

Australian Infrastructure Audit

Our Infrastructure
Challenges
Executive Summary
April 2015



Executive Summary - Overview

Productive, sustainable infrastructure is essential if we are to drive economic growth, increase employment and enhance the quality of life of all Australians.

Our roads, rail, ports and airports are all critical to the movement of people, goods and resources. When our transport and logistics networks work effectively, they raise productivity levels and strengthen the economy.

Similarly, telecommunications infrastructure is a powerful driver of connectivity and modernisation, while our energy and water infrastructure is at the core of Australia's success in industry and trade. Efficient operation of these sectors will be essential to sustain our quality of life.

But experiences of transport networks failing to keep pace with demand, water quality standards being uneven, energy costs being too high, telecommunication services being outdated, or freight corridors being neglected are now so common that they necessitate a strategic response.

Australian Infrastructure Audit

The Australian Infrastructure Audit (the Audit) takes a strategic approach to assessing our nation's infrastructure needs. It examines the drivers of future infrastructure demand, particularly population and economic growth.

The Audit provides a top-down assessment of the value-add, or Direct Economic Contribution (DEC) of infrastructure. It also considers the future demand for infrastructure over the next 15 years, and delivers an evidence base for further gap analysis, long term planning and future investment priorities.

Our economic modelling found that in 2011 (the Census base year), \$187 billion was derived from infrastructure. By 2031 this is projected to increase to \$377 billion¹. Direct Economic Contribution gives us a pointer to areas of infrastructure demand and need. It gives us an indication as to where reforms might lead to increased efficiency across our existing networks.

Challenges of growth

Overall, our capital cities contributed \$854 billion to our economy in 2011. This is projected to grow by 90 percent to a contribution of \$1.6 trillion in 2031. Our cities are vital economic engines – but unless action is taken, growing congestion threatens to cost Australians \$53 billion by 2031 as the population increases to 30.5 million.

Growth is not only a challenge in our cities. Other hot spots such as the Pilbara and Gladstone are growing at a rapid rate. Today they contribute \$44 billion, largely through resources and agricultural activities. By 2031 this is projected to more than double to \$110 billion. Efficient infrastructure—particularly roads, rail, ports and gas pipelines—is vital to ensure these vibrant regions continue to grow and maintain their significant contribution to the Australian economy.

Transport reform

Australia's transport sector makes the greatest contribution to our economy but it also needs the greatest amount of reform.

In Perth, Melbourne, Sydney, Adelaide, Brisbane and Canberra, without investment in new transport capacity and/or means of managing demand, car travel times are expected to increase by at least 20 per cent in the most congested

If we get our infrastructure right, we will protect Australia's quality of life at a time of population growth and global economic change."

Mark Birrell, Chairman Infrastructure Australia



corridors. In some cases, travel times could more than double between 2011 and 2031.

Demand for public transport in the capital cities (measured by passenger kilometres travelled) is set to rise by 55 per cent in Sydney, 121 per cent in Melbourne and an average of 89 per cent across all capital cities. Unless peak period passenger loads are managed and capacity is increased, commuters in all capital cities will see more services experiencing 'crush loadings', where peak demand exceeds capacity.

Market reform and funding

Market reforms have significantly improved the efficiency and competitiveness of the energy sector and more recently the telecommunications sector. However, institutional arrangements, especially in the transport sector, do not provide sufficient funding to address the required infrastructure needs.

The combined expenditure of the public and private sectors on infrastructure will need to be expanded if the future needs of Australians are to be met, all at a time when spending by governments is being constrained by other legitimate demands.

Pipeline of projects

Australia would benefit from a strong and consistent pipeline of well planned infrastructure projects. This would provide greater certainty for infrastructure constructors and investors, and provide the basis for a well-resourced environment for project procurement and informed decision making.

Governments need to take action to make major project procurement more efficient, including reducing administrative burdens and streamlining assessment processes across governments.

Existing infrastructure

As well as the need for new infrastructure, it is equally important that we make the most of our extensive existing infrastructure networks. Efficient management, improved maintenance and smarter use of technology will help optimise our use of the infrastructure that we already have.

Better planning

Integrated infrastructure and land-use planning is essential if there is to be strategic decision-making at all levels of government. Whilst there have been improvements in this area, progress has been slow in securing the many benefits that will be gained from an integrated approach to managing infrastructure challenges.

Best practice principles for infrastructure planning, procurement, delivery and operation have not been consistently implemented across governments.

Improvements in infrastructure project appraisal and project selection (including the consistent use and transparent reporting of cost benefit analyses) are necessary if Australians expectations are to be realised.

An improved framework is also required to protect corridors for transport and other linear infrastructure.

Engaging communities throughout the decision-making process is a key element of sound infrastructure planning. An ongoing commitment to analysing and addressing community needs and expectations can improve the economic and social outcomes of projects.

