



InfrastructureSA

20-YEAR STATE INFRASTRUCTURE STRATEGY

May 2020

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KEY STATS

ECONOMY

- South Australia's GSP per capita is \$61,965 compared to a national average GDP per capita of \$74,873.¹
- The State's overseas goods exports totalled \$11.2 billion, accounting for 2.9% of the national figure.²
- Defence projects valued at \$90 billion will be carried out in Adelaide over the next 50 years.³
- Trend figures for growth in employment have averaged 1.3% per annum (compared with 2.2% nationally) in the five years to June 2019.⁴
- In November 2019, the average weekly ordinary time earnings for full-time adults in South Australia was \$1,502.40 compared to \$1,658.40 nationally.⁵

PEOPLE

- As at June 2019, South Australia's population of 1.75 million people equated to 6.9% of Australia's population.⁶
- South Australia experienced a net loss of just under 4,000 people interstate in the 12 months to June 2019, a significant improvement on 2017 when the net loss was around 7,000 (primarily to Victoria).⁷
- Like Australia, South Australia's primary source of population growth is overseas migration.⁸
- South Australians aged 65 years or older accounted for 18.7% of the State's population in June 2019, the highest of any state.⁹

- Over 50% of the State falls into the lowest two quintiles of relative socio-economic advantage.¹⁰
- South Australia is on track to meet only two of seven *Close the Gap* measures designed to address persistent inequities faced by Aboriginal* people.¹¹

SUSTAINABILITY

- South Australia leads the nation on a range of sustainability measures, including over 50% electricity generation from renewable sources.¹²
- In 2017, South Australia produced a net 22.1 million tonnes of GHGE, a 37% decrease on 2005.¹³

CITY

- The Greater Adelaide region accounts for 77% of the State's population¹⁴ and 75% of GSP.¹⁵
- The Economist Intelligence Unit ranks Adelaide the 10th most liveable city globally.¹⁶ It also out-performs Australian mainland capitals in cost of living.¹⁷
- In a 2016 KPMG study, Adelaide was found to be the most cost-competitive city to do business compared to Sydney, Melbourne and Brisbane.¹⁸

REGIONS

- South Australia's regions accounted for about 25% of GSP and employment and 60–70% of exports in 2016/17.¹⁹
- Productivity is outperforming interstate regions, with the exception of Western Australia.²⁰
- Remote areas encompass 63% of the State and are home to around 3,000 people.²¹

FRONT COVER IMAGE

South Australia's first vertical school

Increasing school capacity in established areas can entail costly land acquisition. Adelaide Botanic High School has maximised available space by adapting and integrating an existing building into a new seven-storey construction. It leverages easy access to the Botanic Gardens, Adelaide Zoo, universities, the Lot Fourteen technology precinct and CBD sporting facilities to occupy a relatively small footprint.

*The term 'Aboriginal' is adopted throughout this document to refer to both Aboriginal and Torres Strait Islander people residing in South Australia.

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Acknowledgement of Country

Infrastructure SA acknowledges and respects Aboriginal people as the State's first people and nations, and recognises Aboriginal people as traditional owners and occupants of South Australian land and waters.

Infrastructure SA acknowledges that the spiritual, social, cultural and economic practices of Aboriginal people come from their traditional lands and waters, and that Aboriginal people maintain cultural and heritage beliefs, languages and laws which are of ongoing importance today.



FOREWORD

by Chair

Dear Premier,

On behalf of the Board of Infrastructure SA, I am pleased to present the 20-Year State Infrastructure Strategy (the Strategy), as required by the Infrastructure SA Act 2018. This Strategy sets out Infrastructure SA's independent assessment and advice relating to the State's infrastructure including its current state, projected needs and challenges, as well as key priorities over the next 20 years.

The release of this Strategy is occurring during a time of great disruption and uncertainty across the world brought on by the COVID-19 global pandemic, and we are all faced with both direct and indirect impacts. The human cost of the novel coronavirus has been immense and the South Australian Government has been relatively quick to implement policies and necessary measures to 'flatten the curve' and contain its spread.

The Government has responded by preparing to meet increased demand for ICU beds, augmenting public hospital capacity by sensibly tapping into the private providers. The role of telehealth is being significantly expanded to support access to GPs in light of increased demand and social distancing. Hotels are being repurposed to accommodate critical health staff as well as the homeless to help prevent transmission.

The need for flexible facilities that can be scaled up or repurposed to meet surge demand arising from emergency events such as this is indisputable. We should learn the lessons of this crisis.

The private sector, meanwhile, is stepping up by redeploying manufacturing infrastructure to produce much-needed sanitizer and face and respirator masks – underscoring the need for adaptability and responsiveness in a range of contexts. Given our remoteness and heavy reliance on long supply chains we need to ensure we retain strategic capacity to deal with such crises.

Measures to mitigate the spread of disease are an imperative but they present other challenges. We are on the precipice of a serious global and domestic economic downturn with rising unemployment, tightening credit markets and low consumer and business confidence. Fortunately, the resources and agricultural sectors (bushfires notwithstanding) are largely unaffected and the manufacturing, construction and freight sectors continue to operate.

The Government recognises that an economic stimulus is needed to keep the economy going and stabilise the situation. We also need to speed up the recovery once the pandemic is controlled and it is safe to do so.

The timely and targeted deployment of infrastructure projects offers a compelling means of addressing these needs. The focus should be on those projects which enhance productivity and competitiveness and spread the investment geographically.

Accelerating small-to-medium projects (often the domain of local councils) as well as larger state- and federally-funded projects that are close to being confirmed can support continuity of jobs and supply chains in the sizable and essential construction sector.

The gestation period of major projects is long and can take three or more years from concept to execution. Asset maintenance projects would quickly distribute economic stimulus across all regions of the State and would be a fillip for business in general. This applies not just to roads and railways, but education and social housing also.

Ensuring affordable access to first-rate digital infrastructure is another clear opportunity – one that stands to benefit every corner of our society and economy. Its importance has been demonstrated by the enforced isolation brought on by the pandemic, which is changing the way we work and learn. At this time, resources can also be deployed towards developing a pipeline of projects backed by solid business cases for implementation during the recovery phase.

These proposed measures are consistent with recommendations made in this Strategy and geared to enable quick and targeted deployment of limited capital for maximum economic and liveability impacts. However, it would be remiss to not seize this moment to also consider the broader implications of this pandemic – its cause as well as effects – to make wholesale reforms that would improve economic efficiency, lift economic growth while not forgetting broader social needs that this crisis has brought to the fore.

The State Government's long-term goal of increasing the rate of economic growth to an average 3% per year has served as the cornerstone for this Strategy and Infrastructure SA has focused on identifying investments that will best spur investment and growth and lift prosperity for all South Australians.

In order to match the national average, South Australia must increase its interstate and global exports given the natural constraints of a relatively small domestic market. The State already benefits from a competitive edge in many sectors, particularly agriculture, resources, tourism and digital technology.

There exists an opportunity to derive maximum benefit from this low-hanging fruit – whether through government investment in infrastructure or facilitating and encouraging private sector investment. Some self-evident examples of infrastructure that can enable these sectors are

improvements in freight transport, digital access and capacity, and supply of water and reliable and affordable energy.

For example, copper is a basic requirement of the digital age. With the right infrastructure and planning, South Australia could be the third largest copper producer in the world within the 20-year timeframe of this Strategy.

South Australia's strong reputation in health science and education should also be further strengthened. Significant defence investment in South Australia provides a great opportunity to develop the State's intellectual capital and capacity in both defence and civil business.

The State leads Australia on utilising renewable energy, but reliability and affordability are a major issue. ISA supports initiatives to strengthen the network through a new interconnector to NSW on the basis that related initiatives to firm up power supply are put in place and the project is delivered on budget. It is also essential that gas generation capacity be maintained until grid-scale storage capacity is established.

Infrastructure investment is not confined to economic infrastructure; social and other infrastructure is fundamental to a fair, skilled, healthy, sustainable and productive community. ISA's assessment, therefore, includes education, health, justice, affordable housing, and sporting and cultural assets at the State and community level. This infrastructure builds and sustains the

State's enviable liveability, which has proved a great strength through the COVID-19 crisis.

Attracting and retaining the residents and workers needed to support economic growth will help to address a shortfall in labour and skills required to deliver major infrastructure. In sectors like resources and defence, many of the skills need to be imported. This calls for a renewed focus on education, skills development and training to develop home grown talent if we are to maximise opportunities for the State.

Fostering innovation is also essential in a large State with a relatively small population. It is particularly pertinent to development in the regions. ISA supports the Government's investment in exploring the potential for a State hydrogen industry to power large fleets initially, with substantial export potential. Hydrogen could well prove to be a cost-effective way of utilising or storing renewable energy.

No matter the sector, some overarching principles have emerged that can ensure the community is getting full value for money out of its infrastructure by focusing on the efficient utilisation of scarce resources and capital. For example, building new assets should be a last resort taken after opportunities for adapting, upgrading and fully utilising existing facilities are exhausted. This includes Adelaide's extensive yet underused public transport network and those public schools with spare capacity.

Economically sensible measures extend to proper and programmed maintenance of existing facilities which is sometimes overlooked but plays an important role in extending the life of expensive assets. Given the demands on government budgets, proper consideration should be given to whether the required facility or service could be provided in full or in part by the private sector. This includes outsourcing where it is proven to be cost-efficient without compromising quality of service. It is also useful to consider models where government takes the lead on developing infrastructure, assuming the initial construction and market risk and, once established, selling assets to the private sector and recycling the capital raised to fund new projects.

The Government's policies in respect of climate change are an overlay on the Strategy. Providers are obliged to consider the potential impacts of infrastructure design and construction on urban sprawl, carbon emissions, water management and localised ground temperatures, as well as its resilience in the face of increasing frequency and severity of storms, droughts and bushfires.

South Australia is heavily reliant on water supplied by the Murray-Darling river system, and efficient upstream usage and improved storage are essential if the requirements of all users are to be met while ensuring environmental flows for healthy waterways. To this end, ISA supports the development of a national water plan encompassing the Murray-Darling Basin catchment states.

The Strategy covers substantial ground and, as our first, its role is to spark a constructive and ongoing dialogue with public, private and community stakeholders. We envisage this consultation to be strengthened over time as the benefits of applying this new discipline to infrastructure planning and development become apparent.

I would like to thank my colleagues at Infrastructure SA and the staff led by our CEO, Jeremy Conway, for their excellent work on this Strategy, as well as various State agencies and the many subject areas experts, business leaders, non-profit organisations and citizens who have contributed to and informed its development.

I commend the Strategy to the South Australian Government.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Anthony F Shepherd', followed by a long, sweeping horizontal line that ends in a small upward flick.

Anthony F Shepherd AO
Chair
Infrastructure SA

INTRODUCTION

What is Infrastructure SA?

Infrastructure SA (ISA) is an independent statutory body established in 2018 with the intent to “support the achievement of the Government’s aspirations and policy commitments, particularly with respect to economic growth and delivery of public services”.²² Similar infrastructure bodies – or *iBodies* – have been established in Victoria, New South Wales, Queensland, Tasmania and Western Australia, and for Australia at the Commonwealth level.

