakeholders to ensure these changes benefit the whole state.

Our Future State
Advancing Queensland's Priorities

Create jobs in a strong economy
- Create jobs
- Increase private sector investment
- Engage more young Queenslanders in education, training or work

Give all our children a great start
- Increase the number of babies born healthier
- Increase childhood immunisation rates
- Improve wellbeing prior to school

Keep Queenslanders healthy
- Increase the number of Queenslanders with a healthy body weight
- Reduce suicides

Keep communities safe
- Reduce the rate of crime victims
- Reduce rates of youth reoffending

Protect the Great Barrier Reef
- Reduce Queensland's contribution to climate change
- Improve water quality

Be a responsive government
- Make Queensland Government services easy to use

Figure 1: The Queensland Government's objectives for the community

Department of Transport and Main Roads		Queensland Transport Strategy	
Vision	**Transport system objectives**	**Strategic outcomes**	**Directions**
Creating a single integrated transport network accessible to everyone	Community connectivity	1. Accessible, convenient transport	• Enabling the introduction of new mobility providers and technology • Prioritising investment in shared transport services and infrastructure • Delivering new capacity on our roads to improve journey times and reliability • Ensuring transport is accessible for all
	Safety and security	2. Safe journeys for all	• Using new technology to improve our roads to achieve zero deaths • Improving personal security on the transport network • Protecting the cyber security of the transport system and customers
	Customer experience and affordability	3. Seamless, personalised journeys	• Enabling integrated journey planning, information and payments • Planning, facilitating and partnering to enable more on-demand transport • Making interchanging more convenient and seamless, digitally and physically • Providing world-class, innovative customer services and community connection
	Efficiency and productivity	4. Efficient, reliable and productive transport for people and goods	• Reducing the cost of transport for households and businesses • Enabling a new generation freight and shipping network • Minimising road congestion using smart technology
	Environment and sustainability	5. Sustainable, resilient and liveable communities	• Improving the attractiveness of places on the transport network • Making active transport more convenient and attractive • Transitioning to a net zero emissions transport system • Enhancing the resilience of the transport networks to the effects of climate change

Figure 2: Queensland Transport Strategy strategic outcomes and directions

A long-term strategy that complements other planning

The *Queensland Transport Strategy* complements other strategic planning documents by setting longer term outcomes and directions (Figure 3). It is one of five strategic infrastructure documents, which provide a clear direction for strategic infrastructure decisions across the energy, transport, digital, water and social asset classes. A key objective of the strategic infrastructure documents is to take forward the intentions of the State Infrastructure Plan across each infrastructure class.

The *Queensland Transport Strategy* is our overarching 30-year vision for the future transport system for Queensland and will guide all future plans and strategies.
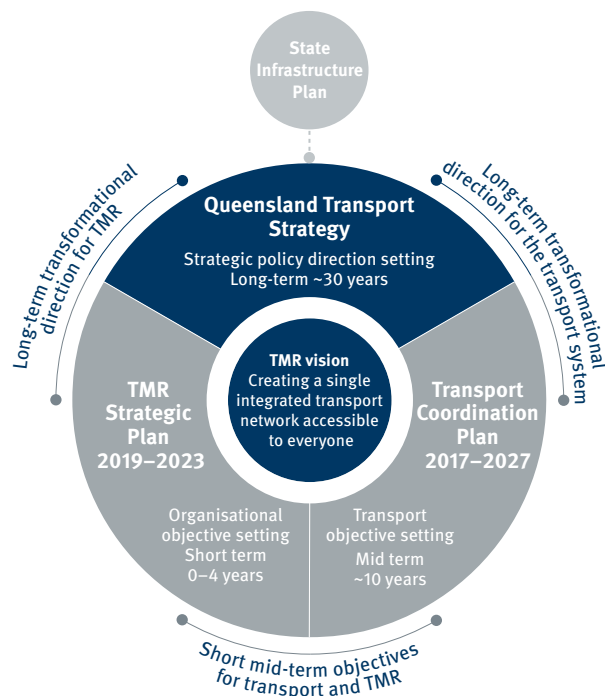
A strategy that meets the needs of Queenslanders

Our customers and the community are at the core of what we do, which is why the *Queensland Transport Strategy* focuses on what Queenslanders need and want.

The outcomes also support the Queensland Government's objectives for the community. An efficient and productive transport system enables increased private sector investment and will create jobs in a strong economy, keeps communities safe, is accessible for all and protects the natural environment including our iconic Great Barrier Reef. That is why it is so important that the strategic outcomes help deliver the Queensland Government's broader priorities.

Our Future State: Advancing Queensland's Priorities outlines the Queensland Government's objectives for the community, highlighting key priorities both for now and the future. Transport and Main Roads is contributing to these priorities through the *Queensland Transport Strategy* strategic outcomes and associated directions and initiatives. Linkages between the Queensland Government's objectives and the *Queensland Transport Strategy* strategic outcomes and directions position Transport and Main Roads to best contribute to *Our Future State* (Figure 4).

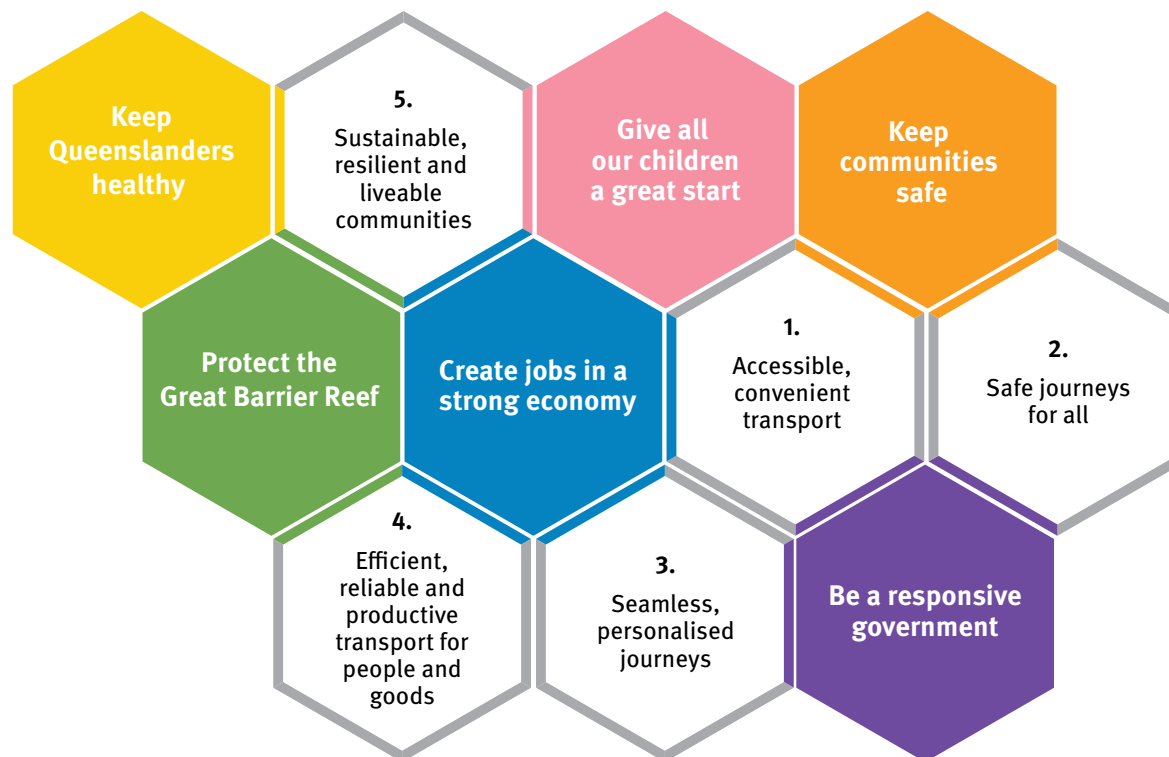Figure 3: Strategic transport planning documents

Figure 4: Alignment between strategic outcomes and Queensland Government objectives for the community

Harnessing exciting opportunities for transport in Queensland

Global and local trends are creating new opportunities for transport in Queensland and changing the transport task. Around the world, there is an increasing need to make better use of resources, manage environmental impacts and respond to significant changes in the global economy. In Queensland, our economy is growing and more people are choosing to call our state home. Collectively, these trends are resulting in new transport services, demand for more trips and a range of other impacts.

Through smart use of new and emerging technologies, we can position the transport system to meet the future needs of Queenslanders – creating an integrated system that anticipates, rather than just responds to, customers' needs. Technology is already transforming how people and goods move, whether through on-demand transport, cooperative and automated vehicle (CAV) technology or using drones to deliver parcels. It is also providing improved transport access options for people with disabilities, older Queenslanders and people who may not have a driver's licence. Further changes will improve safety, efficiency and convenience, ultimately saving people and businesses time and money.

The *Queensland Transport Strategy* will enable Transport and Main Roads to harness these opportunities in partnership with industry and other stakeholders. There are many things that are uncertain – that is the nature of change. What is certain is that Queensland will have a transport system that embraces the positive opportunities change can bring and meets the needs of customers and the community. By planning for, and carefully managing change, everyone will share the benefits. At the same time, we can address existing and future transport network challenges.

Global trends are reshaping transport

Emerging trends are creating opportunities for Queenslanders, our society and our economy (Table 1). These trends include more efficient use of resources, increasing digitisation and greater personalisation of services. While some of these are not new, their increasing prevalence and interconnectedness makes them significant.

For transport, megatrends are creating new opportunities and demands on the transport system, including for services, infrastructure and operators. For example, the need for efficiency is placing greater focus on how we can better use our existing infrastructure, as well as investing in new links.

Increasing environmental concerns are necessitating a focus on how we can make more sustainable forms of transport, such as shared transport, walking and cycling, more attractive and affordable.

These trends also have implications for how Transport and Main Roads functions. With new services increasingly being developed by the private sector, the role of government will increasingly transition to be an enabler of these new services rather than a direct provider. This will mean partnering more with the private sector and being agile and responsive to change.

Table 1: Global megatrends and transport response[1]

Trend	How the transport system is responding
More from less Growth in population and consumer demands are intensifying the need to better manage our resources.	• Using existing networks better • Encouraging more sustainable travel behaviours
Planetary pushback Evidence is building of our effect on the planet. Investing in more sustainable solutions is an increasing priority.	• Investing in more environmentally sustainable forms of transport • Focusing on ensuring the network is resilient to climate change impacts
Asian Ascendancy The epicentre of global economic growth is shifting to Asia, driving trade and economic activity in Australia.	• Ensuring freight access to trade gateways • Addressing increased demand across the network
Forever young Many populations are ageing across the globe, placing a greater urgency on ensuring services are accessible to all.	• Ensuring the network is accessible to all • Harnessing new services to improve accessibility
Digital immersion Automation and data driven capabilities are creating opportunities to better integrate and connect systems, goods and people.	• Better understanding customer needs • Making better information available to customers
Porous boundaries Traditional boundaries that separate buyers and sellers of goods and services are dissipating with new models including peer-to-peer markets and sharing economies increasing.	• Making new transport services available to customers • More affordable transport from shared vehicles and services
Great expectations As we experience the benefits of innovation and improved services in one facet of our lives, our expectations in others increase.	• More personalised forms of transport

How Transport and Main Roads is responding	
• Putting customers and the community first • Being an enabler of mobility • Ensuring sustainable funding	• Building an innovative, flexible culture • Being agile and responsive

[1] CSIRO 2012, 'Our future world: Global megatrends that will change the way we live' report

Fast fact

Shared transport refers to any form of transport where multiple customers use the same vehicle, such as train, bus, light rail, ferry and rideshare. Public transport is a type of shared transport.
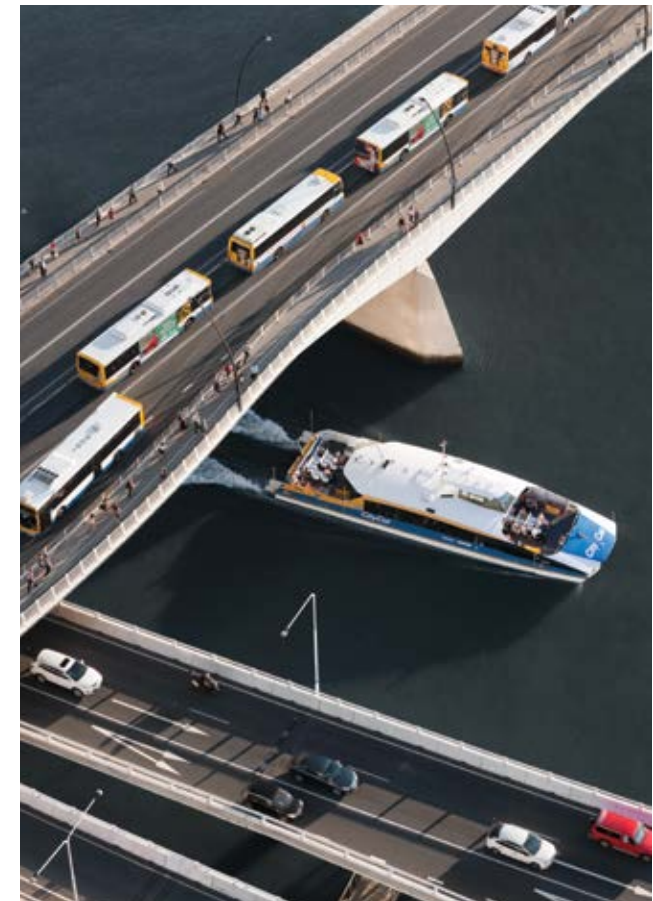
Local trends are placing new demands on Queensland's transport system

Queensland itself is changing and this is placing new demands on the transport system. As our economy grows, more people and goods are moving around the state. In the 30 years to 2019, our population has nearly doubled from 2.8 million to almost 5.1 million.[2] Between 2016 and 2041, it will increase by almost 50 per cent to 7.2 million (Figure 5).[3] Our population is also getting older. The share of the population over the age of 65 is predicted to grow from 13.7 per cent in 2016 to 20 per cent in 2041.[4] If these current trends continue, the forecast number of trips across the state is expected to rise by 58.2 per cent over this time, with the physical accessibility of services becoming increasingly critical.[5]

The volume of goods being moved across the state is also rising. An estimated 930 million tonnes of goods were transported across Queensland in 2017-18. Current projections indicate the freight task will increase by approximately 465 tonnes to 1395 million by 2035.[6] This means more demand for road, rail and – potentially – air space and the need for strong links to trade gateways.

Current Queensland Treasury forecasts indicate state employment growth of over 1 million between 2020-21 and 2040-41.[7] This growth will place pressure on our transport networks, increasing demand for freight and passenger transport.

Employment will grow at different rates across the state. For example, the number of SEQ residents working in Brisbane but residing in its surrounding regions is forecast to double to over 516,000.[8]

This highlights the need for continued investment in transport infrastructure and services between Brisbane and its surrounding regions.

Importantly, these growth patterns differ by region. For example, while SEQ's population is forecast to grow by 56.2 per cent between 2016 and 2041, some other regions face population decline.[9] This has implications for the type of transport that will be needed in each region and the most effective and efficient ways to connect Queenslanders. Key transport and land use trends are outlined in Figure 6.

These trends inform our vision for the transport system of the future. The outcomes we have set are designed to address the opportunities and challenges associated with these changes while ensuring we remain focused on what matters most to customers.
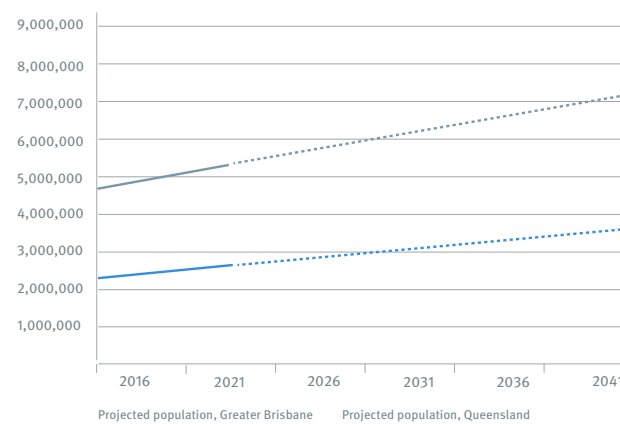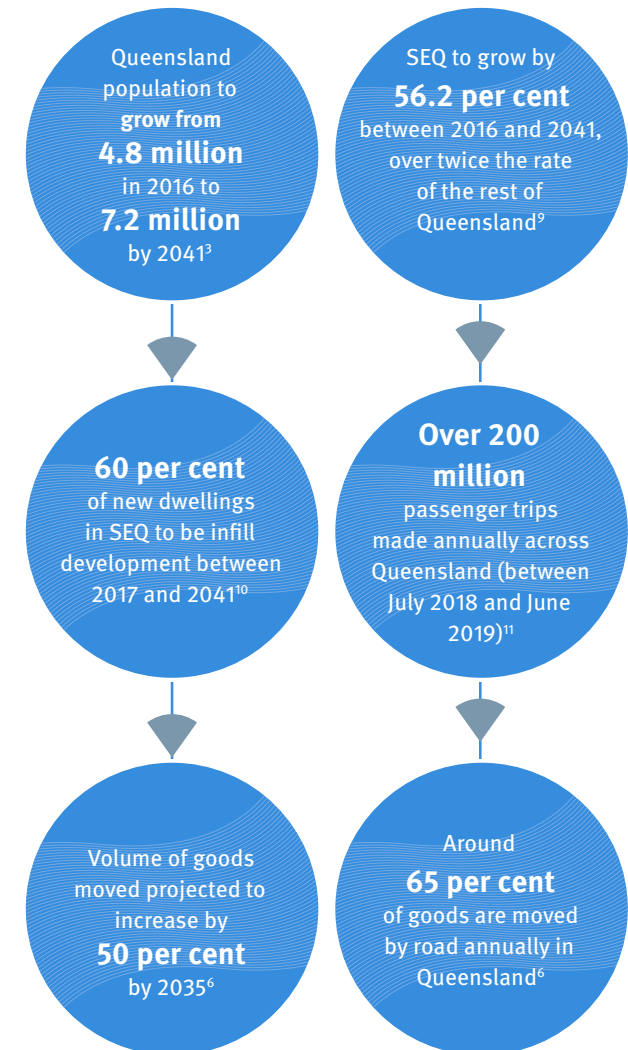

Figure 5: Queensland and Greater Brisbane population projections[9]

Figure 6: Key transport and land use trends in Queensland

Queensland population to **grow from 4.8 million** in 2016 to **7.2 million** by 2041[3]

SEQ to grow by **56.2 per cent** between 2016 and 2041, over twice the rate of the rest of Queensland[9]

60 per cent of new dwellings in SEQ to be infill development between 2017 and 2041[10]

Over 200 million passenger trips made annually across Queensland (between July 2018 and June 2019)[11]

Volume of goods moved projected to increase by **50 per cent** by 2035[6]

Around **65 per cent** of goods are moved by road annually in Queensland[6]

2   Australian Bureau of Statistics (ABS) 3101.0 Australian Demographic Statistics, June 1989; June 2019.

3   Queensland Government population projections, medium series, 2018 edition; Australian Bureau of Statistics, Population by age and sex, regions of Australia, 2016 (Cat no. 3235.0)

4   Queensland Government population projections, medium series, 2018 edition; Australian Bureau of Statistics, Australian demographic statistics, Jun 2017 (Cat no. 3101.0).

