

# An Assessment of Australia's Future Infrastructure Needs

The Australian Infrastructure Audit 2019



Challenges and  
opportunities  
for Australia's  
infrastructure  
services

Infrastructure Australia is an independent statutory body that is the key source of research and advice for governments, industry and the community on nationally significant infrastructure needs.

It leads reform on key issues including means of financing, delivering and operating infrastructure and how to better plan and utilise infrastructure networks.

Infrastructure Australia has responsibility to strategically audit Australia's nationally significant infrastructure, and develop 15 year rolling infrastructure plans that specify national and state level priorities.

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Burrungkuy (Nourlangie), Kakadu National Park

## Acknowledgement of Country

Infrastructure Australia acknowledges the Traditional Custodians of Australia, and pays respect to their Elders past, present and emerging. We pay respect to their continuing connection to land, and the continuation of their cultural, spiritual and educational practices.

In preparing for the future of our infrastructure, we acknowledge the importance of looking beyond the immediate past to learn from Aboriginal and Torres Strait Islander's unique history of land management and settlement, art, culture and society that began over 65,000 years ago.

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## i. Chair's foreword

Infrastructure is fundamental to our quality of life. It connects us to jobs, education and other opportunities. It allows us to travel safely home to our families at the end of each day and enables us to keep in touch with friends near and far. It provides us with the essential services we rely on – from energy, water, and telecommunications, to social infrastructure such as hospitals, schools and parks, and access to goods, such as fresh food, that most Australians could not imagine living without.

Most of our networks work well, and support our lives every day in ways we have grown to take for granted. But infrastructure is only as good as the services it delivers to users. When it comes to infrastructure, the community has told us what matters most – access, quality and cost.

Too often, our infrastructure doesn't meet these needs. Congestion, crowding, rising bills, outages and declining service standards can undermine our confidence in the infrastructure we use. These are clear signals that our infrastructure needs to work harder to support Australia into the future.

Infrastructure Australia has a mandate to drive better infrastructure outcomes for all Australians. As the nation's independent infrastructure advisor, it is our job to champion the 'big picture' view of Australia's infrastructure needs – across sectors and across jurisdictions. This involves developing a national evidence base to guide infrastructure decision-making, and focus attention on the investments and reforms that will improve both our living standards and national productivity.

The 2019 Audit covers transport, energy, water, telecommunications and – for the first time – social infrastructure, and looks at the major challenges and opportunities facing Australia's infrastructure over the next 15 years and beyond. We have presented our findings in terms that matter to users, by focusing on outcomes for them. Our hope is that this enhanced focus on users, and the role infrastructure can play in improving their quality of life, helps to drive better decisions that are rooted in the long-term interests of Australians.

Since the 2015 Audit, Australia's infrastructure has witnessed positive progress. There has been a material increase in the level of investment, and governments across the board have initiated reforms aimed at enhancing the performance of infrastructure. However, the clear message from across the sectors is that more must be done if we are to maintain, let alone enhance, our quality of life and economic efficiency.

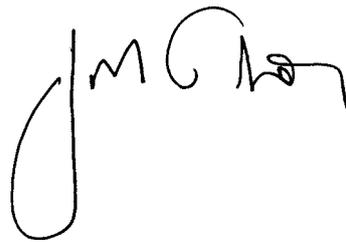
Australia's infrastructure faces a range of challenges – vast distances, extreme weather, increasing maintenance backlogs and rapidly growing cities. While increased levels of public and private investment are welcome, we still rank below the OECD average for infrastructure investment. The world is also rapidly changing, and at a faster rate than we've experienced in the past. This brings immense opportunities to further improve the lives of all Australians but also poses challenges regarding how we plan, deliver and operate our infrastructure.

In this context, sustained reform and increasing investment is still required.

This is Infrastructure Australia's second national Audit. Like its predecessor, in 2015, the 2019 Audit and its findings will inform the recommendations in our next major pieces of work – initiatives and projects in the annual *Infrastructure Priority List* and reforms in the *Australian Infrastructure Plan*, which is due for release in 2021. Together with these two documents, the Audit is intended to guide the next wave of infrastructure reform in Australia.

The challenges and opportunities identified in this Audit are just the starting point. We invite submissions to help build on the findings of the Audit. I invite you all to engage with the issues and findings of this Audit to ensure our advice is informed by a diversity of evidence and opinions about the role infrastructure should play for decades to come.

Our hope is that this provides the foundation for the Australian Government, as well as other governments, industry and the community, to deliver a clear and positive agenda for Australia.



**Julieanne Alroe**  
Chair, Infrastructure Australia



## ii. Key messages

The findings of the *Australian Infrastructure Audit* are broad in scope, covering the full range of sectors, modes and geographies that are impacted by Australia’s infrastructure. However, across the document there are several key messages and a set of common themes regarding the outcomes for users and the impacts on communities.

### Outcomes for users

**Access:** Access to choice in infrastructure services has improved since the 2015 Audit, largely due to new technology. While access to choice is strongest in fast-growing cities, it is weaker in other areas, and for people from lower socio-economic and diverse backgrounds.

**Quality:** The quality of infrastructure services is high for most Australians in urban areas, however population growth is impacting some services. Low density areas, emerging industries and lower socio-economic groups’ needs are not met.

**Cost:** Average household infrastructure costs have grown in real terms, but decreased as a proportion of household incomes. However, these costs disproportionately impact low-income households.

### Impacts on communities

**Fast-growing cities:** Infrastructure in our four largest cities is failing to keep pace with rapid population growth, particularly on the urban fringe.

**Smaller cities and regional centres:** These areas are growing as service hubs for their neighbouring regions, including supporting growth as satellites of fast-growing cities.

**Small towns, rural communities and remote areas:** The quality of infrastructure services for people living in remote communities does not meet the standards Australians expect.

**Developing regions and northern Australia:** Infrastructure can catalyse quality of life and productivity by improving connectivity and efficiency.

1. **Since the last Audit, governments and industry have made important progress to promote reform, improve planning and invest in infrastructure gaps.** Since 2015 over \$123 billion of work has commenced,<sup>1</sup> with a committed forward pipeline of over \$200 billion.<sup>2</sup>
2. **However, changing and growing demand, and a mounting maintenance backlog, mean a new wave of reform and investment is necessary to ensure quality of life and economic productivity are enhanced over the next 15 years.** By 2034, Australia's population is projected to grow by 23.7% to reach 31.4 million,<sup>3</sup> adding to infrastructure demand, while existing infrastructure struggles under maintenance backlogs and the condition of many assets is unknown.
3. **Users are often not at the centre of infrastructure planning and decision making for Australia's future, however communities are increasingly demanding greater transparency and service choice.** Engagement with communities is critical, with 80% of Australians indicating it is important that government considers the views of the community when planning or investing in major infrastructure.<sup>4</sup>
4. **Constant and rapid change is creating challenges for the way we plan, deliver and operate infrastructure.** For example, the sharing economy has rapidly grown across infrastructure sectors, particularly the transport sector where the use of ridesharing services have more than tripled between 2015 and 2018.<sup>5</sup>
5. **Growing social, economic and environmental interdependencies have added both complexity and opportunity to the planning, delivery and operation of our infrastructure.** For example, the increased uptake of electric vehicles will have implications for the energy sector. By 2040 40% of our vehicles are likely to be electric, and these vehicles could have the potential to store electricity to a similar capacity as the proposed Snowy 2.0 scheme.<sup>6</sup>
6. **Infrastructure is facilitating structural changes to the Australian economy, as we shift away from traditional industries, such as manufacturing, towards knowledge and service-based industries.** In 2017-18 economic activity in Sydney and Melbourne together accounted for 52.8% of national growth.<sup>7</sup> To support this activity the New South Wales and Victorian governments have a committed forward pipeline of transport infrastructure investment totalling over \$78 billion in these cities.<sup>8</sup>
7. **Australia's national productivity and global competitiveness rely on efficient infrastructure networks, however we are falling behind international competitors.** Australia currently ranks 18th in the world for ease of doing business, having dropped over the past decade from 9th in 2008.<sup>9</sup>
8. **Infrastructure is the most significant contributor to Australia's greenhouse gas emissions, however progress to reduce emissions is inconsistent and policy directions remain uncertain.** For example, while electricity emissions have decreased by around 3% since 2015, emissions in the transport sector have increased by almost 9%.<sup>10</sup>
9. **New technologies are enabling substantial improvements to user experience and quality of life outcomes, but these benefits are not being shared by all Australians.** The digital inclusivity of our lowest income quintile is one-third below the national average.<sup>11</sup>
10. **Population growth impacts are being felt in fast-growing cities as infrastructure is placed under pressure, including congestion on our roads and crowding on public transport.** 77% of population growth over the coming 15 years is projected to occur in our fast-growing cities,<sup>12</sup> leading to pressure including road congestion growing by \$18.9 billion to \$38.8 billion in 2031.<sup>13</sup>
11. **People live in diverse areas across Australia, from fast-growing cities to remote areas, meaning infrastructure accessibility, quality and cost differ for users in different places.** For example, the National Broadband Network (nbn) is able to deliver internet speeds via Fibre to the Premises of over 100 Mbps to some residents in urban areas,<sup>14</sup> whereas some remote areas rely on satellite services that can only deliver speeds of up to 25 Mbps.<sup>15</sup>
12. **Policy uncertainty and poor coordination has affected investment in the energy sector and delayed an effective response to rising energy prices, impacting energy reliability and increasing community anxiety regarding climate change.** Over the past decade, the unit price of electricity has risen in real terms by 56%,<sup>16</sup> while retail gas for households has risen by 45% over the same period.<sup>17</sup>
13. **Some infrastructure services will continue to require government subsidies, however these are not transparent and often poorly targeted to those in need.** There are 315 community service obligations for infrastructure, 39% of which are not transparent.<sup>18</sup>
14. **New data is being generated in real-time on the performance and use of our infrastructure, enabling improved decision making by users and operators.** Road agencies are providing live traffic data on smartphones, in car devices and roadside signage, while transport operators are using smartphone data and third-party apps to show train carriage capacity and to direct waiting customers to empty carriages



## iii. Executive summary

### 1. A future of uncertainty

Australia, perennially labelled the ‘Lucky Country’, stands in a position of strength. However, looking to the future, we face an unprecedented period of uncertainty.

The compounding issues of a changing climate, the re-ordering of the world economy, and increasing political polarisation are reshaping global institutions and norms. Closer to home, our population is growing and changing, the structure of the economy is shifting, our communities and environment are experiencing weather extremes, and rapid technology change is fundamentally reshaping our day-to-day lives.

As a result, Australia finds itself at a unique point in its history with significant implications for how we plan for our future infrastructure.

Infrastructure is central to our quality of life. But looking to the future, user needs are evolving and it is very likely, in coming decades, our infrastructure will look very different to today.

We need to evolve the way we plan for Australia’s infrastructure to embrace this uncertainty. Historically, infrastructure planning has sought to predict future conditions and then provide infrastructure to meet anticipated demand. Today, we require a more robust approach.

Rather than projecting forward the status quo, our infrastructure planning should set an ambitious vision for the country, anticipate and adapt to change, manage risk, and deliver infrastructure that works towards – rather than against – the current and future needs of Australians.

The time is right to reconsider how we deliver infrastructure, and how we can adapt existing networks to our changing user needs. The *Australian Infrastructure Audit* is the starting point for this process.

The context of uncertainty has formed the foundational principle for Infrastructure Australia in developing the Audit. It has provided the lens through which we have assessed the current capacity of our existing infrastructure networks and assets, and identified the challenges and opportunities sectors face in the coming 15 years.

## What has changed since the 2015 Audit

Infrastructure Australia's first Audit, released in 2015, was the first national picture of our infrastructure and the challenges it faced.

Since the release of the 2015 Audit and the first *Australian Infrastructure Plan* in 2016, Australia has witnessed a number of positive shifts in the way we plan, deliver and operate our infrastructure.

Infrastructure investment across key economic sectors, especially transport, has showed signs of an upward trend since early 2016.

At the same time, governments are increasingly integrating infrastructure and land-use planning. A number of strategically significant transport corridors have been preserved. Regulatory changes have enabled new service delivery models in transport, energy and telecommunications. New technologies are improving user experience across all sectors, from telehealth to smart water meters.

In other areas, ongoing challenges remain and new issues have emerged:

- Population growth has become a major point of contention in infrastructure debates. In our largest cities, ageing assets have been put under growing strain, with rising road congestion, crowding on public transport and growing demands on social infrastructure, such as health, education and green space.
- Energy affordability has also deteriorated over recent years. A steep rise in network costs has driven energy bills 35% higher over the past decade, and up by 56% per unit of electricity consumed in real terms.<sup>19</sup>
- In telecommunications, the nbn rollout continues to face challenges. In the 4.8 million households in which it has activated,<sup>20</sup> services have not met the expectations of many users.
- In the water sector, the past four years have seen mixed results. Many metropolitan utilities are increasing the sustainability and quality of their services through innovation, supporting the liveability of our cities. But many regional areas are suffering from growing water security fears as large parts of the country are in drought.

## The objectives of this Audit

The role of this Audit is not to identify solutions. Before arriving at solutions, it is important to have a clear understanding of the problems we are seeking to solve. To do this, the Audit identifies issues, gaps, problems and untapped potential in the form of:



**Challenges:** Where a change in how we deliver infrastructure is required to avoid future costs or erosion of our quality of life or productivity.



**Opportunities:** Where infrastructure could unlock future growth and development, and improve quality of life or productivity beyond the status quo.

This distinction between challenges and opportunities is important to ensure infrastructure planners and proponents identify and progress infrastructure solutions that not only keep pace with community aspirations and demands, but create the potential to unlock step changes into the future.

In developing this Audit, our aim has been to engage both the users and providers of infrastructure. To achieve this, this document is drafted to be relevant and easily accessible to a broad audience.

This means it is not a conventional audit. Instead of providing a comprehensive assessment of the quality and capacity of individual infrastructure assets or networks, we seek to:

- Provide information about the most significant issues for each sector
- Guide and frame discussions using new evidence and the significant body of research undertaken by others
- Create a platform for the further analysis needed to support future decisions.

## The approach of this Audit

In response to the current setting of uncertainty, Infrastructure Australia has taken a new approach to the development of the 2019 Audit, informed by strategic foresight methods.

Strategic Foresight is a new field of research that aims to understand the future in a way that does not simply extrapolate past trends forward.<sup>21</sup> Instead, foresight methods use available knowledge and forecasting tools to understand plausible future events and, based on a balanced view of the different futures that may occur, enable robust decision making and investment.

Infrastructure Australia has applied this thinking to the development of a three-stage methodology:

1. **Horizon Scanning:** The starting point for Infrastructure Australia in undertaking this Audit was to understand the national and global forces that are likely to shape Australia over the coming decades. These trends focus on shifts that are likely to transform how we live, and consequently what we need from infrastructure.
2. **Interpretation and analysis:** The next step was to apply these trends to the sectors of transport, water, energy, telecommunications and social infrastructure, to understand the likely future impacts and needs of these sectors. To do this, we have sought to understand future infrastructure needs for users and places.
  - The Audit puts users at the centre of infrastructure issues, and focuses on the key user outcomes of access, quality and cost in order to understand how infrastructure can do more to meet user needs.
  - We looked to understand impacts on community types, rather than conventional geographic boundaries, by adopting four broad settlement categories: fast-growing cities, smaller cities and regional centres, small towns, rural communities and remote areas, as well as developing regions and northern Australia.
3. **Identifying challenges and opportunities:** Based on this analysis, the Audit has identified a set of sector-based and cross-sectoral challenges and opportunities. For each challenge or opportunity, the Audit provides an estimate of when each will impact infrastructure services and users if no action is taken.