First and foremost, ISA provides independent assurance and advice relating to the identification, assessment, prioritisation and delivery of major infrastructure projects in South Australia. This independent advisory and oversight role will help ensure projects are driven by long-term strategic need. It takes a bird’s eye view of infrastructure across the State, enabling a more holistic thinking to supersede traditionally siloed approaches to decision-making.

In this advisory capacity, ISA is not responsible for project selection or delivery, nor does it develop government policy. This remains the responsibility of government. ISA will work collaboratively with individual state agencies to ensure major project selection and delivery follows robust processes for the best possible outcomes for South Australia.

Among ISA’s key deliverables is the development of a 20-year infrastructure strategy for the State. This will be updated every five years or

less to ensure relevance and responsiveness to change. As the first integrated 20-Year State Infrastructure Strategy, it is important that this version sets the strategic direction and the initial priorities for infrastructure development in the State. ISA anticipates that future versions will build on this Strategy as initiatives are pursued, further detailed studies are completed and the strategic planning and data analysis capabilities across government mature.

ISA is maintaining links with interstate iBodies and Infrastructure Australia to ensure alignment across jurisdictions and sharing of key intelligence and learnings.

Why develop an infrastructure strategy?

ISA is mindful of the impacts that COVID-19 will have on the economy and government budgets. Infrastructure has an important role to support the immediate response in maintaining jobs through direct investment, and also maintaining supply chains and access to health and other essential services during the crisis. While the impacts of COVID-19 will be significant, having a long-term infrastructure strategy that identifies the areas where investment can best catalyse growth in an economically efficient way will be important. This will enable a stronger economic recovery and support pursuit of the long-term ambition of raising growth to 3% per annum. This growth must be targeted in ways that make our communities stronger and more resilient.

What is infrastructure?

Before a strategy can be developed, it is important to define its scope. Infrastructure can be defined in different ways; for the purpose of the Strategy the following definition has been adopted by ISA:

The physical assets and structures that enable the services necessary to sustain or enhance the economy or liveability of South Australia.

While the focus of the Strategy is on the physical assets, it is critical to consider the user and their service need. It is also important to note that the Strategy is not just concerned with new infrastructure but, in the first instance, how existing investments can be optimised.

Process undertaken to develop the Strategy

In developing the Strategy, ISA has consulted broadly and taken many sources of information and evidence. ISA has engaged closely with relevant government agencies and also listened to the community and industry. A Strategy Discussion Paper was released in July 2019 that generated a very strong response, with over 100 submissions received. ISA has visited

the regions and engaged directly with a range of businesses, industry groups and community groups, and also sought out expert advice. ISA has reviewed all this input, worked to test and challenge assumptions and identify gaps, and brought this together as the first long-term integrated infrastructure strategy for South Australia.

Role of the Strategy

The Strategy takes a statewide view and aims to set the priorities and direction for infrastructure investment to achieve the following objectives:

- Sustained economic and jobs growth
- Planned population growth
- Connected and productive regions
- A vibrant, global Adelaide
- Envable liveability.

The role of the Strategy is to identify the key needs and challenges and provide priorities to guide government policy and investment in infrastructure to achieve efficient outcomes and support economic growth. The Strategy is not an audit. It is not intended to identify every infrastructure need or capacity constraint in the State. Nor is it intended to be an action plan listing the projects that government should undertake.

The Strategy will be complemented by the annual Capital Intentions Statement that will set shorter term priorities for government to action

beyond current budget commitments. Being the first CIS, there is still scope for further work to refine each priority and develop business cases to substantiate benefits; however, investment priorities in the next five years include the following:

- Greater investment in asset maintenance in accordance with well-developed asset management plans.
- Building the case for private sector investment in water infrastructure to expand production to meet global demand for produce from the Barossa, and copper and other minerals in the far north.
- A program of evidence-based incremental interventions in the freight network that address supply chain constraints on key economic corridors.
- Finalise an updated business case for the Strzelecki Track that considers a wider range of benefits.
- Interventions to improve patronage and efficiency of public transport, with a focus on identifying the preferred solution for mass transit to Mount Barker and the Adelaide Hills, how to cater for increased activity in the north-west of Adelaide due to naval shipbuilding and forecasted urban infill in the area, and develop a place-based program of level crossing removals to improve efficiency of the network.

- Identify solutions for additional capacity for corrections and forensic mental health.
- Complete studies into recommendations arising from the Arts and Culture Plan and the forthcoming Sport and Active Recreation Infrastructure Plan.

While the Strategy considers a 20-year horizon, ISA recognises that the world changes fast. It is important to have a vision and ensure that investments are future-focused and adaptable to an ever-changing world. ISA will monitor the currency of the Strategy and will undertake a review within five years.

Structure of the Strategy

The 20-Year State Infrastructure Strategy is presented in both a Snapshot format as well as a Full Strategy document. The former offers a distillation of the key themes that the latter discusses in greater detail.

The Strategy provides an initial context of where South Australia is now and some of the factors that need to be considered in planning its infrastructure requirements. It then identifies some key principles that will improve planning and delivery across all infrastructure sectors in the State. This is followed by a section on each key infrastructure sector that articulates its current state, identified needs and challenges as well as future priorities, as identified by ISA.

STRATEGIC CONTEXT



Making South Australia more productive

South Australia has a long history of below par economic growth relative to Australia as a whole.

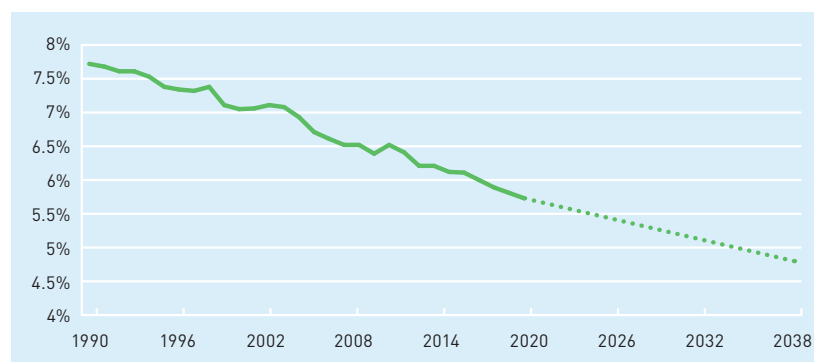


Figure 1:
South Australia's share of Australia's economic output (1990–2018) and trend

Source: ABS Cat. No. 5204 and 5220

Using gross state product (GSP) per capita as a measure of productivity, South Australia contributes \$61,965 compared to a national average of \$74,873²³ (see Figure 2). In a low growth environment, improving productivity is key to raising living standards.

Consistent with the decline in share of economic output, the State's share of Australia's population has also been declining. Population is still growing, albeit at a much slower rate than the national average, with annual growth rates as of June 2019 at approximately 0.9% compared to the national average of around 1.5%.²⁴

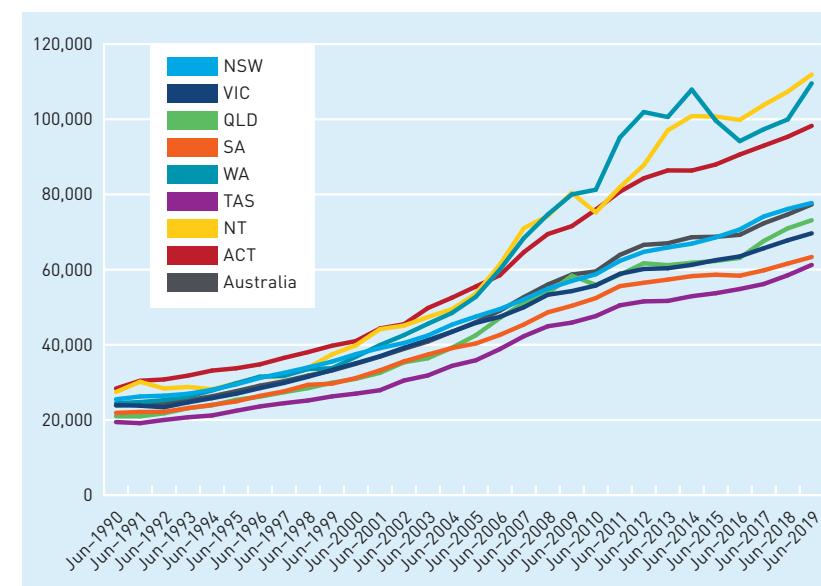


Figure 2:
Per capita GDP and GSP (current prices)

Source: ABS Cat No. 5220 Australian National Accounts, 2018/19

Population growth has largely been a result of net overseas migration. The recent pattern of net interstate migration has resulted in a *brain drain* due to significant net departures from the core working-age cohorts (see Figure 3). This population trend is resulting in an ageing of the population and loss of productive workforce, which reinforces under-performance.

The State economy has been in transition as traditional industries have declined while new growth industries have emerged (see Figure 4). New industries such as defence have different infrastructure requirements and a greater reliance on technology and flexible skilled labour.

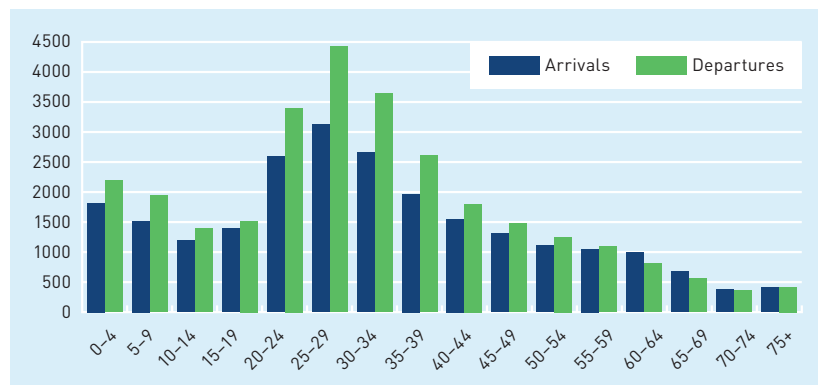


Figure 3:
Interstate arrivals and departures by age group, SA, 2017/18

Source: Department for Planning, Transport and Infrastructure

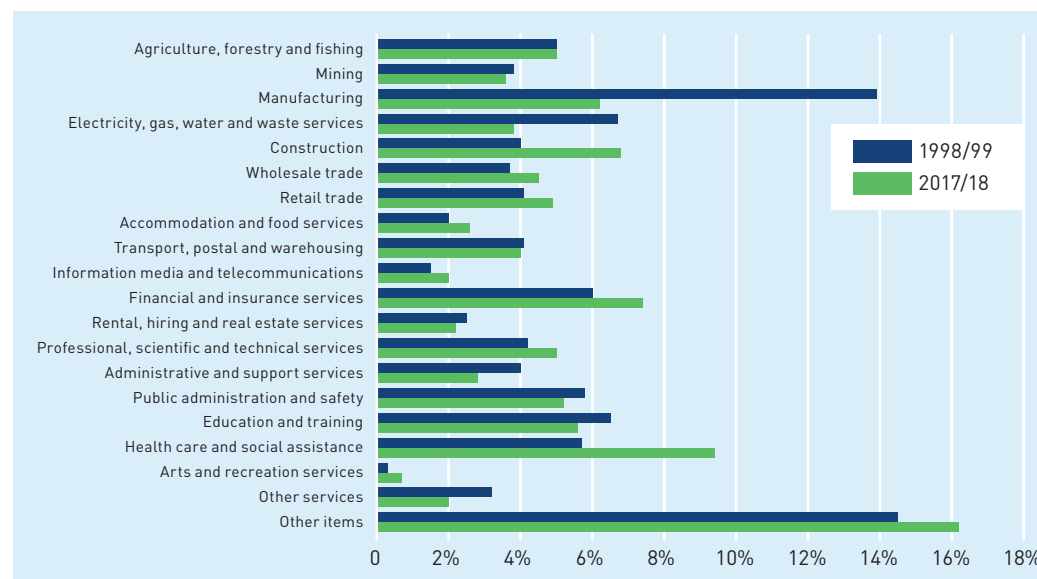


Figure 4:
Composition of industry value added to the South Australian economy, 1998/99 and 2017/18

Source: ABS, Deloitte

This transition presents an opportunity for South Australia to reposition itself and find new areas of growth into the future.