1. All dollar figures in this document are in 2011 prices, unless otherwise indicated.

Establishing a robust, accessible evidence base to support decisions on infrastructure reforms and investments is also critical. Without this evidence base, it is difficult for our governments, the private sector, and the wider Australian community to have a clear understanding of where the major challenges lie.

National debate

The Audit also provides the foundation for an open and robust conversation about how we are going to plan and pay for the infrastructure we need and the most efficient ways to use the infrastructure we have.

Hotspots: Australia's top 20 regions for infrastructure Direct Economic Contribution 2031 (\$ million)

Rank	Region		2011	2031
1	Greater Sydney	NSW	42,756	79,834
2	Greater Melbourne	VIC	36,373	71,221
3	Greater Perth	WA	17,490	53,874
4	Greater Brisbane	QLD	20,823	44,837
5	Greater Adelaide	SA	12,068	21,090
6	Pilbara	WA	5,240	15,035
7	Newcastle and Lake Macquarie	NSW	4,725	7,741
8	Gold Coast	QLD	3,934	7,707
9	Australian Capital Territory	ACT	3,456	6,760
10	Hunter Valley exc Newcastle	NSW	3,607	6,134
11	Illawarra	NSW	3,088	4,790
12	Sunshine Coast	QLD	1,997	3,994
13	Gladstone – Biloela	QLD	971	3,753
14	Geelong	VIC	1,670	2,919
15	Hobart	TAS	1,809	2,882
16	Latrobe – Gippsland	VIC	1,809	2,708
17	Darwin	NT	1,224	2,650
18	Cairns	QLD	987	1,897
19	Bunbury	WA	887	1,805
20	Central West	NSW	1,167	1,792

Drivers of Growth



Infrastructure demand is being directly driven by strong growth in our population and economy.

countries for population growth over the decade to 2012, and were the fastest of those with a population over 10 million.

Australia's population growth is high by developed world standards, especially in our cities

Population

Australia's population is expected to grow from 22.3 million in 2011 to 30.5 million in 2031. The national population has already increased by more than one million people since 2011.

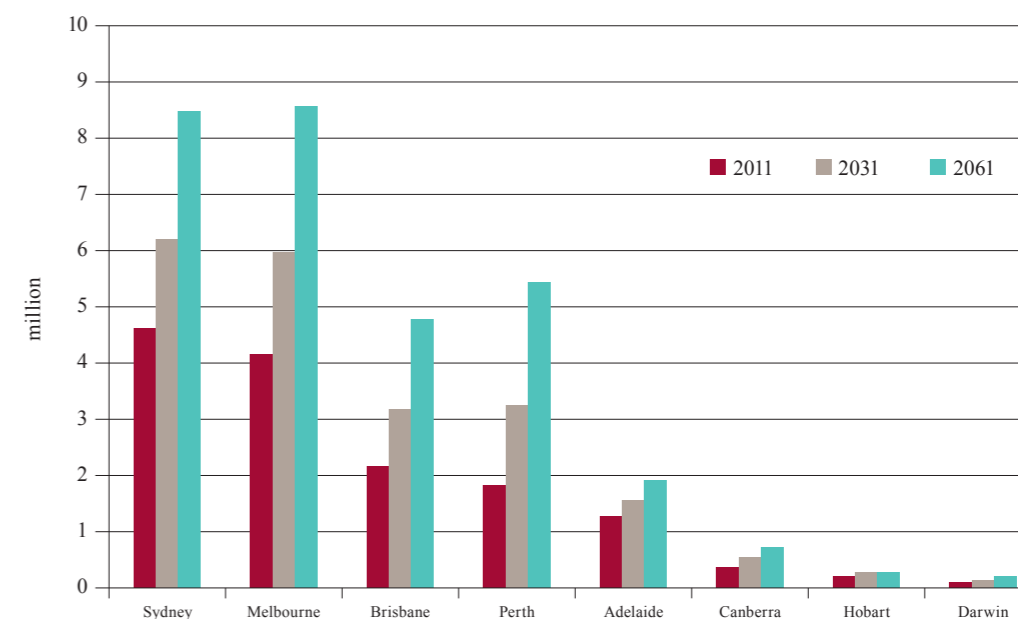
To put that in perspective, Australia's population growth has been high by developed world standards. We ranked fourth out of 40 OECD