To support this analysis, Infrastructure Australia has drawn evidence from the substantial knowledge and expertise among government agencies and industry representatives who plan, build, operate and maintain our assets and networks.

Where clear and reliable evidence exists, our aim has been to build on this work, rather than compete with it. We have commissioned a range of supporting papers to supplement the Audit evidence base. These are published on our website as is this document.

### The structure of the document

The Audit is divided into four sections:

1. **Future Trends:** 2. *Future Trends* identifies the future national and global trends impacting Australia, and our infrastructure, over the next 15 years and beyond.
2. **Cross-sectoral chapters:** 3. *Infrastructure services for users*, and 4. *Industry efficiency, capacity and capability*, bring together the challenges and opportunities that are common across all sectors.
3. **Sector-based chapters:** 5. *Transport*, 6. *Social Infrastructure*, 7. *Energy*, 8. *Telecommunications*, and 9. *Water*, individually identify the challenges and opportunities relevant to each infrastructure type.
4. **Next steps:** 10. *Next Steps* provides information on how to provide feedback on the Audit and contribute to the development of the forthcoming *Australian Infrastructure Plan* and the *Infrastructure Priority List*.

The remainder of the Executive Summary provides a detailed summary of each of these chapters.



**Fast-growing cities:**  
Sydney, Melbourne, Brisbane and Perth.



**Smaller cities and regional centres:**  
Smaller capital cities, satellite cities and regional centres home to more than 10,000 people.



**Small towns, rural communities and remote areas:**  
Small towns with populations of fewer than 10,000 people and more than 200 people, regional communities with fewer than 200 people, and all remote areas outside of recognised settlements, including connecting infrastructure.



**Developing regions and northern Australia:**  
Developing regions with strong growth prospects and where industry composition is changing, and northern Australia, including a mix of regions across the Northern Territory, and the northern parts of Queensland and Western Australia.



## 2. Future trends

The everyday lives of Australians are shaped by a range of interdependent global and local trends. These trends impact the way we live – how much we earn and our economic opportunities, our work-life balance, our health, and social connections – and influence how infrastructure is planned, built, used and managed.

In this chapter, we identify the seven future trends that we believe will play a decisive role in how Australia grows and changes over the next 15 years and beyond. These trends have formed a critical input for Infrastructure Australia in identifying the challenges and opportunities our economic and social infrastructure is set to face.

Quality of life and equity

In 2018

# Australia ranked 3rd

in the world on the UN's Human Development Index <sup>22</sup>



Cost of living and incomes

Borrowing for housing makes up around

# 90% of total household debt

of Australians <sup>23</sup>

Population and participation



Number of **single person** households will **increase** by over **60% to 2036** <sup>24</sup>

Technology and data

# Just over 90%



of Australians own a smartphone (world average should reach 90% by 2036) <sup>25</sup>

Community preferences and expectations

By 2028 women will control close to 75% of discretionary spending worldwide <sup>26</sup>

Environment and resilience



Australia's average annual equivalent CO<sub>2</sub> emissions per capita, nearly double the OECD average <sup>27</sup>



Economy and productivity

Emerging industries for Australia include: higher education, food exports, tourism, rare earths and new minerals <sup>28</sup>



## Quality of life and equity

Australians rightly expect a high quality of life – a high standard of health, wealth, happiness and choice in how they live. By international comparison Australia's quality of life is high, thanks to our strong economy underpinned by natural resources and knowledge sectors, and our healthy environment and natural beauty.

However, it can be challenging to access a high quality of life in particular parts of Australia, such as rural and remote areas, and for particular groups, including children and older people, those with disability, culturally and linguistically diverse communities, and Aboriginal and Torres Strait Islander peoples.

## Cost of living and incomes

Our high quality of life translates into a high cost of living for many Australians. While average incomes have risen modestly over the past decade, the earning capacity of some Australians is declining, particularly in regions outside fast-growing cities.

Household budgets are increasingly under pressure from the cost of services and housing, despite many consumer goods becoming cheaper. Job security is becoming a key issue, particularly as new sharing and 'gig' economies create more transient and casualised workforces.

## Community preferences and expectations

The expectations Australian communities place on governments, institutions, services and products are changing. Communities want greater choice and flexibility in their lives, in response to both social and technological advancements. We are living increasingly connected, digital lives.

Citizens, employees, customers and shareholders are expecting, and demanding, more. Our awareness of the world around us, and the impacts of our decisions and behaviours, is increasing. These preferences and expectations are often evolving ahead of government policy and regulation, and even political sentiment, creating challenges in ensuring changes bring benefits to all communities.

## Economy and productivity

Australia has experienced a record-breaking 28 years of uninterrupted economic growth, with the size of the economy increasing by 130% in real terms since 1991, largely driven by our growing population and a significant export market for our natural resources.<sup>29</sup>

Over this period, Australia has increased its global economic engagement, while avoiding the depth of economic crises that have affected other global economies, by building on our industry strengths and capitalising on our proximity to emerging Asian markets. However, our economy is experiencing

structural shifts, as service and knowledge industries drive employment and economic output, and economic activity is increasingly urbanised.

## Population and participation

Australia has a small but rapidly-growing population by international comparison. At 25 million people, equivalent to the city of Shanghai, we are the 55th largest country in the world,<sup>30</sup> but growing at a faster rate than other developed nations (1.8% per annum compared to the global average of just over 1.5%).<sup>31</sup> Net overseas migration is a large driver of this growth.

Within Australia, our population is densifying and urbanising, particularly in fast-growing cities. Some rural and remote areas are facing population decline. We are also more diverse, and ageing – which brings both challenges and opportunities. Participation in the workforce remains steady overall, but is increasing for women.

## Technology and data

Technology is deeply embedded in Australian life. We rely on different forms of technology every day to communicate and share information, to learn, to travel, to access services and buy products, to do business, and for entertainment.

The pace and scale of technological change today provides profound opportunities for Australia – to improve lifestyles, provide better access to services, enhance efficiency and create new industries. However, technological advancements and data generation are increasingly also creating new challenges around control and privacy, and raising questions about how to ensure the benefits are available to all.

## Environment and resilience

Australia's environment is one of extremes – a land of flood, drought, fire and cyclone. It is the driest inhabited continent on earth, with much of it unable to support intensive settlement.

Despite this, Australia's environment is the foundation of our social and economic wellbeing – we produce, consume and export high quality fresh food from the ground, we extract, consume and export valuable minerals from underneath it, we enjoy clean air, water and diverse landscapes, and people travel across the world to experience our unique flora, fauna and landscapes.

Today, our environment faces increasing pressure from human activity and the effects of climate change, affecting not only liveability and quality of life, but also our economic opportunities.



### 3. Infrastructure for users

This chapter examines the performance of infrastructure services through the eyes of users and identifies challenges and opportunities that require a national response:

- It explores the role of new technology and models of service delivery in improving user outcomes but identifies that these benefits may not be evenly shared across Australia.
- It examines issues of cost and affordability for households and businesses and finds that the average annual infrastructure bill for households is rising, with these costs hitting our most vulnerable hardest.
- It highlights the infrastructure challenges faced by fast-growing cities and finds that infrastructure services in these locations are struggling to keep pace with users' growing and changing needs.
- It explores the performance of infrastructure in Australia's smaller cities and regional centres, and finds that many of these areas have the capacity to serve as service hubs and satellite cities, taking some pressure off fast-growing cities.
- It finds that infrastructure service quality in many rural and remote communities often does not meet an adequate standard.



## Access

Australians are most optimistic about access to mobile and broadband services, with

**35% of people**

expecting improvements <sup>32</sup>

## Customer



Better functioning cities and towns could deliver a

**\$29 billion increase**

in GDP in the long term <sup>33</sup>

## Quality

Without action, road and public transport congestion could double to nearly

**\$40 billion by 2031** <sup>34</sup>

## Asset

In 2018

**877,651**

kilometres of roads in Australia <sup>35</sup>



## Cost



Australian households spent on average

**\$314.39**

on infrastructure per week <sup>36</sup>

## Industry



Community opposition has contributed to the delay, cancellation or mothballing of more than

**\$20 billion**

of infrastructure projects in the last decade <sup>37</sup>

## State of play: Infrastructure for users

In most parts of the country, users' needs are being met relatively well. Almost all Australians have safe, reliable running water and wastewater services in their homes.<sup>38</sup> They are connected to electricity grids that meet 99.998% of forecast customer demand.<sup>39</sup> There is near-nationwide access to broadband internet and one of the most extensive transport networks of any country. Most Australians have access to education,<sup>40</sup> health,<sup>41</sup> and other social services that compare favourably with most other countries.

However, the scale of our country and the diversity of our needs present challenges for ensuring all users receive infrastructure services that are accessible, affordable and good quality.

## Progress since the 2015 Audit

In the four years since the first *Australian Infrastructure Audit*, some infrastructure services have evolved considerably, driven by the availability of new technologies. For example:

- Ride and carsharing have provided new travel options for our cities.
- Household solar and storage technologies have enabled millions of Australian households to produce their own energy, export it to the grid and reduce their bills.
- Increasingly rich information is now at users' fingertips. Real-time data on congestion, transport timetables and public transport vehicle capacity, as well as energy usage, and a range of health and education services are being delivered via smartphones or online.

At the same time, a range of new challenges have emerged for infrastructure users:

- Across all parts of Australia, users feel infrastructure is adding to cost of living pressures. Energy affordability is a particular concern. Energy prices have risen by over 50% in the past decade – and by much more for some users.<sup>42</sup>
- Congestion on our roads and crowding on public transport has worsened in many of our fast-growing cities.
- Some Australians still do not have access to high-speed internet, reliable mobile coverage or clean drinking water and sanitation.

## Key messages

Infrastructure is only as good as the user outcomes it delivers. But across many parts of the country, and most sectors, there is a lack of reliable and user-focused information. This makes tracking progress against these user-focused outcomes difficult and increases the risk that infrastructure decisions may fail to focus on the long-term interests of users. Helpfully, increasing access to user data and use of behavioural insight tools can help regulators and service providers to better understand users' evolving needs and drive improved service quality.

Access to infrastructure services can vary greatly for users based on their location. Users in our cities have typically had access to high-quality infrastructure at affordable costs. However, the pace of growth and change in our fast-growing cities has put many legacy networks under strain. At the same time, relatively poorer access to services in many outer urban, regional and remote communities is reinforcing disadvantage. Technologies can help to overcome these barriers to access.

The cost of infrastructure across all sectors is a concern for every Australian. However, community perceptions on the scale of infrastructure cost rises do not always align with what they are actually paying.

Average household infrastructure costs have risen in real terms, but on average, they have decreased as a proportion of household incomes. However, infrastructure costs are regressive and hit lowest-income households hardest.

## 4. Industry efficiency, capacity and capability

This chapter examines infrastructure issues from the perspective of the infrastructure sector and discusses how the sector is responding to changing demands and how it can meet best practice:

- It identifies infrastructure planning and decision making that falls short of consistent best practice.
- It examines costs from the perspective of governments, service providers and investors, and identifies that there are challenges resulting from Australia's scale and diversity.
- It identifies that while there is improved visibility of the near-term pipeline, this does not appear to have resulted in better coordination of projects entering the market, limiting the capacity for industry to deliver.
- It explores national trends in procurement and contracting, and finds that high volumes of infrastructure activity are driving competition and capacity challenges, risking higher costs in the next 5 years.
- It identifies the mounting risks for Australian infrastructure from changes in technology, the economy, user preferences and the environment, and calls out that many resilience strategies do not provide adequate guidance.

Access

NSW and Victoria account for around

# 33%

of planned project activity <sup>43</sup>



Customer

# \$39 billion

(2.1%) of GDP spent by governments on infrastructure in 12 months to December 2018 <sup>44</sup>

Quality



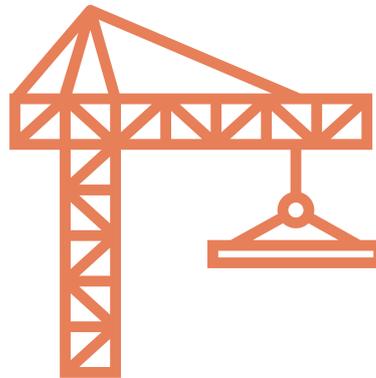
In 2018

# 90%

of potential investors are 'highly likely' to invest in Australia, up from 70% in 2017 <sup>45</sup>



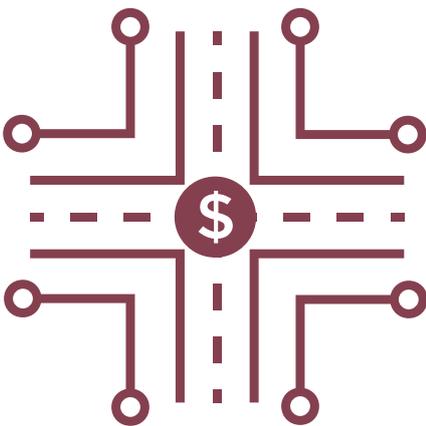
Asset



# \$130 billion

of transport infrastructure projects under construction (2018) <sup>46</sup>

Cost



Since the last Audit, transport infrastructure investment has totalled

# \$100.9 billion

(\$73.2b private, \$27.7b public) <sup>47</sup>

Over

# 20%

of GDP attributed to infrastructure sectors <sup>48</sup>

Industry



## State of play: Industry efficiency, capacity and capability

Infrastructure is more than steel and concrete. It is also about the workers, engineers and project teams who design and build it, and users who rely on it for their daily needs. Infrastructure planners, financiers, operators and community engagement teams are all part of the tens of thousands of people that make up the sector. In total, the sector accounts for around 21% of national GDP,<sup>49</sup> and every dollar of value the Australian economy creates is reliant on infrastructure in some way.

### Progress since the 2015 Audit

The 2015 Audit did not specifically examine the capacity of our industry. However, in light of the scale of investment and construction underway in the sector it has become clear that it requires close examination.

Since 2015, the infrastructure sector has changed. We have witnessed an increasing number of mega-projects being funded by state and territory governments in response to our rapidly growing population. Industry's role in delivering and planning these projects, and providing experienced and skilled labour will be tested over the course of the next 15 years.

Since the last Audit, Infrastructure Australia's Reform Series papers have focused heavily on the changing capability needs of the sector. Our analysis and the work of others has resulted in industry reform. In particular, the increased focus on population policy, improved data collection and reporting, and the emergence of new governance models for major urban infrastructure have contributed to an improved capability within the sector. Despite progress, and the considerable work from the people that make the industry, there remains room for improvement.

## Key messages

How we plan, fund and deliver infrastructure has improved but Australia is not achieving best practice. Each decision to build or upgrade infrastructure can impact taxpayer and user bills for generations. Every dollar of public infrastructure investment can generate GDP increases that add up to \$4 of value over the life of the asset.<sup>50</sup> It's essential we get these decisions right to improve the quality, affordability and access to our infrastructure.

Funding options are often underdeveloped and projects face procurement issues. We face challenges in addressing funding shortfalls that impact our ability to fund the right projects, at the right time. The challenges and opportunities associated with where we source our funding, how we use grants and subsidies and funding our maintenance backlog, will impact the quality and access to our infrastructure and our economic strength.

Projects are getting larger and increasingly complex, and will require new approaches. How the public sector make decisions, handles procurement, selects contract models and handles risk will have significant bearing on the functionality and efficiency of our infrastructure. Alongside these changes new demands for sustainability, resilience and security will provide opportunities to achieve better outcomes. However, this makes the planning and management of industry capacity more complex.