5   Transport Energy & Environment and Pekol Traffic and Transport 2017, Queensland Transport facts

6   Transport Energy & Environment and Pekol Traffic and Transport 2019, Queensland Transport Facts

7   QGSO, Labour and employment - Economic projections 2018, Available at: https://www.qgso.qld.gov.au/statistics/theme/economy/labour-employment/economic-projections

8   Regional Employment Projections Data Tables, 2010-11 to 2040-41, Queensland Treasury

9   Queensland Government population projections, 2018 edition; Australian Bureau of Statistics, Population by age and sex, regions of Australia, 2016 (Cat no. 3235.0)

10   Department of Infrastructure, Local Government and Planning, ShapingSEQ: South East Queensland Regional Plan 2017

11   The Department of Transport and Main Roads, 2019, Annual Report 2018-2019. Available at: https://www.publications.qld.gov.au/dataset/annual-report-2018-2019-transport-and-main-roads/resource/e2e33266-db66-4afd-acae-bf741c4d179c

New services and technologies will provide exciting possibilities

New services and technologies, including software advancements, energy storage, data analytics and the growth in the sharing economy, present opportunities to address the transport needs of Queenslanders and deliver a safer, more efficient, sustainable and convenient transport system. Some of the most significant changes are summarised in Figure 7.

Many of these new services and technologies are still in their infancy, and even more will emerge over the next 30 years. The focus of this strategy is to develop the right conditions to harness the opportunities they bring.

In focus: Passenger drones

Passenger drones are beginning to be trialled internationally, with exciting developments being predicted. At this stage, the technology is largely untested and implementations are experimental. Transport and Main Roads will continue to monitor the technology and consider possible applications and benefits for Queensland.

The Queensland Government has worked with CSIRO's Data61 to produce *The Innovation Imperative* to determine what our future jobs could be. The report has found there are substantial opportunities to generate new jobs, higher incomes and improved lifestyles for Queenslanders. New jobs could emerge in design, data and robotics while freeing up time by automating repetitive and well defined tasks. Higher incomes could result from expanding consumer demand for new products and services, especially those where we persuade, negotiate with or care for others. Future technology and future transport technology can improve the lifestyles and jobs of Queenslanders.
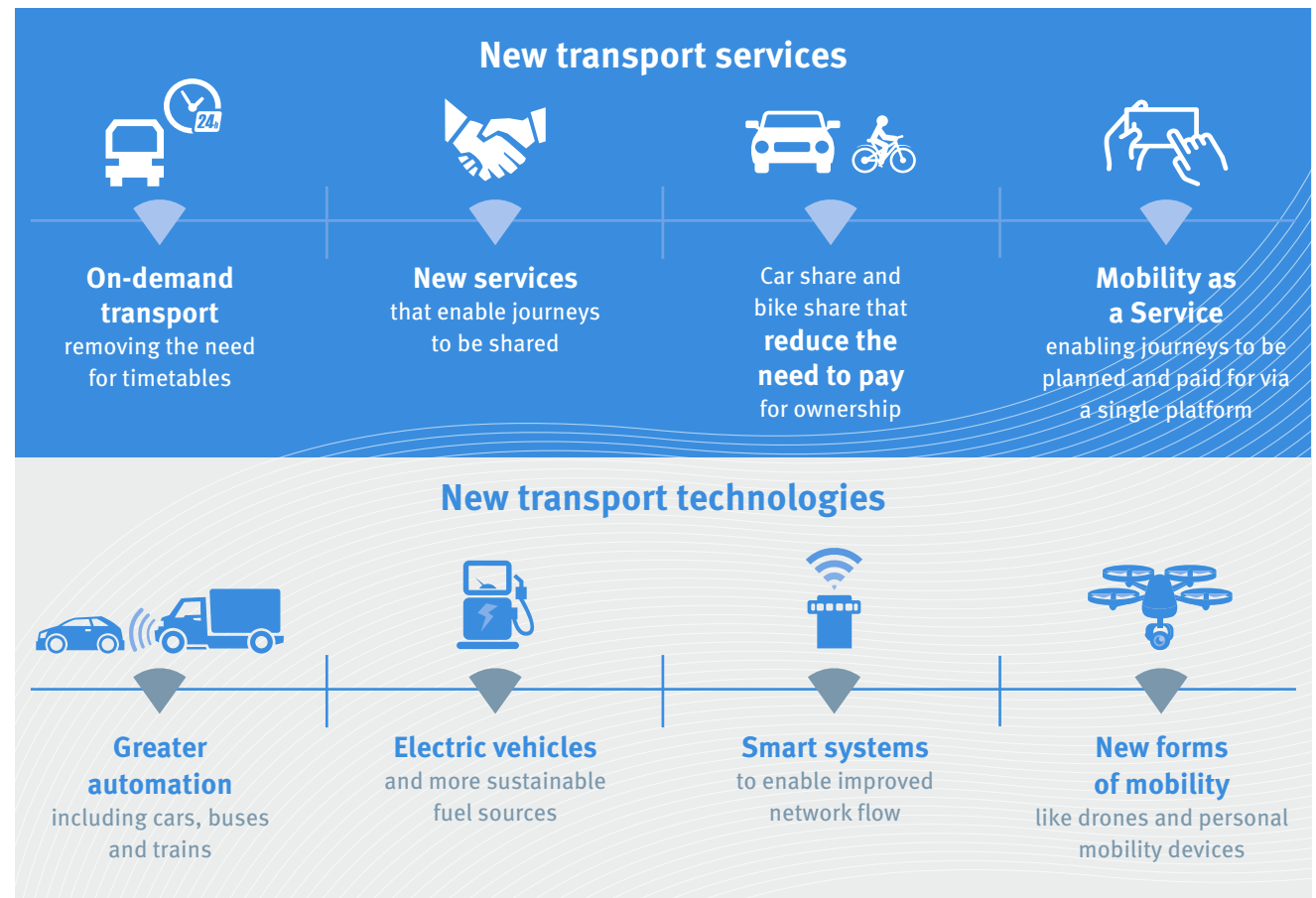

New transport services

On-demand transport removing the need for timetables

New services that enable journeys to be shared

Car share and bike share that **reduce the need to pay** for ownership

Mobility as a Service enabling journeys to be planned and paid for via a single platform

New transport technologies

Greater automation including cars, buses and trains

Electric vehicles and more sustainable fuel sources

Smart systems to enable improved network flow

New forms of mobility like drones and personal mobility devices

Figure 7: Overview of innovative transport services and technologies

Mobility as a Service could transform how Queenslanders access transport

The popularity of new transport services, such as on-demand transport and car sharing, is increasing around the world, including in Queensland.

On-demand transport enables customers to access shared transport when and where they want. Currently, most public transport services run to a scheduled timetable on fixed routes, even if few customers are using them during off-peak times. New technologies now enable transport providers to dynamically optimise a route, reducing traffic delays. Shorter waiting and boarding times make the system more efficient. Flexible and demand responsive, point-to-point services are being piloted in Queensland and around the world to refine the technology and make it easy for customers to use.

Across Queensland, more customers are choosing to share vehicles and journeys. For example, car and bike share services enable customers to access pooled cars or bikes when they want and only pay for what they use.

Pooled rideshare services are becoming increasingly popular. They allow customers to share journeys when travelling to nearby destinations and present opportunities to efficiently use resources and more environmentally sustainable travel choices. These services can also make transport more accessible and affordable by reducing the need to own a vehicle.

As a new transport ecosystem develops, it is important that services are integrated and make sense to customers. An emerging service model – known as Mobility as a Service – can address this by seamlessly combining all available transport options and active transport, and allowing customers to compare, plan, purchase and track their end-to-end journeys through a single platform (Figure 8). Already being trialled in cities and regions in Europe, Mobility as a Service could deliver personalised, seamless journeys, particularly for those who rely on multiple forms of transport to make their journeys.

Fast fact ⓘ

Shared vehicles could reduce household transport expenditure by up to 60 per cent depending on the deployment model.[12]

Fast fact ⓘ

Mobility as a Service aggregates infrastructure, services, technology and information. It brings together transport operators and third parties, allowing a seamless provision of service, information, booking, payment and customer relationship management services between transport types.

In focus: Individual ride-sourcing services in regional Queensland ◎

Customers in regional Queensland are benefitting from new ride-sourcing services.[13] Uber (an on-demand ride-sourcing service) has been introduced in several regional centres along the coast from Cairns to the Gold Coast and west to Toowoomba, enabling customers to access services via their phone. It is one of many personalised transport services emerging across Queensland, providing new ways for customers to get around.

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[12]   Data61 2018, *Time Travel: Megatrends and scenarios for Queensland Transport out to 2048*, CSIRO Data61.

[13]   Commonwealth of Australia, Department of Infrastructure and Regional Development 2016, *Trends, Transport and Australia's Development to 2040 and Beyond*
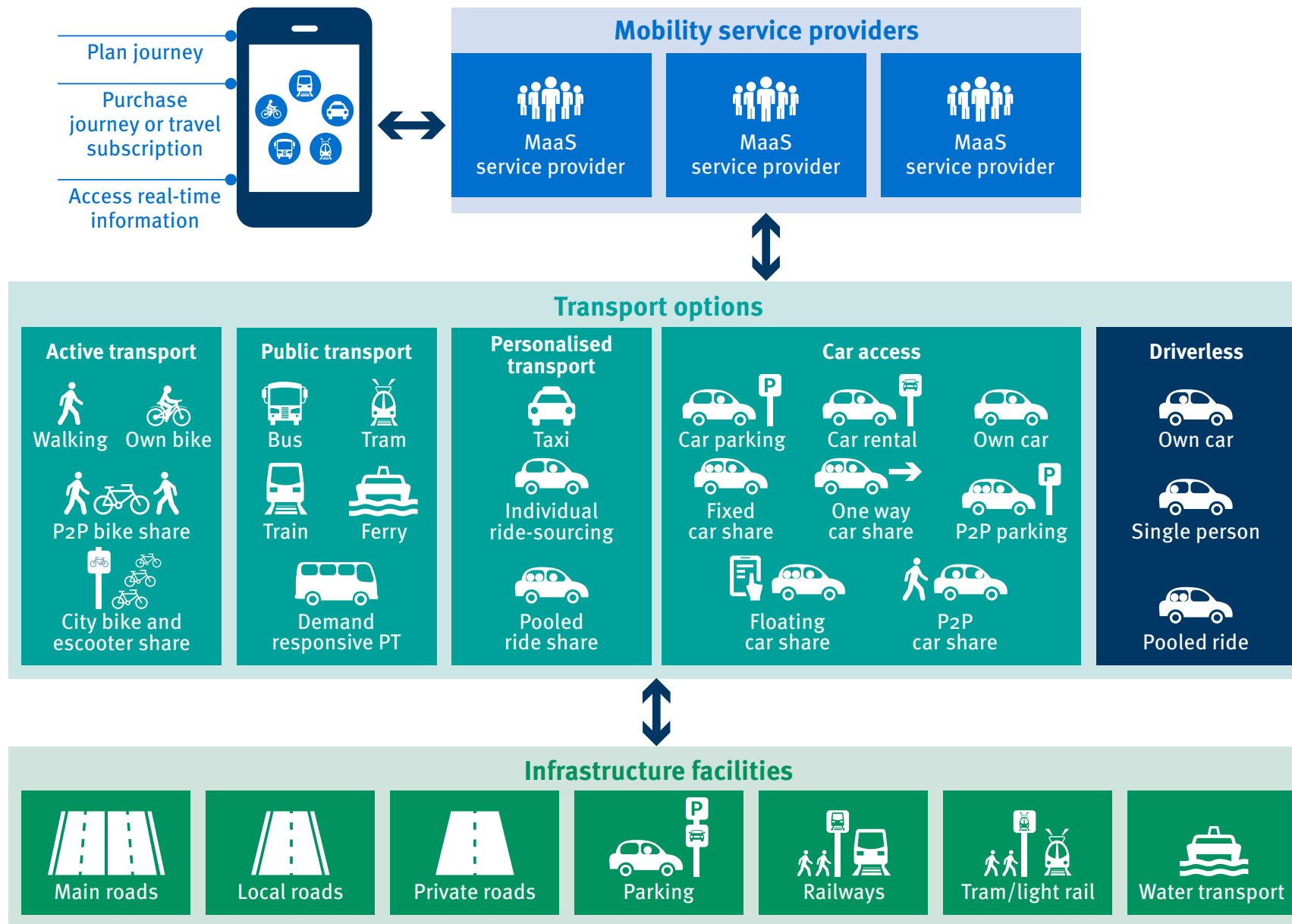
Mobility service providers

Plan journey

Purchase journey or travel subscription

Access real-time information

MaaS service provider

MaaS service provider

MaaS service provider

Transport options

Active transport

Walking · Own bike

P2P bike share

City bike and escooter share

Public transport

Bus · Tram

Train · Ferry

Demand responsive PT

Personalised transport

Taxi

Individual ride-sourcing

Pooled ride share

Car access

Car parking · Car rental · Own car

Fixed car share · One way car share · P2P parking

Floating car share · P2P car share

Driverless

Own car

Single person

Pooled ride

Infrastructure facilities

Main roads · Local roads · Private roads · Parking · Railways · Tram/light rail · Water transport

Figure 8: Overview of Mobility as a Service (Source: Modified from MaaS Australia)

New technology will enable a safer, more efficient and productive Queensland

Emerging transport technologies will improve the outcomes of our transport system for the community, economy and environment. Automation is one of the most significant of these developments and has the potential to improve journey safety, efficiency and convenience for both passenger and freight movement.

Many train systems around the world are already partially or fully automated, enabling more frequent services, as trains can run closer together.

Increasingly, most new cars and trucks are also partially automated through features such as sensor technology and automatic emergency braking. However, vehicle manufacturers and technology companies around the world are now trialling higher levels of automation, with the potential for road vehicles to become fully automated. By combining automation with vehicle-to-vehicle communication and 'smart roads' (Figure 9), AVs could improve safety and help make journeys more efficient and reliable.

International trends suggest fully automated vehicles could be available in Queensland within a decade and be in widespread use within 30 years. The safety, efficiency and time-saving benefits they could deliver worldwide have been estimated at $5.6 trillion a year.[14] AVs have the potential to reduce fatalities and hospitalisations and help address urban congestion, which could otherwise cost Brisbane over $5.9 billion a year by 2030.[15] Greater automation could also increase the capacity of the rail network, particularly in South East Queensland.

To fully reach their potential in urban areas, AVs will need to be well integrated with mass transit options. Effective regulation will be required to ensure AVs complement existing mass transit modes and become a positive part of the broader transport system, rather than increasing congestion and overall journey times.
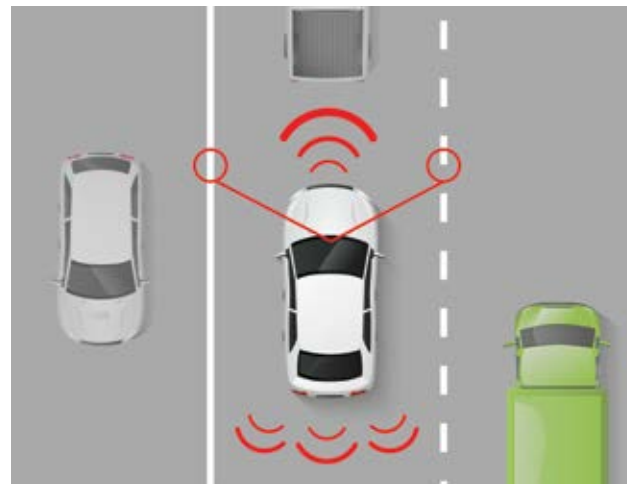

Figure 9: Connected vehicles communicate with other vehicles and infrastructure

In focus: Understanding the potential impacts of AVs in regional Queensland

The Queensland Government commissioned a project to model and analyse the potential impacts of the introduction of AVs and new mobility models in regional Queensland. While AVs offer opportunities, some models suggest they could potentially also have some negative outcomes, such as increased congestion.

The findings of the Queensland Government research are that AVs offer significant transport benefits for regional Queensland. The key will be to integrate them into the regional Queensland transport system in a way that supports and encourages options like ridesharing and connections to mass transit, where available.

[14] *Morgan Stanley 2013 Blue Paper – Autonomous Cars Self-Driving the New Auto Industry Paradigm*

[15] *BITRE Working Paper 74, 2015.*

Electric vehicles will help the transition to Queensland's low-carbon future

Low and Zero Emission Vehicles (LZEVs), that is Electric Vehicle (EVs) and hydrogen Fuel-Cell Electric Vehicles (FCEVs), present exciting opportunities for Queensland. Driven by efforts to reduce greenhouse gas emissions and advancements in battery power, the number of EVs sold globally has grown considerably since 2010 (Figure 10). In 2019, there was a 132 per cent increase in battery EVs registered in Queensland from 908 to 2,115 vehicles.[16] This number is expected to continue to grow rapidly, as are sales across Australia and globally.