City growth

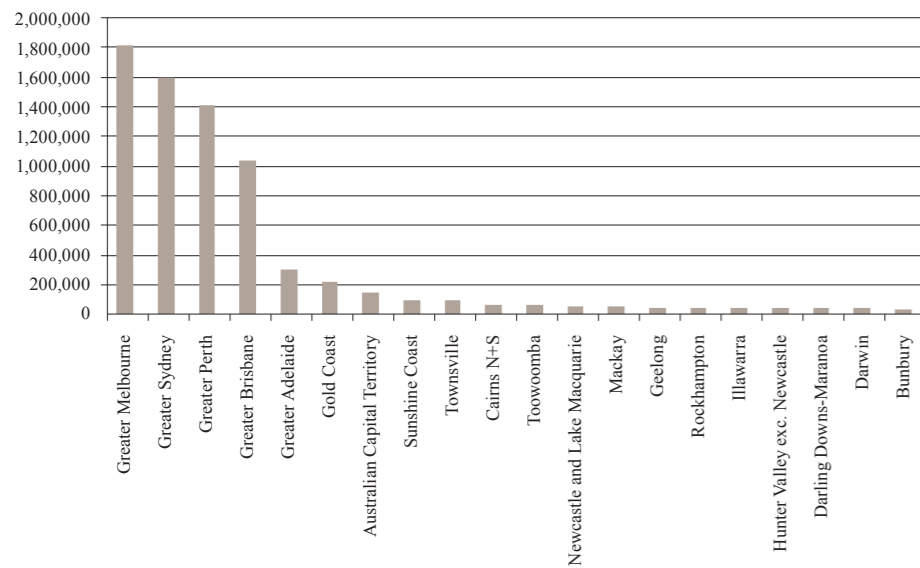
Our four largest cities – Sydney, Melbourne, Brisbane and Perth – are projected to grow by 5.8 million (or around 45%) from 12.8 million in 2011 to 18.6 million in 2031. Areas around these cities – the Hunter, Illawarra, Gold Coast, Sunshine Coast and Geelong regions – are expected to grow from 2 million in 2011



Projected population of Australian capital cities, 2011–2061



Top 20 Audit regions by projected population growth, 2011–2031



to over 2.5 million in 2031. These four extended metropolitan areas will account for over two thirds of Australia’s population in 2031.

In percentage terms, Hobart and Adelaide are projected to grow the slowest of the capital cities. Darwin and Canberra are expected to grow more quickly, although off a somewhat smaller base population in 2011 compared to the larger capitals.

On the whole, the challenge of meeting the infrastructure needs of those cities is likely to be less significant than for the four larger cities. Indeed, it is worth considering what steps could be taken to foster growth in those cities and in regional centres so as to ease the pressure on our larger cities.

Outside the capitals and surrounding regions, population is projected to grow by 22 per cent, from 5.6 million in 2011 to 6.8 million in 2031.

Our nation will continue to grow beyond 2031. Decisions we make in the next 15 years need to set up our cities and regions to manage further growth over the next 40-50 years

Economic growth

The Australian economy is projected to grow by 84 per cent, from \$1.4 trillion in 2011 to \$2.6 trillion in 2031, a growth rate of 3.1 per cent per year.

This growth in our population and economy will make us richer as a country. However, it will also create unprecedented infrastructure challenges.

Nationwide population increases and ongoing prosperity will be the big drivers of an increasing need for road space, public transport capacity, freight capacity and improved gateways for trade.

Infrastructure’s contribution

The Audit found the value-add (or economy-wide spending) attributable to infrastructure services made up 13.3 per cent of GDP in 2011. This is projected to double, from \$187 billion in 2011 to \$377 billion in 2031. More than 70 per cent of the value-add derived from infrastructure in 2011 was attributable to transport, while the remaining sectors accounted for 8-10 per cent each. Well over half of transport value-add was from urban transport.

Spending in the economy on infrastructure services comprised 13.3 per cent of GDP

The Audit projects economic activity across 73 regions. From an economic perspective, 91 per cent of the value-add from infrastructure occurs in just 20 regions spread across urban and regional Australia.

Sectoral priorities

Most sectors, excluding energy, are projected to experience significant demand growth, with transport in particular facing significant challenges.

In the energy sector, several regulatory issues require attention, including tariff reform to reduce peak period demand, and more efficient and reliable provision of services to regional and remote communities.

Reforms are required across urban and regional water markets to promote competitive pricing, improve economic and environmental regulation, and support further private involvement in the sector.

Levels of service delivery in telecommunications infrastructure outside of major cities must be improved to ensure the productivity benefits of technological improvements are shared by all Australians.