## 5. Transport

### Passenger transport

This section focuses on a broad range of modes, from active transport, such as walking and cycling, to private cars, public transport, aviation, cruise ships, ferries and emerging modes like rideshare. The chapter identifies a range of challenges and opportunities the sector faces in connecting people to places:

- It examines the impact of economic and social developments on urban transport demand and highlights the changing role of government from delivering to facilitating transport services.
- It explores how the private vehicle market is changing at a rapid pace, with sharing and connectivity already a common feature, the mass rollout of electrification likely to occur in five to ten years, and autonomous vehicles growing in sophistication over the next 15 years.
- It highlights the important economic contribution of our international, regional and remote airports and identifies the unique challenges they face.
- It discusses the lack of consistency and transparency across Australia for funding and maintaining our transport assets.
- It identifies the large and growing emissions footprint of passenger transport and discusses the role of transport network resilience in safeguarding the liveability and economic strength of our communities.
- It looks at the recent trends in road safety and notes that Australia is unlikely to meet targeted reductions in fatalities.
- It explores inequity of access to transport, with a specific focus on the financially disadvantaged, people with disability, older Australians and people who live in rural and remote Australia and the outer suburbs of our fast-growing cities.

Access

# 4 in 5 tram stops

in Melbourne are not accessible to customers with disability <sup>51</sup>



Quality



Australians drive the equivalent of

# 1,000 times from Earth to the Sun

every year <sup>52</sup>



Customer

In 2031, public transport crowding will grow five times to cost Australia

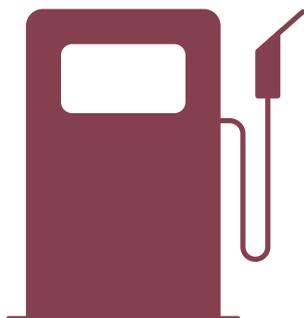
# \$837 million per year <sup>53</sup>

Asset

Australia's rail network is the length of a return trip to London from Sydney <sup>54</sup>



Cost



An average household spends around **\$200 per week**

owning and operating vehicles <sup>55</sup>

Industry

8 Sydney Opera Houses could be built with the annual subsidy to public transport <sup>56</sup>



## State of play: Passenger transport

Australia-wide, there were 433 billion passenger kilometres travelled in 2015-16.<sup>57</sup> Cars are overwhelmingly the dominant passenger transport mode, accounting for 64% of the total, and 85% of all land-based passenger kilometres.<sup>58</sup>

However, aggregated statistics only tell part of the story. People's travel habits are complicated and patterns of demand vary depending on context. Public transport is most competitive in our four fast-growing cities, accounting for about 20% of journeys to work in the cities combined.<sup>59</sup>

Walking and cycling are also critical to the passenger transport network. Whether people drive or catch public transport, most trips have a walking component. While cycling is less popular, it comes with significant health and environmental benefits.

For long distance inter-city and regional trips, catching a flight is often the most practical solution. Australia has some of the busiest air routes in the world, with Sydney-Melbourne being the second busiest and Brisbane-Sydney the eighth.<sup>60</sup> Air travel is also critical for rural and remote communities, ensuring they have access to major centres and key services.

Finally, cruise ships are an important emerging industry in the transport and tourism sectors. There were 1.34 million cruise passengers in 2017, having quadrupled since 2010.<sup>61</sup>

## Progress since the 2015 Audit

Most of the performance challenges regarding access, quality and cost identified in this chapter are consistent with the findings of Infrastructure Australia's 2015 Audit. Access remains inequitable, regional infrastructure is poorly maintained and costs have remained stable but impact some groups more than others.

However, looking forward, the location of future congestion has changed. This Audit has modelled the projected cost of congestion in 2031 using the same methodology as the 2015 Audit. The costs of public transport crowding will grow from \$175 million in 2016 to \$837 million in 2031. Similarly, the costs of road congestion will grow from \$18.9 billion in 2016 to \$38.8 billion in 2031. The overall cost of road congestion for 2031 in this Audit is about \$14.5 billion less than projected in 2015.<sup>62</sup>

The reduction is the result of a combination of changes to inputs, particularly lower population projections by the Australian Bureau of Statistics, some changes to assumptions regarding travel behaviour, improvements to the model, as well as capacity increases to transport infrastructure networks since 2015.

Of the six modelled conurbations, the cost of congestion in the four less populated regions has reduced, reflecting a range of issues such as lower population forecasts and increased transport infrastructure investment. However, our two largest cities, Sydney and Melbourne, have higher congestion costs. This reflects substantial population growth in these two cities since the last Audit.

## Key messages

Access to and the quality of our passenger transport networks is unequal. Transport can be particularly difficult to access for the financially stressed, people with disability, older Australians, people in regional and remote communities and in the outer suburbs of our major cities.

The quality of service also varies depending on where people live. Our large and fast-growing cities suffer from congestion while our remote communities often have poorly utilised and maintained assets.

Our passenger transport networks are at risk of becoming financially and environmentally unsustainable. There is a lack of transparency about why and how money is spent, particularly for maintaining our existing networks. Additionally, the transport sector is the second largest emitter of Co<sub>2</sub> in Australia (behind electricity), and emissions are growing.

However, there are also positive developments. The transport sector is in a state of rapid transition, with advances in communications technology, electric vehicles and eventually driverless cars offering customers unprecedented mobility and access to information, as well as potentially improving the environmental and safety performance of the sector.



## Freight transport

This section focuses on the complex array of supply chains that transport imported and locally produced goods for domestic consumption, as well as our export supply chains:

- It explores the ability of our domestic and international freight networks to capitalise on world growth, especially in Asia, with a focus on the challenges faced by our main container ports and international airports.
- It analyses the challenges freight faces in our major cities, including poorly coordinated land-use and transport planning, the impact of congestion and the growth of micro freight.
- It investigates the efficiency of the domestic freight network, including the impact of inefficient regulatory structures, the potential benefits of technology for the freight sector and the importance of safety for road freight.
- It explores the diversity of regional supply chains and identifies the challenges of providing sufficient infrastructure for seasonal agricultural flows and the potential for freight investments to act as catalysts for regional development.
- It examines the challenges faced by Australia's waste sector, including growing pressure due to population growth, export bans and heightened environmental awareness.

Access



Australian exporters spend five times more than Canadian exporters on border compliance costs <sup>63</sup>

Customer



Every year **three truckloads of freight** is moved per person <sup>64</sup>

Quality

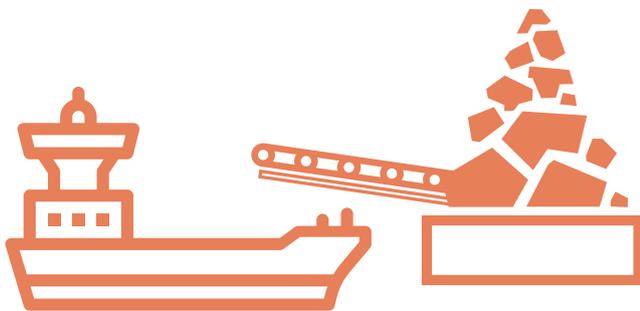


Delivery times could

**reduce by 40%**

with autonomous vehicles <sup>65</sup>

Asset



Port Hedland is the worlds largest bulk export port. It handled

**519,000,000 tonnes in 2017-18** <sup>66</sup>

Industry



**Freight tonne kilometres** that are carried on rail <sup>67</sup>

Cost



Freight is **5%** of the retail cost of doing business <sup>68</sup>

## State of play: Freight transport

Australia's freight task is growing rapidly. In the ten years to 2016, the domestic freight task grew by 50%.<sup>69</sup> This task is expected to continue to grow, by another 26% between 2016 and 2026.<sup>70</sup>

The freight task in Australia is diverse and the needs of individual supply chains can vary substantially. Our freight flows broadly encompass the following:

- The movement of bulk commodities, largely for export, such as iron ore, coal and liquefied natural gas (LNG)
- The transport of agricultural produce including grains, cotton, rice, sugar and livestock
- The import and transportation of manufactured goods, machinery and motor vehicles
- The transport of largely imported consumer items to retail outlets and, increasingly, direct to people's homes and offices
- Waste transport, disposal and recycling.

## Progress since the 2015 Audit

Many of the challenges identified in Infrastructure Australia's 2015 Audit remain today. Freight continues to grow quickly, congestion on key urban freight routes remains, inconsistent regulation hinders efficiency and key regional bottlenecks still exist for agricultural supply chains. Australia's waste transport and management sector has also come under pressure as a result of new restrictions on the import of lower-quality recyclable materials to key export destinations.

There has been some progress on key reforms, but they remain incomplete. In 2011 Australian governments agreed to establish a national system of freight regulation, with the establishment of national regulators and progressive transition away from state laws. Since the 2015 Audit the transition to national rail safety regulation has been completed.

Progress has also been made with heavy vehicle regulation, with jurisdictions progressively transitioning to the National Heavy Vehicle Regulator. However progress is slow, and heavy vehicle regulations remain inconsistent and difficult for industry to understand.

Technology has progressed and begun to improve the efficiency of key freight facilities since 2015. For example, the introduction of automatic straddles at numerous ports means the transfer of containers from ships to trucks and trains is now automated. The impact of technology is likely to grow in the freight sector, with automation potentially reducing freight costs into the future. Finally, safety has improved since the last Audit, with a decline in the number of fatal crashes and number of deaths involving heavy vehicles. However, progress remains slow and road freight still has the highest fatality rate of any industry in Australia.<sup>71</sup>

## Key messages

The performance of our freight networks varies. Australia is home to some world leading mineral supply chains, particularly in the Pilbara, Central Queensland and Hunter Valley. However, our urban and agricultural supply chains in particular are experiencing challenges.

Our cities are key centres of demand, supply and the processing of high value and containerised freight. However, too often they act as bottlenecks in our national supply chains, limiting access to key markets for exporters and increasing costs for consumers. Congestion on key routes, land-use planning that doesn't consider freight and regulatory constraints on our gateways are common.

Agricultural supply chains also suffer from constraints. Local infrastructure is often poorly maintained and lacks capacity. Infrastructure constraints are coupled with inefficient regulation in our regions, where freight operators often cross-jurisdictional boundaries and have to deal with a myriad of access permits.

Australia is one of the world's largest waste producers per capita, but our waste management is often poorly planned, and the sector is under increased pressure as waste generation increases and the capacity of infrastructure declines.

Australia is well positioned to take advantage of Asia's economic development. But to do so, we need to ensure our freight and supply chains operate efficiently and minimise costs for business and consumers.



## 6. Social infrastructure

This chapter examines the challenges and opportunities Australians face in accessing affordable, high quality social infrastructure across six sectors:

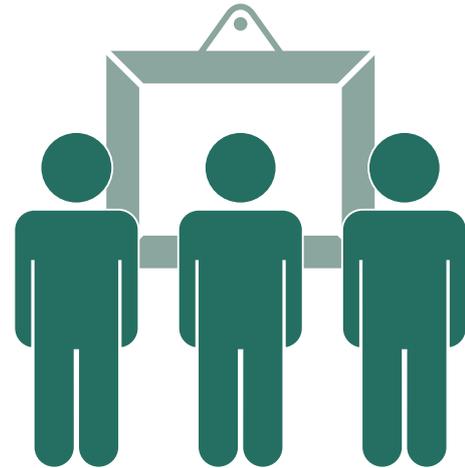
- It considers the infrastructure needs of hospitals, aged care facilities and digital health systems in the context of substantial increases in demand for services and facilities as our population grows and ages.
- It highlights the changing population and technological demands being placed on education infrastructure, from childcare and preschool through to tertiary and vocational levels.
- It explores the role of green spaces, waterways and community facilities play in providing social, economic and environmental benefits to communities. It also identifies fragmented governance as a key driver for unequal access, quality and cost of these spaces and facilities.
- It identifies the crucial role that arts and culture play in strengthening social inclusion and identity for Australian communities and it describes challenges for the sector in providing fit-for-purpose spaces.
- It analyses the challenges some Australians face in accessing adequate and affordable housing, in particular those who require social housing, and housing in remote areas.
- It examines how advances in technology in the justice system, and the changing nature of emergencies and disasters are placing pressure on ageing, often not fit-for-purpose infrastructure assets.

Health and aged care



Health services are rated as poor by **one in five people**<sup>72</sup>

Arts and culture



**3 in every 10**

international visitors to Australia in 2017 visited a museum or gallery<sup>73</sup>

Social housing

**4.4%**

of Australia's housing stock is **social housing**, compared to around **17% in the UK** and less than **1% in the US**<sup>74</sup>

Justice and emergency services



Prisoners awaiting sentence represent

**32%**

of prison population<sup>75</sup>

Green, blue and recreation

The quality of **green, blue and recreational infrastructure** is considered better than all other social infrastructure<sup>76</sup>



Education

**85%**  
**of students**

rated university learning and student spaces as good or excellent in 2017<sup>77</sup>

## State of play: Social infrastructure

Compared to economic infrastructure, individual social infrastructure assets may be smaller in scale – a local public swimming pool, park or single social housing dwelling – however, together these assets form networks that deliver nationally significant benefits to the community, the economy and our environment.

On a national scale, social infrastructure sectors contributed 12.5% of Australia's GDP in 2018.<sup>78</sup> These sectors employ just over 3 million people (or around a quarter of Australia's workforce).<sup>79</sup> Australia has over 1,300 public and private hospitals,<sup>80</sup> and over 9,400 schools.<sup>81</sup> We make just over 100 million visits to public pools every year,<sup>82</sup> and over 80% of us attended an art and cultural venue or event in 2018.<sup>83</sup> There are close to 400,000 social housing dwellings across the country,<sup>84</sup> and over 40,000 prisoners in over 100 prisons.<sup>85</sup>

## Progress since the 2015 Audit

In a shift in approach from the 2015 Audit, Infrastructure Australia has considered both social and economic infrastructure in this Audit. In the four years since the last Audit was produced, population growth, coupled with technological advancements and an increasing expectation for personalised and transparent services has changed the way social infrastructure is being delivered in Australia.

Community perceptions of social infrastructure have also shifted:

- Australians feel that the quality of health and aged care has improved over the past four years, but affordability has decreased, particularly for older people.<sup>86</sup>
- In the education sector, almost a quarter of Australians believe that quality has improved, while over a third have seen costs increase to participate in learning, particularly for those with or caring for someone with disability.<sup>87</sup>

- Over a quarter of surveyed Australians say the quality, cost and accessibility of our social housing infrastructure has declined over the past five years.<sup>88</sup>
- Perceptions of the quality of justice and corrections facilities have largely remained the same, while over a quarter of people feel the quality of parks and open spaces has increased.<sup>89</sup>
- More than a quarter of surveyed Australians see the quality of arts and cultural facilities as having risen over the past five years.<sup>90</sup>

Over this period, social infrastructure has also become increasingly digital, helping to provide services to more people and in a more personalised and up-to-date way. This is particularly evident in rural and remote areas, driven by the delivery of the nbn.

## Key messages

Australia has high-performing social infrastructure sectors by international standards, as reflected in our ranking as the country with the third highest quality of life and standard of living in 2018.<sup>91</sup> However, ease of access to and quality of social infrastructure varies for different types of infrastructure, across different places and groups of people.

For example, accessing a major art gallery may be difficult for someone living in a rural town, whereas they have access to large amounts of green space. Conversely, someone living in a city may experience delays at an overcrowded hospital, but may live close to a world-class university.