LZEVs provide an opportunity for the transport sector to contribute to significant emissions reductions. Particularly if charged from renewable sources, LZEVs can help to greatly improve the sustainability of Queensland's transport sector, which in 2016 contributed 14.7 per cent of the state's greenhouse gas emissions.[17]

Operating costs are 60 to 90 per cent lower than traditional cars, potentially making EVs a more affordable transport option in the long-term. The cost of driving an EV per 100km equates to $3.75 to $5 when charged at 25 cents per kWh.[18] Alternatively, charging using a home solar system would reduce this cost even further to almost zero. The Queensland Government is already partnering with industry to support and enable the transition to EVs.

Other emerging zero and low emission fuels, such as hydrogen, are being monitored and supported by Transport and Main Roads for potential applications in Queensland.

The Queensland Hydrogen Industry Strategy was launched in 2019. The Strategy includes a $15 million industry development fund to support hydrogen projects in Queensland. This includes initiatives such as the CSIRO pre-feasibility study for an ammonia to hydrogen demonstration plant in Gladstone.[19]
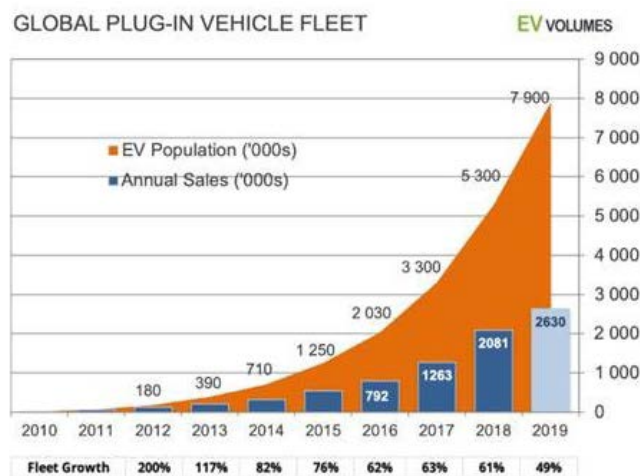

Figure 10: Annual global plug-in vehicle sales and share [20]

[16] Department of Transport and Main Roads, Data Analysis - Engineering and Technology branch.

[17] Department of Environment and Science, State of the Environment 2017. Available at: https://www.stateoftheenvironment.des.qld.gov.au/home

[18] Queensland Government, Compare electric vehicle costs, site last updated: 1 July 2019, Available at: https://www.qld.gov.au/transport/projects/electricvehicles/about/compare

[19] Department of State Development, Manufacturing, Infrastructure and Planning, Queensland Hydrogen Industry Strategy 2019-2024, Available at: https://www.dsdmip.qld.gov.au/resources/strategy/queensland-hydrogen-strategy.pdf
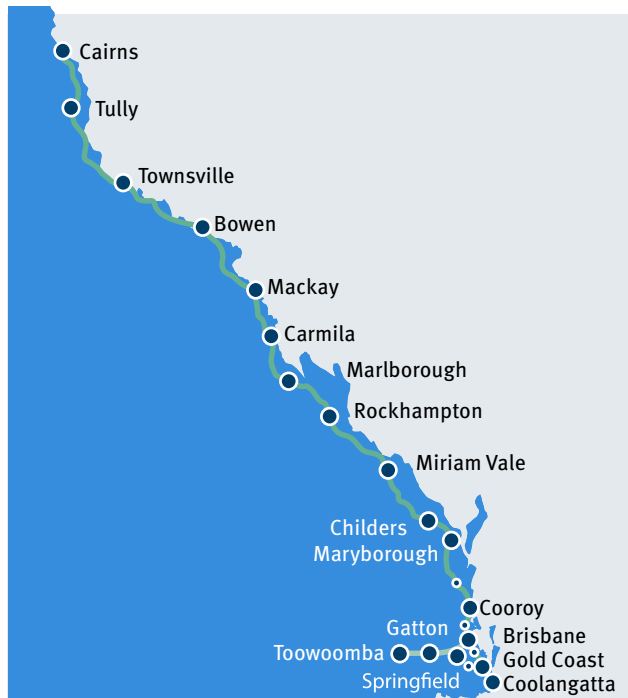
[20] EVvolumes.com 2020, http://www.ev-volumes.com/country/total-world-plug-in-vehicle-volumes/

In focus: Enabling EVs in Queensland

The Queensland Government, in collaboration with Yurika,[21] local councils and other partners, has rolled out the Queensland Electric Super Highway network – the world's longest EV superhighway within a single state.

The network of EV fast charging stations runs from Cairns to Coolangatta, and west to Toowoomba. This is just one of the ways the Queensland Government is supporting the introduction of EVs, with a range of initiatives outlined in *The Future is Electric: Queensland's Electric Vehicle Strategy*.

Cairns
Tully
Townsville
Bowen
Mackay
Carmila
Marlborough
Rockhampton
Miriam Vale
Childers
Maryborough
Cooroy
Gatton
Brisbane
Toowoomba
Gold Coast
Springfield
Coolangatta

21 *A subsidiary of Energy Queensland*

Completely new transport technologies will advance Queensland further

A range of other emerging transport technologies also present opportunities for Queensland. Drones could help move goods, or even people, more efficiently, reducing emissions, congestion and freeing up road space for other uses.[22] Personal mobility devices, such as electric scooters and bikes, can make active transport more attractive in both regional areas and cities, and improve liveability. In addition to direct transport benefits, these new technologies will bring more jobs to Queensland, supporting households and boosting regional economies.

Smart system technology is also enabling more intelligent management of the transport system. By using sensors and monitoring equipment we can better manage the road network and provide drivers with information on alternative routes in the case of incidents. As this technology advances, there will be opportunities to further optimise the transport system.

For example, AVs could dynamically change their routes and enable customers to conveniently change transport modes to ensure optimal travel, while also helping to reduce journey times and congestion and improve reliability across the network. Transport and Main Roads will continue to work closely with other levels of government and the private sector to ensure that, in providing these benefits, data and privacy are protected and cyber security is strengthened.

In focus: Advancements in transport technology and more jobs for Queenslanders

New forms of transport technology are bringing jobs to Queensland. In March 2018, Boeing announced Queensland as the base for its largest automated systems development program outside of the United States.

This will increase Boeing's existing Queensland workforce of 1500 – located at Townsville, Brisbane, Amberley and Oakey – by an additional 131 jobs. These jobs will help advance new drone development and realise the benefits these can bring for Queensland businesses.[23]

This is just one of many ways technology shifts will create up to one million new jobs over the next two decades.[24]

Innovation to address some of today's challenges

New services and technologies in transport will help address many of the challenges we currently face, including congestion, accessibility, service reliability, safety and network resilience (Table 2). Through existing and planned investments, Transport and Main Roads will continue to upgrade roads and other transport infrastructure across the state, invest in mass transit and deliver new services. However, over time, innovation may improve or change the way these core services are delivered.

The importance of planning for 30 years

With the transport system undergoing such transformation, a clear long-term strategy is more important than ever. By setting clear outcomes, we can ensure that change is harnessed to provide a transport system that customers and the community want.

Regardless of the changes technology and innovation may bring, Queenslanders will know that they have accessible, convenient transport options with seamless and personalised journeys, have a productive and efficient transport network and have sustainable, resilient and liveable communities. These are the outcomes that will endure and be used to guide investment in the transport system.

[22]   C. Samaras and J. Stolaroff, Drone Delivery Good for the Environment? Special Report, Smithsonian Magazine, 14 February 2018, Available at: https://www.smithsonianmag.com/innovation/drone-delivery-good-for-environment-180968157/

[23]   Queensland Government 2018, Boeing partnership backs Queensland as global aerospace powerhouse Media Release

[24]   CSIRO 2018, The Innovation Imperative report, Available at: https://data61.csiro.au/en/Our-Research/Our-Work/Future-Cities/Planning-sustainable-infrastructure/Q-Foresight

Table 2: Key challenges and possible solutions

Key challenge	How new services and technology can help
Journey times and reliability (connected communities) As our cities and regional centres grow, journey times and reliability can be affected. Left unchecked, the avoidable cost of congestion in Brisbane alone could rise from $2.3 billion in 2015 to $5.9 billion in 2030.[25]	• Mobility as a Service can help make shared transport more convenient and seamless, reducing single occupant car use. • Shared AVs can help make better use of existing road capacity by enabling more efficient running.
Road safety (safety) One serious injury or fatality on our roads is one too many. In rural and regional areas, road safety remains a major challenge. In urban areas, improving the safety of vulnerable road users, including pedestrians and cyclists, is a particularly significant challenge.	• AVs could reduce fatalities on the road network by up to 90 per cent by mitigating risks of driver fatigue and human error.[26] • New services and technology could provide innovative solutions to safety, advancing Transport and Main Roads' approach to road safety management.[27]
Customer access (accessibility) Transport services must be accessible for everyone. This means ensuring customers can get where they want, and that services and infrastructure can be accessed by every Queenslander. Ensuring accessibility requires understanding limiting factors such as socio-economic background and location of residence. In addition, being an enabler of services requires consideration for the needs of people with many types of disability, including physical, vision, hearing, intellectual and psycho-social, as well as linguistically diverse people with disability, and children with disability.[28]	• On-demand transport can help Queenslanders access transport services when and where they want. • Extensive user testing of the accessibility of new technology and infrastructure projects can ensure usability and suitability.
Transport costs (efficiency, productivity and affordability) Queensland's freight task is increasing – a trend that is projected to continue. Ensuring sufficient infrastructure capacity to support this growth, and addressing pinch points on the network, will reduce the cost of moving goods. In 2015–16, the average Queensland household spent 15 per cent of income on transport.[29] A more efficient transport system can improve affordability.	• New technologies, such as drones and delivery bots, can improve first- and last-mile access and reduce freight costs by up to 40 per cent.[30] • Increased automation in supply chains can deliver further cost savings in freight. • Shared transport can help lower transport costs by reducing the need for vehicle ownership.
Environmental sustainability (sustainability) Queensland's total transport emissions have increased by 26 per cent from 2005 to 2017.[31] The transport network is also exposed to some inevitable, long-term effects of climate change, such as more severe weather events. The Queensland Climate Transition Strategy prioritises development of a Zero Net Emissions Transport Roadmap to ensure that the functioning of the transport system aligns with Queensland's goal of zero net emissions by 2050.[32]	• LZEVs can help reduce transport greenhouse emissions • Shared AVs can help lower greenhouse gas emissions per person by reducing the number of vehicles per person. • Priority port master planning and improved monitoring systems are assisting in securing the long-term health and resilience of the Great Barrier Reef. • Integration of active transport infrastructure and services can increase sustainable transport options.[33]

[25] BITRE 2015, Traffic and Congestion Cost Trends for Australian Capital Cities, Available at: https://www.bitre.gov.au/publications/2015/is_074

[26] McKinsey & Company 2015, Global Media Report 2015 – Global industry overview

[27] See the 4 guiding principles in Safer Roads, Safer Queensland: Queensland's Road Safety Strategy 2015-2021. Available at: https://www.tmr.qld.gov.au/Safety/Road-safety/Strategy-and-action-plans.aspx

[28] Australian Government 2017, The Whole Journey: A guide for thinking beyond compliance to create accessible public transport journeys. Also see - Queensland's State Disability Plan 2017–2020.

[29] 6530.0 Household Expenditure Survey, Australia (2015–16), Australian Bureau of Statistics

[30] McKinsey 2016, Parcel delivery: The future of last mile

[31] Australian Government 2019, State and Territory Greenhouse Gas Inventories 2017: Australia's National Greenhouse Account. Commonwealth of Australia. http://www.environment.gov.au/system/files/resources/917a98ab-85cd-45e4-ae7a-bcd1b914cfb2/files/state-territory-inventories-2017.pdf

[32] Queensland Climate Transition Strategy 2017, Available at: https://www.qld.gov.au/__data/assets/pdf_file/0026/67283/qld-climate-transition-strategy.pdf

[33] See Queensland's Cycling and Walking Strategy documents, Available respectively at: https://blog.tmr.qld.gov.au/cycling/ and https://www.tmr.qld.gov.au/Travel-and-transport/Pedestrians-and-walking/Queensland-Walking-Strategy

Accessible, convenient transport

STRATEGIC OUTCOME

1

STRATEGIC OUTCOME 1

The transport system is central to Queensland's liveability and economic prosperity. We all rely on transport to get to places of work and education, access services, move goods and travel around the state. Enabling people and goods to get where they want in a timely and reliable manner is essential.
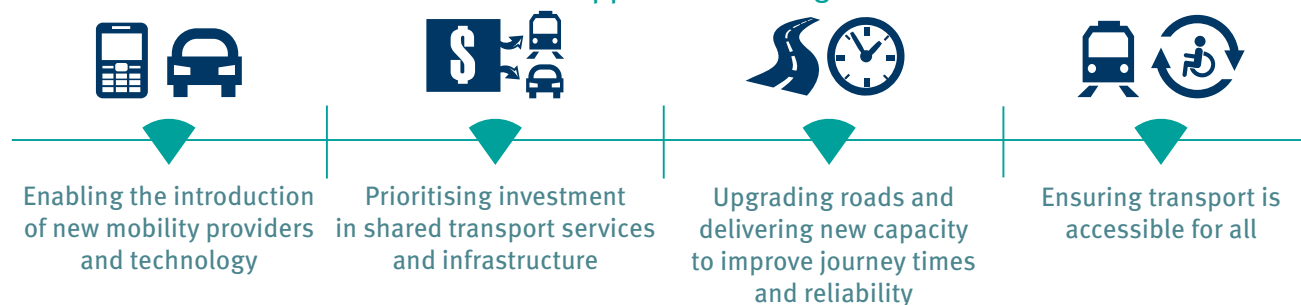
While this task remains unchanged, the way it is achieved is changing. No longer is it just about customers choosing a particular form of transport – instead, it is increasingly about customers choosing the most convenient journey, even if that involves multiple forms of transport. Customers now have more choice than ever before, with rideshare and community transport services, new on-demand services and soon, AVs, which will make journeys faster and more reliable.

Accessibility is not just about enabling the provision of different types of services. Ensuring accessibility requires understanding limiting factors such as socio-economic background and location of residence. Furthermore, being an enabler of services requires consideration of the needs of people with many types of disability, including physical, vision, hearing, intellectual and psycho-social, as well as linguistically diverse people with disability, and children with disability.

Making sure everyone has convenient transport options will still require the design and delivery of an accessible, efficient and reliable road and rail network, but it will increasingly involve a wider range of services and more personalised transport. By optimising the planning, design and delivery of infrastructure and enabling new services in partnership with industry, we can be a responsive government and ensure the transport network provides Queenslanders with accessible, convenient transport.

Directions that support this strategic outcome

Enabling the introduction of new mobility providers and technology

Prioritising investment in shared transport services and infrastructure

Upgrading roads and delivering new capacity to improve journey times and reliability

Ensuring transport is accessible for all

What this outcome means for Queenslanders

This outcome means Queenslanders can expect:

- high-quality, well maintained road and rail networks that connect communities and support high-demand passenger movements and transporting bulk goods
- timely and reliable transport services through prioritisation of shared transport on busy roads and the use of new technology on rail and bus networks
- accessible transport for all, through upgraded services, vehicles and infrastructure, partnering with industry and innovative service delivery solutions.

Road and rail networks are the backbone of our state. From north to south and east to west, they connect every community in Queensland. These networks will continue to play a critical role in providing access for the movement of people and goods in rural, regional and urban Queensland.

Regardless of future changes, roads and mass transit lines continue this critical role in moving people and goods, especially in our regions which contribute so much to the state's economy.

The road network will support new forms of transport, such as AVs and LZEVs, through sensor technology and charging stations. Shared – where multiple customers travel in the same vehicle – will be prioritised on the road network, with research indicating these will deliver more efficient, reliable and cheaper journeys.[34]

It is anticipated that as a high capacity mode, rail will remain important to move people and goods across Queensland. In busy urban and regional corridors, including Brisbane, the Gold Coast and Sunshine Coast, rail and busway corridors will continue to underpin the public transport system, particularly to access employment and suburban centres.

With convenient interchanges and simpler journey planning and ticketing systems (see Strategic Outcome 3), rail will seamlessly integrate with other forms of transport, delivering improved connectivity for customers. Rail will also support the movement of bulk goods and containerised goods, particularly on high demand corridors, such as to ports, where it is more efficient than road transport. In some cases, greater separation of passenger and freight rail networks will be necessary to support this.

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[34] TransPosition 2016, *Conceptual sensitivity modelling and analysis on the introduction of AVs. Report prepared for the Department of Transport and Main Roads by TransPosition.*

Across all modes, infrastructure will be well-maintained to enable journeys that are efficient and reliable. With a road network extending more than 33,000 kilometres and a rail network of 7220 kilometres, new technologies will provide better insights into network condition.[35] For example, drones will be used to inspect road and rail links and provide real-time images to maintenance crews and sensor technology will provide real-time insights on the performance of roads, railway lines and vehicles. Comprehensive network screening algorithms and advanced analytics providing anticipatory estimates for infrastructure deterioration will also enable repairs to be undertaken before faults occur. These technologies will help create a more reliable and efficiently maintained transport system.

Everyone will have access to timely and reliable transport services. In rural, regional and urban communities, journey times will be efficient, consistent and reliable so that customers can travel with confidence. On-road shared transport will have improved priority, such as dedicated transit lanes on busy roads and technology that prioritises delayed services.

New rail signalling technology will reduce equipment failures and enable greater network automation, delivering reliability benefits for both freight and passengers. Additional capacity on congested parts of the network, particularly in central Brisbane, will improve journey times and reliability by alleviating bottlenecks.

Transport will be physically and geographically accessible, as well as affordable. Upgraded infrastructure and facilities, such as stations, trains and buses, will enable customers with a disability and older people to easily access transport services. On-demand services will provide greater geographic coverage, enabling customers to request pick-up and drop-off locations that suit them, rather than relying on fixed routes.

In focus: Innovative approaches to transport accessibility

New ideas are emerging that can help make transport more accessible for customers with a disability. For example, students in Singapore have developed an app that provides voice guidance for visually impaired and elderly customers when using the transport system. It combines real-time transport data and GPS to tell a customer when, for example, their bus is approaching or they need to disembark, based on the journey they are making. Technological innovations such as these will improve the everyday journey experience for customers with a disability.