International comparisons

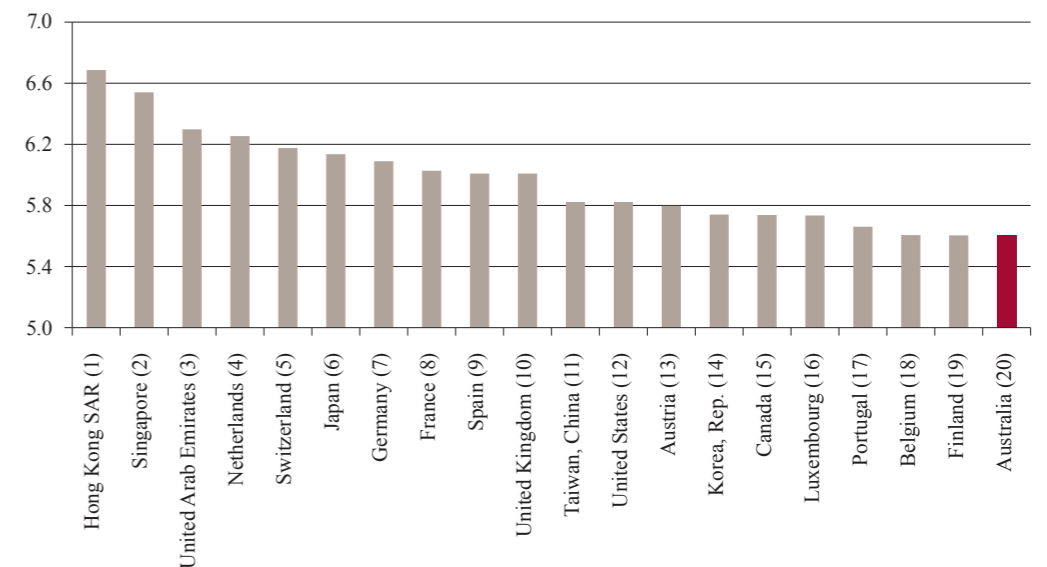
The available international comparisons suggest that, despite recent increases in government spending and increased private participation, the overall quality of our infrastructure lags behind comparable nations.

For example, the World Economic Forum has ranked the quality of Australia’s infrastructure 20th out of 144 countries. Some of the poorest scores were for the quality of Australia’s roads and ports. The World Bank’s Logistics Performance Index 2014 ranked Australia’s trade and transport infrastructure 16th in the world.

These patterns emphasise the fact that improving Australia’s international competitiveness requires ongoing attention.

While Australia has some unique characteristics, including a large landmass relative to population, countries like Canada have similar characteristics yet rate more highly for infrastructure.

World Economic Forum International Ranking of Infrastructure, 2014



Transport

Congestion is the dominant challenge in cities and infrastructure networks.

Demand on many key urban road and rail corridors is projected to significantly exceed current capacity by 2031. The importance of managing urban transport is underlined by the fact that in 2011, the cost of delays on roads in the six largest capital cities was \$13.7 billion. This figure is projected to grow by around 290% to \$53.3 billion in 2031, in the absence of appropriate strategies including integrating land use and transport planning, new road construction, additional public transport investment and the introduction of demand management measures.

We need to consider demand management measures to make the best use of our roads. These include increased use of lanes for ‘High Occupancy Vehicles’, buses and other ‘high value’ vehicles such as trucks and delivery vans. It also requires investment in smart road technology that maximises the use and productivity of the systems we already have.

Daily commuter task growing strongly

The passenger transport task (both road and public transport) across our six largest capital cities is projected to increase by 58 per cent, from 622 million km per day in 2011 to 982 million km per day in 2031.

Both public transport and road infrastructure will need to be expanded to meet this growth in demand. While the use of public transport has been increasing since 2004, currently only

one in six Australians travel to work by public transport. Demand for public transport is projected to increase by 89 per cent by 2031.

Expansion of freight networks required

The forces driving the projected increase in demand for passenger transport will also drive increased demand for freight transport. Container movements through Australia’s ports are projected to grow by 165 per cent between by 2031, while non-containerised trade is projected to grow by 138 per cent over the same period. The road and rail freight task is projected to increase by 86 per cent from around 458 billion tonne km in 2011 to 852 billion tonne km in 2031.

National Highways

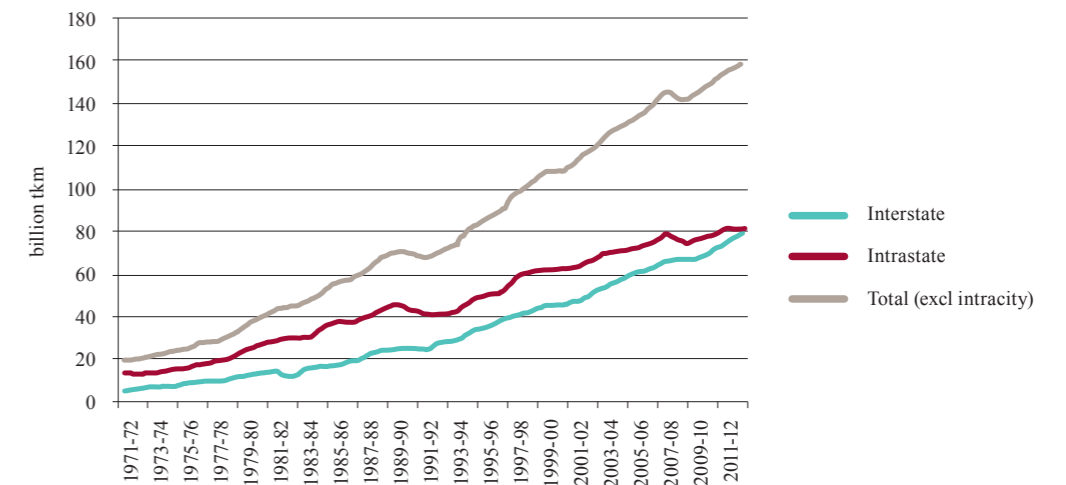
The National Highway network is a prime enabler of freight movements and economic growth. B-Triples have improved efficiency on some regional routes, however there is an opportunity to enhance the network and increase its productivity. Further improvements to productivity will require a focus on reforms to enable the wider use of such vehicles, and greater investment in bridges and measures to improve road safety.