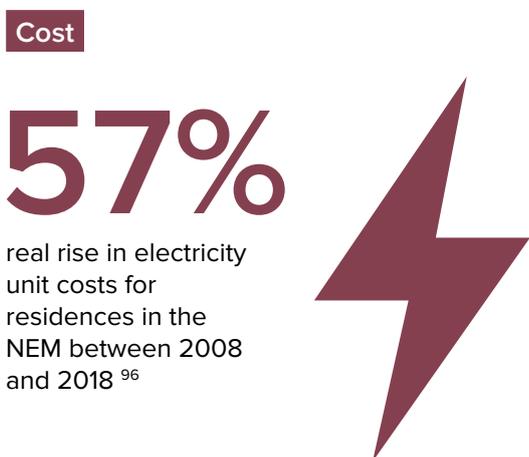
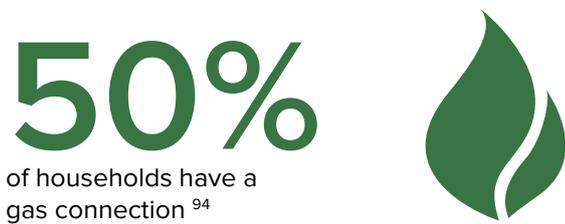
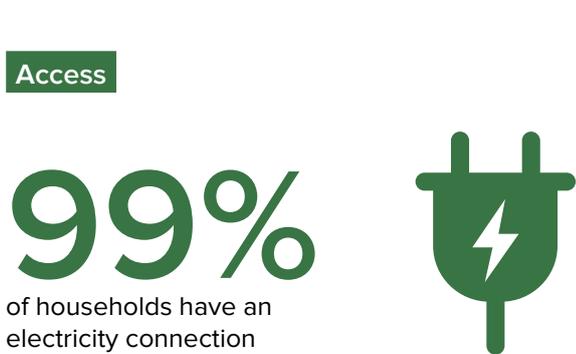
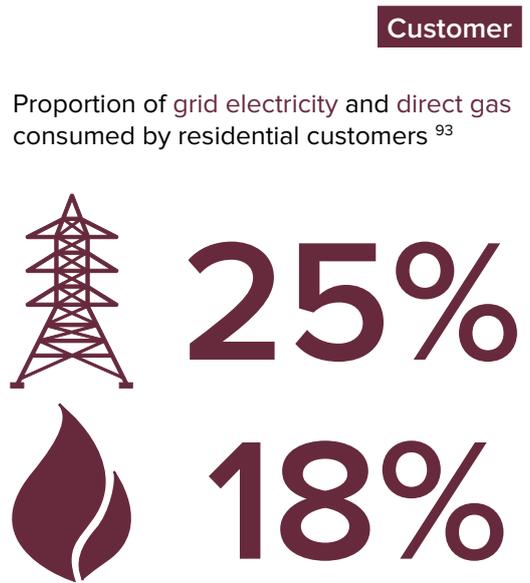
Different social infrastructure sectors are also closely tied, and many people need multiple and overlapping services and facilities. This provides opportunities to align sectors to achieve better outcomes, but also makes the planning and management of social infrastructure more complex for service providers.



## 7. Energy

This chapter focuses on the factors affecting infrastructure in the stationary energy sector, including electricity generation, transmission and distribution networks, large and small storage infrastructure, and retail issues that affect infrastructure provision:

- It looks at how different groups of consumers and businesses are impacted by electricity and gas price rises, identifies the infrastructure-related components of affordability, and discusses how better information can help consumers manage their grid energy costs.
- It looks at key issues raised by the 2017 Finkel Review, including electricity reliability, different customers' willingness to pay, meeting climate policy commitments, and improving system resilience and security.
- It discusses Australia's short and longer term fuel market transition and identifies the challenges faced by each fuel, and the effect of new forms of generation.
- It considers the ability of current governance structures to manage, and lead, given the ambiguity regarding the withdrawal of existing large generators and their replacement with new forms of generation.
- It discusses the role of cheaper solar PV in providing choice for consumers and identifies the costs to the community of increased adoption and the challenges of integrating this technology with existing infrastructure.
- It highlights the costs and reliability of electricity provision in rural and remote areas and identifies opportunities to better meet these communities' needs.
- It considers opportunities that have the potential to enable Australia to become a new energy superpower.



## State of play: Energy

Australia's energy sector is undergoing a transformation, adapting to new generation sources and consumer preferences.

This change is most pronounced in the electricity market. Investment in energy networks grew rapidly over the past decade, with the value of assets in the National Electricity Market (NEM) growing by around 75%.<sup>98</sup> The generation mix is also rapidly changing. Older coal-fired generators are being retired or approaching end of life. In 2018, one in five households had rooftop solar, and 21% of electricity came from renewable sources. This figure will continue to climb off the back of \$20 billion in large-scale renewable energy projects in 2018 – twice that of the year before.<sup>99</sup>

In gas, Australia has evolved from being a relatively stable, closed domestic market to the world's largest exporter of LNG in less than a decade.<sup>100</sup> Export terminals in Queensland have changed the dynamics of the East Coast gas market, exposing Australian users to higher global prices. The construction of a pipeline to link northern and eastern markets could bring further changes for domestic and global markets.

### Progress since the 2015 Audit

The dominant issue in the energy sector since the last Audit has been the growth in energy prices. Over the past decade, the unit price of electricity has risen in real terms by 56%,<sup>101</sup> while retail gas for households has risen by 45% over the same period.<sup>102</sup> Many of the reasons for the spike in prices occurred prior to 2015 – including decisions to increase investments in electricity network assets, and to open the East Coast gas market to global forces through the construction of new export facilities in Queensland.

However, since 2015, wholesale electricity prices have risen steeply. This was caused by the closure of key coal-fired generation assets, issues with network reliability due to ageing assets, and rising costs for generation inputs such as coal and gas.<sup>103</sup>

The impact of this steep climb in users' electricity bills has been a negative shift in user perceptions of affordability – with electricity seen as the least affordable form of infrastructure by Australian consumers,<sup>104</sup> and least likely to improve over the next five years.<sup>105</sup> This is despite energy costs not forming a large component of the average household's expenditure, ranking behind transport and telecommunications.<sup>106</sup>

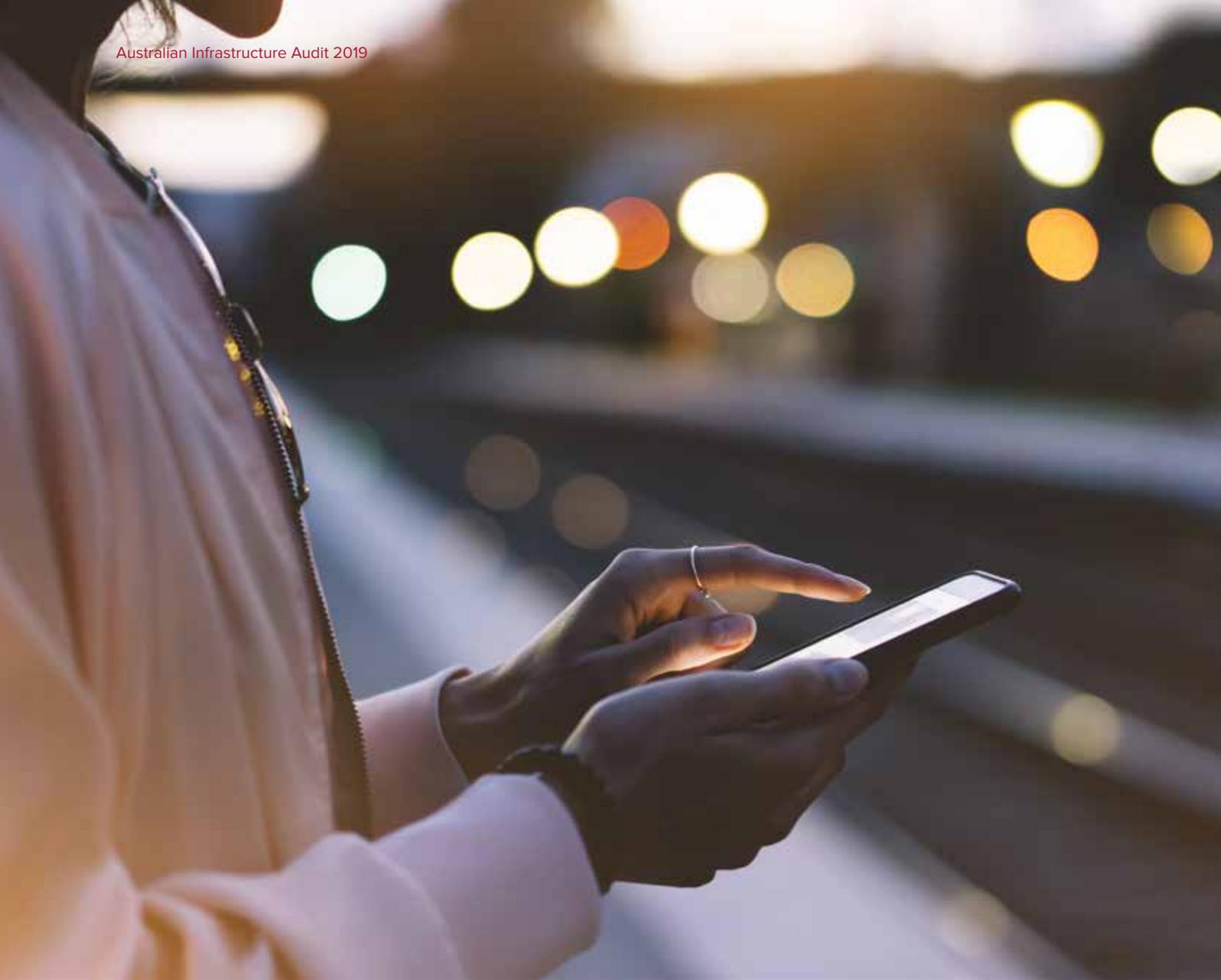
Concerns about lack of certainty expressed by Infrastructure Australia in the 2015 Audit persist in this Audit. The NEM, and the institutions which support its operation, have continued in the absence of decisive federal leadership, and a lack of certainty on energy or emissions policy. Retail reform has taken a back seat to settling future arrangements in the NEM as it transforms its input energy mix.

### Key messages

For many years, Australia has held a comparative advantage in energy costs, as well as an abundance of natural energy assets. This has propelled our economy, supporting improvements in the productivity of our businesses and helping us to compete in global markets. There are indications that this advantage is slipping, but Australia can overcome current challenges and spur a new wave of growth off the back of our energy resources and industry capability.

Much of Australia's energy infrastructure is fixed, costly and long lived. Its markets are highly complex and sensitive to change. These characteristics are adding to the challenges of a sector that is undergoing a transformation, adapting to new generation sources and consumer preferences.

This energy transformation is occurring against a backdrop of climate change and ongoing policy uncertainty, with a lack of coordination across Australia's governments on how best to manage changes. The result has been a worse deal for many users, with bills rising rapidly over recent years and most users expressing dissatisfaction with the affordability of their energy services.<sup>107</sup>



## 8. Telecommunications

This chapter focuses on four key issues impacting the telecommunications sector in the coming 15 years:

- It considers the increasing role telecommunications will play in supporting new services for people and businesses.
- It looks at our strengths in the provision of mobile services and identifies emerging challenges and opportunities created by the emergence of 5G.
- It considers how we can capitalise on the delivery of the nbn in order to maximise benefits for Australians.
- It identifies the challenges faced in ensuring no Australian is left behind in the digital world, in terms of digital literacy, access and affordability.

Quality

Customer

Australia ranks

# 57th

globally for fixed broadband speeds in June 2019 <sup>108</sup>



# 26.9 million

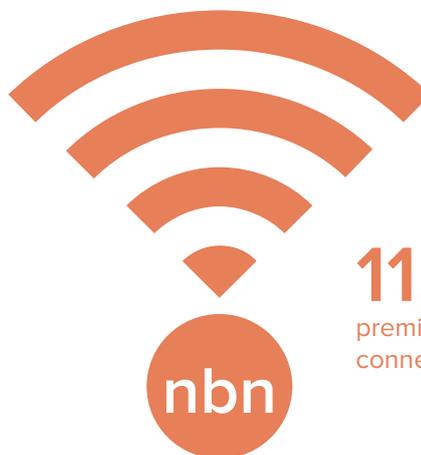
mobile handset subscribers in Australia <sup>109</sup>

Access



# 1 in 10

adults did not access the internet at least once in the six months leading to May 2018 <sup>110</sup>



Asset

# 11.7 million

premises will be ready to connect to nbn by mid-2020 <sup>111</sup>

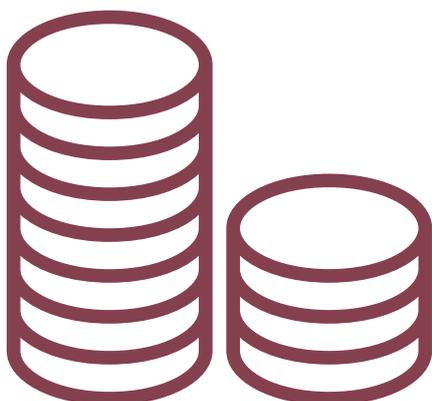
Industry

Cost



# 2.5%

average annual decline in revenue related to fixed networks in Australia over the last 4 years <sup>112</sup>



# 44%

Proportion of consumers that rate fixed broadband as costly <sup>113</sup>

## State of play: Telecommunications

Telecommunications infrastructure covers the networks that carry voice and data between users across Australia, and our connections with the rest of the world. This includes wires, fibre, towers, sensors, satellites, radio spectrum and assets such as data centres and cable landing stations, which come together as networks to deliver communication to and from our devices.

Most of the telecommunications infrastructure in Australia is privately owned. The notable exception is the publicly-owned nbn, which is still in its initial rollout phase. nbn is solely a wholesale provider of broadband services, and sells access to its network to over 150 large and small retail service providers nationally,<sup>114</sup> including major players such as Telstra and Optus, and smaller retailers such as Bendigo Telco, Central Coast Internet and Telecom West.

In the mobile service area, the three major mobile network operators are Telstra, Optus and Vodafone. These operators sell access to their networks to a range of over 50 other mobile service operators.<sup>115</sup> These operators are often only active in specific, usually built-up areas.

### Progress since the 2015 Audit

In the four years since the 2015 Audit, the role of telecommunications in the everyday lives of Australians has continued to increase. Australians' use of fixed broadband and mobile data has increased by 175% and almost 250% respectively, a growth rate that is many times faster than our economy overall.<sup>116</sup>

The 2015 Audit indicated the transformative role the nbn would play in Australia's future telecommunications landscape, and it remains so in this Audit. It noted that 818,000 premises were nbn ready (about 7% of all premises), and that 346,000 had connected to the service by February 2015 (3% of premises). Today, the nbn is over half way to its target of delivering peak wholesale download data rates of at least 25 megabits per second to all premises, and 50 megabits per second to 90% of fixed-line premises by 2020.<sup>117</sup>

In 2015 the Audit focused on 3G and 4G mobile services. In 2019, 2G and 3G mobile networks are largely obsolete, while there is significant ongoing private investment in 4G network upgrades. The arrival of 5G networks is imminent, and the likely step change is substantial.

## Key messages

Telecommunications is increasingly central to our personal lives and to the way we work and do business. Business and government are rapidly moving services online. As almost all of us rely on these services, access to networks that keep us connected is increasingly essential to our day-to-day lives.

However, digital disadvantage remains a challenge for certain groups within the community. For those in areas with good access, the challenge is how to increase digital literacy and to make telecommunications access more affordable. In rural and remote settings, the cost of providing telecommunications infrastructure increases and the returns reduce as population densities decline. This limits the scope for universal coverage by commercially-focused private sector operators, without government intervention.