Fast fact

Between now and 2041, the forecast number of trips across the state is expected to grow by 58.2 per cent if the current trend continues.[36]

[35] Queensland Government 2019, State Infrastructure Plan Part B: Program – 2019 update

[36] Centre for Transport Energy & Environment and Pekol Traffic and Transport 2017, Queensland Transport facts

In focus: A vision for connectivity in South East Queensland

In 30 years, South East Queensland's transport system is operating under a Mobility as a Service model. High volume, high frequency passenger bus and rail services run to and from Brisbane's Central Business District (CBD), the Gold Coast, Sunshine Coast and Ipswich. Metro-style inner suburban all-stop services are supplemented by fast inter-regional express services to the north, south and west. Cross River Rail has enabled higher frequency services and provided better passenger access to the CBD.

Demand-responsive systems incorporate complementary shared AV services to feed passengers into high frequency rail lines at key hubs and cover the first- and last-miles. In the future, transit oriented developments could incorporate intermodal interchanges, as well as shopping, dining, entertainment and residential options.

In focus: Peninsula Development Road project

The $276 million Cape York Region Package has progressed priority enhancement works on the Peninsula Development Road. This project upgraded critical infrastructure on Cape York Peninsula improving accessibility, creating safer roads and providing remote communities opportunities to increase tourism and freight productivity. Significant benefits have been realised in increased local and Indigenous training and employment and in developing Indigenous and local business capability. This important initiative complements the Queensland Government's broader priorities and will help to improve social outcomes for Aboriginal and Torres Strait Islander peoples and local communities by providing better access to health services, employment, and education and training opportunities.

Source: The Department of Transport and Main Roads, 2020, Cape York Region Package Overview, https://www.tmr. qld.gov.au/Projects/Name/C/Cape-York-Region-Package-Peninsula-Developmental-Road

Achieving this outcome

We are already partnering with industry and other levels of government to improve connectivity through high-quality road and rail networks, timely and reliable services and improved accessibility. Building on our *Disability Action Plan 2018-2022* and *Disability Service Plan 2017-2020*, we will continue to prioritise equitable accessibility as a decision-making principle that underpins the initiatives and actions we identify and progress. This principle also supports our continued work in establishing opportunities for improving transport accessibility in rural and remote areas. Some of these initiatives are summarised below (Table 3).

Table 3: Initiatives that support this strategic outcome

Initiatives already underway or recently completed			
Enhanced infrastructure	**Cross River Rail** – a new 10.2 kilometre rail link between Dutton Park and Bowen Hills in Brisbane, including a new tunnel under the Brisbane River and CBD, boosting capacity and providing new stations. **Cairns Transit Network** – a new busway and priority bus lanes connecting neighbourhoods between Cairns, Palm Cove and Gordonvale. **Beerburrum to Nambour Rail Upgrade Project** – increasing capacity on the North Coast Line between Beerburrum and Nambour to improve access and reliability for passenger and freight trains. **Cape York Region Package** – $276 million program jointly funded by the Australian and Queensland Government to upgrade critical infrastructure, including sealing sections of the Peninsula Developmental Road.	**New technologies and services**	**On-demand transport trial** – partnering with 13cabs to deliver a trial of on-demand transport near Logan. **New generation rolling stock** – delivering 75 new passenger trains for the South East Queensland rail network to meet growing demand for rail services.
		Policy and planning	*Disability Action Plan 2018* – a new plan to improve accessibility for people with disability using the passenger transport system in Queensland. **AV modelling** – modelling the long-term impacts of AVs, including journey times and congestion impacts in regional Queensland and for freight, to optimise planning for AVs. **MaaS Program Management Office** – established by the Department of Transport and Main Roads to provide oversight, governance, and direction for MaaS related initiatives in Queensland.

We have established new directions to guide government, industry and other stakeholders to deliver on this outcome. These are supported by a range of initiatives for investigation (Table 4).

Table 4: Initiatives for investigation to support this strategic outcome

Future directions and initiatives		
Directions	**Initiatives we will investigate**	
Enabling the introduction of new mobility providers and technology We will improve access and connectivity across Queensland by supporting the introduction of new transport services and technology. We will explore opportunities to partner with industry to support the development of new services and technology, undertake pilots and, where proven to be beneficial, support their introduction.	• Prepare for the safe introduction of AVs by undertaking further analysis of their impacts, supporting pilots of new technology and reforming policy and regulations as required. • Consider new and emerging modes of transport and mobility services when undertaking area planning and corridor studies to optimise multi-modal integration.	• Investigate examples of technology to enhance transport accessibility and explore opportunities to partner with industry and undertake pilots in Queensland. • Work with government and industry partners to develop a transport technology opportunity statement to attract investment and support skills and industry development activities.
Prioritising investment in shared transport services and infrastructure Particularly in our regional centres and cities, we will prioritise investment in efficient and reliable shared transport that delivers the capacity and frequency that is needed. This will support and enable efficient and reliable journeys for our customers by reducing dependence on trips by private vehicle.	• Enable a public transport network optimised to realise opportunities from innovative services. • Expand mass transit in urban areas, focusing on the busiest corridors where higher capacity services are needed, and ensure mass transit links are effectively integrated with first- and last-mile feeder services. • Improve priority for shared transport services on the busiest roads, ensuring more people can be moved more efficiently.	• Explore opportunities for more shared transport services in regional areas, particularly around busier town centres. • Optimise maintenance of the rail network and trains by using new technologies, such as drones and sensor technology, to provide better insights on asset conditions and enable maintenance as-needed.
Delivering new capacity on our roads to improve journey times and reliability Roads will continue to play a critical role in moving people and goods in Queensland. We will ensure journeys for road users are efficient and reliable by better using existing capacity, ensuring roads are well maintained, and upgrading and investing in new roads where needed.	• Improve the performance of the road network by prioritising funding for initiatives that make better use of existing road capacity, as well as upgrading and building new roads where there is no spare capacity.	• Optimise maintenance of the road network by using new technologies, such as drones and sensor technology, to provide better insights on asset conditions and enable maintenance as-needed.
Enabling transport that is accessible for all We will work with service providers and other stakeholders to enable transport services and infrastructure, such as stations and stops that are accessible to all. This means being geographically and physically accessible and affordable for all customers.	• Ensure existing and future stations, stops and interchanges are made accessible for all customers, particularly for people with a disability and older Queenslanders. • Enable new transport services, such as rideshare services that are accessible and affordable for all customers. • Work with the private sector to enable a future transport system that works with and meets the needs of the community, including improving first- and last-mile accessibility.	• Use new technology, such as connected devices, to improve transport access for customers with a disability. • Introduce new on-demand services to improve access for customers in remote, regional and rural areas, as well as less accessible urban areas. • Enhance existing access to regional and remote Queensland with well-designed infrastructure and connected technology. • Ensure extensive user testing is carried out to ensure the accessibility of new technology and infrastructure projects.

Safe journeys
for all

STRATEGIC OUTCOME

2

STRATEGIC OUTCOME 2

Ensuring customers reach their destination and feel safe and secure when travelling is critical to the development of a future-focused transport system. Road safety has improved dramatically over the past 50 years, with the annual road fatality rate dropping by nearly 87 per cent over this period. Reasons for this decreased fatality rate include advances in vehicle and enforcement technology, licensing and road rules reform, behaviour change campaigns, improvements in road and roadside infrastructure and improved speed limits and management.[37]

As a society, we must do everything we can to further reduce deaths and serious injuries on the transport network, with a vision of reducing these to zero. Every injury or fatality on the road network, rail network or waterways impacts families and communities. That is why we are committed to the outcome of safe journeys for all.

Upgrading roads, train lines and the vehicles that use them will improve safety and security. Increased automation will help reduce incidents, and advanced monitoring technology will improve personal security and keep communities safe. However, technology can also pose new security challenges, including ensuring the cyber security of the network and protecting customers' data. These challenges will need to be carefully managed to avoid unintended negative impacts on customers, particularly in terms of privacy.

Directions that support this strategic outcome

Using new technology to improve our roads to achieve zero deaths

Improving personal security on the transport network

Protecting the cyber security of the transport system and our customers

What this outcome means for Queenslanders

Safe journeys for all means:

• zero deaths and serious injuries by equipping infrastructure with smart technology and enabling greater automation

• a secure transport system through improvements in live monitoring and detection on the network

• protection from cyber threats through secure digital systems.

In the future, every aspect of the transport system will be interconnected to ensure customers reach their destination safely, including infrastructure, vehicles, drivers, industry partners, federal government and everyone using the network. This is particularly important on our roads (Figure 11), which account for most injuries and fatalities on the transport network.

New technologies will have an important role in ensuring our roads are safe. AVs will improve safety by alleviating fatigue and driver error, which account for 90 per cent of crashes in Australia.[38]

To obtain these benefits, the road network will be equipped with smart technology to enable higher levels of automation as advancements in AV technology occur (Figure 12). This includes sensor technology that will enable AVs to be digitally connected to road infrastructure and systems, supporting safe operations.

Figure 11: Influences on road safety

37 The Department of Transport and Main Roads 2020, Queensland Road Crash Weekly Report, Report No: 1154, Available at: https://www.tmr.qld.gov.au/Safety/Transport-and-road-statistics/Road-safety-statistics.aspx ; Department of Transport, Office of Road Safety 1984, Road Traffic Accident Data and Rates: Australia, States and Territories 1925 to 1981, Available at: https://www.infrastructure.gov.au/roads/safety/publications/1984/pdf/Stats_Aust_1.pdf

38 Engineers Australia 2015, Are autonomous cars the new airbags? Available at: https://www.engineersaustralia.org.au/portal/news/are-autonomous-cars-new-airbags

The past		Where we are now	Currently working towards	The future	
LEVEL 0	**LEVEL 1**	**LEVEL 2**	**LEVEL 3**	**LEVEL 4**	**LEVEL 5**
No automation	**Driver assistance**	**Partial automation**	**Conditional automation**	**High automation**	**Full automation**
Everything is done manually by the driver.	Driver completes the driving task, with minimal assistance provided by the vehicle for either steering, acceleration or braking.	The vehicle assists with driving whilst the driver needs to have hands on the steering wheel at all times. The driver watches the road and intervenes when required. Adaptive cruise control and traffic jam assist are examples of automated features.	The driver is not required to watch the road, but must take over control of the vehicle when requested. **The vehicle can drive itself some of the time.**	The driver is not required to take action when the system is driving but can take back control if needed. **The vehicle will work fully autonomously.**	The driver is never required to take action as **the vehicle will drive itself all of the time.** There won't even be a need for a steering wheel.
Eyes on	**Hands on**	**Eyes on**	**Temporary Hands off**	**Eyes off**	**Hands off**

Figure 12: Levels of vehicle automation (Source: Qld CAVI)

In focus: Preparing for Emerging Vehicle Technologies in Queensland

Transport and Main Roads' Cooperative and Automated Vehicle Initiative is leading the way in trialling Cooperative Intelligent Transport Systems (C-ITS) technologies through the Ipswich Connected Vehicle Pilot, Australia's largest on-road trial of connected vehicles and infrastructure.

The pilot will involve up to 500 participants, with their own vehicles retrofitted with C-ITS devices that enable vehicles to 'talk' to other connected vehicles, roadside infrastructure, and traffic management systems to share relevant safety-related messages. Whilst there is no level of vehicle automation involved in the trial, the C-ITS devices will provide the driver with safety warnings about a range of conditions, for example, a pedestrian crossing at a signalised intersection, a hazard on the road or congestion ahead. Connected vehicles and infrastructure will evolve the way vehicles and our roads interact, and have the potential to enhance safety, reduce congestion, emissions or travel times. Transport and Main Roads is conducting this pilot to understand the implications for both infrastructure and drivers so that the community can reap the safety benefits of connected vehicles sooner.

New services and technology will help deliver a secure transport system for customers, whether walking, cycling or using shared transport. Real-time journey planning and on-demand transport services will reduce waiting and enable customers to access transport at times and locations where they feel secure. Improvements in live network monitoring and the ability for customers to share their location using connected devices will reduce security risks. Public spaces, such as interchanges, footpaths and cycling paths, will be designed to improve security with more open space and lighting. Collectively, these solutions will help protect customers across their end-to-end journeys and keep communities safe.

As we develop a digitally-connected network though smart roads technology, digital train signalling and greater automation, we will strengthen security to protect the network from online threats and keep customer data safe. This will require effective collaboration with other levels of government and industry as well as continued investment in cyber security technology.

In focus: Keeping our waterways safe

Reef Vessel Traffic Service (VTS) is a reporting system and navigational and information service which reduces the risk of collisions and damage to the marine environment. VTS is compulsory for vessels in the Great Barrier Reef and Torres Strait. Increased information and navigational data will help to prevent pollution and will assist in providing an effective response in a safety or pollution incident.

Achieving this outcome

We are already partnering with industry and other levels of government to improve safety by working to achieve zero deaths and serious injuries, increasing customers' personal security on the transport network and securing the integrity of our digital systems. Building on our *Safer Roads, Safer Queensland* vision, we will continue to undertake initiatives that help ensure 'safe journeys for all'. Some of these initiatives are summarised below (Table 5).

Table 5: Initiatives that support this strategic outcome

Initiatives already underway or recently completed			
Enhanced infrastructure	**Road safety improvements across the state** – enhancing roads across Queensland to address blackspots and improve safety for road users, such as Caboolture Connection Road Route Safety Strategy, Warrego Highway Upgrade Program, Bruce Highway Upgrade Program and Carnarvon Highway Upgrade Program.	**Policy and planning**	**Queensland's Personalised Transport Horizon reforms** – establishing a modern, agile and simplified regulatory framework for personalised transport services that allows greater choice for customers while ensuring safety, accessibility, affordability and accountability in relation to the provision of those services. **Inter-governmental collaboration** – working with public transport operators, the Queensland Police Service and the Australian Government to help improve the security and resilience of Queensland's transport system. ***Safer Roads, Safer Queensland: Queensland's Road Safety Strategy 2015–21*** – commits the Queensland Government to a vision of zero road deaths and serious injuries, aiming to reduce fatalities from 303 to 200 or fewer by 2020 and reduce hospitalised casualties from 6,670 to 4,669 or fewer by 2020. ***Safer Roads, Safer Queensland: Queensland's Road Safety Action Plan 2020-2021*** – implementing the 50 initiatives in our rolling two-year road safety action plan.
New technologies and services	**Cooperative and Automated Vehicle Initiative** – testing CAVs and supporting infrastructure to enable their introduction in partnership with industry.		

We have established new directions to guide government, industry and other stakeholders to deliver on this outcome. These are supported by a range of initiatives for investigation (Table 6).

Table 6: Initiatives for investigation to support this strategic outcome

Future directions and initiatives		
Directions	**Initiatives we will investigate**	
Using new technology to improve our roads to achieve zero deaths and serious injuries We will make our road network safer by working with industry to pilot new technologies, such as AVs, and where proven, support their introduction.	• Expand C-ITS technology on the road network to ensure roads are ready to support AVs as they become operational. • Explore opportunities to undertake further testing of CAVs on Queensland roads, to ensure potential safety benefits can be realised.	• Embed Safe Systems approach to improving road safety across the Department of Transport and Main Roads to achieve zero deaths and serious injuries.
Improving personal security on the transport network We will ensure customers are safe across the transport network through careful design of places, ensuring assistance is available when needed and through effective monitoring of services and infrastructure.	• Explore opportunities to use connected devices to improve personal security across the transport network, such as enabling customers to more easily alert authorities of potential security issues. • Ensure new and upgraded stations, stops and paths are designed using the latest in Safer by Design principles to minimise security risks to customers. • Seek opportunities when planning and implementing new technologies to collaborate with the community to achieve optimum outcomes and build community confidence in new technologies.	• Continually review and improve requirements for all transport service providers to protect the personal security of customers. • Work with industry and other governments to ensure that, prior to their introduction, new technologies are carefully tested to meet customers' personal safety and security requirements. • Explore ways customers can be provided with relevant safety information and warnings prior to commencing their journey where possible.
Protecting the cyber security of the transport system and our customers We will continue investing in security to protect the transport network and the vehicles that use it from cyber risks and to ensure customer data is protected, particularly as the transport network becomes more digitally connected.	• Use AV testing to develop solutions that will mitigate cyber risks associated with greater automation on the road network. • Ensure that appropriate safeguards are developed to mitigate the risks of new technologies, in collaboration with the Australian Government, other state governments, local government and industry.	• Continually review and improve requirements for all transport service providers to protect customer data.

Seamless, personalised journeys
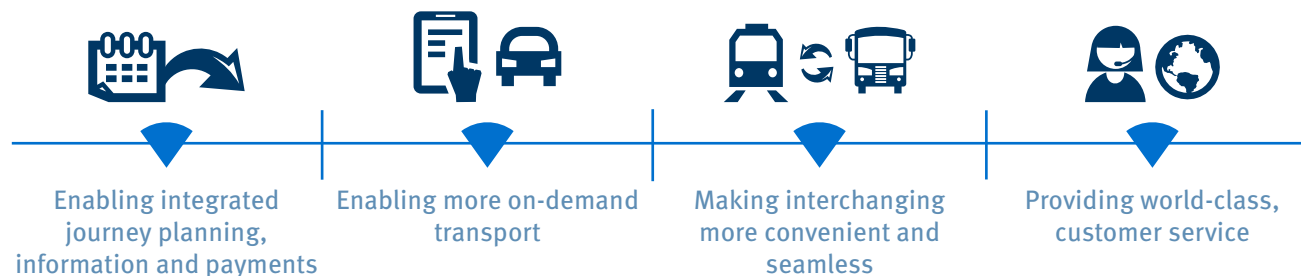
STRATEGIC OUTCOME

3

STRATEGIC OUTCOME 3

Perhaps one of the most exciting changes in transport is the emergence of personalised travel. This has seen a fundamental change in the way people travel, with customers taking more control of their journeys through real-time information and on-demand transport apps.

Queenslanders have embraced the idea of having information at their fingertips and are using it to plan their journeys in the way that suits them. This has seen a shift from thinking about transport modes to thinking about transport journeys, so that the method of travel becomes less important than the end-to-end journey.

In a large and diverse state like Queensland, people make journeys for many different reasons and to many different places. This diversity, and the availability of new transport services, means that customers increasingly want access to personalised journey information and travel options. In doing so, they want to reach their destination in the most convenient way possible. Queenslanders expect a transport system that works for them. We are committed to being a responsive government, ensuring everyone in Queensland can access seamless, personalised transport.