Rail freight

The mode share of rail freight within the national freight task is expected to continue to grow over the period to 2031. This is mostly due to increased haulage of minerals for export.

Demand for national rail infrastructure is projected to grow, especially in WA, Queensland and NSW. WA accounts for some 50 per cent of national rail freight value-add, due to mining in

National freight task, 1972–2012 (billion tonne kilometres)



the Pilbara. The Audit projects that the value-add from rail freight services will grow to \$9.5 billion in 2031, an increase of 75 per cent.

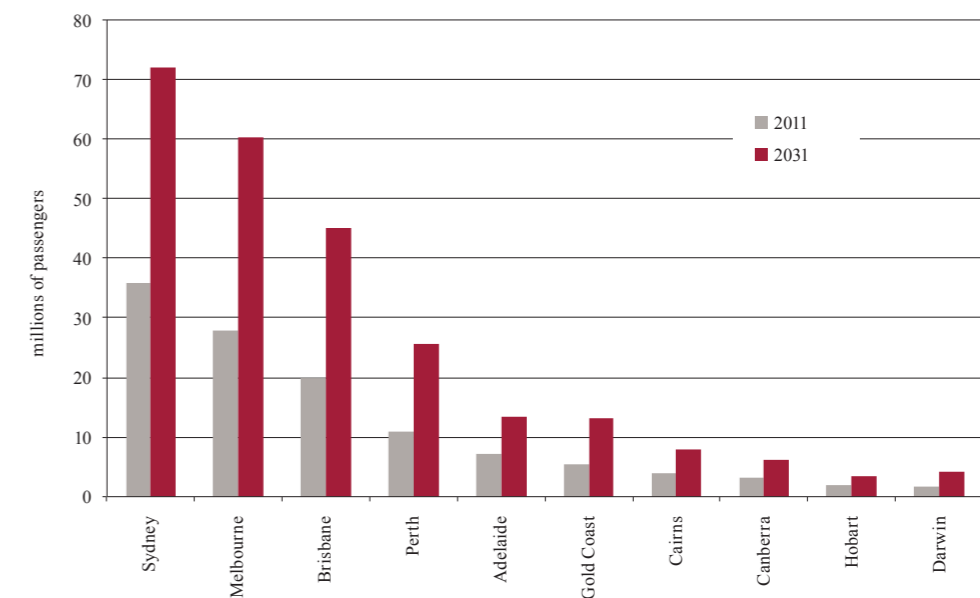
Bulk ports

Traffic through some ports is projected to significantly exceed current capacity by 2031. This includes bulk ports in Fremantle, the Pilbara, and Gladstone. User charges will continue to help pay for this infrastructure.

Additional airport capacity required

Demand for airport services is expected to approximately double between 2011 and 2031. Australia’s 10 busiest airports handle more than 80 per cent of total passenger traffic. Over the next 15 years, air travel demand will double and additional capacity will be required in Sydney, Brisbane, Perth and Melbourne. Funding this will require continued investment from private sector operators. Meanwhile some smaller airports are likely to need government funding support.