The Government has responded with *Growth State: Our Plan for Prosperity*²⁵ as its economic plan for the State. This identifies nine key export-focused sectors that will drive this growth and has a stated medium-term target of an average economic growth rate of 3% per annum. This would bring the State into line with average national growth rates. The Premier has also stated an intention for population growth to reach the national average, which would see annual growth increase from a fairly stable circa 12–14,000 to approximately 30,000.

Infrastructure has a fundamental role in supporting growth through direct investment and improved productivity and access to the markets and jobs. The challenges for planning infrastructure are different in South Australia than in the capital cities in the eastern states, where there is a greater challenge in managing and responding to growth. Infrastructure within South Australia has a role to facilitate and catalyse growth where there is evidence that it will improve productivity, open new markets and grow the economy. This is particularly important where key growth sectors such as mining, agribusiness and tourism are heavily reliant on infrastructure to unlock growth opportunities. Strategic investment in infrastructure that improves productivity and supports these sectors will be important as the economy rebuilds from the impacts of COVID-19.

Maintaining liveability

Achieving a significant increase in growth will entail change. The challenge is to foster new economic opportunities while sustaining and enhancing liveability, measures of which include cost of living, access to services, level of congestion, safety and a clean environment.

South Australians place great value on the liveability of their communities and the environment which supports liveability. The State's regional communities have a proud history and strong sense of community, while Adelaide is ranked 10th among the world's most liveable cities in The Economist Intelligence Unit's *Global Liveability Index*.²⁶

Adelaide also has a relatively low cost of living²⁷ and is a competitive place to do business.²⁸ While congestion has been increasing, Adelaide remains, for the most part, an easy city to get around, as demonstrated by the recent Australian Infrastructure Audit findings on congestion (see Figure 5). These qualities are a competitive strength and should be preserved.

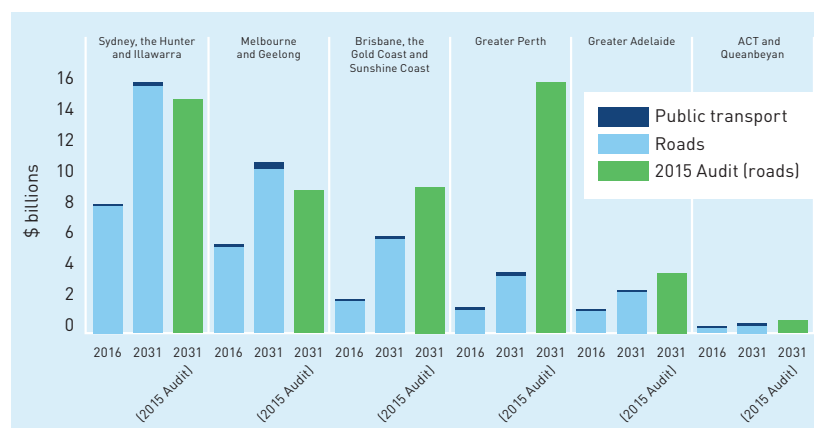


Figure 5:
Cost of road congestion and public transport crowding, 2016 and 2031

Source: Infrastructure Australia and Veitch Lister Consulting

Accessibility of facilities and services is a key part of the liveability of a community, as is access to active and passive recreation spaces. Open and green spaces are important for the liveability of a community and as the world becomes more urbanised, green infrastructure will play an increasingly important role to maintain that liveability, particularly as it helps mitigate some of the impacts of a hotter climate.

While South Australians benefit from a relatively high standard of living, it is important to acknowledge that not all people are able to take this for granted. Liveability for regional populations, the long-term unemployed, low-income workers, people with disabilities and/or mental illness, and culturally and linguistically diverse (CALD) communities is generally compromised to some degree due to unequal access to services and opportunity. South Australia has the second-lowest median income of all states and, according to the 2016 Index of Relative Socio-Economic Advantage and Disadvantage (IRSAD), more than half of South Australia falls into the lowest two quintiles of socio-economic advantage.²⁹

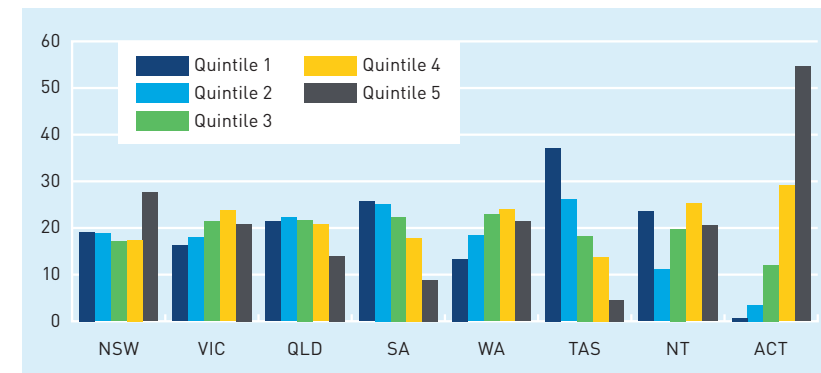


Figure 6:
Proportion of state population per IRSAD quintile

Source: ABS Census of Population and Housing 2016



Keep our cool in a warming climate

Singapore has a vision to transform into a 'city within a garden' as part of counteracting the urban heat island effect – where heat is trapped by buildings, roads and other hard infrastructure to unnaturally elevate temperatures. By integrating green spaces within urban environments, it has cooled its ground temperature by 1°C over 10 years and boasts 30% green space – more than any other city.

Adequate infrastructure co-designed and integrated to support the delivery of essential and other services in urban, regional and remote Aboriginal communities is fundamental to improving the lives of Aboriginal people in the State and helping to achieve COAG's *Closing the Gap* targets. Closer coordination and cooperation between the Commonwealth, states and non-government organisations is essential.

Ensuring sustainability and resilience

South Australia's unique natural environment, resources and reputation for being clean and green provides immeasurable social, economic and environmental benefits. These must be preserved as the State grows into the future.

Its natural ecosystems are the foundation for liveability – acting as carbon sinks, supporting biodiversity, air and water quality, and recreation and wellbeing, and providing unique natural amenity and heritage qualities. Land, water and environmental assets, including minerals, soils, energy and timber, underpin a significant portion of the State economy and exports. There is ample opportunity to capitalise on growing consumer demand for clean, green products and unique tourism experiences. Effective resource management and ecosystem preservation and rehabilitation is critical.

The State's climate has changed and further change is inevitable. Reduced annual rainfall, warmer weather, sea level rise and increased frequency of natural hazards are already being felt and having significant direct impacts on health and wellbeing, infrastructure, primary production and the natural environment. Over the past 20 years (2000–2019), Adelaide had an average of 6.1 days per year over 40 degrees. In 2019, there were 18 days over 40 degrees in Adelaide³⁰ as well as the hottest temperature ever recorded in an Australian state capital, reaching 46.6 degrees on 24 January.³¹

Continued warming is expected to contribute to greater climate volatility and rising sea levels in coming decades.³² However, according to the Reserve Bank of Australia, it already presents a trend change that is having ongoing effects on Australia's output and prices and poses a clear systemic risk to Australia's financial stability.³³

Infrastructure influences sustainability and climate change adaptation in terms of the impact of its built form and choice of materials on the environment as well as the services that it enables.

For example, the construction and operation of infrastructure influence the State's greenhouse gas emissions in many ways, including through construction and materials (e.g. cement production), energy use, energy infrastructure, fugitive emissions and the transport systems that infrastructure facilitates. Figure 7 outlines greenhouse gas emissions by source, with infrastructure contributing across key areas. Efforts are needed to minimise emissions during construction and operation of infrastructure.

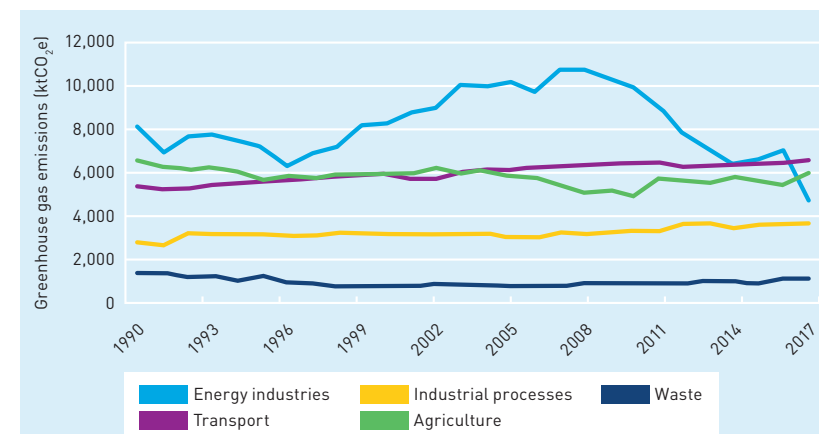


Figure 7:
South Australian greenhouse gas emissions by source, 1990–2017

Source: Department of the Environment and Energy

Built assets and infrastructure are also exposed to climate-related physical and financial risks. The physical impacts of more extreme weather events along with a warmer and drier climate will affect the operation of assets and infrastructure. The location and design of new buildings and infrastructure

will need to consider the future climate, and existing assets may require retrofit or upgrades to increase their resilience.

Building resilience to the impacts of a changing climate and reducing emissions are priorities and need to be factored into long-term infrastructure planning. Infrastructure comprises long-lived assets and most assets built over the term of this Strategy will still be operational in 50 years' time.

The devastating bushfires that South Australia experienced in the 2019/20 summer highlight the need for resilience to be a critical element in infrastructure planning. The increasing number of hot days and extreme weather events will put a greater strain on infrastructure, some of which will need to be designed to respond to the forecast changes. Considerations include fire resistance, increased water storage capacity and vulnerability to flooding.

The following are examples of how climate change impacts can be addressed during infrastructure planning:

- Undertake analysis during infrastructure scoping and design to understand potential impacts of projected changes to rainfall, run-off and sea level rise on volumes, quality and timing of stormwater flows and associated infrastructure design requirements.
- Review where critical access routes intersect hazard-prone land and identify available alternate options.
- Design infrastructure to optimise renewable energy use, maximise thermal comfort and minimise energy and water consumption.
- Consider the application of green infrastructure such as green walls and facades, green roofs, onsite rainwater harvest and use, trees, gardens and plantings to maximise shade.
- Ensure water infrastructure is planned to help provide water security during increased periods of drought or low rainfall.
- The COVID-19 crisis has also shown the importance to plan for resilience to shocks such as pandemics.