Directions that support this strategic outcome

Enabling integrated journey planning, information and payments	Enabling more on-demand transport	Making interchanging more convenient and seamless	Providing world-class, customer service

What this outcome means for Queenslanders

Seamless, personalised journeys mean that Queenslanders can expect:

- personalised, real-time journey information across all forms of transport, with Mobility as a Service available in rural, regional and urban Queensland

- access to on-demand mobility across most parts of Queensland

- seamless mode transfers at interchanges that are easy to navigate.

Whether travelling by car, shared transport or active transport, customers will be able to access transport information when, where and how they want it, including information on journey options, network conditions and travel times. Smart roads and AVs will enable road users to change route as they go, based on live insights on network conditions.

As AV technology advances, more vehicles will be able to process information and, where a passenger allows it, make decisions that optimise the journey.

Across the entire transport system, Mobility as a Service will enable customers to plan, purchase and track their end-to-end journey through a single platform or mobile app. The app will provide journey options for customers based on their preferences and then guide them through each stage of the journey (Figure 13).

Whether in rural, regional or urban Queensland, customers will no longer need to use different methods to access information on different forms of transport or pay separately for each part of their journey.

Customers will instead manage their transport needs through a single mobility service that will customise journeys to suit individual needs.

Example journey in urban Queensland	Example journey in rural Queensland

Example journey in urban Queensland

Susan uses her Mobility as a Service provider to determine fastest route to office today, paid for as part of a monthly travel subscription.

Based on Susan's preferred arrival time, the Mobility as a Service provider requests an on-demand bus service collect her from her home.

Dropped off at entrance to Woodridge Station.

Susan boards the on-demand service. Smart road and vehicle technology optimises the route of the on-demand service to minimise delays.

Turn-up-and-go train service arrives within 5 minutes.

Due to special event, Susan is alerted to alight at Roma Street and is redirected to a shared AV that drops her off within a short walk of her office.

Example journey in rural Queensland

Colin contacts his Mobility as a Service provider regarding options to get from Bollon to Roma Hospital.

Mobility as a Service provider advises best journey option based on Colin's preferences and real-time network conditions.

Based on Colin's preference for a shared trip, a second passenger is picked up in Surat.

A shared AV picks Colin up from home, and starts on the route.

Road sensors detect damage blocking the Carnarvon Highway. AV is diverted to avoid the damaged road.

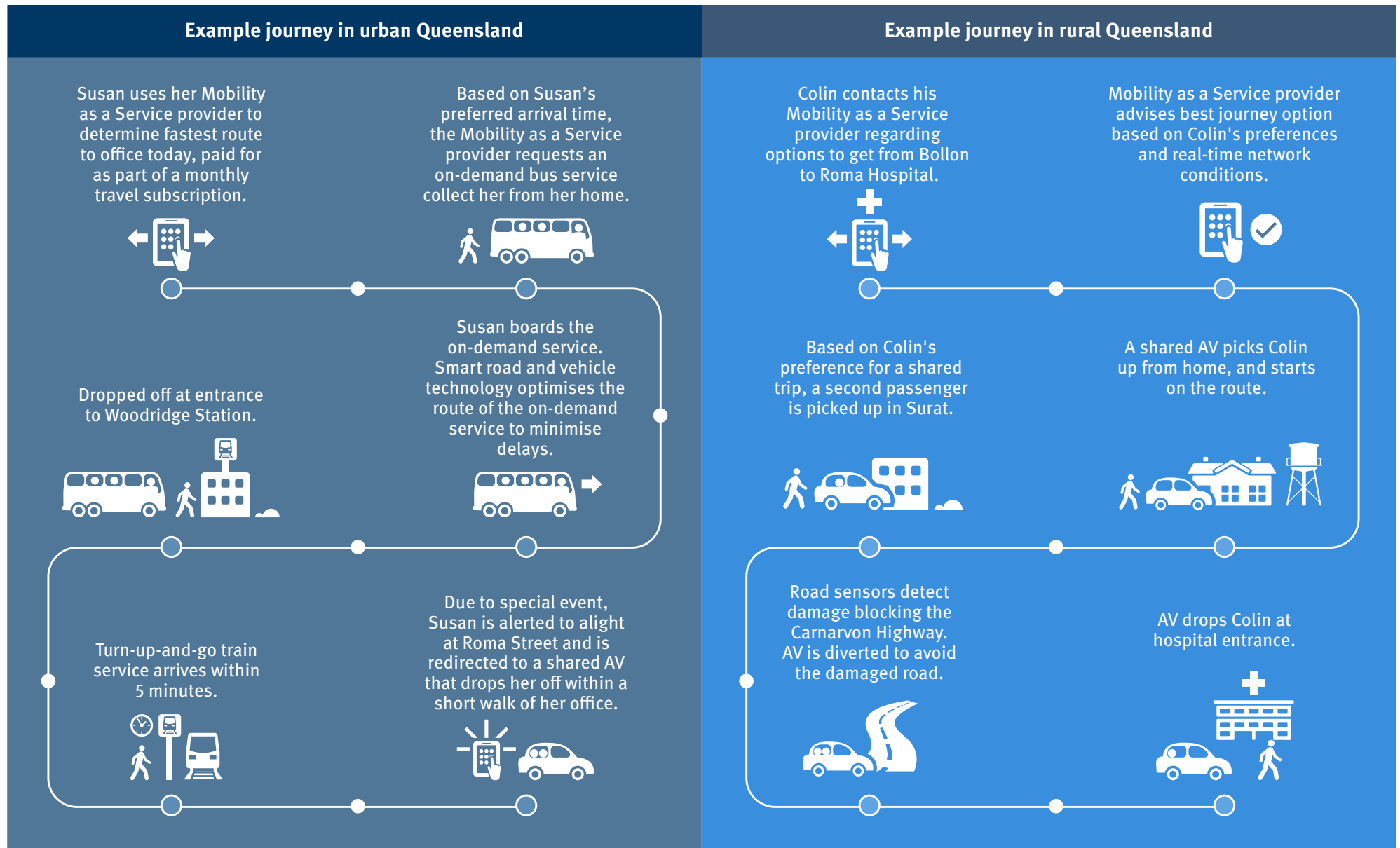AV drops Colin at hospital entrance.

Figure 13: How Mobility as a Service could streamline journeys for customers in Queensland

Using new on-demand transport options, customers can access shared transport when and where it suits them, rather than relying on fixed routes and schedules.

Using a connected device, customers will be able to request a shared service to pick them up and drop them off where it suits. Software will optimise the service route to ensure each individual customer's request is met while delivering an efficient and reliable journey for everyone on-board.

These new flexible service options could particularly benefit regional and rural communities where there is insufficient demand for regular fixed bus routes. By operating when and where customers need them, on-demand services can better meet their needs and be financially sustainable.

Interchanges will enable customers to more conveniently transfer between different forms of transport. They will be easy to navigate, designed to minimise transfer times between services and be accessible to all customers. They will be attractive places where customers can access shops and services when transferring. This will help reduce the 'friction' many customers experience when interchanging, whether from train to bus, bus to bike or car to train.

In focus: Working towards seamless, personalised journeys through on-demand mobility trials

Transport and Main Roads are trialling demand responsive transport in selected suburbs of Logan. The trial uses technology, flexible routes and changes in customer behaviour to provide more responsive and personalised services. This option is designed to make it easier for customers to travel when other services are not available. The pre-booked shared transport services are flexible and adapt to customer demand. The services change their route and capacity to suit the number of passengers and where they want to go.

In focus: International examples of Mobility as a Service

Although a relatively new concept, Mobility as a Service is already being tested and implemented internationally. Examples include:

- **Mobility Shop** – the first operational example of Mobility as a Service was launched in February 2016 in Hannover, Germany. Mobility Shop offers customers the ability to bundle a range of transport services which are invoiced monthly via a 'joint mobility bill'.

- **Whim** – Mobility as a Service Global released its Whim app in Helsinki, Finland in October 2016. Whim offers both monthly and pay-as-you-go mobility options. Each Whim package gives customers a quota of mobility points, which can be redeemed for journeys on any mode of transport.

- **UbiGo** – Since 2015, households in Stockholm, Sweden have been subscribing to an integrated mobility service called UbiGo. The service combines public transport, car sharing, rental car service, taxi and a bicycle system in one app, on one invoice and with 24/7 support and bonus points for sustainable choices.

Transport and Main Roads is already investigating opportunities to make Mobility as a Service a reality in Queensland by implementing a Mobility as a Service Roadmap which will help bring this transformative solution to customers in rural, regional and urban Queensland.

STRATEGIC OUTCOME 3

Achieving this outcome

We are already partnering with industry and other levels of government to enable personalised travel using Mobility as a Service across Queensland, increasing access to on-demand mobility and improving transfers between different forms of transport. We will continue to seek opportunities to achieve 'seamless, personalised journeys', including through the identification and progression of initiatives in rural and remote areas.

Supported by the vision set out in Transport and Main Roads' *Strategic Plan 2019–2023* and the work of the MaaS Program Management Office, our partnership and integrated approach will continue through initiatives, such as new and extended trials of innovative technologies and services, that prioritise customer-focused outcomes. Some of these initiatives are summarised below (Table 7).

Table 7: Initiatives that support this strategic outcome

| Initiatives already underway or recently completed			
Enhanced infrastructure	**Delivering major interchange improvements** – making interchanging more seamless by upgrading major interchanges, such as Brisbane Central Station and Townsville City Bus Station (in collaboration with Townsville City Council). **Queensland Rail Station Accessibility Upgrade Program** – enhancing stations to improve access for all customers, including those with disabilities, the elderly, parents with prams, people with injuries and those carrying luggage. 	**New technologies and services**	**Improving existing transport apps, such as the MyTransLink app** – new customer-initiated features and an improved design with a focus on map-based navigation. **Trialling innovative customer service channels** – deploying new technologies in service centres to improve the customer experience, including a live chat service pilot and a trial of robotic process automation in customer service centres.
		Policy and planning	**Implementing Queensland's Personalised Transport Horizon reforms** – establishing a modern, agile, and simplified regulatory framework for personalised transport services. **Smart ticketing** – upgrading the current ticketing system to improve the payment experience and support future innovation.

We have established new directions to guide government, industry and other stakeholders to deliver on this outcome. These are supported by a range of initiatives for investigation (Table 8).

Table 8: Initiatives for investigation to support this strategic outcome

Future directions and initiatives		
Directions	**Initiatives we will investigate**	
Enabling integrated journey planning, information and payments We will work with industry to support the introduction of solutions, enabling customers to access personalised journey planning, information and payment through a single online platform.	• Explore opportunities to partner with industry and local governments to pilot Mobility as a Service in rural, regional and urban Queensland. Mobility as a Service will enable customers to plan, purchase and track their journeys through a single platform.	• Facilitate the technology to enable services, in partnership with Federal Government and industry. • Continue to work with partners across government and industry to develop the Transport Data Exchange to integrate and improve data management, access and decision making.
Planning, facilitating and partnering to enable more on-demand transport We will foster the introduction of more on-demand transport services to enable more convenient journeys for customers, by partnering with industry, supporting on-demand pilots, establishing an effective policy regime and regulatory framework.	• Explore opportunities to partner with industry, local government, and community groups to explore further opportunities to pilot and roll-out on-demand services in rural, regional and urban Queensland, ensuring these are effectively integrated into the wider transport network. • Optimise regulatory and contractual frameworks to enable and support on-demand transport services.	• Enable on-demand transport options, particularly in regional locations.
Making interchanging more convenient and seamless, digitally and physically We will make interchanging more convenient and seamless through better design and improved services at interchanges.	• Adopt the latest in world-class design standards for transport interchanges and infrastructure to improve transfers between services and expand availability of end of trip facilities. • Ensure customers have access to more personalised navigation for larger interchanges, by using connected devices.	• Work with planners and transport providers to ensure that land use and transport service planning enables physically accessible, connected and seamless journeys for all.
Providing world-class, innovative customer services and community connection We will continue to improve our existing customer service offering while exploring new digital opportunities that provide greater accessibility and connectivity, and more opportunities for authentic community engagement.	• Identify opportunities to improve frontline and online customer services, such as improving coordination of services across government, drawing on the findings of a review of current service delivery. • Develop a department-wide relationship management system to enable customers to have access to more seamless, personalised customer service.	• Engage with customers, the community and partners to co-design initiatives and services. • Work with industry to share transport data and enable better network design, unlock new services and generate value customers and the community.

Efficient, reliable and productive transport for people and goods
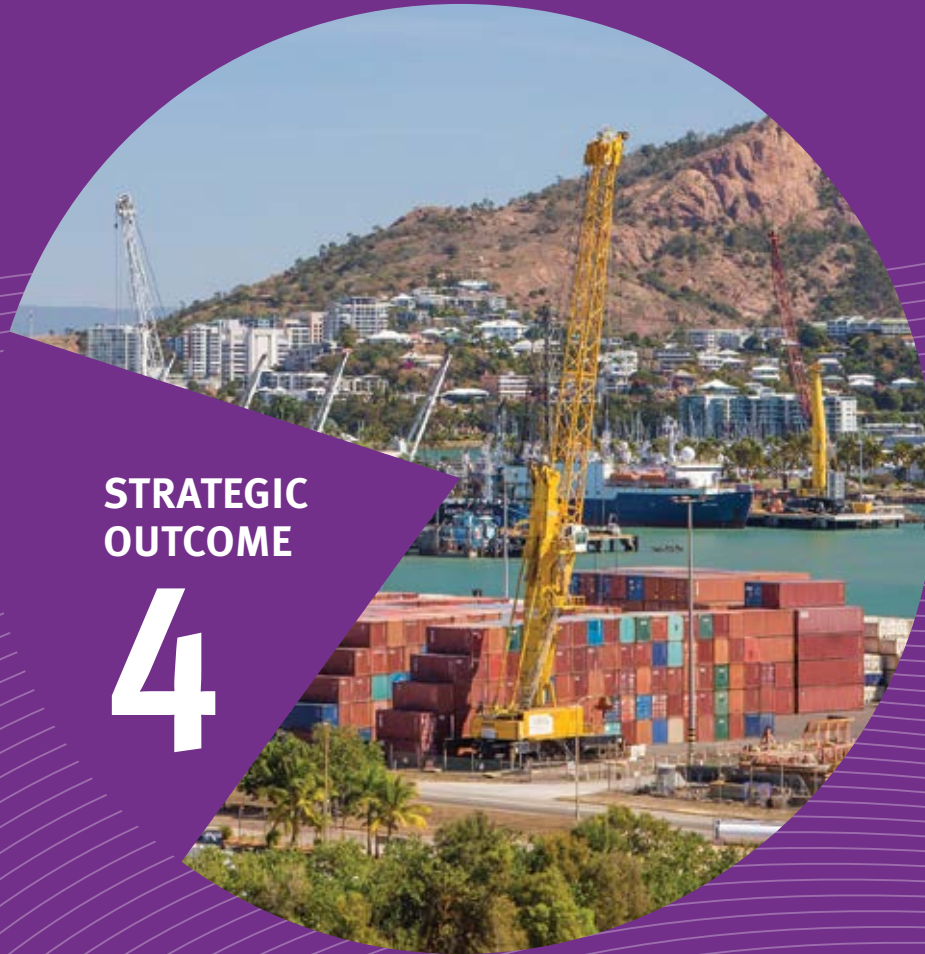
STRATEGIC
OUTCOME

4

STRATEGIC OUTCOME 4

An efficient, reliable and productive transport system aligns network capacity with demand; connects people with jobs and suppliers with markets; and is affordable for people, businesses and government. Transport system efficiency is vitally important to grow Queensland's economy. 1013 million tonnes of freight and 200 million passengers move around Queensland each year relying on Australia's longest road and rail networks.

Likewise, during 2018-19 almost 360 million tonnes of cargo moved through Queensland's 21 declared ports. This included nearly 22,000 ship movements through the ports and almost 12,000 ship movements in the Reef Vehicle Traffic System (ReefVTS) monitored region.[39]

New services and technology will increasingly help make our transport system more efficient, reliable and productive, creating jobs, boosting economic competitiveness and reducing costs for all Queenslanders. There are significant opportunities to increase efficiency – we can use new signalling technology to extract more capacity from the train network, drones to enable faster freight movements around busy centres and shared AVs to reduce transport costs for families.

Directions that support this strategic outcome

Reducing the cost of transport for households and businesses

Enabling a new generation freight and shipping network

Minimising road congestion using smart technology

What this outcome means for Queenslanders

For Queensland households and businesses, this outcome means:

- an efficient and reliable freight network that connects suppliers and markets

- sustainable transport costs for households, businesses and government through better use of infrastructure and assets

- more reliable transport services and reduced congestion, by using smart technology to better manage the transport network

- productivity and jobs growth in both cities and regions, by connecting people and jobs.

The future transport system will connect suppliers and markets using the right form of transport for the right task – rail for bulk and containerised goods, and quality roads for other types of freight. With more data available on freight movements, a better understanding of freight flows will ensure the right infrastructure is delivered where it is needed.

With freight volumes projected to increase by more than 400 million tonnes by 2035 (to 1395 million tonnes), providing the right infrastructure – road, rail or otherwise – in the right place will boost economic productivity and enable export opportunities.

39   The Department of Transport and Main Roads, 2019, Annual Report 2018-2019. Available at: https://www.publications.qld.gov.au/dataset/annual-report-2018-2019-transport-and-main-roads/resource/e2e33266-db66-4afd-acae-bf741c4d179c

Innovative technologies will be used to optimise freight journey times and keep costs low, particularly by improving first- and last-mile access. This is a significant constraint on freight productivity in Queensland, as many access roads are not suitable for larger vehicles and congestion around centres slows freight movements. New technologies, such as drones and delivery bots, will help address this by bypassing busy roads to reduce transport costs. This could reduce last-mile costs by up to 40 per cent.[40] In addition, better optimised load-pooling and distribution offer opportunities to consolidate freight shipments into fewer vehicles, improve efficiency and reduced freight costs for the majority of the shipping distance.