Top 10 airports by passenger movements, 2011–2031



Energy

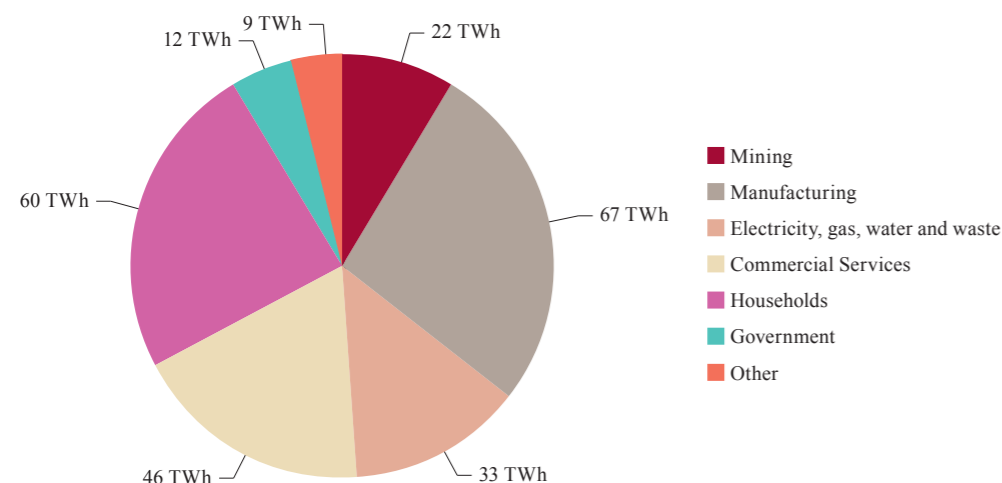
The energy sector has benefitted from reform, and will need to focus on efficiency and environmental impact.

Demand for electricity infrastructure is projected to grow significantly slower than GDP and there is expected to be sufficient electricity generating capacity for at least the next five to 10 years. Future investment will be affected by regulatory settings for the electricity and gas markets, environmental targets, technology changes and the need to replace existing equipment or facilities.

Reforms in energy

The National Electricity Market is working well, providing a competitive market which provides for the long-term needs of consumers in an efficient and properly regulated manner.

Electricity consumption by sector, 2011



However there should be a review of ownership arrangements for energy utilities and infrastructure in NSW, Queensland, WA and Tasmania. Reforms (like those successfully introduced in Victoria and South Australia in the 1990s) would assist the market to become fully competitive and more sustainable.

Future issues for attention include efforts to reduce peak period demand for electricity by giving customers incentives to manage peak consumption.

There is a need for continued government assistance to support electricity supply in remote communities where generation is not able to be provided on a commercial basis.

Energy security

Australia's dependence on imported fuel has increased. Present arrangements for managing petroleum reserves involve higher risks than those adopted by other countries, as Australia does not enforce an obligation to hold stock levels equivalent to at least 90 days of net imports.

Telecommunications

The telecommunications sector's economic contribution will be best served by continuing support for effective competition.

The quality of telecommunications service across Australia is mixed, with generally good services in cities and lower quality services in rural areas and some outer urban areas.

The NBN is expected to reduce service disparities in the next five years. Governments and industry will need to work to avoid a re-emergence of service disparities in the medium term.

Data a key source of growth

Demand for telecommunications infrastructure will continue growing faster than GDP growth. This is largely due to business and consumer demand for services that increasingly depend on high volumes

of data. This includes agriculture, tourism, financial services and many other industries.

A key challenge will be the efficient rolling-out of an open access, wholesale only fixed-line broadband network.

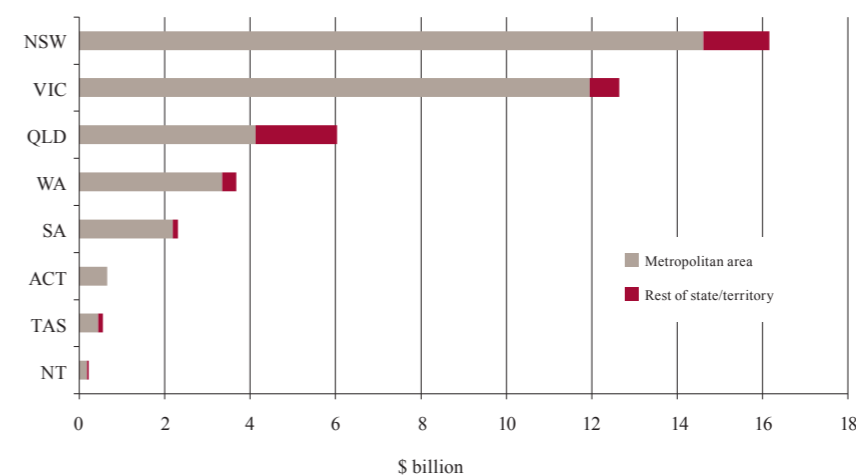
Governments and the private sector will need to focus on taking full advantage of the NBN, thereby delivering economic and social benefits to the country.

Market forces and the private sector providers will ensure demand for services is met in urban areas, but parts of rural and remote Australia will continue to require government assistance to access similar, high quality services.

Opportunities for the infrastructure sector

Infrastructure operators will also need to use the opportunities created by high quality telecommunications, including the development of systems to make better use of networks to improve asset management.

Projected value-add (DEC) of telecommunications infrastructure, 2031 (\$ billion)



Water

The water sector needs reforms to address quality, reliability and supply issues.