Infrastructure is capital intensive

Infrastructure can be expensive to develop and maintain, and consumes a significant amount of both public and private capital.

Commonwealth Government contribution to South Australia's infrastructure development fluctuates year to year. Using Commonwealth Final Budget Outcome data for payments over the 10 years to 2017/18, South Australia has received an average of 6.9% of Commonwealth Infrastructure National Partnership Payments. This amounts to approximately \$4.2 billion. A further \$2.9 billion has been allocated from 2018/19 to 2022/23.

The 2019/20 State Budget allocates a total of \$11.9 billion to infrastructure over the following four years. This is a positive increase in investment compared to trend but still leaves South Australia below the Australian average infrastructure investment per capita (see Figure 8). This is, in part, reflective of infrastructure supply historically keeping up with demand due to a lower rate of population growth. If the State achieves its economic and population growth ambitions, corresponding growth in infrastructure investment will be needed in response. To this end, a further \$1 billion was allocated in the mid-year budget review.

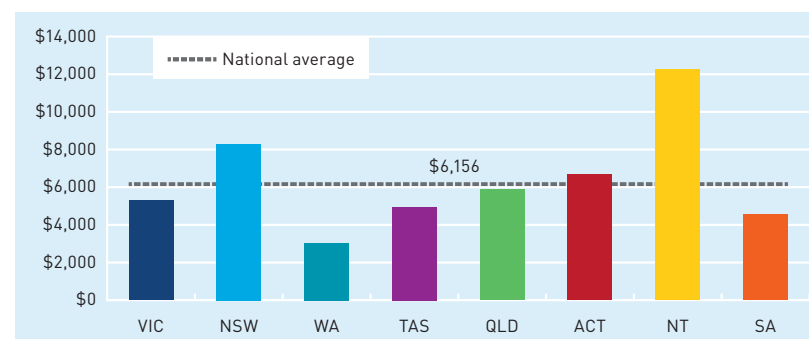


Figure 8:
State infrastructure funding per capita, FY2018/19 to FY2021/22

Source: Infrastructure Partnerships Australia

Figure 9 shows how major State Government infrastructure spending has been distributed.

There has been some recent private sector investment in infrastructure in the State such as the \$165 million Adelaide Airport expansion and the \$80 million Outer Harbour Channel Widening project. The amount of private capital invested in South Australia has traditionally been modest compared to the eastern states.

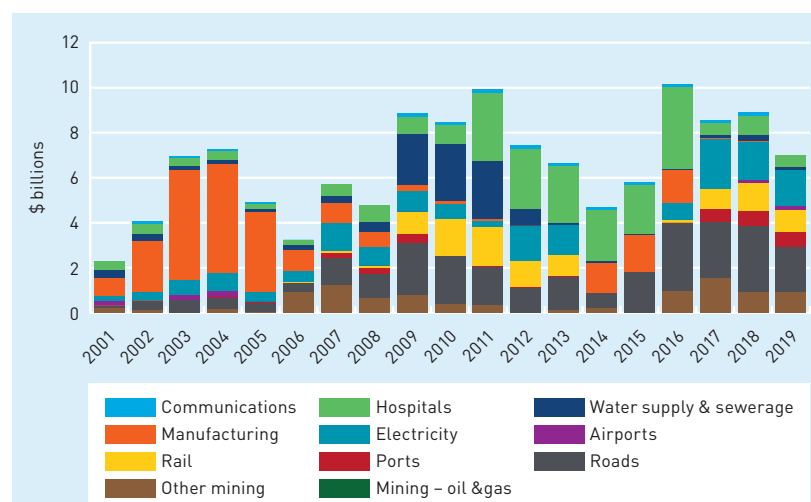


Figure 9:
South Australian Government's major project investment by sector

Source: Deloitte Access Economics, BREE, State Government budget papers

Local government is also a significant investor in the State's public infrastructure, with local councils spending around \$2 billion to manage approximately \$24 billion in public infrastructure assets and provide local services.³⁴

In 2017-18, over 37% of council expenditure was on traditional infrastructure (transport and recreation), 25% was on community support (libraries, community centres, community transport, street lighting) and 21% was on environmental services (waste management, coastal adaptation, stormwater management).

– Local Government Association of South Australia

In the current fiscal environment, where there have been significant write-downs in GST revenue forecast and modest budget surpluses, it is clear that the State Government needs to be efficient with its allocation and investment decisions to ensure maximum benefits are realised from investment of scarce capital.

There needs to be focus on optimising current capacity and 'sweating' assets through non-capital demand management strategies, improving efficiencies through adoption of technology and better data analysis and targeted incremental investments. All investment decisions should be informed by evidence of its contribution to economic growth or public value.

There are also opportunities to take advantage of historic low long-term interest rates to fund the infrastructure pipeline and leverage greater private sector capital investment in infrastructure. Infrastructure assets that have a stable return are very attractive assets in a market that is searching for yield. In 2018, over \$85 billion was raised for new global infrastructure-focused private investment funds.³⁵

GEOGRAPHIC CONTEXT



South Australia has a highly urbanised population concentrated in Greater Adelaide. This region accounts for 77% of the State's population of 1.74 million. The State lacks the significant regional centres found interstate.

Table 1:
Share and size of South Australia's largest population centres (by Statistical Area 2), 2018

Source: ABS Estimated Resident Population catalogue 3218.0

* Greater Adelaide Capital City region includes Mount Barker, with a population of 18,627 (1.1%)

City	Population	% of total
Adelaide (GACC*)	1,345,777	77.5%
Mount Gambier	29,639	1.7%
Whyalla	21,742	1.3%
Murray Bridge	18,779	1.1%
Port Lincoln	16,326	0.9%
Victor Harbor	14,954	0.9%
Port Pirie	14,188	0.8%
Port Augusta	13,799	0.8%
Goolwa/Port Elliot	11,578	0.7%

The Department for Planning Transport and Infrastructure (DPTI) has prepared population projections out to 2041.³⁶ The medium series projections see the State's population growing by 333,903 people from 2016 to 2041, reaching 2.05 million. The high series sees the population reach 2.21 million people. The majority of this growth is forecast to occur in Adelaide, with the rest of the State growing by only 43,096 people in the medium series. The Government's ambition to achieve the national average rate of growth would see population growth exceeding the high series projections.

Urban areas

A long, narrow city bounded by hills to the east and the sea to the west, Adelaide spans about 80 km from Gawler in the north to Seaford in the south. Its urban footprint is constrained by important food production zones in both the north and south.

The *30-Year Plan for Greater Adelaide 2017 Update*³⁷ (the Greater Adelaide Plan) provides the strategic planning framework for urban development within Adelaide. The Plan has six strategic targets to help shape the city:

1. Containing our urban footprint and protecting our resources

2. More ways to get around

3. Getting active

4. Walkable neighbourhoods

5. A green liveable city

6. Greater housing choice

Housing

Urban growth that has traditionally extended to the north and south places increased pressure to extend essential infrastructure further into the urban fringe. Infrastructure Victoria's study into infrastructure costs in different (Melbourne-based) development scenarios shows that while dwelling costs are lower, development in the outer urban greenfield can come with a significant cost premium for most infrastructure services (see Table 2).

Urban sprawl may impose higher operating costs and entrench disadvantage for those living further from job opportunities than those incurred by people living in denser inner urban areas. The Greater Adelaide Plan seeks to address this with a target that 85% of all new dwellings by 2045 be built within the established metropolitan area. This policy objective fits with a growing public preference for residing close to services, jobs and recreational activities. In 2018, 71% of the 6,350 new dwellings in Greater Adelaide were urban infill; traditionally, the majority have been in greenfield areas.

Table 2:
Costs in development
settings, medium capital
scenario

Source: Infrastructure
Victoria

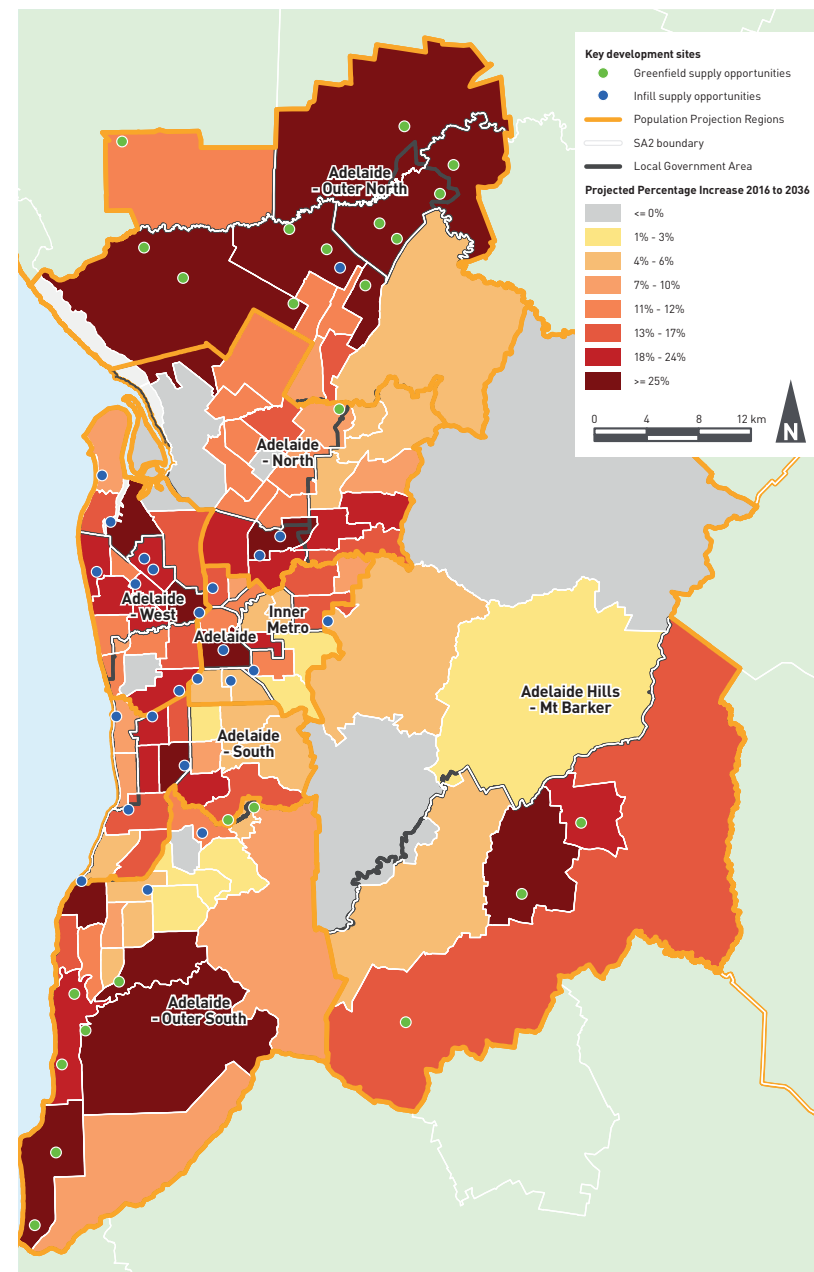
Infrastructure type	Greenfield (\$)	Small scale dispersed infill (\$)	Precinct scale brownfield (\$)
Transport	45,703	-	-
Civil works incl. drainage	50,463	21,982	30,951
Sewerage	10,983	5,139	5,187
Water supply	10,289	4,990	3,417
Electricity	9,665	8,515	8,343
Gas	3,105	5,400	1,680
Telecommunications	3,791	3,765	3,293
Community	14,616	-	-
Emergency services	817	-	-
Health	1,200	-	-
Education	16,400	3,267	3,267
TOTAL	167,032	53,057	56,138

Figure 10 shows the projected change in settlement patterns, which is an important factor in planning for infrastructure and should drive where infrastructure investment is focused.