A more efficient and productive transport system will reduce costs for households, businesses and government. Transport currently accounts for 15 per cent of average household expenditure, and a significant share of business and government expenditure.[41]

New services and technologies will help reduce these costs. For example, Mobility as a Service will mean that customers can use shared and other forms of transport rather than paying the ownership costs of a private vehicle, significantly reducing transport costs (Figure 14 and 15, page 45). Shared transport options are also emerging in freight, for example through shared load-pooling in trucks and shipping containers. More efficient fuels and improved automation will help reduce end-to-end supply chain costs for businesses, while on-demand transport services will reduce operating costs and improve fleet utilisation. Through these exciting changes we can deliver the outcomes customers expect in a way that better uses the assets and infrastructure we have.

New technology will help manage congestion by improving the flow of people and goods on the network. As more roads and train lines become equipped with sensor technology and the vehicles that use them become more digitally connected, the flow of data will mean customers and transport operators can make more informed decisions about their journeys in real-time. For example, sensor technology will be able to alert drivers when there is a road accident that may affect their journey and advise alternative routes.

As technology advances, the transport system could become self-managing, automatically optimising routes for vehicles in response to changing conditions.

An efficient transport system will improve productivity and support jobs growth. By providing the right types of services and infrastructure in the right place, we can better connect people with jobs and services. For example, mass transit will connect busy urban corridors so that people can access major centres efficiently and reliably, while a combination of rail and high-quality trunk roads will connect producers, businesses and residents in rural and regional areas.

In focus: Trial of parcel delivery bots in New Farm, Brisbane

The potential for new technology to improve freight delivery is already on display. Australia Post has trialled the use of automated bots for small package deliveries in New Farm, Brisbane. The bot is a small device that uses GPS and sensors to travel on footpaths and take parcels directly to front doors. It can enable more delivery of parcels out-of-hours when people are more likely to be home while also reducing freight costs.

In focus: Toowoomba Second Range Crossing

The Toowoomba Second Range Crossing is a once in a generation development that improves travel times and enhances liveability in the Toowoomba region and beyond. Currently more than 22,000 vehicles cross the range daily, including 2900 heavy vehicles. Both crossings provide access to regions which account for almost half of all exports from the Port of Brisbane.

The new crossing substantially improves the efficiency, reliability and safety of transporting people and goods across the Toowoomba section of the Great Dividing Range.

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[40] *McKinsey & Co 2016, Parcel delivery: The future of last mile*

[34] *Australian Bureau of Statistics 2017, 6530.0 Household Expenditure Survey, Australia (2015–16)*
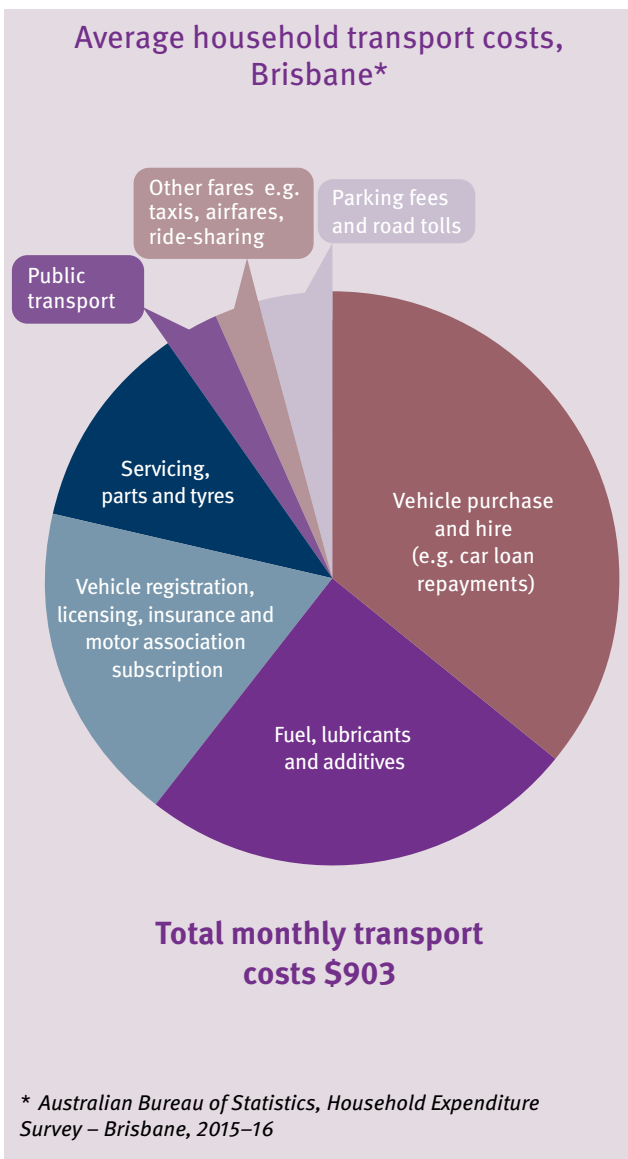
Average household transport costs, Brisbane*

Other fares e.g. taxis, airfares, ride-sharing

Parking fees and road tolls

Public transport

Servicing, parts and tyres

Vehicle purchase and hire (e.g. car loan repayments)

Vehicle registration, licensing, insurance and motor association subscription

Fuel, lubricants and additives

Total monthly transport costs $903

Australian Bureau of Statistics, Household Expenditure Survey – Brisbane, 2015–16

Figure 14: Average monthly household travel costs for a Brisbane household

All in one Mobility as a Service plan available in Helsinki, Finland offers a range of affordable monthly transport packages

The Household Budget Survey in Finland showed that average monthly household expenditure on transport was €318 (AUD$474[#]) in 2016.*

	Pay as you Go	Whim Everyday	Whim Unlimited
Monthly payment	0	€59,7/30 days (AUD$96.63^)	€499/month (AUD$807.8^)
Public transport	Pay as you go	HSL 30-day ticket	Unlimited HSL single tickets
City Bike	Not included	Unlimited	Unlimited
Taxi (5km)	Pay as you go	€10	80 rides (max 5km)
Rental Car	Pay as you go	€49/day (AUD$79.34^)	Unlimited

All in one mobility plans offered in Helsinki, Finland, by European Mobility as a Service provider Whim as at 18 February 2020.

* Official Statistics of Finland (OSF): Households' consumption [e-publication]. ISSN=2323-3028. Helsinki: Statistics Finland [referred: 18.2.2020]. Access method: http://www.stat.fi/til/ktutk/index_en.html

 # Exchange rate as at 31 December 2016 https://www.ofx.com/en-au

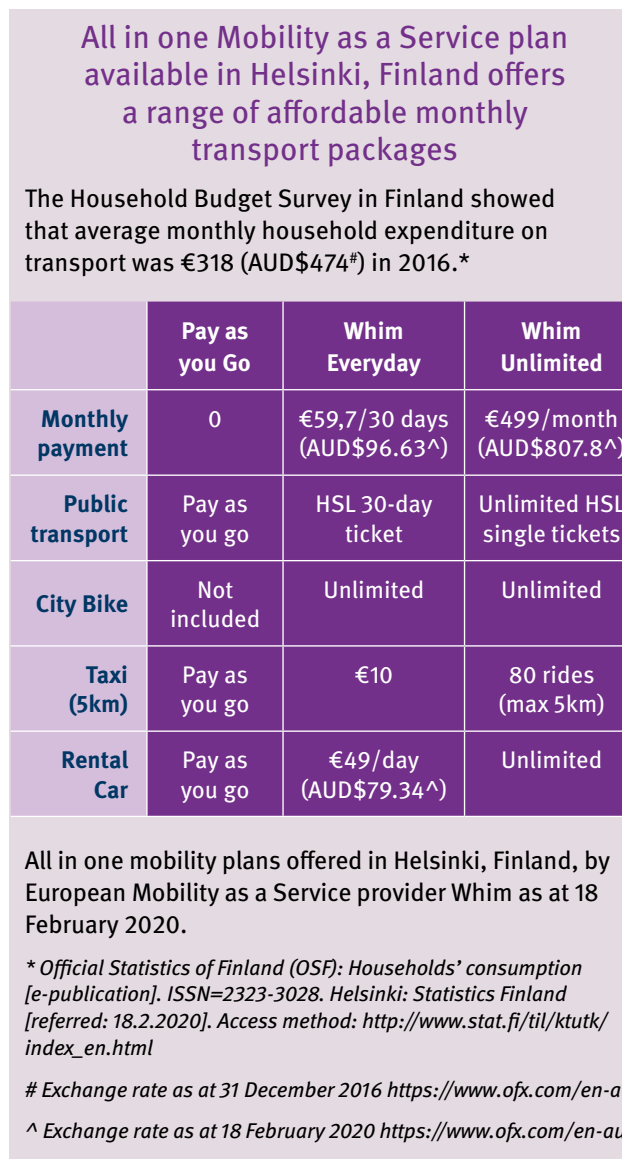*^ Exchange rate as at 18 February 2020 https://www.ofx.com/en-au*

Figure 15: Mobility as a Service plans available in Helsinki, Finland

In focus: Smart Motorway technology

Technology is being rolled out on our busiest motorways to reduce congestion, improve travel times and increase safety. These use Intelligent Transport System technologies to improve the efficiency, reliability and productivity of transport by reducing stop-start travel and providing more predictable travel times. Smart Motorway technology demonstrates the capability to improve motorway performance by the equivalent of adding an extra lane. The technology used includes:

- variable speed limit and lane control signs to manage traffic flow
- on-ramp signalling to control the rate at which vehicles merge onto motorways
- travel time and electronic message signs to provide drivers with real-time advice about travel conditions and alternative routes
- roadside data systems, such as traffic detectors and closed-circuit television cameras, to quickly detect and respond to motorway incidents.

The implementation of Smart Motorways has resulted in significant benefits including travel time savings of 42 per cent during peak periods, 30 per cent reductions in motorway accidents and 11 per cent reductions in greenhouse gas emissions.

STRATEGIC OUTCOME 4

Achieving this outcome

We are already partnering with industry and other levels of government to enable personalised travel using Mobility as a Service across Queensland, increasing access to on-demand mobility and improving transfers between different forms of transport. Building on the vision of the *Queensland Freight Strategy*, the *Queensland Drones Strategy* and the Regional Transport Plans, we will continue to identify initiatives that help deliver 'efficient, reliable and productive transport for people and goods'. Some of these initiatives are summarised below (Table 9).

Table 9: Initiatives that support this strategic outcome.

Initiatives already underway or recently completed			
Enhanced infrastructure	**Toowoomba Range rail upgrade** – a $48 million investment to increase the height of 11 rail tunnels on the Toowoomba and Little Liverpool ranges, enabling containerised freight to be transported by rail from the Darling Downs and South West Queensland regions directly to the Port of Brisbane.	**New technologies and services**	**Smart Motorways** – deployment of Smart Motorways technology on the Bruce Highway to monitor conditions, identify incidents and provide real-time information to drivers so they can plan their trips accordingly and avoid delays. (see 'In focus' box, page 45).
	Kennedy Developmental Road Upgrade – $53.3 million Kennedy Developmental Road (Hann Highway) improvements between Mount Garnet and Hughenden to deliver a more reliable freight and tourist route for North Queensland.	**Policy and planning**	**Queensland Freight Strategy** – a new 10-year strategy and actions to improve freight movement in Queensland.
	Toowoomba Second Range Crossing – $1.6 billion road bypass route north of Toowoomba to improve freight efficiency and driver safety, relieve pressure on Toowoomba's roads, and enhance liveability for the city's residents.		**Queensland Drones Strategy** – a strategy to make Queensland a world leader in drone technology and application. **Queensland's Fairer Fares Package** – the Queensland Government's response to the South East Queensland Fare Review, simplifying fares and making them fairer for public transport users.

We have established new directions to guide government, industry and other stakeholders to deliver on this outcome. These are supported by a range of initiatives for investigation (Table 10).

Table 10: Initiatives for investigation to support this strategic outcome

Future directions and initiatives		
Directions	**Initiatives we will investigate**	
Reducing the cost of transport for households and businesses Enabling new services and technologies within the transport system and addressing transport constraints in supply chains to help reduce the cost of travel for households and businesses.	• Promote a shared AV model, in partnership with industry, to reduce car ownership costs for Queenslanders.	• Investigate opportunities to partner with new Mobility as a Service providers to ensure that transport remains affordable for all Queenslanders, such as through appropriate concessions, and by introducing more affordable transport options and mobility plans.
Enabling a new generation freight and shipping network Collaborating with industry to ensure Queensland has a world-class freight and shipping network, with efficient and reliable road and rail links connecting suppliers and markets, improved first- and last-mile freight access and world-class technology.	• Evaluate the benefits of potential demand management approaches, such as enabling more urban freight deliveries outside core business hours, to improve freight journey times and improve network reliability. • Work with industry to introduce new technologies within the freight system to better use existing capacity, reduce freight costs for regional and rural communities and to encourage economic development.	• Explore applications for new technologies and innovations in ports to minimise impacts and improve sustainability. • Evaluate options to improve connected infrastructure at high priority ports.
Minimising road congestion using smart technology Equipping more roads with smart technology to minimise congestion impacts. Smart technology includes improved real-time monitoring, variable speed limits and messaging and dynamic lane configurations that enable roads to be optimised based on varying conditions.	• Expand smart motorway technology to other busy motorways and arterial roads to better use existing infrastructure capacity, improve network reliability and reduce congestion impacts. • Partner with the Australian Government and other states to progress an integrated network management system.	• Work with industry to share data and use data insights to optimise network congestion and travel times.

Sustainable, resilient and liveable communities
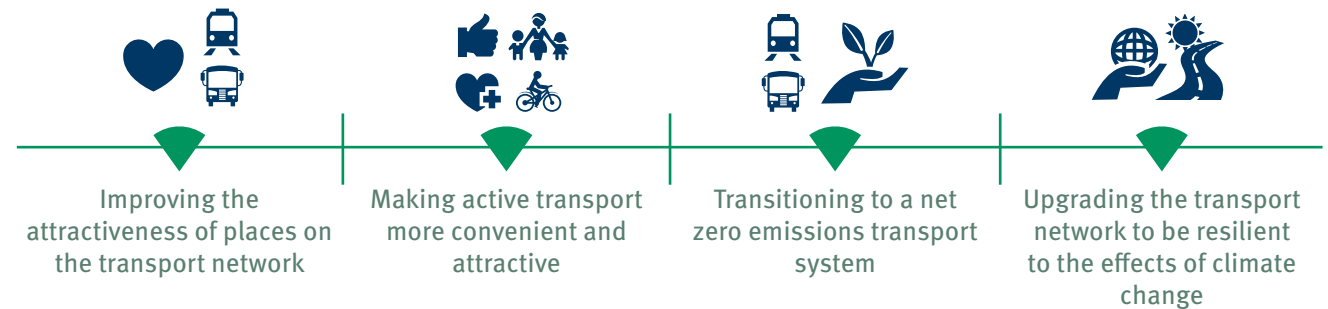
STRATEGIC OUTCOME

5

STRATEGIC OUTCOME 5

Transport plays an important role in the liveability and sustainability of communities across Queensland. It influences where people live, where businesses locate and how people access services. For example, light rail has helped improve accessibility and amenity on the Gold Coast, and activity centres have formed around new train stations across Queensland.

However, transport also impacts on the amenity of our cities and towns and the environment, including air quality and noise. The transport sector is a major contributor to greenhouse gas emissions in Queensland. Transport greenhouse gas emissions were 22.5 million tonnes of carbon dioxide (C02) equivalent, or around 14.7 per cent of Queensland's total emissions. Without any intervention, this is projected to increase.[42]

Transport has a positive impact on liveability and sustainability when services and infrastructure are planned, delivered and operated effectively and the network is resilient to extreme weather events. The use of sustainable forms of transport, as well as new services and technology, present enormous opportunities to make Queensland's communities more liveable and sustainable. This will ensure Queensland maintains an enviable lifestyle, continues to attract visitors and our important natural assets like the Great Barrier Reef are protected.

Directions that support this strategic outcome

| Improving the attractiveness of places on the transport network | Making active transport more convenient and attractive | Transitioning to a net zero emissions transport system | Upgrading the transport network to be resilient to the effects of climate change |

What this outcome means for Queenslanders

For Queenslanders, this outcome means:

• transport and land use planning are integrated, and future transport corridors are protected, to support planned land use and to respond to future needs

• shared transport is an attractive alternative to private car use, particularly in denser urban and regional areas

• walking and cycling are attractive forms of transport

• new vehicle technology and innovative infrastructure solutions are used to achieve net zero emissions from transport

• the transport network is resilient to extreme weather events and adaptive to the effects of climate change.

With better integration of transport and land use planning we can provide the right capacity, frequency and type of transport to meet demand and reflect local characteristics.

For example, in denser urban areas, higher capacity transport modes, such as busways, light rail or rail, may be the best solution. In regional and rural areas, land use will influence road and rail capacity requirements.

[42] Department of Environment and Science, State of the Environment 2017. Available at: https://www.stateoftheenvironment.des.qld.gov.au/home

Corridors for future transport links in urban, regional and rural Queensland will be protected to support land use planning and provide more certainty for communities.

In the future, shared transport will be a more attractive alternative to private car use, helping manage emissions and creating more attractive places. As regional centres and urban areas continue to grow, greater use of shared transport will help manage congestion and emissions. In urban areas, new mass transit links will provide more frequent and reliable services. More shared transport will also provide opportunities to repurpose road and parking space as places for people.

Active transport will be a key feature of the future transport system, with safe and accessible footpaths, dedicated cycling paths and safe pedestrian crossings making walking and cycling more attractive for residents and visitors and helping to keep Queenslanders healthy. Shared bike services and integration of active transport with other modes, such as facilities at interchanges, will make active transport a realistic alternative in towns and centres across the state. This will improve the liveability and sustainability of communities by supporting healthy lifestyles, improving community connections and managing emissions.[43]

New vehicle technology will help deliver more sustainable, liveable communities by reducing greenhouse gas emissions and making better use of resources. New technologies, including CAVs and smart infrastructure, could significantly reduce greenhouse gas emissions by increasing the efficiency of the transport network.

LZEVs and other alternatively powered vehicles will play a particularly important role, with EV charging stations to be accessible across Queensland. LZEVs can help reduce greenhouse gas emissions and improve the amenity of our regional centres and cities, especially if powered by renewable sources.