The volume of water supplied across the nation is projected to double, increasing from 7,641 GL in 2011 to approximately 15,300 GL in 2031, reflecting the anticipated increase in use by rural users (irrigation) and urban users (with the increase in properties served). Regulation and public policy leadership of the water sector has improved, but remains fragmented. For the long term needs of consumers to be met there must be national leadership and co-ordination – continuing the National Water Initiative agenda. Clearer regulatory objectives would: improve overall decision making on planning; and help expand water services through extra private sector involvement and investment.

Need for more competitive pricing

The Audit has identified that pricing of water supply and wastewater services across regions and sectors is not consistent or equitable. Historical policies and subsidies have led to under-pricing and inefficient pricing structures. There is a need for more transparent pricing.

Water quality in urban areas is good, but in parts of regional Australia it does not meet relevant drinking water standards. Raising regional drinking water quality to at least a minimum standard should be a focus for all governments.

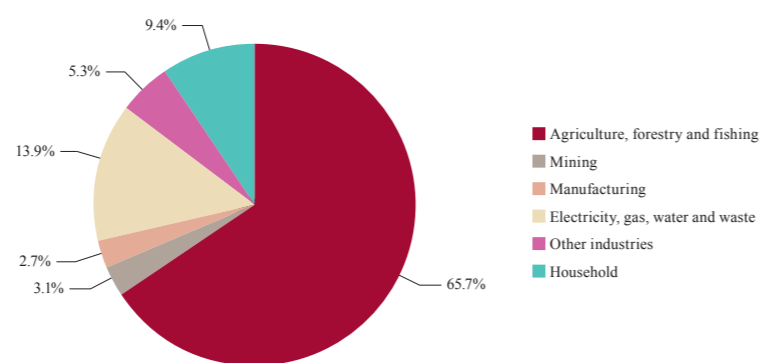
Transparent and competitive pricing of water supply and wastewater treatment services is also required across urban and regional areas. In particular, the rural water sector requires

reforms to improve the competitiveness of markets, along with the sustainability and resilience of water supplies.

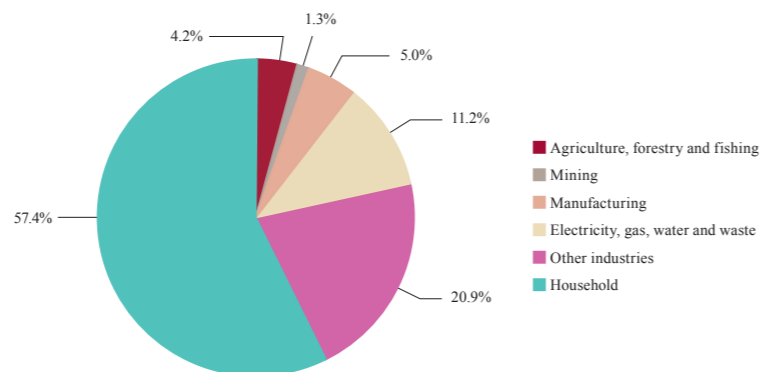
Improving reliability

Improving water quality and the security of supply will require concerted on-going effort. With the CSIRO predicting lower rainfall across much of Australia, and longer, more severe droughts over coming decades, existing challenges are expected to become more pressing.

Water consumption by industry and household, 2012-13



Expenditure on water by industry and household, 2012-13



Challenges for the future



We need to improve our infrastructure planning

International and local reviews show that rigorous project selection is the key to boosting economic activity and supporting productivity growth. However, investment in poorly conceived projects can undermine a country's economic prospects.

Our infrastructure planning processes need continuous improvement and greater transparency. The key areas requiring attention are the collection and analysis of data, benchmarking, integration of planning processes, and sharing of data to support the development and prioritisation of projects.

Long-term planning necessarily involves dealing with uncertainty. Australia will need to deal with a number of particularly complex issues, including:

- the implications of demographic change for Australian society generally and government finances;

- the scope and direction of technological change;
- changes in the global economy;
- the future of work, e.g. where people work, incomes, and part-time work; and
- the prospect of climate change, and uncertainty as to how the international community will respond.

We must ensure that our planning processes enhance our economic success, international competitiveness and quality of life.

We need to increase total public and private funding

As a proportion of GDP, spending on infrastructure has been higher in the last five years than in the preceding 20 years. However, fiscal pressures (especially the need to fund health, retirement and other social welfare programs) suggest that governments will struggle to maintain current levels of infrastructure expenditure in the medium to longer term.

Public sector expenditure on engineering construction as a proportion of GDP, 1987–2014



Private investment in infrastructure has grown, with more private owners and developers of infrastructure, including in the energy and resources sectors. Creating the conditions for further private investment is an important strategy in meeting future infrastructure needs.

Australia will have to increase the amount of funding available from both public and private sources, to maintain and grow our infrastructure networks.