Infill development is likely to be concentrated in the inner and middle urban areas within 10 km of the CBD where there is either a change of land use or generally older housing stock with relatively low capital-to-site-value ratios and good access to transport corridors.

Figure 10:
Projected population change, Greater Adelaide, 2016–36

Source: Department for Planning, Transport and Infrastructure



Innovative urban infill

When first built in 1902, New York's Flatiron Building was criticised by some for its unconventional triangular design and height, the result of developers utilising an awkward wedge of leftover space in a dense urban setting. Yet it has come to be regarded as an iconic building and a significant tourism drawcard. The building was also the first attempt at steel-framed construction following a change in city building codes, allowing its 22 stories to be built with relative ease.



While there are significant minor infill opportunities across Adelaide, net return is quite low, with an average 1.8 dwellings replacing each existing dwelling. Appropriate infill development should be encouraged. This should comprise diversity in the housing stock to meet different household profiles, as well as provide sufficient open space that is green and shaded to maintain liveability and support activity and wellbeing.

Major infill sites provide greater opportunities to plan for this as well as for any necessary augmentation of infrastructure to support a denser population. There are several major infill developments underway, but future supply is mostly constrained and ISA supports the work of the State Planning Commission to understand limitations, identify strategic major infill opportunities and develop policy that facilitates land aggregation to enable better development outcomes. Strategic investment in infrastructure will be necessary to unlock some of these opportunities. Identifying a suitable supply of affordable land for development and renewal is necessary for Adelaide to maintain its competitive advantage with regard to affordable housing.

Although there has been a shift to a greater concentration of infill development, there is still an ongoing demand for new housing in the traditional growth areas. With the exception of some tightening in the south of Adelaide, there is significant greenfield land supply already zoned.

Work and play

The change in settlement patterns has coincided with the reduction in the State's industrial manufacturing base, underscored by the closure of the Holden factory in the north of Adelaide. Adelaide has signed the City Deal, which is seeing significant investment around Lot Fourteen in the CBD as well as its growing defence and space industries and innovation ecosystem. With the redevelopment of Adelaide Oval and changes to small bar licensing, there has also been an increase in the vibrancy and liveability of Adelaide – all positive developments to build upon.

For the State to be successful and to capture the growth opportunities presented by emerging industries, the Greater Adelaide region – which accounts for 75% of GSP – needs to be vibrant, productive and globally focused. Many of the world's most vibrant cities are similar in size to Adelaide and to join their ranks, the positioning and vision for the future of Adelaide needs to be clear.

A key asset and recent focus of investment is the Riverbank area adjacent to the River Torrens through the CBD of Adelaide. From the Royal Adelaide Hospital and the BioMed City in the west through to Lot Fourteen and the Botanic Gardens in the east and the central cultural and entertainment precinct up to the Adelaide Oval and Cathedral in between, the Riverbank precinct will be the focus of upwards of \$7–8 billion of public and private investment. As it evolves, the heart of Adelaide and its economic, social and cultural activity will move towards the northern edge of the city and this area will become the global focus for Adelaide. With a wide range of stakeholders across the precinct, coordination of investment and activity will maximise benefits and establish a clear global positioning. How the Riverbank Precinct interrelates with the broader Parklands and the other innovation precincts in Adelaide is worthy of consideration.

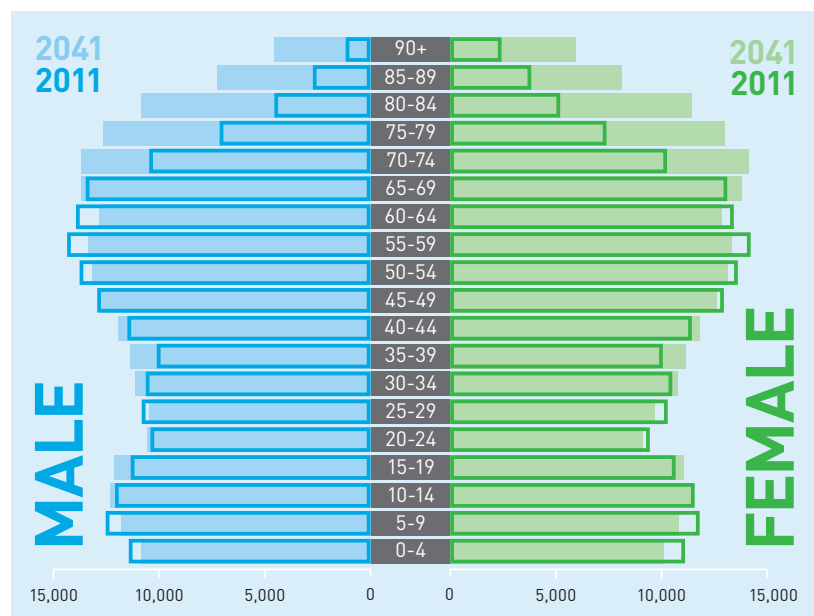
Regional and remote areas

South Australia is a vast state that is equivalent in size to the combined areas of France and Germany, but with a population of less than 400,000 in its regions.

Certain major regional centres such as Murray Bridge, Mount Gambier and Port Lincoln are experiencing limited growth; however, with small declines in some areas, the regional population overall is relatively unchanged. The regional population is also ageing at a faster rate than that of Adelaide, as young people leave for larger centres in search of opportunities and older cohorts enter to retire. This pattern of migration is not only creating some labour shortages and social disruption as people leave communities; it is also increasing demand for social services due to a disproportionately high number of older people. This trend is expected to continue.

Figure 11:
Population age structure
for regional South
Australia in 2011
and 2041

Source: Department for
Planning, Transport and
Infrastructure



The relatively small and thinly distributed regional population makes it a challenge to economically and efficiently provide infrastructure. Infrastructure in some regional areas suffers from underutilisation or is unable to provide a full range of services without the critical mass to make it economically viable or attract the necessary skilled labour. Investment in the creation of regional hubs should be considered as a means of providing a more efficient, modern and complete range of regional services that reduce the need for users to commute to Adelaide. New service delivery models that don't require the same level of infrastructure to provide the service also need to be explored and developed.

Maximising the value derived from regions will be pivotal to the State achieving its growth ambitions, and frameworks need to be established that appropriately value regional economic contribution when prioritising infrastructure investment.

Despite their relatively small populations, regional areas contain strong communities and are an important part of the State's culture and history. They offer unique visitor experiences, quality produce, some of the world's greatest wine producing regions and pristine coastlines.

As such, they are very productive, accounting for 60–70% of merchandise exports. South Australian regions outperform all interstate regions on a productivity basis, with the exception of regional Western Australia³⁸ (see Figure 12).

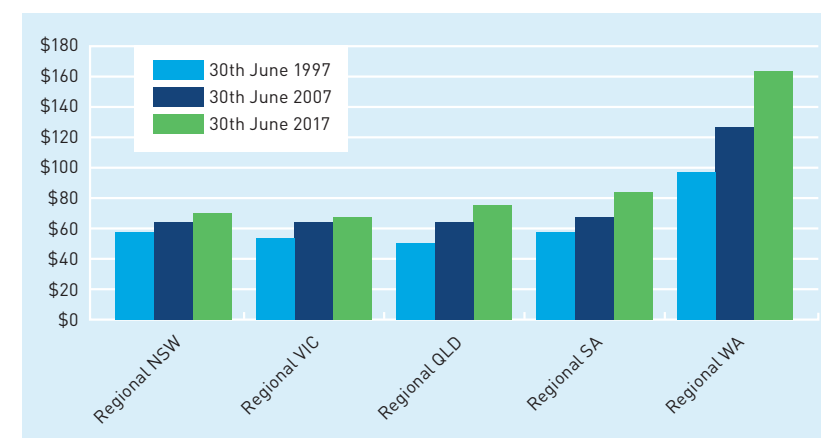


Figure 12:
Labour productivity per hour worked

Source: SGS Economics and Planning

South Australia also has some excellent mineral, oil and gas resources. For example, the State hosts 68% of Australia's demonstrated resources of copper. Global demand for copper is forecast to double over the next 30 years as it will be the foundation of the growing electric vehicle (EV) industry. The State also has untapped rare earth resources, another critical input for EVs. However, many of these resources are in remote areas that are difficult and expensive to service. Significant investments in power, water and transport are required to efficiently bring these resources to market.

Meanwhile, remote areas are subject to some of the greatest disadvantage in South Australia. They encompass 63% of the State, but are home to only around 3,000 people, who reside in a number of small townships and numerous smaller settlements including pastoral, farming and tourism enterprises¹⁶ and Aboriginal communities and lands.³⁹ These communities face particular issues with access to water, energy and social services. Infrastructure investment plays a role in ensuring access to an acceptable standard of living consistent with a modern developed economy, and innovative solutions need to be explored in delivering this at small scale.

Aboriginal communities

Infrastructure Australia's 2019 Infrastructure Audit noted that 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 Aboriginal people. The Audit asserted that failing to improve services for Aboriginal people in remote communities and rural areas undermines potential improvements in quality of life and reinforces gaps in inequality and disadvantage.⁴⁰

Closing the Gap is a framework established in 2008 by the Council of Australian Governments (COAG) to address Aboriginal disadvantage, with a particular focus on health and education outcomes. In 2018, a review of the program found that South Australia is on track to meet only two of the seven targets.⁴¹ COAG has committed to working with Aboriginal people to reset the agenda for the future. This is very likely to have implications

for infrastructure investment to support improved outcomes relating to education, health and safety of communities, and needs to be supported by appropriate funding for community-led project design, delivery and governance.

In 2015, the Commonwealth Government transferred funding for Municipal Services (MUNS) in Aboriginal lands and communities to the State Government to manage via grants to local communities and other organisations. In accordance with the *South Australian Government Aboriginal Affairs Action Plan 2019–20*,⁴² the State Government is currently undertaking an audit of MUNS in regional and remote Aboriginal communities in South Australia, which is due to be completed by June 2020. The audit will provide a snapshot of the condition of some essential service infrastructure assets and provide an indication of what capital investment may be required.

ISA supports the State Government giving due consideration to the outcomes and infrastructure requirements arising from the update of the Closing the Gap framework and the MUNS audit.

PRIORITY 1: DEVELOP FRAMEWORKS THAT APPROPRIATELY VALUE THE ECONOMIC CONTRIBUTION OF REGIONAL PROJECTS WHEN PRIORITISING INFRASTRUCTURE

The State's regions should make a significant contribution to South Australia's export growth, provided the challenges of servicing remote area resources and assets are addressed. The nature of these locations means that while infrastructure may not service significant volumes, it can still make a significant economic contribution to the State. Frameworks should be developed to appropriately value the strategic merit and economic contribution of low-volume, high-value projects when prioritising infrastructure investment.