Other technologies and services will also help deliver a cleaner transport system. AVs will reduce emissions by optimising journeys and driving patterns and, if shared, reduce vehicle kilometres travelled on the road network.

Better use of existing infrastructure, such as Smart Motorways, will contribute to a cleaner transport system by reducing emissions associated with construction and enabling the smoother flow of vehicles.

A transport network that is resilient to the effects of climate change, particularly more extreme weather events, contributes to sustainable communities. Resilience enables fast recovery following a problem or interruption to resume regular operations or services. This reduces disruption to the broader transport network and allows people and freight to keep moving.

43   AARP The Livability Index 2018, Available at: https://livindexhub.aarp.org/AARP1232_REPORT_Livability2018_Jun20v21.pdf

The transport network will be able to withstand natural disasters and be safe to use as soon as practically possible after such events. Better planning and design of infrastructure, early warning sensors and connected vehicle-infrastructure technologies will improve network resilience.[44]

There will be times when physical connections cannot be maintained. In these circumstances, effective and reliable communication becomes critical to keep transport users informed through early warning systems, real-time information and innovation in traffic incidence response.

New forms of mobility, such as drones, also have the potential to improve the resilience of the transport network, enabling essential goods and potentially people to access areas isolated by flooding.

In focus: Transit oriented development

Transit oriented development is a planning concept that promotes the creation of a network of well-designed, human-scale urban communities that are focused around transit stations. These are characterised by a rapid and frequent transit service, a mix of residential, retail, commercial and community uses, high accessibility to the transit station and high quality public spaces and streets. Current and future transit oriented developments are being progressed by Transport and Main Roads to improve local amenity and increase active and public transport patronage.

In focus: Cross River Rail and creating new, attractive places for people

Cross River Rail will help revitalise parts of Brisbane's inner suburbs and CBD. The new station at Albert Street – Brisbane's first new inner-city rail station in more than 100 years – will trigger a revitalisation of the southern part of the city, create new space for pedestrians and outdoor dining, and encourage new business.

The station will provide direct access to the southern CBD, supporting sustainable economic development and population growth by increasing the capacity of the transport network.

Albert Street will become a pedestrian friendly zone to further enhance Brisbane's green spine, linking the City Botanic Gardens and Roma Street Parkland.

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44   Guerrero-Ibanez, J. et al. 2018, Sensor Technologies for Intelligent Transportation Systems, Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5948625/

Achieving this outcome

We are already partnering with industry and other levels of government to enable personalised travel using Mobility as a Service across Queensland, increasing access to on-demand mobility and improving transfers between different forms of transport. We are also working to integrate and encourage use of active and public transport options, prioritising them above private personal car travel in the transport network, where appropriate. Building on the priorities set out in the *Queensland Cycling Strategy 2017–2027*, the *Queensland Walking Strategy* and the Regional Transport Plans, we will continue to identify potential active and shared transport initiatives to deliver customer-focused outcomes and foster more 'sustainable, resilient and liveable communities'. Some of these initiatives are summarised below (Table 11).

Table 11: Initiatives that support this strategic outcome

Initiatives already underway or recently completed			
Enhanced infrastructure	**Investment in cycling connections** – investing in high priority connections to make cycling safer and more convenient, including the North Brisbane Bikeway, New England Highway Cycleway in Toowoomba and Mackay Slade Point Road Cycle Path, Stage 1 **Road network flood resilience** – enhancing roads across the state to improve flood resilience, including the Ipswich Motorway, Bruce Highway and Warrego Highway.	**Policy and planning**	**Regional Transport Plans** – 15-year plans that identify the specific transport priorities for each of Queensland's regions. *ShapingSEQ 2017* – a 25-year plan for South-East Queensland for sustainable growth, economic competitiveness and high-quality living. *Queensland Cycling Strategy 2017–27* – setting the direction for cycling over the next ten years, and a two-year fully funded action plan. *Queensland Climate Transition Strategy* – outlining how Queensland proposes to prepare for the transition and meet a target of zero net emissions by 2050. *Queensland Climate Adaptation Strategy 2017–2030* – ensuring an innovative and resilient Queensland that manages the risks and harnesses the opportunities of a changing climate. *The Future is Electric: Queensland's Electric Vehicle Strategy* – preparing and positioning Queensland for a transition to a greater uptake of EVs. **Queensland Walking Strategy 2019–2029** – providing the framework for promoting walking as an accessible, healthy, active transport mode across the state. *Sustainable Ports Development Act 2015* – establishing a legislative framework to balance the protection of the Great Barrier Reef with the development of the state's major bulk commodity ports in the regions. *Maintenance Dredging Strategy* – providing a framework for sustainable, leading practice management of maintenance dredging at ports in the Great Barrier Reef World Heritage Area.
New technologies and services	**Queensland Electric Super Highway** – partnering with industry and local governments to deliver a network of fast EV charging stations from Cairns to South East Queensland and Toowoomba. 		

We have established new directions to guide government, industry and other stakeholders to deliver on this outcome. These are supported by a range of initiatives for investigation (Table 12).

Table 12: Initiatives for investigation to support this strategic outcome

Future directions and initiatives		
Directions	**Initiatives we will investigate**	
Improving the attractiveness of places on the transport network We will help improve community amenity by working with local government to enable appropriate land use around transport networks and by ensuring road and station design effectively integrates with surrounding land uses. This includes planning for the future by designing infrastructure that is appropriately flexible to grow and adapt to evolving needs.	• Explore opportunities to use the introduction of AVs to repurpose car-related space in centres, such as parking, for pedestrians and other activities. • Enhance the amenity of centres by partnering with local councils to improve the allocation of road space and create more attractive places for people and businesses.	• Continue to work effectively with community, industry, local and federal government to enable coordinated land use planning and to develop social infrastructure appropriately flexible to remain effective and relevant in future.
Making active transport more convenient and attractive We will make walking and cycling more convenient and attractive by working with stakeholders to deliver safe and connected cycle paths and footpaths, and by making new services, such as bike share, available to more Queenslanders.	• Explore opportunities to partner with industry to provide more shared active transport services, like bikes and escooters, across the state, making active transport more accessible and convenient for Queenslanders.	• Work with local councils and industry to deliver new and upgraded footpaths and cycling paths around centres and along key corridors that are safe and connected.
Transitioning to a net zero emissions transport system We will support the transition of our transport system to net zero greenhouse gas emissions by improving efficiency and enabling new vehicle technologies and infrastructure solutions.	• Implement the Queensland Electric Vehicle Strategy to support the adoption of more sustainable vehicle technologies and energy storage solutions. • Develop and implement a net zero emissions transport roadmap in collaboration with industry and other stakeholders.	• Adopt a whole-of-life approach to transport emissions, by minimising emissions across the planning, design, delivery, operation and maintenance of infrastructure and services. • Use real-time management of the transport network to minimise emissions, such as advising road users of alternative routes that will be more efficient.
Enhancing the resilience of the transport network to the effects of climate change We will ensure our roads and train lines can withstand the inevitable impacts of climate change, including more extreme weather events. This will be achieved through world-class planning, design and construction and through better use of real-time network data to ensure services and infrastructure can be operational as much as possible.	• Embed climate adaptation considerations into all our transport planning and services. • Ensure new and upgraded infrastructure is designed to withstand expected effects of climate change through modelling and evaluation of likely impacts.	• Improve real-time monitoring of the network to improve responsiveness to service and infrastructure issues due to climate and weather-related events. • Embed a whole-of-life asset management approach.

Our role in the transport system of the future

The changes that present so many opportunities for the transport system also have implications for the role of government. A new transport ecosystem is emerging in which government is no longer the sole provider of shared transport. Vehicle manufacturers, technology companies and transport operators are collaborating to deliver new transport solutions – often personalised to suit the specific needs of each customer. Industry is also playing a greater role in delivering and operating transport infrastructure.

The opportunities and challenges this new ecosystem presents for Transport and Main Roads are summarised in Table 13.

Transport and Main Roads will continue to put customers and the community first. We will capitalise on opportunities and address challenges through fostering a culture of innovation to harness change. Being agile and responsive will allow us to adapt plans as needed to improve transport outcomes for Queenslanders. Through being an enabler of mobility, we will provide the right environment for industry to innovate and bring new solutions to customers. We will ensure that the transport system is funded sustainably and is flexible to respond to change, often in partnership with industry.

Putting customers and the community first

One thing that does not change is putting our customers and the Queensland community first. This means ensuring the transport system is delivering the outcomes we have set, and that decisions are consistent with our principles.

We will maintain this commitment as we work with the community and industry to plan, design and deliver transport for the future. We will partner with industry to understand and meet the needs of customers and measure the performance of the transport system against these expectations. We will work with the community and industry to educate customers and enable road users to understand the changing transport system.

Through new technologies, aggregated service delivery and management platforms such as Mobility as a Service, customers will increasingly be able to provide feedback on their journey preferences and have this addressed in real-time. These new methods of interaction will not replace all existing communication channels; we will maintain traditional feedback channels as we listen to and meet the needs of all Queenslanders.

In focus: Data driven decision-making in transport

Using the latest technologies, we can better collect and analyse customer data. We can gather insights into how, why and where people are travelling and use this to make more informed investment and operational decisions.

Through Bluetooth technology, we already track average travel times on key bus routes. This data is used to better plan and manage congestion on the road network and to provide customers with real-time bus arrival information in Brisbane.

Data driven decision-making is likely to become increasingly automated. For example, using live network performance data, AVs could automatically respond to traffic congestion and take customers to their destination using alternative routes to reduce journey times.

Table 13: Organisational challenges and opportunities and Transport and Main Road's response

Organisational challenges and opportunities
Key challenges
• Customer behaviour more dynamic and less predictable, which makes it more challenging to satisfy customers. • Traditional planning and regulation of the transport system no longer suited to a rapidly changing market. • Different capabilities needed to harness innovative services and technologies. • More challenging funding environment due to greater demand for range of government services, including health and human services.
Key opportunities
• Using real-time data analytics to better understand customer needs and behaviours. • Providing more opportunity for industry to bring innovation to transport customers. • Prototyping and trialling new solutions, providing the opportunity to learn from and integrate learnings to shape future delivery outcomes. • Collaborating with industry, bringing new funding opportunities and revenue streams.
How Transport and Main Roads will address challenges and opportunities
• Continue putting customers and the community first. • Foster a culture of innovation to harness change for the benefit of Queenslanders. • Be an enabler of mobility – providing the right environment for industry to innovate and bring new solutions to customers. • Ensure the transport system is sustainably funded. • Be flexible to respond to change, often in partnership with industry. • Be agile and responsive – adapting plans as needed.

Fostering a culture of innovation

Innovation is about doing things differently and better to create value for our customers. With so many new developments happening in transport, we must ensure that we as a government are ready to embrace these changes. This means building a culture of innovation, where we are increasingly open to new ideas and willing to test and learn.

Transport and Main Roads' innovation framework (Figure 16) provides an approach for us to do this, generating new ideas and testing these against our objectives. However, a culture of innovation also means working closely with our industry partners and being open to the ideas they bring to deliver on the transport outcomes we have set.

We will identify opportunities to develop and update plans, regulations, policies and infrastructure to harness innovation through partnerships and influence positive customer outcomes.

TMR INNOVATION PROCESS

1 **PROBLEM DEFINITION** Define problems worth solving

2 **IDEA GENERATION** Identify ideas worth pursuing

3 **IDEA EVALUATION** Identify alternatives worth exploring

4 **IDEA PRESENTATION** Provide recommendations worth investing

5 **IDEA IMPLEMENTATION** Validate solutions worth scaling

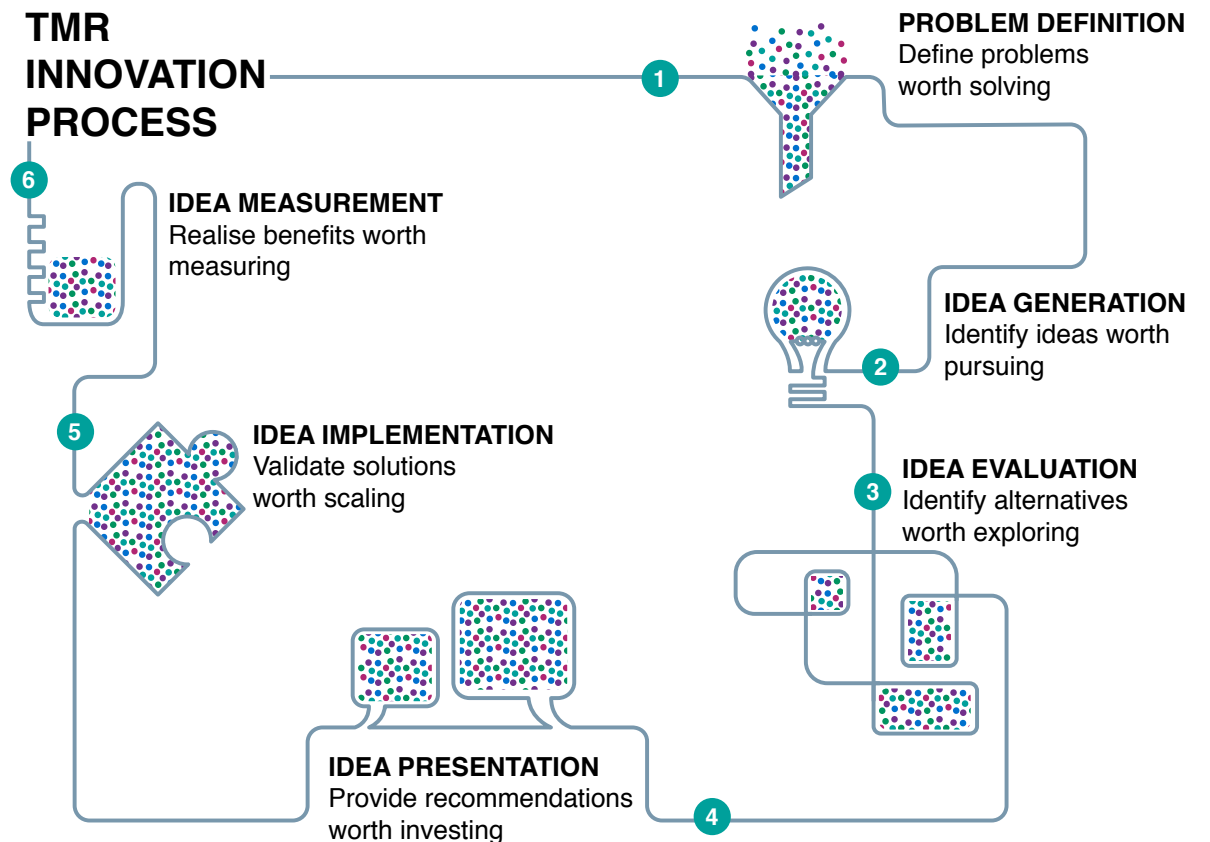6 **IDEA MEASUREMENT** Realise benefits worth measuring

Figure 16: Transport and Main Roads' innovation process

Being an enabler of mobility

Industry plays an important role in the adoption of innovative transport solutions in Queensland. Whether through new on-demand transport services, ridesharing, car sharing or bike sharing, the transport system is increasingly resembling an ecosystem of mobility providers.

The traditional role of government as planner, deliverer and operator of transport is changing, as customers increasingly choose to directly access alternative services.

Compared to the current approach, where government is the primary provider of transport services, the future system may be characterised by several providers 'packaging' transport services for customers (Figure 17).

In this future ecosystem, government will retain an important role to enable service providers to develop and deliver innovative services, while ensuring that they support integrated and customer-focused outcomes.

To achieve this, Transport and Main Roads will:

- establish clear outcomes that service providers must deliver

- adopt regulations that foster innovation and improved service delivery

- ensure transport data is available and shared with service providers

- work with industry to test and support innovative technologies.

Ensuring sustainable funding

To be future-focused, Queensland's transport system needs sustainable funding. New transport technologies are challenging traditional revenue sources, such as fuel consumption taxes, which may impact on the amount of money government can generate. We will investigate potential use cases and applications of revenue generation and ensure equitable and accessible transport options are prioritised.

The State Infrastructure Plan outlines an Options Assessment approach to investment which encourages reform and better use of existing infrastructure, where possible, rather than constructing new infrastructure (Figure 18, page 58). At the same time, transport is competing for limited funding, as the government carefully manages the state's budget to balance different needs, including increased demand for health and human services.

In this environment, we must rethink how transport is funded and delivered. Around Australia and internationally, governments are exploring different ways to reduce reliance on general revenue to fund, operate and maintain transport networks (Figure 19).