Consumers are generally positive about the quality of their telecommunications services, although rural and remote Australians are less positive about their experience. Consumers also view telecommunication services as costly and are concerned about paying more.

The continuing evolution of digital technologies, which rely on telecommunications networks, represent a significant opportunity to enhance Australia's economic productivity. Embracing these new technologies will be a source of competitive advantage for Australia and can improve outcomes for users.



## 9. Water

This chapter examines the key trends impacting the water sector across urban and productive markets, and in different parts of the country:

- It identifies the range of challenges facing urban water, including population growth in our cities, the impacts of climate change and increasing concerns over the health of our waterways.
- It explores options to enable the sustainable provision of water that supports the ongoing liveability of our cities.
- It examines the challenges facing water and wastewater services in regional and remote communities, and identifies the risk that Australia is not meeting acceptable standards in remote communities.
- It explores the governance of the water sector and finds that the value of water is not well understood, resulting in decision-making processes that do not meet best practice.
- It looks at the challenges we face in balancing the competing needs for water, and identifies that complexity and a lack of transparency in existing water markets is undermining the social licence and community confidence.

Access

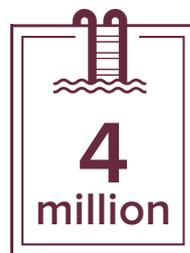


Residents with access to mains water from a utility with over 10,000 connections <sup>118</sup>

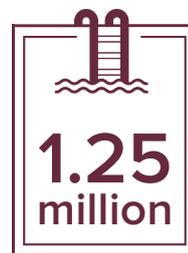
Quality



Annual water consumption in Olympic swimming pools <sup>119</sup>



Agricultural



New Murray-Darling Basin environmental flows



Residential households

Customer

80 litres

of water lost by utilities per connection on average each day <sup>120</sup>



Asset

Unknown

The age and condition of urban water assets across the country

Industry



27,000

people employed in water supply, sewerage and drainage services, adding

\$18.9 billion

to the economy <sup>122</sup>

Cost



Cost of water per kilolitre for households and industry <sup>121</sup>

\$3.28

\$0.28

## State of play: Water

Water supports almost every part of our lives, from the functional – clean, reliable drinking water and safe wastewater services, to the social – providing green spaces and clean waterways, and the environmental – sustaining natural life, enhancing biodiversity, and supporting natural habitats of flora and fauna.

The Australian water sector provides essential services to almost all people and businesses. Across the Australian economy, users consumed around 16,500 gigalitres of water in 2016-17, which is enough to fill Sydney Harbour 33 times.<sup>123</sup> Water and wastewater services are delivered by around 196 businesses and local governments in Australia's cities and towns. There are also a range of smaller licensees that provide local and specialised services, including in remote communities.<sup>124</sup>

## Progress since the 2015 Audit

In the four years since the last Audit, a range of issues have emerged in the water sector that have come as a shock to many people. These include concerns about running out of drinking water in some regional towns, fish deaths in parts of the Murray-Darling Basin, and rising bills to pay for expensive infrastructure upgrades. For many, this may be the first time they have considered risks to Australia's water, or the potential impacts of failure to meet users' needs.

These events are no reason to lose faith in the capacity of the water sector to provide high quality services, reliably and efficiently in future. However, they do provide a reminder to governments and service providers. These events also provide impetus for renewed efforts to progress important reforms to ensure Australians can continue to receive reliable services in the future, and know that water is being managed in a way that balances competing needs and mitigates risks efficiently.

## Key messages

Australia's water sector has typically performed well in meeting the needs of businesses and households over many years across most of the country. However, the sector faces unprecedented risks and challenges. Climate change, population growth, ageing assets, and competing interests will ramp up pressure for limited resources. Advances in technology, markets and planning can help to overcome these challenges, but many will require changes in laws and regulations to unlock benefits.

The true value of water is poorly understood by users and many in the sector. Unreliable and incomplete evidence undermines the effectiveness of decisions, and community confidence in water managers. Overcoming the challenges faced by the water sector and preparing for the future will require a shift in planning and decision making to ensure the long-term interests of a range of stakeholders are protected.

Water services in some parts of the country do not meet an acceptable standard. Advances in urban water in metropolitan areas risk leaving large parts of the country behind. There are significant barriers and costs for delivering safe and reliable water and wastewater to all Australians. Without action, these barriers could drive further inequality, and undermine progress towards national targets and commitments.

# Next steps

Completing this Audit is the first step in a program of work by Infrastructure Australia to plan for Australia’s future infrastructure.

The next *Australian Infrastructure Plan* will consider each challenge and opportunity identified in this Audit that requires action via policy reform. The *Infrastructure Priority List* will respond to challenges and opportunities that require action via infrastructure investment.

The process does not end there. Once the reform and investment priorities are set, Infrastructure Australia will track and publically report on progress. We will track Australia’s progress against meeting the reform targets set by the Plan and progressing the potential investments highlighted in the *Infrastructure Priority List*.

## We welcome your input

To help us shape the future, we want to know what you think about this Audit.

For the next three months we will work intensively to engage with governments, community and industry. There will likely be differing views, and there may also be gaps in our evidence. We don’t have all the answers, so we need your help to get this right.

To give feedback on our Audit, you can:

- **Make a submission** to tell us what we got right, what we missed, and what responses may be needed – such as policy reform or project investment. When you give this feedback, please respond directly to a relevant challenge or opportunity.

- **Provide new evidence**, if it is available and not reflected in the Audit. Please do this in a submission, or over time as evidence becomes available. Your contribution will ensure our evidence base stays as up to date as possible.

## Anyone can make a submission

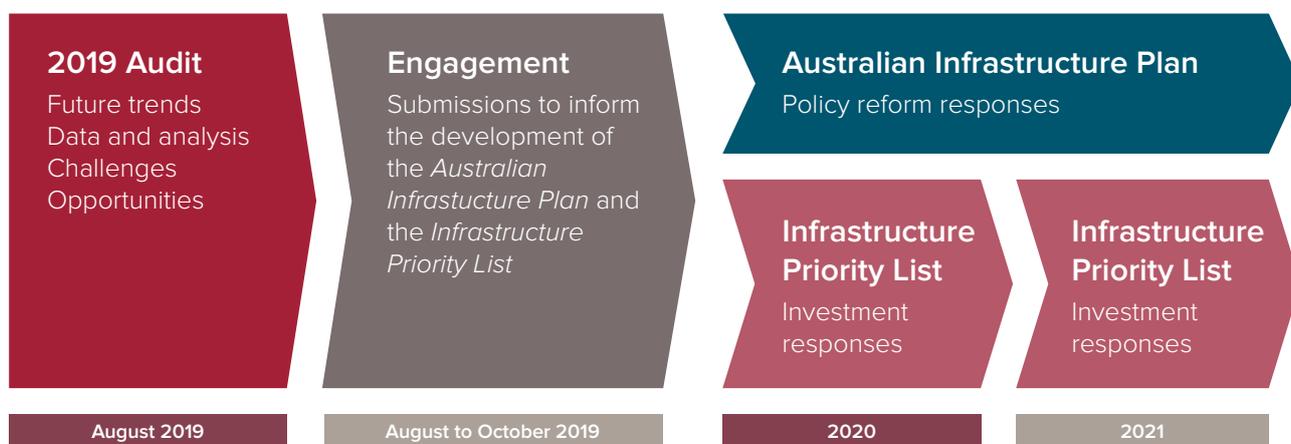
We encourage everyone to get involved from governments, industry experts and peak bodies, to academics, community groups and individual Australians. This is your chance to have a say on our infrastructure for the next 15 years and beyond.

To comment on individual challenges and opportunities, or download a longer template with room for more supporting evidence, visit the Infrastructure Australia website [www.infrastructureaustralia.gov.au](http://www.infrastructureaustralia.gov.au).

If your submission includes a specific investment proposal, you should provide supporting documents through the separate *Infrastructure Priority List* submissions process, which closes on **31 August 2019** for this round. If you submit after this date, we will consider your submission for the 2021 publication, along with the next *Australian Infrastructure Plan*. Figure 1 provides an overview of the submission process and indicative timings.

Your submission should identify which Audit challenges and opportunities each initiative or project responds to.

Figure 1: We invite submissions to help shape our future advice



# iv. Challenges and opportunities

The Audit identifies 180 challenges and opportunities. These are not recommendations. Instead, they provide a clear assessment of the key issues likely to impact the access, quality, and cost of infrastructure,

and form the starting point for the investment priorities and reform recommendations to be identified in the *Australian Infrastructure Plan* and the *Infrastructure Priority List*.

## Key: Challenges and Opportunities

-  0–5 Years
-  5–10 Years
-  10–15 Years
-  15+ Years
-  National
-  Fast-growing cities
-  Smaller cities and regional centres
-  Small towns, rural communities and remote areas
-  Developing regions and northern Australia

## Infrastructure services for users



### Infrastructure that works for users

#### 1. Challenge

**Governments and service providers do not always adequately measure and report on access, quality and costs for users.** Insufficient user-focused data makes it difficult for users and policy makers to make decisions that improve user outcomes.

**When this will impact:**

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**Where this will impact:**

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#### 2. Opportunity

**Technologies can help to overcome barriers to service access as a result of distance or location.** Better access to services through improved technology can bring economic and social opportunities for users outside of fast-growing city centres.

**When this will impact:**

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**Where this will impact:**

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### 3. Opportunity

User data and customer insights can enable innovation to better meet users' needs. Better understanding users' needs can help operators to improve user experience, attract more users and provide services more efficiently.

When this will impact:



Where this will impact:



### 4. Challenge

Users that are disadvantaged, such as those with low digital literacy or with disability, may be unable to access infrastructure services provided through new technologies. Not extending the benefits of change to all Australians is likely to increase inequality and reduces quality of life by limiting access to services for some members of the community.

When this will impact:



Where this will impact:



### Costs and affordability

### 5. Challenge

Limited reliable data exists to allow government, regulators and users to understand the total costs of infrastructure. Poor data limits the ability for government to understand the affordability of infrastructure services and cost of living pressures.

When this will impact:



Where this will impact:



### 6. Opportunity

Improved collection of data, including by third parties (such as financial institutions) could support improved decision making using big data. Partnering with data owners to support the collection of detailed, up-to-date data, will allow better decision making. However, data privacy will need to be managed.

When this will impact:



Where this will impact:



### 7. Challenge

User-pays funding for infrastructure has widespread support within the community. However, its regressive nature disproportionately affects low-income earners. Transport, energy, water and telecommunications infrastructure user costs are above affordability thresholds for our lowest income earners thereby reducing access to services and quality of life.

When this will impact:



Where this will impact:



## 8. Opportunity

Some users have limited information or understanding of the costs associated with their use of infrastructure, however new technologies will increase information and control for those that can afford them. New technology will increase transparency of infrastructure costs for users and provide the opportunity for consumers to invest in alternatives to substitute or replace traditional services.

**When this will impact:**



**Where this will impact:**



### Infrastructure for fast-growing cities

## 9. Challenge

Rapid growth in Sydney, Melbourne, Brisbane and Perth has brought many benefits, but has also put legacy infrastructure under increasing strain. Without action, infrastructure constraints will add to economic, social and environmental costs, eroding the productivity of these cities and reducing quality of life for residents.

**When this will impact:**



**Where this will impact:**



## 10. Challenge

Unreliable and inconsistent population projections makes planning for future needs difficult. This uncertainty may undermine confidence in infrastructure investments, or delay vital network upgrades to meet future growth, reducing long-term productivity and liveability of our fast-growing cities.

**When this will impact:**



**Where this will impact:**



## 11. Challenge

In fast-growing cities, many of our most vulnerable or disadvantaged groups, including Aboriginal and Torres Strait Islander people, suffer from poor access to services. This can reinforce disadvantage and limit opportunities for improvements in quality of life through vital links to employment opportunities, education, health, recreational and cultural facilities, and other services.

**When this will impact:**



**Where this will impact:**



### Infrastructure for smaller cities and regional centres

## 12. Opportunity

Smaller capitals and satellite cities have capacity to grow, and in turn take pressure off infrastructure in our fast-growing cities. Satellite cities can support growth by leveraging the infrastructure of their fast-growing neighbours and smaller capitals, through leveraging infrastructure designed to support their surrounding region.

**When this will impact:**



**Where this will impact:**



### 13. Challenge

**Developments in the economy, regulation, technology and service delivery mean our infrastructure needs are changing, leaving some regional centres at risk of being left behind.** Lags in infrastructure quality and access to services in smaller cities and regional centres could lead to a growing gap in productivity and liveability, relative to larger cities.

**When this will impact:**



**Where this will impact:**



#### Infrastructure for small towns, rural communities and remote areas

### 14. Challenge

**Infrastructure is more expensive to provide per unit of consumption in low population density areas, but communities and businesses in these areas are also more reliant on available infrastructure for their productivity and wellbeing.** Poorer infrastructure services in small towns, rural communities and remote areas could lead to limited opportunities for growth and may undermine the long-term viability of some communities.

**When this will impact:**



**Where this will impact:**



### 15. Challenge

**Regional infrastructure faces a range of unique challenges and risks, which make it difficult to efficiently provide services that support growth in regional industries.** Failure to overcome the challenges and risks facing regional infrastructure raise costs and barriers for investment in regional industries, limiting opportunities for employment and growth, and eroding confidence in the future viability of some areas.

**When this will impact:**



**Where this will impact:**



### 16. Challenge

**Infrastructure can do more to support Aboriginal and Torres Strait Islander peoples in remote communities and rural areas, and to underpin progress towards local and national objectives for improving quality of life.** Failing to improve services for First Australians in remote communities and rural areas undermines potential improvements in quality of life and reinforces gaps in inequality and disadvantage.

**When this will impact:**



**Where this will impact:**



#### Infrastructure to support regions and unlock growth in northern Australia

### 17. Challenge

**Fluctuations in economic activity in regional industries make it difficult for infrastructure to efficiently and sustainably underpin long-term growth and development.** Failure to keep pace with growth can reduce productivity and output during boom years, while underutilised assets raise costs in areas with declining populations, undermining the long-term social and economic viability of regional communities.

**When this will impact:**



**Where this will impact:**



## 18. Opportunity

Infrastructure can help to catalyse growth across northern Australia, and unlock development across a range of industries. Improving the resilience, reliability and efficiency of northern infrastructure could help to capitalise on the immense potential of northern regions, and improve the productivity, quality of life and competitiveness of its people and businesses.

When this will impact:



Where this will impact:



## 19. Opportunity

Development in northern regions could benefit from more detailed information and evidence-based studies of economic opportunities, as well as a better understanding of local needs and values, particularly of local Aboriginal and Torres Strait Islander peoples. Better information on opportunities and local needs can support more efficient investment and greater benefits for northern communities.

When this will impact:



Where this will impact:



# Industry efficiency, capacity and capability



## Planning and decision making

### 20. Challenge

Decision-making processes across many jurisdictions and sectors are not meeting best practice standards, including application of the *Infrastructure Decision-making Principles*. Failure to improve project decision making is likely to reduce the potential productivity and quality of life improvements of infrastructure investments.

When this will impact:



Where this will impact:



### 21. Challenge

Many decisions are being made without meaningful engagement, and without the means for comment and stakeholder feedback to inform project planning and delivery. By not adequately engaging, governments and proponents miss the opportunity to address stakeholders' concerns, ensure projects and reforms meet their needs, establish social licence and build trust in decisions.