Re-purposing a disused asset

London's home of international contemporary and modern art opened in 2000 and is one of the UK's top three tourist attractions. In its previous life, Tate Modern was the iconic Bankside Power Station, built between 1947 and 1963 and lying unused since 1981. An international competition was launched in 1995 and the chosen design retains much of its original character while modernising internal spaces.

KEY PRINCIPLES



Throughout the development of the Strategy, several themes were consistently apparent that, if addressed at a holistic level, would improve the planning and delivery of infrastructure in South Australia across all sectors while supporting economic and population growth.

The following key principles should be adopted in the planning and delivery of all infrastructure in South Australia.

Optimise current assets before building new

Building new infrastructure is expensive, and the full range of options to optimise current assets and any spare capacity needs to be considered. Prior to committing to any new build, an evidence-based assessment of a range of interventions is needed, including non-capital demand management strategies, new service models enabled by technology, and incremental investments that are shown to contribute to economic growth or provide other service benefits. Often incremental investments will generate a better return than significant new builds. Improving the utilisation of existing asset capacity before investing in new and additional capacity will be important to effectively managing capital budgets.

To ensure that assets continue to be utilised and do not become stranded or redundant before their design life, they should be planned with sufficient adaptability. This should enable them to respond to changing demographics and consumer preferences, climate change, technological developments and growth. Where a new build is required, designs should be standardised as much as possible to improve efficiency of delivery.

Adopt a lifecycle approach to new infrastructure

Infrastructure is a long-term asset, and the life of a project does not stop at commissioning. Any investment decision for new infrastructure should also consider the full lifecycle cost, as the operating cost over the life of the asset can be significant for some classes of infrastructure.

The nature of political and budget cycles has often meant that lifecycle costs are not fully considered. Where appropriate, public-private partnerships (PPPs) and other contestable delivery models can offer the advantage of lifecycle costs being fully accounted and assets maintained through the life of the contract due to defined service-level agreements.

Maintenance backlogs are consistent across all classes of infrastructure. It is important that programmed asset maintenance is properly funded as it can often prolong the life of assets, is less costly than responsive breakdown maintenance, is less disruptive due to reduced downtime and can better maintain service levels and meet customer expectations. Investment in asset maintenance is also an effective and efficient means to direct government investment in a dispersed manner. However, to ensure that maintenance budgets are efficiently and effectively managed to maximise benefit, a certain level of maturity of strategic asset management capability is required. There are some good practices of asset management across government, but the maturity level needs to improve more broadly to enable the potential benefits of effective assessment management to be realised. Poor quality of information available on some assets is another barrier.

PRIORITY 2: REQUIRE GOVERNMENT AGENCIES TO PRODUCE 10-YEAR ASSET MANAGEMENT PLANS

Taking a strategic approach to asset management entails, in large part, the development of long-term asset management plans. Agencies are currently required to develop asset management plans for their own facilities; however, these are completed to varying standards. Agencies must undertake a more disciplined and consistent approach to these plans and broaden this practice to include all assets in their portfolio. This will improve the efficiency and transparency of capital budgets across government. By outlining the asset activities and resources for each service area or asset in these plans, agencies will be able to clearly articulate policies, asset performance and demand, budget and operating standards and risks. This will enable them set a program to justify and address the capital investment and asset maintenance backlogs across government portfolios.

Prioritise infrastructure that contributes to economic and jobs growth

South Australia will not be able to meet its growth ambitions through government investment alone. It is also necessary to improve productivity, grow exports and attract more private investment. Infrastructure plays a vital role in supporting this.

The *Growth State* plan identifies nine key growth sectors, and supporting these via strategic infrastructure investment will be important. Infrastructure that has the potential to unlock growth, and export opportunities in these sectors should be identified and prioritised where there is a supporting business case. To achieve a step-change in growth it will be important to identify opportunities that have scale and global demand.

One sector that offers scale and is heavily reliant on infrastructure to unlock economic value for the State is the resources sector. As previously noted, South Australia has some excellent mineral, oil and gas resources; however, these are in remote areas that can be difficult and expensive to bring to market and service. To unlock the value of these resources requires significant upfront investment in power, water and transport infrastructure. Government should work with stakeholders to identify the most prospective provinces or regions and efficient infrastructure solutions and routes to market. It should play a role to facilitate appropriate corridor developments and multi-user access, and provide greater certainty to de-risk projects.

Within the urban context, innovation precincts will be a key driver of growth, and Adelaide boasts several distinct offerings. These include Tonsley, Technology Park, Adelaide BioMed City and the newly developed Lot Fourteen and the Osborne Naval Shipbuilding Precinct. To be successful, these precincts must be supported with good place-making, connections – both physical and digital – and governance.

An overarching strategy and governance structure across the key economic precincts in South Australia are needed to maximise their combined value and present a clear value proposition to potential investors.

South Australian Government could play the role of first mover in developing common user infrastructure and by doing so break the investment deadlock that has stymied the development of the State's resources provinces.
– South Australian Chamber of Mines and Energy

Make evidence-based planning decisions

To ensure that taxpayers and investors are getting value for money and that benefits are maximised, emphasis must be placed on decision-making supported by strong evidence.

This requires data and robust forecasting that can be trusted in order to accurately define the infrastructure need and understand the potential impacts of the intervention. ISA has found the maturity and robustness of data across government to be mixed. This is a capability that should be invested in.

Investment decisions must also be informed by business cases that clearly define the problem or opportunity that is being addressed and contain a thorough options analysis. This should include options to better utilise current assets as well as private sector delivery options before identifying the preferred solution. Throughout the development of the Strategy, ISA has observed a lack of consistent rigour across government in the preparation of thorough business cases. Greater investment and resourcing is required in this area and investment decisions should be deferred in the absence of a compelling business case. ISA has developed an independent assurance framework to ensure a structured discipline and consistent approach to all major capital investment proposals throughout the project lifecycle.

Adopting a more data-driven, evidence-based approach towards public sector infrastructure planning will ensure that the South Australian Government can support future population growth.
– Australian Information Industry Association

Break down silos through integrated planning

Infrastructure is part of a system. When planned in isolation, infrastructure risks serving a narrow purpose without considering the people it impacts and, in the worst case scenario, can dislocate communities. If poorly planned and executed, it can restrict economic growth and divert investment into unproductive assets. Where community access to services is compromised, this can entrench social disadvantage and delay efficient development. The latter has been evident interstate, where cities have developed without consideration of future infrastructure needs, which is later built at considerable cost and disruption.

For infrastructure planning and investment to be efficient and effective, it cannot be done in silos. An integrated approach to planning is critical to avoid unintended consequences and maximise benefits. Planning for population growth through integrated land use, infrastructure and service planning ensures that services can be efficiently delivered and communities are great places to live and work in. Prioritising space for social infrastructure such as schools, hospitals and affordable housing is key, and government can play a role in bringing together stakeholders to fully understand needs and impacts. When planning social infrastructure and supporting services, an integrated, person-centric approach is needed. Decisions can involve trade-offs at times, but these should be made in a balanced way in full consideration of the facts and a range of perspectives.

There are multiple strategies and plans across government which are not always aligned. These often impact on the most efficient infrastructure delivery.
– Urban Development Institute of Australia

The Greater Adelaide Plan recognises the importance of this integration, as does State Planning Policy 1: Integrated Planning.⁴³ Efforts to improve integration of land use and infrastructure planning as well as the services necessary to support the population should continue, as this can provide the framework for efficient development that encourages economic growth and builds stronger, more cohesive and resilient communities.

The provision of basic utility services such as power, gas, water and telecommunications is a critical element of any development. Service relocations are also becoming a significant risk factor to other projects in an increasingly urbanised environment. Ensuring there is transparency around service requirements and work programs is important for efficient coordinated development. Transparent and equitable funding arrangements for the augmentation of infrastructure are also key to unlocking efficient development.

Expand funding and procurement models to prioritise private sector capital

In October 2018, BIS Oxford Economics noted that governments are “not fully utilising the range of procurement approaches”.⁴⁴ Traditionally within South Australia, most infrastructure has been funded through general government revenue under traditional contract forms. It is important that the appropriate procurement model and contract form is adopted for each project, with care taken to ensure risk allocations are appropriate.

Different commercial models with the potential to attract private sector investment should be proactively pursued early in the planning for projects. A challenge within South Australia is that there can be insufficient demand to make a project fully commercial at concept design stage. Where there is strategic merit, government should explore what role it can play to de-risk the project and aggregate demand sufficiently to attract private capital.

Road price reform is an initiative available to the South Australian Government that aligns the demand of road users with road space supply. It would also permit more effective, targeted investment in road infrastructure, ensuring that investment dollars flow to where they are most needed.

– Australian Logistics Council

User-pays models are common within the utilities and communication sectors to fund related infrastructure. These models can provide a link between user benefits and costs for economic infrastructure. Opportunities to expand the use of such models should be explored as an alternative to general government revenue and to drive economic efficiencies under the right circumstances.

Outsourcing of the provision of public services has had proven success in Australia in terms of the efficiency and quality of services.⁴⁵ There are opportunities to explore contestable models of private sector provision of services on behalf of government. Care must be taken in the outsourcing process, with expectations regarding the quality and range of services made clear and the appropriate contractual incentives and controls put in place.

Another important consideration during procurement is digital engineering, particularly as industry moves to broader application of digital twins. As this becomes increasingly prevalent, it has the potential to drive efficiencies in the planning, design and operation of infrastructure. Building digital engineering capability will also complement the sectors prioritised in the *Growth State*.

Build capability and capacity across public and private sectors

As South Australia grows, so will the size and complexity of the infrastructure pipeline. This can put a strain on the capability and capacity for delivery. For industry to invest in its capability in the State, transparency of the pipeline of work is key.

While the State has been successful to date in ensuring that there is sufficient competition in bids received for its infrastructure projects, the market will need to be monitored to ensure appropriate contract forms and risk allocations. Government will have a role to play in ensuring that there are sufficient skills in the market through industry participation plans on procurements, promoting apprenticeships and traineeships and identifying shortages of specific professional skills such as engineers and project managers.

The selection and retention by Government of experienced and appropriately skilled project development and procurement personnel will promote private sector confidence in the tender and operational processes.

– Australian Industry Group

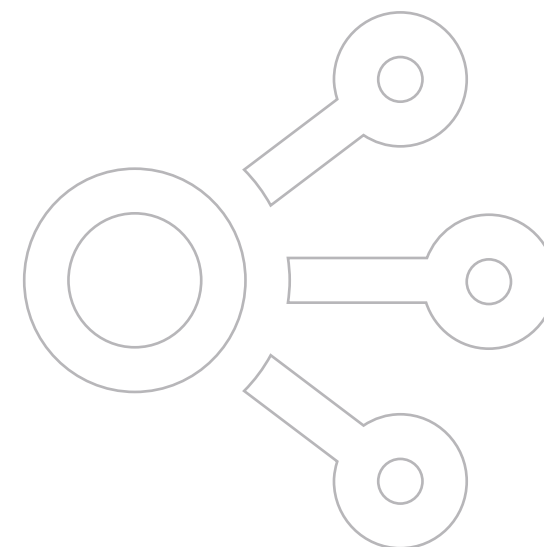
The public service must have the necessary knowledge and skills to manage the infrastructure pipeline, and traditional pay classifications and scales may need to be adjusted to attract and retain the right talent.