Current funding arrangements are unsustainable, particularly for the transport sector, and will require reform. While users contribute a proportion of the cost of transport infrastructure through licensing and registration, fuel excise, public transport tickets and freight network access charges, governments still pay the lion's share.

The current system therefore relies on limited revenue sources (which in the case of fuel excise is likely to decline over time as vehicles become more efficient) and it does not ensure that the revenue is directed to transport outlays, new projects or improved performance of networks.

Providing more transparent links between user charges and expenditure on transport planning, investment and maintenance could provide governments with greater means of implementing a more effective road and transport-user charging model than currently exists.

Unless the funding issue is addressed by all governments, the level of service offered by our transport networks will decline. If there is no change, maintenance of existing assets would need to be cut back, and new projects aimed at maintaining or raising levels of service in our cities and regions would not proceed.

We need a focus on resilience and improved maintenance

Maintenance and resilience are major themes in the Audit. Most of the infrastructure that Australians will use in 2031 has already been built, but maintenance standards are often below par. There is evidence that regional and rural roads, for example, are less well maintained than roads in urban areas, and that water supply service levels in some towns are at risk of deteriorating without greater investment in maintenance.

Service providers will need to improve whole-of-life asset management processes, including adequate long-term funding strategies, to ensure infrastructure networks are able to provide reasonable levels of service in the future.

We need to have sustainable development and improved environmental outcomes

Pursuing sustainable environmental outcomes and adapting to climate change are a core responsibility of infrastructure planners, owners and operators. This is a reality that has to be planned for. Infrastructure-related emissions account for approximately half of Australia's total greenhouse gas inventory. Reducing greenhouse gas emissions should be a key consideration when infrastructure plans, construction methods and operational frameworks are being determined.

Enhancing the resilience of assets will become more important for infrastructure providers as extreme weather events become increasingly likely to threaten certain assets.

Between 2000 and 2012, insured losses from natural disasters reached \$16.1 billion, an average of over \$1.2 billion per year. These events can cause immediate and significant damage to infrastructure assets, lowering productivity and output. The damage to public infrastructure from the 2011 Queensland floods alone was estimated at \$5-6 billion.

We need a national debate about reform

All parts of the infrastructure sector require some level of reform. If we are to become a more productive nation and provide the affordable services that Australians reasonably expect, we must look to changing our systems for infrastructure decision making. These changes include:

- finding ways to increase the use and value we draw from our existing infrastructure;
- reforming procurement and construction to reduce the cost of delivering the infrastructure we need;
- applying user charges to fund infrastructure, while having clearly targeted government support to those regions and people where user charging will impose undue social costs;
- ensuring that our regulatory environment supports cost-effective and transparent delivery of the services we require and seek; and
- fostering the uptake of new technologies.

We need sensible, considered change. Done well, this will help improve our decision making in infrastructure planning, procurement, delivery and operation. We must act on these issues to enhance our economic competitiveness and quality of life.

Looking ahead

The Australian Infrastructure Plan



Infrastructure Australia will be seeking feedback and public comment on the issues raised in the Audit, which it will consider in developing the Australian Infrastructure Plan. Following this period of consultation the Plan will be released later in 2015.

The 15-year Plan will outline a suite of recommended reforms as well as a comprehensive up-date of the nation's list of priority large infrastructure projects.

It will address the key challenges raised by the Audit, including:

- Productivity** – national productivity levels need to be increased through regular strategic investment in economic infrastructure
- Population** – huge population growth, particularly in our major cities, will necessitate the delivery of new and renewed infrastructure
- Connectivity** – modernised infrastructure networks and gateways are needed to link businesses, boost trade and improve access to workplaces
- Funding** – reforms are essential to increase the total pool of funds made available for infrastructure, especially by facilitating private investment

Competitive Markets – national infrastructure markets must operate to improve investment decisions and give consumers choice

Governance – integrated planning, transparent project selection, and stakeholder consultation are essential, and all have to improve

Sustainability and Resilience – we will need to cut environmental impacts and improve resilience, using new technology to run our infrastructure better

Regional – we must see how infrastructure improvements can enhance local service standards and facilitate rural and regional growth

Indigenous – across the nation we can do more to achieve equity and close the infrastructure gap faced by remote communities

Best Practice – a unifying theme is how to pursue best practice procurement and delivery, and encourage whole-of-life asset management.

Make a submission

We want your views on the findings from the Australian Infrastructure Audit. Your ideas and suggestions on how to solve the issues raised will help to inform the development of the 15 year Australian Infrastructure Plan.

You can tell us your views at www.infrastructureaustralia.gov.au

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Infrastructure Australia
GPO Box 5417 Sydney NSW 2001 Australia
T +61 2 8114 1900 F +61 2 8114 1932
E mail@infrastructureaustralia.gov.au
W infrastructureaustralia.gov.au