When this will impact:



Where this will impact:



### 22. Challenge

Across many infrastructure markets, regulatory principles are complex, inconsistent, do not sufficiently protect the long-term interests of users, and reporting does not always align with user outcomes. A lack of clarity on user-focused objectives is likely to lead to worse outcomes for many users, and frustration with the perceived complexity of markets and decision making.

When this will impact:



Where this will impact:



## 23. Challenge

How infrastructure is provided and used will transform over coming decades, meaning laws and regulations will need to be reviewed, removed or updated. Failing to anticipate and adapt to change will undermine Australia’s global competitiveness, stifle innovation and reduce the benefits of productivity-enhancing technologies.

When this will impact:



Where this will impact:



### Funding and financing

## 24. Challenge

Funding for public infrastructure has risen above historic trends, but remains below that of many OECD nations and may need to rise further to maintain or improve user outcomes. Without sufficient funding for public infrastructure, outcomes for users will deteriorate over time, undermining productivity and quality of life.

When this will impact:



Where this will impact:



## 25. Challenge

Many community service obligations lack transparency, are not frequently reviewed, and may be inefficient. Opaque funding arrangements erode community support for CSOs and the benefits they deliver, while the lack of consistent review processes means taxpayers cannot be sure that this funding is efficient and delivers value for money.

When this will impact:



Where this will impact:



## 26. Challenge

A historical underspend on preventative maintenance, short budgetary and funding cycles, a lack of data and incentives, and inadequate reporting have contributed to a maintenance funding backlog across infrastructure sectors. An ongoing maintenance backlog will erode quality and reliability of many assets, and bring higher costs for future asset maintenance and renewal.

When this will impact:



Where this will impact:



## 27. Opportunity

Low or non-capital better-use solutions to infrastructure problems could help to avoid or delay investment in expensive new or upgraded assets. These solutions could stretch public funding for infrastructure further, bringing productivity benefits for more users sooner.

When this will impact:



Where this will impact:



## Market depth and skills

## 28. Challenge

Increased transparency of the infrastructure pipeline has not improved coordination on the timing and release of projects into the market, leading to some stretching of resources. A lack of coordinated procurement and delivery activity is resulting in constraints in key resources and skills.

When this will impact:



Where this will impact:



## 29. Challenge

The overall volume and project scale of infrastructure construction has created a heated, stretched construction market and reduced competition for projects. High risk projects are not achieving a desired level of competition during procurement. This may result in delivery being delayed or delivered by a higher risk, lower skilled contractor.

When this will impact:



Where this will impact:



## 30. Challenge

Despite meaningful progress in key jurisdictions and large agencies, the public sector is inadequately skilled and resourced to undertake a high volume of sophisticated procurement activity, including the oversight of projects during the delivery phase. Inadequate public sector procurement expertise can result in the taxpayer being exposed to inappropriate risks or costs, and compromising the capability of projects to achieve user outcomes.

When this will impact:



Where this will impact:



## 31. Challenge

There are skill constraints for key roles within the sector. The entrenched construction sector culture is limiting the sector's attractiveness to potential future employees.

When this will impact:



Where this will impact:



## Procurement and contracting

## 32. Challenge

Truncated bidding timelines, unnecessary documentation requirements and under-resourced government project teams are leading to poor procurement and delivery outcomes. This results in higher levels of risk and uncertainty being priced into tenders. These costs are ultimately carried by the users through poor quality services or additional costs, or met through government reimbursements.

When this will impact:



Where this will impact:



### 33. Challenge

Community pressure can encourage premature project commitments or the acceleration of project delivery. Decision makers are often poorly resourced to respond to this pressure to arrive at an informed decision. Poorly planned, budgeted or scoped projects can result in project cost blow-outs or delays, as well as a failure to meet project objectives, resulting in long-term costs to users.

When this will impact:



Where this will impact:



#### Security, resilience and sustainability

### 34. Challenge

Anticipating and mitigating against ever-changing risks to infrastructure is becoming more difficult as assets and networks become more interdependent and complex. Australia lacks comprehensive resilience strategies for its assets and networks. A failure to appreciate and plan for risks to infrastructure may impose substantial financial, social and personal costs.

When this will impact:



Where this will impact:



### 35. Challenge

Climate and cyber risks are likely to pose considerable and growing threats to Australia's infrastructure. Enhanced consideration of the risks to infrastructure can assist planning, design and operation of assets and networks, and can improve the resilience of services and reduce costs to future generations of users and taxpayers.

When this will impact:



Where this will impact:



### 36. Opportunity

Australia could lead the world in developing and applying sustainability-enhancing approaches to its infrastructure. Taking the lead on sustainable infrastructure practices can benefit current and future generations of Australians, while providing opportunities for our businesses to share their expertise and innovation through exports and international development programs.

When this will impact:



Where this will impact:



### 37. Challenge

Australia is at risk of not meeting its 2030 Paris Agreement commitment to reduce emissions by 26-28% below 2005 levels. Australia's future emission reductions are limited by increases in emissions from transport, direct combustion and fugitive emissions.

When this will impact:



Where this will impact:



# Transport



## Changing urban travel patterns

### 38. Challenge

Urban travel patterns are becoming increasingly complex, driven by economic, social, demographic and technological changes. There is a risk of growing divergence between the way our networks are planned and designed, and the needs of customers. Failure to cater for changing patterns of travel could contribute to growing congestion in our fast-growing cities.

**When this will impact:**



**Where this will impact:**



### 39. Challenge

Rapidly changing land use and development can place pressure on urban transport networks. Densification in our largest cities places pressure on legacy networks, while greenfield development requires new infrastructure and services. Failure to coordinate land use and transport planning can contribute to congestion and crowding in some areas, or a lack of adequate services in others.

**When this will impact:**



**Where this will impact:**



### 40. Challenge

Our radial public transport networks are inflexible and have varied levels of service and relatively low mode shares. Unless our public transport networks are designed to cater for a broader range of trips, they will not meet the changing needs of a growing number of customers.

**When this will impact:**



**Where this will impact:**



### 41. Opportunity

New technology and data sets are increasingly available in the transport sector, that can be used for planning and service delivery. Better information allows governments and operators to better understand and cater for customers' transport needs and expectations.

**When this will impact:**



**Where this will impact:**



### 42. Challenge

Australia has relatively low rates of active transport, driven by a range of issues including low densities and long distances, insufficient infrastructure and safety concerns. Without action, our transport networks and travel patterns will remain poorly integrated and sustainability improvements will be limited.

**When this will impact:**



**Where this will impact:**



## Technology and the future of passenger cars

### 43. Challenge

The accessibility and affordability of ride and carsharing could decrease demand for public transport. In these circumstances, demand shifts from space efficient public transport back to cars, potentially increasing congestion.

When this will impact:



Where this will impact:



### 44. Opportunity

Connected vehicles can reduce accidents, improve traffic flow and reduce costs for drivers. Leveraging this new technology could improve access, quality and cost outcomes for users.

When this will impact:



Where this will impact:



### 45. Challenge

Many regional, remote and rural communities do not have the economies of scale to justify private investment in charging infrastructure. Without charging infrastructure, users in these areas will have fewer opportunities for electric vehicle uptake.

When this will impact:



Where this will impact:



### 46. Challenge

There is a lack of appropriate regulation, trials and physical infrastructure to enable the use of many cooperative and autonomous vehicle features. Without action, the benefits offered by cooperative and autonomous vehicles will be missed.

When this will impact:



Where this will impact:



## International, inter-state and inter-regional connectivity

### 47. Challenge

There is congestion on roads around our major airports, particularly in Sydney and Melbourne. Unless addressed, travelling to airports will become increasingly unreliable, leading to longer travel times.

When this will impact:



Where this will impact:



## 48. Challenge

Some of our major airports are subject to operational restrictions reducing airport efficiency however adding to local amenity. Without regular reviews to ensure regulation is fit for purpose, the efficiency of our airports could be unnecessarily compromised.

When this will impact:



Where this will impact:



## 49. Challenge

Governance and funding of our regional road networks is inconsistent and lack transparency. This means funding and maintenance is subject to budget volatility of different levels of government.

Without change to road network governance, our regional roads will continue to be poorly funded, maintained and safety may decline.

When this will impact:



Where this will impact:



## 50. Challenge

Regional aviation often struggles to be financially viable and customers view it as costly. Without action, regional and remote communities will lack access to air services and affordable airfares.

When this will impact:



Where this will impact:



## 51. Challenge

Our regional railways generally have uncompetitive travel times with cars and planes. This means they carry a relatively small share of passengers. Unless travel times are improved, regional rail will continue to play a small role, meaning regional customers have less choice when they choose to travel.

When this will impact:



Where this will impact:



## 52. Challenge

The popularity of cruise ships in Australia is growing, producing important tourism opportunities for fast-growing cities and regional centres. However, there are a lack of berths for international cruise ships, particularly in Sydney. Without additional berthing capacity, Australia will lose cruise ships and tourist visitation will decline.

When this will impact:



Where this will impact:



## Funding and maintaining our transport assets

### 53. Challenge

Asset maintenance lacks transparency, consistency and accountability. This is particularly the case for sectors that rely on government funding rather than user charges, such as roads and public transport. Unless addressed, maintenance of our transport networks will become increasingly unsustainable.

**When this will impact:**



**Where this will impact:**



### 54. Challenge

There is no clear link between expenditure on roads and usage, which means road expenditure is inequitable, inefficient, unsustainable and lacks transparency. Without reform, revenue from fuel excise will decline, drivers will not be charged fairly and people will be incentivised to drive, contributing to congestion.

**When this will impact:**



**Where this will impact:**



### 55. Challenge

Public transport investments and operating subsidies are substantial, but decisions lack transparency. Unless addressed, public transport will continue to be subject to political cycles and budget conditions.

**When this will impact:**



**Where this will impact:**



### 56. Challenge

Regional and remote local governments struggle to fund and maintain roads and airports. Local governments often have relatively small revenue bases but are responsible for the maintenance of expensive transport networks. Without addressing funding shortfalls and maintenances practices, regional and remote infrastructure will become increasingly unsustainable.

**When this will impact:**



**Where this will impact:**



### 57. Opportunity

There are numerous emerging revenue sources for the transport sector, with many related to technological development and changing patterns of demand for transport. There is an opportunity for emerging revenue streams to improve the financial sustainability of our transport networks.

**When this will impact:**



**Where this will impact:**



## Passenger transport sustainability and resilience

### 58. Challenge

Transport sector emissions are increasing. Passenger cars account for the vast majority of emissions, but heavy vehicles and aviation are projected to drive growth in emissions in the next ten years. Without action, the emissions intensity of passenger transport may cause negative environmental impacts and Australia will fail to meet its emissions reduction targets.

When this will impact:



Where this will impact:



### 59. Challenge

Australian governments often do not incorporate sustainability or resilience into their final infrastructure projects. Without regular action, active and public transport modes will be underutilised and our infrastructure will be less resilient and sustainable.

When this will impact:



Where this will impact:



### 60. Opportunity

If partnered with low carbon intensity fuels hybrid electric, plug-in electric, hydrogen fuel cell and automated vehicles are less emissions intensive than internal combustion engine vehicles. These technologies can be leveraged to transition to a low-carbon transport sector. Reducing transport sector emissions would help Australia meet its international obligations while also improving local air quality.

When this will impact:



Where this will impact:



### 61. Challenge

Climate change is likely to cause increasingly frequent and severe weather events that damage transport assets. Without resilient infrastructure, network functionality could be limited and the costs of upgrades could be more substantial.

When this will impact:



Where this will impact:



## Safety in the transport sector

### 62. Challenge

Road safety performance is not on track to meet the objectives of the National Road Safety Strategy. Without action road users will continue to be vulnerable and at risk of serious injury or fatality.

When this will impact:



Where this will impact:



### 63. Challenge

Project selection and funding is based on incomplete safety data. Without action, this will inhibit effective cost allocation and understanding of trade-offs with other transport outcomes, such as productivity.

When this will impact:



Where this will impact:



## 64. Opportunity

**Regional, rural and remote road networks are less safe. There is an opportunity to focus investments and policies on these areas.** Identifying, assessing and prioritising sites for upgrades and road treatments on high risk corridors could optimise investment and reduce fatalities.

**When this will impact:**



**Where this will impact:**



## 65. Challenge

**Australians are holding on to their vehicles for longer.** Older vehicles often do not meet modern safety standards and are more likely to injure or kill if involved in a crash.

**When this will impact:**



**Where this will impact:**



## 66. Challenge

**Pedestrian and cyclist fatalities are over represented in fatalities and injuries.** Without action, active transport users will continue to be injured and killed, and the attractiveness of active transport will remain low.

**When this will impact:**



**Where this will impact:**



## 67. Challenge

**Technological change is driving the collection of valuable data by transport operators and network owners.** This information is valuable and can be vulnerable to cyberattacks.

**When this will impact:**



**Where this will impact:**



### Transport accessibility and equity

## 68. Challenge

**Public transport service levels and access is lower in the outer suburbs and regional centres. This results in lower public transport mode share, and a reliance on cars in these areas.** Without action, people who live in these areas will continue to be reliant on their cars.

**When this will impact:**



**Where this will impact:**



## 69. Challenge

**People on the outskirts of our cities and in regional and remote Australia pay proportionally more for transport.** Unless addressed, our transport networks will continue to be inequitable, with people in the outer suburbs and regional and remote Australia paying proportionally more.

**When this will impact:**



**Where this will impact:**



## 70. Challenge

There is insufficient funding to make our public transport networks accessible to people with disability. Unless funding shortfalls are addressed, legislated accessibility targets for public transport will not be reached and our networks will not be inclusive.

When this will impact:



Where this will impact:



## 71. Challenge

Emerging point-to-point operators are not subject to the same subsidy schemes and accessibility legislation as taxis, meaning they are not accessible to many people with disability. Without action, people with disability will not share in the benefits of emerging transport modes.

When this will impact:



Where this will impact:



## Freight gateways supporting international trade

## 72. Opportunity

Growth in Asia and an increasingly globalised economy means the volume and value of Australia's trade is increasing. Enhancing, adapting and realigning freight networks will allow Australian producers to capitalise on opportunities presented by growing global markets, and Australian consumers to access imported goods as cheaply as possible.

When this will impact:



Where this will impact:



## 73. Challenge

Charges for truck and train operators accessing our major ports have increased and could be passed on to customers. It is challenging for governments to know if and when a regulatory response is required. Stevedores may have the ability to continue increasing charges, which may lead to growing costs for Australian exporters and consumers.

When this will impact:



Where this will impact:



## 74. Challenge

Our major container ports are becoming more productive, but continue to lag behind our trading partners for key indicators. Our ports will need to continue to improve to ensure Australia is globally competitive. Without improvement, our ports will continue to be uncompetitive, potentially increasing the time taken to import and export goods and add to costs for Australian exporters and consumers.

When this will impact:



Where this will impact:



## 75. Challenge

**The need to balance passenger and freight services, operating restrictions and constraints on airport land and surrounding roads reduces the efficiency of our airports.** The efficiency of our airports could decline further as demand grows, potentially leading to delays and higher costs for high value, time sensitive air freight and passengers.

**When this will impact:**



**Where this will impact:**



### The urban freight challenge

## 76. Challenge

**Conflict between land uses, particularly in the inner areas of our fast-growing cities, decreases the efficiency of our urban supply chains, particularly warehousing. Conflicting demand for land is inevitable, and governments face a challenge in balancing the needs of different parties.** Failure to address land use conflict will result in more operating restrictions on key facilities, inefficient layout of facilities, and additional freight trips on out transport networks.