In addition to labour force capacity and capability issues, government should monitor the supply chain to ensure that there are no undue constraints in supply of materials that could put an inflationary pressure on costs.

This is particularly relevant for regional projects, where sourcing materials locally can not only support local industry, but also reduce logistics costs and carbon footprints. ISA understands that, at present, there is no particular shortage of materials market-wide, but this should be monitored and action taken if supplies tighten.

Despite embracing innovation being one of COAG's Transport Infrastructure Committee's four reform pillars, we continue to see evidence that procurement of infrastructure is confounded by practitioners who see no upside in embracing innovations.

– Australian Road Research Board





Prioritising digital inclusion

The Ottawa 20/20 plan listed expansion of the region's broadband service as one of its physical infrastructure priorities. The City of Ottawa utilised a public-private partnership to leverage \$10.4 million in private investment off a contribution of \$750,000. This is helping to ensure that every business and resident across rural Ottawa can access high-speed Internet and supports the city's vision for innovation, competitiveness and prosperity.

DIGITAL



Role of digital infrastructure

For the purposes of the Strategy, digital infrastructure is considered the physical infrastructure necessary to transmit data, either through cables or cellular or radio networks.

Digital connectivity will be central to the Government's growth aspirations. Expanding access to digital infrastructure will be critical to enable new service delivery and business models and to connect to global markets. This will foster productivity and innovation across all sectors of the economy.

Access to Internet and telecommunications services is not solely an economic matter; it is also one of social inclusion. With a growing range of education, information, government, health and community services moving online, this is increasingly regarded as an essential service.⁴⁶

Digital connectivity has proven to be vital through to the COVID-19 crisis to enable new models of work, education and service provision.

Digital connectivity for government services, including health, emergency services and education, supports localised delivery with more accurate and up to date information...

– RDA Barossa Gawler Light Adelaide Plains

Current state

Key assets

With the exception of the National Broadband Network (NBN) and some State- and university-owned assets, telecommunications networks comprising fibre-optic networks, wireless networks and mobile telephone base stations and associated technology are predominantly privately owned and operated.

Current investment in digital assets in South Australia:

- NBN Co, Optus, TPG and Telstra all have significant digital infrastructure networks. The NBN build in South Australia is on track for completion in June 2020. Over 90% of construction has been completed. As of January 2020, over 790,000 premises were ready to connect, 475,000 of which had already been activated. NBN Co is entering into wholesale commercial arrangements with large national corporations, such as supermarkets and health fund providers, to connect their facilities with fibre to the premises. After June 2020, NBN Co's plan is to start upgrading its network and offer more diverse business-grade products like Enterprise Ethernet. It will also be considering further network investment opportunities to improve and upgrade the network.
- The South Australian Broadband Research & Education Network (SABRENet), a fibre-optic broadband network linking 200 major research, education and innovation sites in metropolitan Adelaide, is funded by the three main universities and State Government. Established in 2005, it connects nationally to the Australian Academic and Research Network (AARNET).
- GigCity – which leverages SABRENet and is delivered by EscapeNet, with funding from the State Government – connects businesses in 24 precincts in metropolitan Adelaide to ultra-fast and affordable gigabit-speed Internet, filling a gap in the market for ultra-fast Internet for commercial purposes. Funding for this arrangement is currently in place until 30 June 2021 and will be subject to review in 2020. GigCity is also being extended into Whyalla and Mount Gambier, where it will be available until at least 2025.
- Ten Gigabit Adelaide is a high-speed, high-performance fibre-optic data network that is being rolled out to 1,000 commercial buildings across the City of Adelaide. The network will enable businesses to access the Internet and share high volumes of data at gigabit speeds.

- The Department for Education and Telstra have partnered to invest \$84 million in the SWiFT program to connect 514 of the 518 public schools across the State to high-speed fibre-optic cable. The remaining four schools will be connected via other technologies.

AUSTRALIAN CONTEXT

Australia ranks 4 th on mobile broadband speeds (June 2019)	Household data usage is estimated to grow by 340% between 2016 and 2026
91% of all data consumed is on fixed broadband	70% of regional households will have access to a fixed broadband connection at the end of the NBN rollout

Figure 13:
Australia's digital performance

Source: Infrastructure Australia

Network performance

NBN Co has a performance target to deliver peak wholesale download data rates of at least 25 megabits per second to all premises by 2020, although this is currently being revised.

A report by AlphaBeta, commissioned by NBN Co, reported that the average Australian broadband download speed over the last five years has more than doubled. In 2014, the average Australian household accessed the Internet via a DSL connection and had an average broadband speed of 16 Megabits per second (Mbps). Today, the average Australian household has a broadband connection with an average download speed of 37 Mbps – a 138% increase in speed.

Despite recent investment and speed increases, Australia's comparative performance for fixed broadband speeds is poor and lags well behind

comparable nations. This impacts productivity, liveability and attraction of business investment.⁴⁷

In South Australia, developments such as GigCity are providing businesses in certain designated innovation precincts with excellent connectivity, both in terms of affordability and capacity. However, GigCity services are not available across the State, with pockets of the metropolitan and most regional areas not as well serviced.

In terms of accessibility, the Australian Digital Inclusion Index (ADII), which measures access, affordability and digital ability at a national and state level, ranked South Australia in 2019 as the second lowest jurisdiction in the nation, although the State has recorded the greatest improvement since the previous Index.

Rank	State/Territory*	ADII score	Change from 2018
1	ACT	67.6	+1.3
2	Victoria	63.3	+1.9
3	New South Wales	61.8	+1.0
4	Western Australia	61.3	+1.5
5	Queensland	60.9	+2.1
6	South Australia	60.2	+2.7
7	Tasmania	58.1	+1.2

Table 3:
ADII ranking of jurisdictions, 2019

Source: Roy Morgan Single Source, March 2019

*NT excluded due to small sample size (<150)

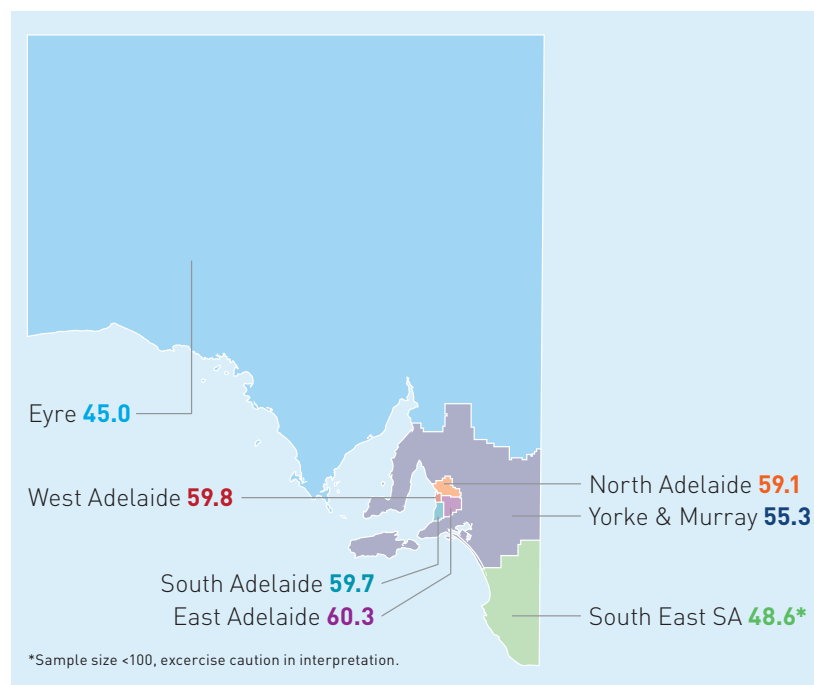


Figure 14:
South Australia regions ADII score

Source: *Measuring Australia's Digital Divide. The Australian Digital Inclusion Index, 2018*

The ADII has noted that while gaps between digitally included and excluded Australians are substantial and widening for some groups, overall access is improving. This is considered to be due primarily to the rollout and uptake of the NBN, which has shown a significant impact where the network is completed or nearly complete.

Other findings of the ADII 2019:

- Mobile-only users are less digitally included, which limits access to services. This is linked to socio-economic factors.
- Digital inclusion for Aboriginal people is low but improving. The key issue is affordability and prevalence of mobile-only service, which has a higher cost per gigabyte than fixed connections.
- Affordability remains a key challenge and has only marginally improved since 2014. While the cost of the Internet has come down, demand for increased levels of data drives up the cost of plans.
- The gap between capital city to country areas is evident across access, affordability and digital ability, but is narrowing given the uptake of NBN is proportionately greater in regions.

High speed connectivity to undertake research, education and support for innovation permits the regions to further expand, take advantage of new technology, diversify industries and create community and economic growth.

– SABRENet

Policies and programs

There are programs and strategies at state and national levels to expand the infrastructure network, build a technology-savvy workforce and position governments to improve delivery of services through digital transformation. The public sector should be an exemplar in the use of digital technology and broadband communications.

State Government	Australian Government
<p>The State's <i>Digital Transformation Strategy</i> is aimed at transitioning government to become digital by default in terms of customer service delivery and interactions with citizens and business.</p> <p>This is underpinned by the <i>South Australian Government ICT Strategy 2018–2021</i>, which identifies areas for investment to achieve this approach.</p> <p>The <i>Cyber Security Strategic Plan 2018–2021</i> aims to safeguard State infrastructure, digital assets and citizen information against the ever-increasing incidence of cybercrime and espionage.</p>	<p>In 2018, the Commonwealth Government's Digital Transformation Agency released its <i>Digital Transformation Strategy</i>, which aims to lift digital interactions with government to the same innovative level as leading private sector organisations.</p> <p>The <i>Australia's Tech Future</i> strategy focuses on building a workforce to position Australia to take advantage of the digital economy.</p>

Major Commonwealth Government investment in digital infrastructure is being implemented through the NBN. This aims to provide high-speed broadband connections to every home and office in Australia across a mix of technologies – fixed line, fixed wireless and satellite. It is the largest infrastructure project in the history of Australia, providing retail telecommunications providers (e.g. Telstra, Optus, TPG and others) access to the wholesale network to enable delivery of services to households and businesses.

The Commonwealth Government has committed a further \$80 million funding for the Mobile Black Spot Program to invest in telecommunications infrastructure to improve mobile coverage and competition across Australia.

The State Government has also established a \$10 million Mobile Phone Black Spot Fund that is contributing more than \$5.3 million in the 2019/20 financial year towards 28 sites in regional and remote areas, which will benefit from the delivery of new and upgraded towers.

To complement this funding and the delivery of the NBN, a Regional Connectivity Program is being designed by the Commonwealth Government, with funding of up to \$60 million towards improving digital connectivity in regional Australia. This will provide place-based solutions to regional digital connectivity issues through a range of mobile and/or broadband services.⁴⁸

There is currently no plan that integrates strategies at the Commonwealth and State Government level and also considers public and private sector partnership arrangements to address current and future demand and connectivity gaps. Hence, investment and policy decisions for digital initiatives can be disparate, with agencies often catering for different stakeholders and cohorts, and the ability to leverage existing infrastructure assets is not always considered.