As the funding challenge grows, we must consider these alternative solutions to ensure Queensland has a world-class transport system that is equitable and accessible to all. If pursued, many of these solutions will also require cooperation with the Australian Government and other states.
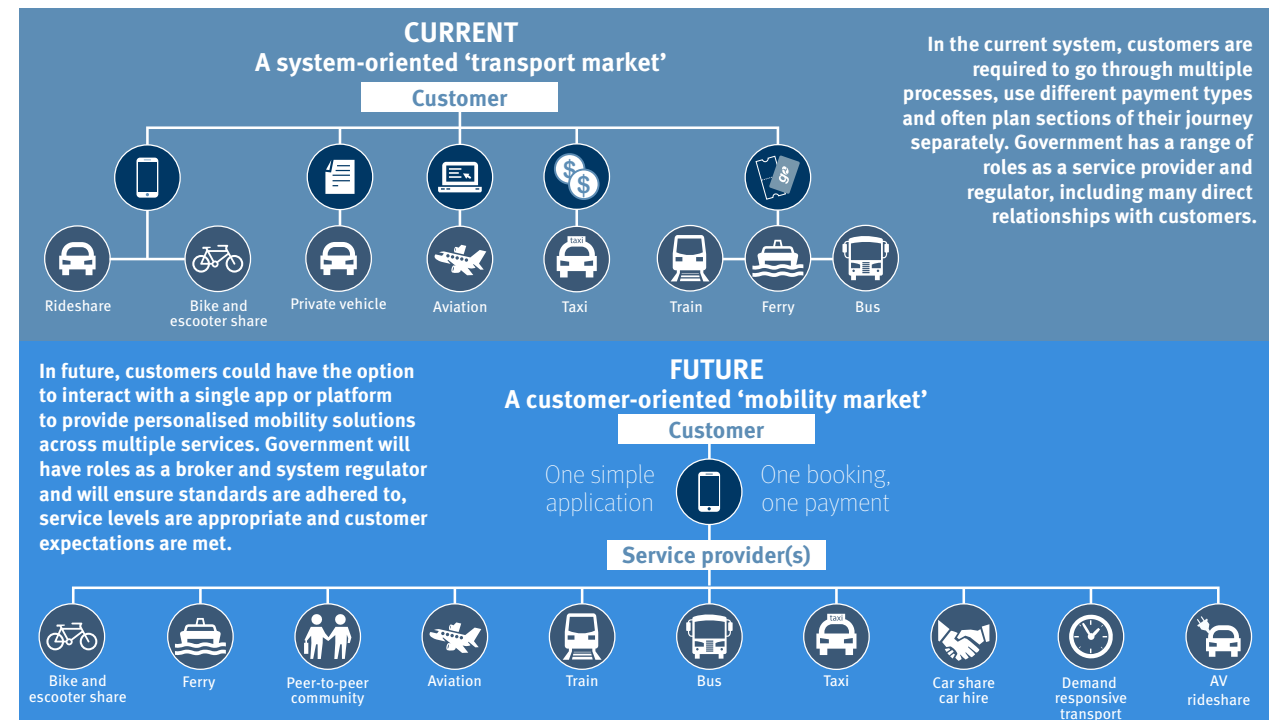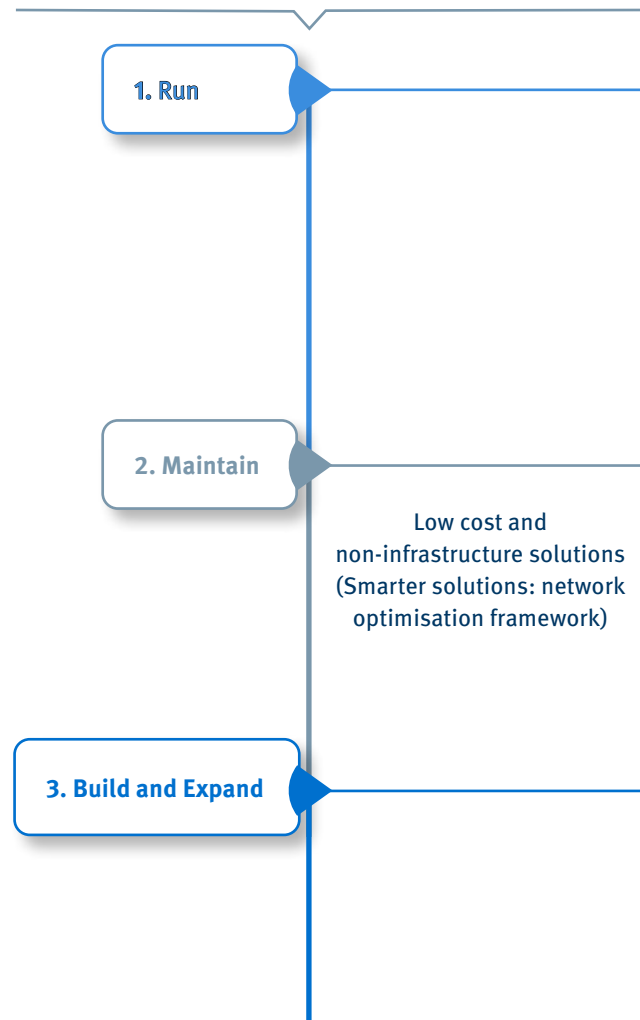

Figure 17: Traditional and future models for the delivery of passenger transport services

The Department of Transport and Main Roads **approach** to Transport:

The State Infrastructure Plan options assessment **approach** to infrastructure investment:

1. Run

2. Maintain

Low cost and
non-infrastructure solutions
(Smarter solutions: network
optimisation framework)

3. Build and Expand

Most Preferred	1. **Reform.** Improving service performance through an amendment of existing institutions and laws.	• Changes to governance arrangements, organisational structure and culture, service delivery models and cross-agency planning. • Regulatory change, safety and environmental standards, land-use planning controls, access regimes and licensing. • Reform initiatives such as the personalised transport framework which seeks to ensure that Queenslanders have access to safe, reliable and affordable personalised transport services into the future.
Less Preferred	2. **Better Use.** Improving service performance by influencing demand (ie. not building new capacity).	• Demand management, pricing, influencing user behaviour and expectations. • Digital technology for example, smartcards and intelligent transport systems such as signal coordination and incident management systems. • Smart infrastructure with embedded sensors to optimise maintenance and replacement. • Rail signal movements and bus priority.
Less Preferred	3. **Improve Existing.** Improving service performance through relatively (compared to new) lost cost capital works that augments existing infrastructure.	• Road widening, such as to accommodate vehicle lanes, bus lanes and cycle lanes, and rail line duplication. • Intersection upgrade, focusing on pinch points.
Least Preferred	4. **New.** Construction of new infrastructure.	• Constructions of new assets following the elimination of less capital intensive options.

Figure 18: Approach to transport and infrastructure investment

Figure 19: Alternative funding and revenue models

Value sharing

Identifies the key beneficiaries of a transport project, through which contributions to the costs of construction and maintenance of the project can be obtained. A common example of this in practice, is the uplift in land value that occurs with urban renewal and transport projects. Governments are increasingly seeking to share some of this value uplift to fund projects.

Innovative tolling

Improve road based payment by utilising geographic tracking to allow users to pay for the sections of the road they are actually using, or new mobile software that lets road users pay on a trip by trip basis without requiring a payment tag, allowing government to better recoup usage costs.

Mobility as a Service

This model moves towards the provision of services by operators, through which customers can access a broad range of transport modes, through a single platform. In this way, users pay directly for the services they are accessing, removing duplication and promoting efficiencies.

Price regulation

There is opportunity to improve the sustainability of funding through improved road pricing regulation. In practice this means infrastructure access prices are set by an agency or organisation, at arm's length from government, allowing government to properly recover the cost of building, maintaining and operating roads.

In focus: Private sector innovation in Queensland

The Queensland Government has partnered with home grown company Tritium to supply fast-charging stations for the Queensland Electric Super Highway. Tritium has become one of Australia's fastest-growing companies, increasing manufacturing capacity by 600 percent and has developed into a leading global fast charging supplier, holding around 50% of the Norwegian market and 15% of the global market for 50kW fast chargers. Tritium's headquarters and main manufacturing plant is in Brisbane, helping Queensland transition to a low emissions future.
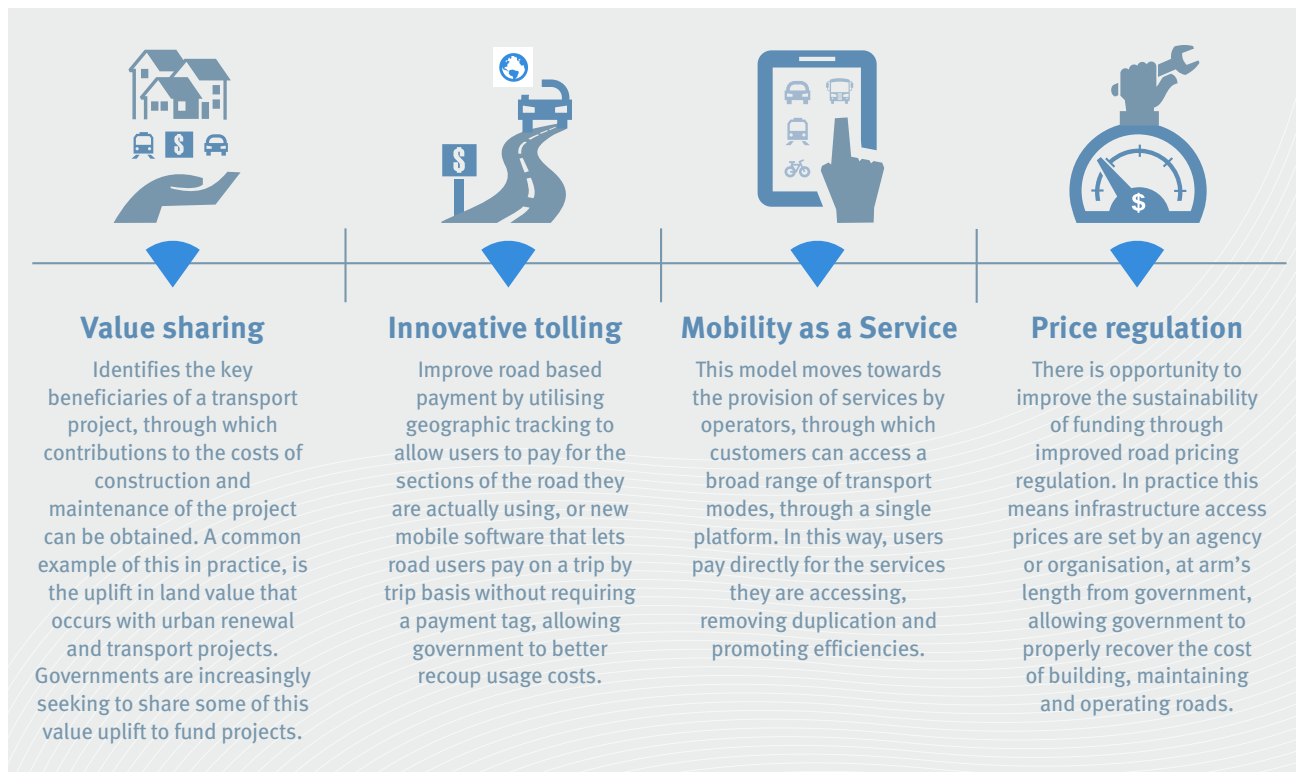
Source: Tritium, 2020, www.tritium.com.au

A flexible organisation

As the world changes, organisations and governments must rapidly adapt and respond to new market trends and disruptive technologies. Transport and Main Roads will need to quickly identify, analyse and test new technologies and ideas, internally and in partnership with industry.

Developing and transparently communicating such initiatives and actions will also support the creation of partnerships to deliver shared customer and community outcomes.

Customers are more connected, more discerning, and their travel behaviours are changing. These changes are likely to rapidly increase and will require us to have the right capabilities to plan, respond, and manage the transport system in real-time, in a high-tech, and data driven environment.

Organisational structures and processes will adapt to provide responsive and agile government and ensure the necessary skills are in place within both the private and public sectors. Partnerships with the private sector are also likely to be more critical, along with more flexible and responsive procurement processes, to incentivise private-sector innovation.

Principles for decision-making

Principles are enduring considerations that can be applied universally across the transport system when making major policy, planning and investment decisions. Upholding key principles in decision-making will help us identify and mitigate potential risks when adopting new technologies and services, such as safety considerations or unequal opportunities in transport access. As we work   with industry and other stakeholders to achieve our desired outcomes, we will apply these principles (Table 14).

Table 14: Principles for decision-making

Principle	Description
Consider transport from a customer and user perspective	A modern, adaptable and agile transport system puts the customer at the centre of all decisions, whether they are passengers, freight operators, drivers or visitors. The mobility needs of people and freight are different, yet equally important. These needs will change and evolve in response to emerging trends such as ageing, sharing and personalisation. The transport system will need to adapt accordingly.
Encourage social equity	Our future transport system will support equity and access and help build liveable, connected and sustainable communities. New service models and technology applications have the potential to benefit individuals or communities that are disadvantaged, have disabilities or other specific accessibility needs, or live in remote areas. Changes need to encourage equitable access and be affordable.
Apply a future focus	A future focus will create a culture that is agile and can embrace positive change. It will consider the long-term impacts of decisions to create flexibility and enable adaptation. We will monitor emerging challenges and trends and continually assess the role of technology and innovation in delivering transport objectives.
Adopt best practice	To address emerging challenges and maintain a modern transport system that supports liveability and prosperity, we will embrace contemporary best practice, and be open to new ways of partnering. We will be proactive to influence how these changes affect Queensland, to plan for the future, not just respond to it.
Be transparent	We will continue the conversation with Queenslanders about the challenges we face, the opportunities we have, and the changes we need to make to embrace and address these.

Being agile and responsive

The extent of change in transport is unprecedented. Perhaps even more significant is the unknown nature of many of these changes. It is difficult to predict which technological developments will transform our lives over the next 30 years. Other social, economic and environmental changes will also occur, which will affect how customers and organisations respond to change.

When making decisions about the transport system today, we do so with the knowledge that we cannot predict what the future will look like. It is therefore important that when we make decisions today, we do not prejudice how we can respond to future change.

This requires:

- a policy and regulatory framework that can be adapted as new technologies and services emerge
- an approach that prioritises 'no regrets' projects, including maximising existing network capacity, and is flexible in response to changes in demand
- openness by government and industry to exploring new ways to achieve outcomes.

An agile approach will ensure we are achieving the outcomes we have set while being prepared for the changes that come our way.

Partnering for success

A collaborative and coordinated approach is critical to harness the opportunities arising from new and emerging technologies.

A fundamental shift from managing transport to enabling mobility is required, to accommodate changing consumer expectations and new industry dynamics created by technology. Strategic partnerships are being formed in recognition of the growing interconnectedness of the technology-enabled transport network.

Where policy alignment exists, utilising and enhancing inter-state partnerships will enable us to influence national transport policy and reforms.

Partnering with local government and communities will also enable us to develop tailored initiatives and trials, improved customer outcomes and achieve the transport priorities and objectives contained within Transport and Main Roads' Regional Transport Plans.

In addition, we will maintain our strong focus and commitment to working and collaborating with international, federal, state and local partners to ensure transformation is managed and benefits maximised, to deliver a safe, accessible, efficient, and sustainable transport system for all Queenslanders.

The Queensland Transport Strategy's Action Plan will be developed and released in 2020.

In focus: Working with industry to deliver safe roads

Partnering with industry is becoming increasingly important as the transport sector grows. Through collaboration, lessons can be shared, delivering better outcomes for the community. For example, a consortium of 45 industry and government partners recently commenced work on a research and development program to improve road safety across Queensland.

The iMOVE program will conduct vehicle safety trials using the latest advancements in in-vehicle systems, on-road operating systems and cloud-based data sharing systems to reduce crashes, crash related gridlock and vehicle emissions. Through this collaboration, government and industry will obtain insights on how to make the road network safer, particularly through new technologies. The outcomes will underpin a holistic effort to achieve zero fatalities and serious injuries on our roads.

Delivering our 30-year strategy

The *Queensland Transport Strategy* outlines our 30-year vision for the transport system, including the outcomes that will define it, the directions that will get us there and the key strategic initiatives we will investigate.

The strategy sets the overarching direction for future planning, such as our Regional Transport Plans and organisational strategies.

It also signals our clear intent to partner with industry to deliver transformative change.

The practical next steps to delivering our strategy

We are already getting on with the job of delivering our 30-year strategy for transport in Queensland. As well as starting work on initiatives to help achieve our outcomes, we are investigating further initiatives to get there. Key performance indicators (KPIs) have also been set, so that our customers and the community can track our progress.

We have identified a range of tangible initiatives to deliver our strategy. These will be detailed in the Queensland Transport Strategy's Action Plan that is intended to be developed for release in 2020 to support our 30-year strategic vision.

Many initiatives are already underway and others will be investigated further. As we consider and progress future initiatives, we will:

- consult with customers and the community to ensure we are delivering initiatives that best meet their needs

- communicate our initiatives and actions to the community and all stakeholders to raise awareness of our work and highlight opportunities to develop partnerships to achieve customer and community outcomes.

- deliver value-for-money for Queenslanders by evaluating the economic and financial case for these initiatives

- collaborate with local, state and federal government to review and harness innovative solutions and enable Queensland to benefit from new and integrated services and technologies.

The Action Plan will be accompanied by an explanation of its governance process to show how it will be transparently reported on and updated in the future.

Agile and adaptive planning

The outcomes we have set for the transport system are enduring, but the pace of innovation means we cannot fully predict the opportunities that will arise. The Action Plan is intended to be a living and agile strategy that will be regularly reviewed.

We will review the directions and initiatives to ensure they are responding to the opportunities and challenges that arise and delivering the outcomes we have set.

Keeping track of progress

New services and technology present enormous opportunities to improve transport safety, efficiency and convenience. While it is difficult to fully quantify the impact of these changes over time, with the right policy settings, we can harness them to achieve the outcomes we have set.

Transport and Main Roads has developed an initial set of measures to track our progress towards achieving the strategic outcomes (Table 15). It also identifies a target direction for each measure. We will report against these measures and target directions and will periodically review this framework to ensure it effectively measures our performance.

Table 15: Measuring progress against outcomes

Outcome	Measure	Target direction
Accessible, convenient transport	• Per cent of residents in urban and regional Queensland able to access essential services within 30 minutes	⬆
	• Per cent of Queenslanders able to access on-demand or high-frequency transport	⬆ ⬆
	• Per cent of services and interchanges aligned to physical accessibility universal design principles	⬆
Safe journeys for all	• Number of serious injuries and fatalities on Queensland roads and the transport system	⬇ ⬇
	• Number of personal security incidents on the transport network	⬇
Seamless, personalised journeys	• Customer satisfaction with transport	⬆
	• Per cent of Queenslanders able to access Mobility as a Service solutions	⬆ ⬆
Efficient and productive transport for people and goods	• Cost of excessive congestion	⬇
	• Transport costs as per cent of average household expenditure	⬇ ⬇
Liveable, sustainable communities	• Net emissions generated from the movement of people and goods	⬇ ⬇
	• Per cent of journeys involving active transport	⬆

In focus: Improving transport affordability

Improving the affordability of transport is one measure we will adopt to determine the success of the *Queensland Transport Strategy*. Transport currently represents around 15 per cent of average household spending. The annual cost of owning a car ranges from around $6,000 for micro class vehicles to over $20,000 for larger sport utility vehicles.[45] Car-related costs account for a significant portion of transport costs for Brisbane households.

New services and technology present an opportunity to reduce household expenditure on transport. For example, households can choose to share transport costs among multiple users by a shift from individual ownership to the shared ownership of vehicles and resources.

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[45]   RACQ, *Private vehicle expenses 2019*, Available at: https://www.racq.com.au/cars-and-driving/cars/owning-and-maintaining-a-car/car-running-costs

Queensland Government
Queensland Transport Strategy

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