**When this will impact:**



**Where this will impact:**



## 77. Challenge

**Freight transport in our fast-growing cities is impacted by congestion leading to increased costs.** If this is not addressed, delays in our urban supply chains will become more common and costs will increase as our cities grow.

**When this will impact:**



**Where this will impact:**



## 78. Challenge

**An increase in deliveries by light commercial vehicles is contributing to road and kerbside congestion, particularly in inner urban areas. This is driven by growth in online shopping and changing consumer expectations about timely and door-to-door deliveries.** Without action, light commercial vehicles will make a growing contribution to congestion in major employment centres.

**When this will impact:**



**Where this will impact:**



### Ensuring the national freight network is effective and efficient

## 79. Challenge

**Inconsistent regulations, standards and technologies across our road and rail networks increase costs for transport operators and agricultural producers, which are ultimately passed on to customers.** Without action, costs and time spent complying with regulation will remain unnecessarily high, reducing the productivity of our supply chains.

**When this will impact:**



**Where this will impact:**



## 80. Challenge

High productivity vehicle use is limited by community sentiment as well as physical and regulatory impediments to access to our road network. Restricted use of high productivity vehicles will lock in high freight costs for businesses and consumers, and limit benefits to road safety, air pollution and amenity.

When this will impact:



Where this will impact:



## 81. Challenge

The pace and impact of technological change on our supply chains is uncertain. Governments face dual challenges of enabling private sector innovation while also regulating to ensure change does not harm the community. If governments do not intervene appropriately, innovation could be stifled or, alternatively, technological development could pose safety and environmental threats.

When this will impact:



Where this will impact:



## 82. Opportunity

New technologies can help improve road safety and efficiency, but they have upfront costs that mean uptake rates remain low. Increased use of technology could improve road safety.

When this will impact:



Where this will impact:



## Unlocking regional economic development through freight

## 83. Challenge

Remote and regional supply chains are critical for industry and to supply communities with basic needs. However, local governments often struggle to fund and maintain critical transport infrastructure. If this is not addressed, our agricultural supply chains and regional and remote communities will be vulnerable to delays, higher costs and extreme weather events.

When this will impact:



Where this will impact:



## 84. Challenge

The complexity of the freight sector means leveraging infrastructure investments to maximise regional development can be challenging. Without improved coordination between jurisdictions, infrastructure managers and freight operators, regional development opportunities will be missed.

When this will impact:



Where this will impact:



## 85. Challenge

Highly variable and seasonal traffic can make investment and maintenance of regional grain railways difficult to justify. This results in bottlenecks, speed restrictions, lower capacities and sometimes line closures. If this is not addressed, producers and transport operators will continue to incur higher costs and delays, particularly in high harvest years.

When this will impact:



Where this will impact:



### Transporting, storing and making the most of our waste

## 86. Challenge

Australia has increasing waste generation, a lack of a mature market for private investment and a reliance on waste export. Without action, our disposal, recycling and transportation of waste will become more costly and environmentally damaging.

When this will impact:



Where this will impact:



## 87. Challenge

A limited number of new waste facilities and landfill sites have been approved and residential development is encroaching on existing sites. Without action, waste freight will have to transport their loads further from the waste generation point.

When this will impact:



Where this will impact:



## 88. Challenge

Waste is often transported large distances from where it is generated due to a patchwork of government regulation. Without action, waste will continue to be transported further from the waste generation point adding to congestion and road degradation.

When this will impact:



Where this will impact:



## 89. Opportunity

There is a lack of a mature market for private investment in recycling and waste disposal. There is a chance to capitalise on increased demand for recycled products and larger economies of scale as waste generation increases. Developing a domestic market could improve recycling rates and the sustainability of Australia's waste disposal.

When this will impact:



Where this will impact:



## 90. Challenge

A lack of scale and access in remote communities means waste freight is inconsistent and not cost effective for consumers or taxpayers. As our waste generation increases waste services in these areas could become more expensive.

When this will impact:



Where this will impact:



## 91. Opportunity

Transporting waste can have high impacts on urban amenity. Using new technology could make waste transport more efficient and environmentally-friendly.

When this will impact:



Where this will impact:



# Social infrastructure



## Health and aged care

### 92. Challenge

Demand for health and aged care services and infrastructure is increasing due to our growing and ageing population, and rising incidence of chronic diseases. This is placing pressure on already stretched health infrastructure. Without action, our healthcare system will be unable to meet this demand and maintain quality, accessibility and affordability of services for communities.

When this will impact:



Where this will impact:



### 93. Challenge

The changing nature of health issues are driving up the cost of health infrastructure and services for both governments and users. If not addressed, government funding will become unsustainable and costs will become unaffordable for people, particularly those on lower incomes.

When this will impact:



Where this will impact:



### 94. Opportunity

New healthcare service models that improve in-home and preventive care can reduce hospitalisations. Embracing new models can alleviate pressure on hospital infrastructure, improving access and service quality for those who need it most.

When this will impact:



Where this will impact:



### 95. Challenge

Chronic condition, aged and end-of-life care infrastructure is not responding sufficiently to changing preferences for care at home or in community. Without action, this care will not be accessible, dignified, nor person centred for a growing number of Australians.

When this will impact:



Where this will impact:



## 96. Challenge

Young people with disability are often forced to live in inadequate or not fit-for-purpose facilities, including aged care and mental health facilities, due to a lack of purpose-built facilities for people with disability. If not addressed, young people with disabilities will continue to experience poor-quality care that does not meet their needs, and reduces their quality of life.

When this will impact:



Where this will impact:



## 97. Challenge

Low service densities can limit the provision of accessible, continuous and quality health care in rural communities and remote areas. Without action, healthcare outcomes for communities in these areas, particularly Aboriginal and Torres Strait Islander peoples, will continue to be adversely affected.

When this will impact:



Where this will impact:



## 98. Opportunity

Technological advancements are enabling health infrastructure to be more digitally-oriented, from patient care to record keeping and infrastructure management. Embracing new technologies has the potential to reduce time and distance barriers to accessing health care, and improve efficiencies and quality of care.

When this will impact:



Where this will impact:



## 99. Opportunity

The delivery of new and upgraded major health infrastructure in cities provides the opportunity to co-locate these assets with other services, such as other health services, research, education and community infrastructure. Creating health precincts could enable more integrated health care, with higher quality and greater accessibility for patients, and improve Australia's health research and education capabilities, attracting global expertise.

When this will impact:



Where this will impact:



### Education

## 100. Challenge

Early childhood education services are delivered by a mix of public, private and not-for profit providers, creating fragmented infrastructure delivery and quality. Without action, continued variation in the quality of facilities may create poor educational outcomes for some children, and exacerbate challenges for parents in accessing and paying for services.

When this will impact:



Where this will impact:



## 101. Challenge

Demand for school infrastructure is increasing in our fast-growing and satellite cities, particularly in the inner city and outer growth areas of fast-growing cities. Without action, increased demand will create overcrowding in schools, and impact the quality of infrastructure and educational outcomes for students.

When this will impact:



Where this will impact:



## 102. Challenge

Traditional approaches to increasing the capacity of school infrastructure, such as using demountable buildings, are not adequate for the demand projected, nor necessarily appropriate for student outcomes. Maintenance backlogs and space constraints provide additional complexity. Without changes to the way demand is evaluated and new capacity provided, schools in fast-growing cities will be unable to meet growing demand, risking reduced quality of education outcomes for students.

When this will impact:



Where this will impact:



## 103. Challenge

Schools in some smaller cities, and rural communities and remote areas are facing reduced demand, as populations in these areas decline and age. Without action, these communities will be forced to reduce educational services and infrastructure provision, potentially resulting in fewer resources to provide rich and diverse curricula to students.

When this will impact:



Where this will impact:



## 104. Challenge

Much of Australia's school infrastructure is ageing and not fit for purpose for 21st-century learning. This includes a lack of flexibility to adapt to new technologies and teaching models, or buildings which are not accessible for all students. Maintaining and upgrading buildings is costly for governments and disruptive for learning outcomes, however without action, Australian schools risk falling behind other countries in preparing students for work and life in the 21st century.

When this will impact:



Where this will impact:



## 105. Opportunity

School infrastructure can provide essential community facilities and spaces, such as sporting fields and halls, however, access to school infrastructure is often restricted to ensure student safety and reduce maintenance costs for government. Harnessing the benefits of school infrastructure for community use outside of school hours, particularly in fast-growing cities where space is scarce, can improve the efficient use of education infrastructure assets and improve health and social wellbeing outcomes for people.

When this will impact:



Where this will impact:



### 106. Challenge

**Demand for tertiary education infrastructure is increasing, particularly for universities in fast-growing cities, and for vocational training in smaller cities, and rural communities and remote areas.** Without action, universities and vocational education facilities will experience overcrowding, impacting on the quality of student outcomes.

**When this will impact:**



**Where this will impact:**



### 107. Challenge

**Access to vocational education infrastructure is a challenge in remote areas. Students often have to travel long distances to reach teaching facilities.** Without action, reduced access to tertiary education will deliver poorer educational and economic outcomes for communities in remote areas, particularly those with high socio-economic disadvantage who cannot afford to travel and stay in other areas to study.

**When this will impact:**



**Where this will impact:**



### 108. Challenge

**Competing priorities are reducing the focus on maintaining ageing assets in tertiary education infrastructure.** Without action, students may experience poorer-quality learning outcomes.

**When this will impact:**



**Where this will impact:**



### 109. Challenge

**Tertiary education infrastructure is often poorly-integrated with other types of infrastructure, including transport and affordable accommodation.** Without action, access to tertiary education infrastructure could be reduced for a growing number of students and employees, impacting more broadly on transport congestion and overcrowding, and potentially increasing costs for students.

**When this will impact:**



**Where this will impact:**



## Green, blue and recreation

### 110. Challenge

**Investment in green, blue and recreation infrastructure is often not prioritised because the true costs and benefits are not well-integrated into government decision making.** Without action, essential green, blue and recreation infrastructure will not be delivered, reducing access for communities to spaces that improve liveability, health and environmental outcomes.

**When this will impact:**



**Where this will impact:**



## 111. Opportunity

Joint- and shared-use of recreation infrastructure can solve space constraints in fast-growing cities, and help to overcome lower demand and funding constraints in rural communities and remote areas. Sharing spaces and facilities can improve access for communities to high-quality infrastructure and bring down costs for users and operators.

When this will impact:



Where this will impact:



## 112. Challenge

Fragmented governance of green, blue and recreation infrastructure makes it hard to integrate into land-use planning. Without action, a lack of coordination for both planning and data could lead to a loss of critical green, blue and recreation infrastructure and inefficient use of existing spaces and facilities.

When this will impact:



Where this will impact:



## 113. Challenge

In fast-growing cities, green, blue and recreation infrastructure is highly valued and overused. The high cost of land, operations and maintenance make it difficult to fund the delivery and maintenance of new infrastructure in these cities. Our fast-growing cities risk not having adequate high-quality, accessible green, blue and recreation infrastructure as they grow and densify, particularly in inner-urban areas.

When this will impact:



Where this will impact:



## 114. Challenge

In areas outside of fast-growing cities, green, blue and recreation infrastructure is often fragmented across multiple assets and expensive to maintain. Lower demand in these areas can make it difficult to fund the delivery, operations and maintenance of new infrastructure. High costs of maintenance for underused assets can create challenges in providing adequate high-quality green, blue and recreation infrastructure to support communities.

When this will impact:



Where this will impact:



## 115. Challenge

Green canopy cover is increasingly hard to provide in cities as backyards decrease and densification occurs. Without action, access to green space will diminish in our cities, and liveability will increasingly be affected by the urban heat island effect.

When this will impact:



Where this will impact:



## Arts and culture

### 116. Challenge

Investment in arts and cultural infrastructure is often not prioritised because the true costs and benefits are not well integrated into government decision making. Without action, arts and cultural infrastructure will not be delivered, reducing access for communities to spaces which enhance liveability, creativity and help to create a sense of identity.

When this will impact:



Where this will impact:



### 117. Challenge

Governance of arts and cultural infrastructure is fragmented, resulting in a lack of comprehensive data on the scale and distribution of the sector. Without action, investment in the sector will not be prioritised, leading to poorer accessibility and quality arts and culture infrastructure for communities.

When this will impact:



Where this will impact:



### 118. Opportunity

Well-integrated arts and cultural infrastructure can enhance the value of other types of infrastructure, such as public transport or green infrastructure. Leveraging investment across other sectors by embedding arts and culture into land use and infrastructure planning will provide greater benefits to communities to access arts and cultural infrastructure.

When this will impact:



Where this will impact:



### 119. Challenge

The arts and cultural infrastructure sector varies across Australia, making it hard to address local needs, audiences, demand levels and funding. Traditional approaches to planning, delivering and maintaining arts and cultural institutions and programs do not always respond to local needs, requiring new approaches to improve access and quality for local communities and visitors.

When this will impact:



Where this will impact:



### 120. Challenge

Arts and cultural infrastructure suffers from maintenance backlogs, high costs of heritage maintenance, and space constraints, resulting in assets not being fit-for-purpose. Without appropriate long term planning and funding prioritisation, the quality and accessibility of these institutions for users will diminish.

When this will impact:



Where this will impact:



## 121. Opportunity

**Arts and cultural infrastructure plays a key role in the social and economic empowerment of Aboriginal and Torres Strait Islander peoples.** Leveraging investment in arts and cultural institutions to promote the collection and celebration of Aboriginal and Torres Strait Islander arts and cultural materials can provide wider socio-economic benefits to these communities, particularly in rural and remote areas.

**When this will impact:**



**Where this will impact:**



## 122. Opportunity

**Digital technology offers new ways to access arts and cultural infrastructure, beyond physical assets.** Harnessing technological advances and investing in ongoing maintenance and curation will improve accessibility to Australia's arts and cultural infrastructure, particularly for rural and remote communities located long distances from major institutions.

**When this will impact:**



**Where this will impact:**



### Social housing

## 123. Challenge

**There are limited pathways for people to move through the housing continuum, particularly from social housing into the private market.** Without adequate affordable housing options for people on different income levels, people may remain in social housing for longer, occupying homes that could be provided to people in greater need.

**When this will impact:**



**Where this will impact:**



## 124. Challenge

**Australia's social housing stock is not meeting current or projected tenant needs in terms of dwelling sizes and configurations, accessibility and supporting services.** Without action, reduced access to adequate and high-quality housing can create adverse impacts on other aspects of peoples' lives, including their health, employment opportunities, educational attainment and broader wellbeing and life satisfaction.

**When this will impact:**



**Where this will impact:**



## 125. Challenge

**Australia's social housing asset base is deteriorating and there is an increasing maintenance task, affecting the quality of dwellings.** Failure to properly maintain dwellings can exacerbate maintenance costs and create negative health and well-being impacts for tenants.

**When this will impact:**



**Where this will impact:**



## 126. Challenge

**Remote Aboriginal and Torres Strait Islander housing is not meeting the needs of communities, due to overcrowding and poor quality dwellings.** Inadequate housing exacerbates the health, education and well-being outcomes of Aboriginal and Torres Strait Islander peoples, which are already below those of other Australians.

**When this will impact:**



**Where this will impact:**



## 127. Opportunity

**The community housing sector is growing, supporting governments to deliver high-quality services to social and affordable housing tenants.** Leveraging further growth in the sector can increase innovation in social and affordable housing delivery and management, and improve the quality of housing services for tenants.

**When this will impact:**



**Where this will impact:**



### Justice and emergency services

## 128. Challenge

**The location of justice infrastructure assets is misaligned with demand, due to population growth and urbanisation.** If left unaddressed, this will result in reduced quality of, and reduced accessibility to our justice services, particularly correctional services.

**When this will impact:**



**Where this will impact:**



## 129. Challenge

**Ageing justice infrastructure assets are not fit-for-purpose for changing user demographics and needs.** Without changes to the design of justice infrastructure and services provided to adapt to changing types of users and needs, diverse users will experience increasingly poor quality services.

**When this will impact:**



**Where this will impact:**



## 130. Challenge

**Our emergency services infrastructure is not adapting to changes in the nature and rate of emergencies.** Without action, emergency services infrastructure which is not fit-for-purpose for the changing nature of emergencies will reduce access to life-saving services, particularly in rural communities and remote areas.

**When this will impact:**



**Where this will impact:**



## 131. Opportunity

There is a high level of interdependence between justice and emergency services, and with other sectors, such as health. The changing nature of crime and emergency events provides opportunities to improve coordination across sectors to deliver more holistic, and higher-quality services, and improve accessibility through approaches such as jointly-managed facilities and programs.

When this will impact:



Where this will impact:



## 132. Opportunity

Digital technology and operational changes are providing 'non-build' ways to improve justice infrastructure efficiency and service quality. Harnessing these advancements can reduce demand on existing physical infrastructure and improve the accessibility and quality of these services for users.

When this will impact:



Where this will impact:



# Energy



## Affordable and competitive energy

### 133. Challenge

Transparent and affordable electricity prices are essential to reducing pressure on household budgets, particularly for lower income households. A continued rise in energy bills will place an added burden on many households and may reinforce inequality. Ongoing complexity of bills will add to user costs and frustrations.

When this will impact:



Where this will impact:



### 134. Challenge

Regaining energy price competitiveness is important for lower business costs and improving productivity of Australian firms. Australia risks becoming uncompetitive in some energy intensive industries due to rising energy costs.

When this will impact:



Where this will impact:



## Secure, reliable and sustainable energy

### 135. Challenge

Balancing reliability and affordability in line with users' willingness to pay will be an ongoing challenge in energy systems with rapidly transforming wholesale and network characteristics. Failure to get the balance right will result in higher costs for users due to inefficient investments, or poorer reliability for users.

When this will impact:



Where this will impact:



### 136. Challenge

Governments, regulators, operators and service providers need to manage growing risks to Australia’s energy systems and fuel sources, including risks from climate change, cyberattack or disruptions to fuel supply. Failure to effectively mitigate against risks to energy services could have substantial consequences for the economy.

When this will impact:



Where this will impact:



### 137. Challenge

Despite positive progress on the development of a national climate policy, ongoing politicisation of the issue and policy inconsistency between levels of government reduce market certainty. Uncertainty prevents timely investment in long-term infrastructure such as electricity generation and gas pipelines, increasing risks and costs to users.

When this will impact:



Where this will impact:



## Transitioning to Australia’s future energy fuel mix

### 138. Challenge

Many major coal generation assets are ageing and approaching retirement. The capacity they provide will need to be replaced. In the NEM, this capacity needs to be replaced or there may be impacts on reliability or competition. In the WEM, where there is overcapacity there may be scope to reduce surplus capacity. In both cases, there is a risk to the order of the market.

When this will impact:



Where this will impact:



### 139. Challenge

As the penetration of small- and large-scale renewables increases across the network, additional investment in networks and generation will be required to manage reliability and service levels. This will increase capital and operational costs in networks, but will be needed to be maintain balanced supply standards.

When this will impact:



Where this will impact:



### 140. Opportunity

New forms of large-scale storage are increasingly available, including pumped hydroelectric and battery assets. Introduction of appropriate new firming capacity will complement variable renewable energy bids and aid the transition to the new electricity mix.

When this will impact:



Where this will impact:



## Planning for our future energy networks

### 141. Challenge

Transmission networks need to respond to new generation in areas not currently served or without sufficient spare capacity. The outcome of these decisions will be paid for by users over many years. It is in the interests of users that the transition is efficient and guided by well-targeted investment.

When this will impact:



Where this will impact:



### 142. Opportunity

Coordinating investment in new generation and network assets in Renewable Energy Zones can promote investment in renewable generation, provide clarity for network investors, and increase scale and lower costs for new generation providers. Optimising investment in Renewable Energy Zones will lead to lower wholesale and network costs for users over time.

When this will impact:



Where this will impact:



## New opportunities for consumer choice

### 143. Challenge

Home solar and storage can help users to save costs and control energy use, but government policies are uncoordinated. Developments in behind the meter energy systems risk leaving some users behind, while uncoordinated policies and subsidies add to costs over the long term.

When this will impact:



Where this will impact:



### 144. Opportunity

Demand response from users can defer or avoid expensive new electricity infrastructure investment, and better use existing infrastructure. This can save users the passed on costs of higher peaks.

When this will impact:



Where this will impact:



### 145. Opportunity

Electric vehicles could provide additional storage capacity to stationary electricity systems. There are regulatory and technical barriers to be overcome. This may provide a means of converging stationary and non-stationary energy at household level.

When this will impact:



Where this will impact:



## Delivering energy in remote communities

### 146. Challenge

The costs of serving remote and regional areas remain high, with customers in those areas also often receiving poor reliability outcomes. Poor energy reliability in remote areas undermines quality of life and opportunities for growth and investment.

**When this will impact:**



**Where this will impact:**



### 147. Opportunity

There is an opportunity to leverage new local energy supply solutions that either replace or complement diesel generation in remote and regional areas. This can increase amenity, reliability and affordability for local communities and businesses.

**When this will impact:**



**Where this will impact:**



### 148. Challenge

The current regulatory regime does not optimise emerging opportunities for energy supply to regional and remote communities via stand-alone power systems. Without regulatory reform, rural and remote users may not take up lower cost and more reliable energy solutions, and overall costs may be increased for all users and taxpayers.

**When this will impact:**



**Where this will impact:**



## Harnessing Australia's energy advantage

### 149. Opportunity

Australia could develop new industries based on cheap and abundant new sources of energy, including large-scale solar and wind. This could attract energy intensive industries to Australia, or allow export of products with high levels of embedded cheap energy. This may require wider use of existing infrastructure, and new infrastructure investment.

**When this will impact:**



**Where this will impact:**



### 150. Opportunity

Australia could leverage its energy resources to provide global leadership and innovation on energy research and development through its high-quality research and education institutions. New discoveries and lower costs can provide Australia with an advantage on applied energy use, supporting new industries.

**When this will impact:**



**Where this will impact:**



## 151. Opportunity

Australia's regions have significant reserves of onshore gas. However, there are restrictions on accessing reserves across many regions. Unlocking these reserves could provide substantial export growth potential, as well as opportunities for lower prices for domestic users.

When this will impact:



Where this will impact:



Introduction

Future trends

Users

Industry

Transport

Social infrastructure

Energy

Telecommunications

Water

Next steps

# Telecommunications



Telecommunications enable productivity and innovation

## 152. Opportunity

Digital technologies are using telecommunications networks to enhance Australia's economic productivity. Embracing these new technologies can be a source of competitive advantage for Australia and can improve outcomes for users.

When this will impact:



Where this will impact:



## 153. Challenge

Australia's comparative performance for fixed broadband speeds is poor, and we lag well behind comparable nations. Failure to rapidly improve speeds could be a constraint on boosting productivity and liveability, and attracting businesses that require high levels of digital access.

When this will impact:



Where this will impact:



## 154. Challenge

Cybersecurity risks, such as data privacy and system resilience, are growing as more Australians use more interconnected digital services. Failure to manage these risks could affect user engagement with new services, and reduce the potential benefits of these services. Network efficiency could also suffer.

When this will impact:



Where this will impact:



The mobile coverage dilemma

## 155. Challenge

Prioritisation of mobile network upgrades in rural and remote areas creates gaps in crucial areas, such as on productive land and along transport corridors. Failure to deliver services to these areas affects community safety, liveability and productivity.

When this will impact:



Where this will impact:



## 156. Opportunity

**5G technology presents an opportunity for Australia and we are well positioned to embrace it ahead of other nations.** Delivering 5G networks will help to accelerate Australia’s digital transformation, providing significant benefits to people, businesses and governments.

**When this will impact:**



**Where this will impact:**



## 157. Challenge

**5G networks will require substantial new infrastructure, creating both cost, planning and security challenges.** In cities, this means retrofitting new cells into existing streetscapes, and in rural and remote areas, this means creating adequate densities and improving coverage beyond that of 3G and 4G. Adequately balancing shared and competing tower and cell sites will affect the scale of investment, and ultimate costs users pay.

**When this will impact:**



**Where this will impact:**



## 158. Challenge

**Government needs to balance different demands, including from mobile service providers, to deliver efficient and competitive allocation of radiofrequency spectrum.** This will affect the quality and cost of mobile services for users.

**When this will impact:**



**Where this will impact:**



### Maximising the benefits of nbn investment

## 159. Challenge

**There is an inherent tension between the nbn’s strategic goals, requiring potential trade-offs between achieving user outcomes and delivering a return on the capital investment made by taxpayers.** If all goals cannot be achieved, the ability for Australians to access affordable and high-quality nbn services may be negatively affected.

**When this will impact:**



**Where this will impact:**



## 160. Challenge

**The technology mix for the nbn has diversified, meaning different users will receive different types of connections.** This change will deliver varied outcomes for users, and some may shoulder higher costs or receive lower-quality services.

**When this will impact:**



**Where this will impact:**



## 161. Opportunity

Private market broadband and mobile operators are providing competitive services in commercial locations to fill nbn gaps. Leveraging competition can provide greater choice for users, supporting affordable and high quality services.

When this will impact:



Where this will impact:



## 162. Challenge

A proposed eventual sale of the nbn to the private sector raises challenges in striking the right balance between realising its value for shareholders and achieving long-term goals for users. Decisions about restructuring and sale can affect both short- and long-term service delivery and outcomes for users.

When this will impact:



Where this will impact:



### Social inclusion and affordability for telecommunications services

## 163. Challenge

The quality of telecommunications services varies for different groups across Australia, with digital inclusion lagging for low-income households, people who did not complete secondary school, those aged over 65 and people with disability. Without action, these people will be increasingly excluded from an increasingly digital world, exacerbating disadvantage.

When this will impact:



Where this will impact:



## 164. Challenge

Telecommunications community service obligations lack transparency, competition and specificity, and are often technology prescriptive. Without action, both taxpayer and user outcomes will be further compromised, and CSOs will not service the locations and communities where need exists.

When this will impact:



Where this will impact:



## 165. Challenge

In fast-growing and smaller cities, telecommunications services are supported by substantial infrastructure that brings fast speeds and data allowances. Access to these services is unaffordable for some groups and can exacerbate socio-economic inequality.

When this will impact:



Where this will impact:



## 166. Challenge

In regional centres and rural and remote areas, telecommunications infrastructure often delivers costly services which provide poor connectivity, speeds and data allowances. This means people often require extra equipment, such as devices and other hardware, to access services, or can only access mobile data services. This creates impacts for both businesses and individuals, which can exacerbate spatial inequalities.

**When this will impact:**



**Where this will impact:**



## 167. Challenge

Businesses are increasingly demanding more from telecommunications services to compete in the digital economy, but increased downloads, speeds and storage come at a cost. Higher costs will reduce the ability for businesses to grow and compete domestically and internationally.

**When this will impact:**



**Where this will impact:**



# Water



### Changes facing urban water

## 168. Opportunity

Imminent renewals of ageing assets bring an opportunity to rethink how water and wastewater services are delivered, and to use technology to improve efficiency and levels of service. Renewals could help to avoid overinvestment in large, long-lived traditional water and sewerage assets, and make the system more adaptable to future trends and shocks.

**When this will impact:**



**Where this will impact:**



## 169. Challenge

The urban water sector faces considerable risks, including the impacts of climate change, population growth, ageing assets, and changing needs and expectations from users. Failure to adequately address these challenges could lead to rising water bills, as well as exposing users to risks of declining service quality and reliability.

**When this will impact:**



**Where this will impact:**



### Sustainable water for liveable cities

## 170. Opportunity

In increasingly dense cities, water will need to play a growing role in supporting our cities as desirable places to live, work and visit over coming years. Better understanding water's role in urban environments could enhance quality of life, open new spaces for recreation, natural regeneration and cultural practices.

**When this will impact:**



**Where this will impact:**



## 171. Opportunity

**Governments and utilities have not fully explored options for greater efficiency by households and industry, including potable reuse.** More efficient household usage and industry service provision could provide substantial benefits for users at low cost.

**When this will impact:**



**Where this will impact:**



### Water and wastewater in regional and remote communities

## 172. Challenge

**Regional and remote utilities face considerable challenges, including reliance on a single source of supply, limited resources, a lack of scale and unreliable information on services.** Failing to adequately address regional water challenges could lead to heightened quality or reliability risks and a deterioration of liveability in regional and remote areas.

**When this will impact:**



**Where this will impact:**



## 173. Challenge

**Many regional and remote utilities face mounting costs to maintain, renew or upgrade ageing water and wastewater assets, but have limited funding through grants or revenue. Where funding is provided, it is often inefficient or lacks transparency.** Failure to provide sustainable funding could lead to declining reliability and quality for regional customers, heightened risks of asset failure, and a mounting funding backlog.

**When this will impact:**



**Where this will impact:**



## 174. Challenge

**Some remote communities, many with predominantly Aboriginal and Torres Strait Islander populations, do not have access to reliable and safe water and wastewater services, while monitoring is often inadequate.** Failure to address these issues will erode social and physical wellbeing, reinforce disadvantage, and undermine our national and international commitments and objectives.

**When this will impact:**



**Where this will impact:**



### Water oversight, regulation and decision making

## 175. Challenge

**Information on water and wastewater services is not nationally consistent, reliable, insightful, or reflective of outcomes that matter to users.** Inadequate information undermines effective decision making, hides issues that impact users and limits understanding of the value of water and wastewater services.

**When this will impact:**



**Where this will impact:**



### 176. Challenge

No jurisdiction meets best practice regulation and governance in urban water. Key issues include a lack of focus on user objectives, and limited coordination, accountability and independence of decision making. Issues with urban water oversight ultimately leads to poorer outcomes for users over the long term, and, without action, is likely to lead to rising bills in many areas.

When this will impact:



Where this will impact:



### 177. Challenge

National objectives have not been updated since the Millennium Drought, despite clear lessons for the water sector during this period, and the need for long-term proactive and adaptive strategies to efficiently meet future needs. Being unprepared for another major drought could lead to reactive expenditure on additional supply assets, adding further costs to user bills and taxes.

When this will impact:



Where this will impact:



## Balancing competing needs for water

### 178. Challenge

Striking an efficient and sustainable balance between competing needs from Australia's water resources has proved problematic. Progress against past reform efforts has been significant but patchy. Failure to strike an appropriate balance in water management can lead to substantial and lasting economic, social, environmental and cultural costs.

When this will impact:



Where this will impact:



### 179. Challenge

Changes in water demand over coming years could affect economic activity and infrastructure requirements in some regional areas. These changes may be exacerbated in drier years. In communities where there is a decline in economic activity, unemployment could rise and some assets may be underutilised or stranded, reducing productivity and growth.

When this will impact:



Where this will impact:



### 180. Opportunity

Water infrastructure could help to unlock economic opportunities, supported by evidence-based assessments that take into account potential benefits, costs and risks for industry, local communities and the environment. Further evidence on water-led opportunities could help to identify productive investments that can support growth, employment and broader public benefits.

When this will impact:



Where this will impact:



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