An example of a coordinated public/private sector plan is the Canadian Government's *High-Speed Access for All: Canada's Connectivity Strategy*. This leads coordination of investments between the public and private sector and provides complementary measures to ensure delivery of universal connectivity across Canada by 2030.

Impact of digital technology on business

Improvements in the productivity and performance of small-to-medium enterprises are essential to the economy. A recent small business customer analysis undertaken by Xero (a global cloud-based accounting software provider) found that, in 2017, there was a 33% greater increase in employment across businesses in mature NBN regions compared to those in non-NBN regions. This has been attributed to the use of cloud-based applications, enabled by high-speed broadband, that drive efficiency across a range of business processes.

Needs and challenges

Demand for data

The pace of change in digital transformation is growing exponentially. As the availability of products, interconnected services and new forms of entertainment grow, data consumption rates will continue to climb.

We must take the steps to ensure no one slips through the cracks as our community transitions to a digital everything world.

– City of Playford

NBN Co reported that data consumed on the NBN broadband access network had increased by almost 25% cent in the 12 months to December 2019, meaning the average Australian is now consuming about 258 GB of data per month – equivalent to 367 hours of video calls.⁴⁹

While the NBN has made a positive difference, the long-term effects of Australia's digital inclusion performance are likely to be complex, and its capacity to meet future data and network requirements will depend on further investment.⁵⁰ Ongoing investment in infrastructure is likely to be required to keep pace with increasing expectations for data availability, network capacity, speed demands and data storage.

Regional connectivity

The Infrastructure Australia 2019 audit noted that “the specific needs of rural and remote users are often overlooked in upgrades to national telecommunications infrastructure.”⁵¹ This has implications for the almost one in four South Australians who live in regional areas.

Inadequate technology is crippling small business in rural and remote communities.

– District Council of Lower Eyre Peninsula

Australia's three national mobile network operators – Optus, Telstra and Vodafone Hutchison Australia – collectively claim to provide mobile coverage to more than 99% of the population (i.e. premises). However, reflecting Australia's highly urbanised population, this level of coverage equates to only around 32% of landmass.⁵² Hence, regional South Australia has many identified black spots. Funding for 70 new mobile phone base stations has been announced since 2013 as part of the Commonwealth Government's Mobile Black Spot Program, including a total of \$7.3 million in funding from State Government; however, further investment is required.

While the NBN has made a significant impact on the accessibility of high-speed broadband and the build for regional South Australia is complete, there remain a number of issues to be addressed:

- **Reliability** – In some regional and remote areas, there is often no back-up or alternative options for consumers during outages and downtime.
- **Affordability** – There are high costs of data when compared to metropolitan connections, primarily due to only one or limited retailer options in many areas and an inability to bundle plans due to limited smaller providers on NBN's Sky Muster satellite service.
- **Digital literacy** – Consumers can lack digital knowledge and independent advice on how to get and stay connected, and the level of service required.
- **Data restrictions** – Data limits on mobile broadband, fixed wireless and satellite can be significantly smaller than other technology options. This is a particularly vexed issue with multi-use premises having to use one limited connection for business, education, health and social needs.

- **Latency** – High latency of satellite connection causes issues for consumers using low-latency cloud and remote desktop programs or applications (e.g. VoIP, Skype (with potential telehealth implications) share trading, online gaming (including gaming software development) and applications with high security restrictions).

In addition, the unprecedented year-on-year growth in demand for data is placing pressure on regional broadband services, including NBN Co's fixed wireless and satellite networks.⁵³ With demand for data and the use of digital technologies increasing, technologies such as satellite and fixed wireless will reach the limit of their capacity and capability. Congestion and data limitations on these services will necessitate upgrades and further investment to keep pace with demand.

Digital infrastructure will need to be sufficient to support a range of new services such as increased use of artificial intelligence in production and logistics as well as data management and storage.

– SA Wine Growers Association

Ubiquitous, reliable and affordable high-speed broadband is the ultimate objective, particularly given that the regions contribute over \$25 billion a year to South Australia's GSP and produce more than 50% of the State's merchandise exports. Hence, there are areas with a high concentration of business activity that could potentially benefit from prioritised investment in infrastructure that expands digital capability. Regional and remote areas with under-serviced healthcare and education needs are another priority for digital connectivity.

As an example, economic modelling taken at a national level has shown that digital agriculture, contingent on reliable and high-speed connectivity,

could increase the gross value of Australian agricultural production by \$20.3 billion – a 25% increase on 2014/15 levels.⁵⁴

Mobile communications also play a key role in the regional tourism experience. There are challenges with telecommunications accessibility in many tourism regions, even those in close proximity to Adelaide. As use of smartphones and mobile data is now common for visitors to South Australia, this has implications for safety, social media sharing, last-minute research and the use of digital maps.⁵⁵

In response to the limitations of regional networks, there are a growing number of private, non-NBN fixed wireless internet providers who operate independent wireless ISP networks to deliver alternative services in regional South Australia.

Mobile blackspots along transport corridors need to be identified, and while preference should be given to ensuring a consistent mobile network, conventional telecommunications should be considered where this cannot be achieved.

– RAA

Evolving infrastructure – rollout of 5G network

The rollout of 5G is a step-change from previous generations of mobile technology that will provide profoundly increased data capacity and speed, and the ability to segregate bandwidth for greater reliability, lower latency and less congestion. While 4G can support about 4,000 devices per square kilometre, 5G will support around one million.⁵⁶

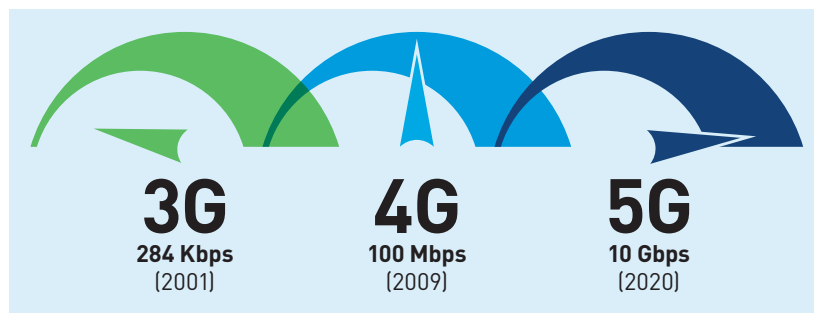


Figure 15:
Evolution of mobile speeds

Source: What Mobile

In Australia, Telstra, Optus and Vodafone (in joint venture with TPG) are building new 5G networks that leverage existing 4G networks and will require the installation of thousands of small antennae for deployment. Each small cell site requires permissions from landowners and/or local authorities, power and a backhaul link. This, along with the potential visual amenity, may be an impediment to rollout.

As 5G utilises higher-frequency radio signals than 4G, it is less capable of penetrating obstructions, which presents a critical issue in servicing indoor networks. The current high demand for strong indoor wireless connectivity will only increase in coming years.

As with deployment of any digital infrastructure, the costs of a 5G network will be affected by the size and concentration of potential users. In regional areas, sparser populations combined with smaller penetration of antennae, will likely hamper deployment. The UK National Infrastructure Commission found that national deployment would cost a total of £42 billion in capital expenditure, up to 85% of which is required to service lower density rural areas.⁵⁷

While 5G is expected to be an alternative for NBN in some locations, it will not be mutually exclusive of fixed-line networks. Fixed line will continue to be used for some services as well as providing backbone connectivity for regional areas to extend the reach of the network.

Digital transformation has long held the promise of improving productivity outcomes and 5G has been viewed as the next development to advance the capacity of communications services across the country.⁵⁸

According to the Bureau of Communication and Arts Research⁵⁹ the rollout of 5G is likely to:

- support the introduction of new goods and services, with higher data rates and lower latency expected to enable greater use of Internet of Things (IoT) devices, and
- improve business efficiency in producing and delivering goods and services and enable scope for greater innovation and the development of new products. For example, faster download speeds and lower latency will make cloud computing more effective and allow for better collection and analysis of big data that can lead to more real-time decision-making.

The development of high speed, high bandwidth connections between remote, regional and urban areas will serve to break down the large distances throughout our State and enable new ways of working such as remote operating centres as well as the potential for regional innovation precincts.

– OzMinerals

5G technology is a potential 'game-changer' for the following:

- Autonomous and semi-autonomous vehicles: Low latency will enable device capabilities to implement vehicle-to-vehicle, vehicle-to-infrastructure and vehicle-to-pedestrian communications to reduce crashes and improve safety.⁶⁰
- Utilities: Improved remote monitoring of facilities and infrastructure, remote site preventive maintenance and protection of power-grid assets.⁶¹
- Public safety: Next-generation mobile networks will support expansion in connected devices (IoT) such as video surveillance for border and area security. 5G also promises to help public safety units respond to incidents more quickly.⁶²
- Healthcare: Increased adoption of remote house calls with diagnosis via video, medical training revolutionised through virtual reality (VR) and physicians able to 'feel' a patient's body during remote examinations or even remote surgery using haptic control.⁶³
- Education: Distance training transformed through augmented and VR.
- Mining: Improved productivity and safety benefits in all areas of operations, e.g. the Boliden Kankberg mine in Sweden.

As the rollout of the 5G network is now in progress across the country, it will be critical for South Australia to identify use cases that describe how the technology can be applied to promote and facilitate uptake. Use cases should be partnership driven, bringing together telecommunications providers, industry and end-users as the critical players. Use cases should be directed to high-value applications that deliver clear economic or social benefits relative to any investment required. Government may have a role as a facilitator.

Data sharing

The Australian Information Industries Association has noted that leveraging and enhancing existing data sharing policies within the South Australian Government can provide a full range of data on key operations and infrastructure to engage the public, guide decision-making and make government more effective.

Increasingly a large volume of data is produced and consumed by devices, therefore connectivity needs to incorporate the Internet of Things and the ability to extend networks to enable future capabilities, such as autonomous vehicles.

– Australian Information Industry Association

While government currently has an open data policy, most data sets remain static and there are few real-time data services available to industries and entrepreneurs. Open access to State Government data 'as a service' could provide significant opportunities for South Australian-based enterprises to develop innovative and inclusive public services. Priority should be given to areas where there is greatest economic benefit and public value.

Cybersecurity

Australia and, indeed, South Australia continue to be targets of persistent and sophisticated cyber exploitation activity by malicious actors.

The 2019 Infrastructure Australia Audit noted that 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 intended benefits.

Network security architecture will need to adapt to achieve the right balance between security and flexibility of use to address new challenges that could emerge.⁶⁴

Leveraging existing digital assets

The State has considerable existing investment in both private and public sector digital assets, including SABRENet and StateNet. In addition to telecommunications providers investing in and holding assets, other organisations such as ElectraNet also own telecommunications networks, which they utilise for their core business. ElectraNet has an existing extensive telecommunications network across South Australia (second largest in South Australia after Telstra), which is predominantly used for protection and control purposes across the electricity transmission network. This has spare capacity that could be utilised for commercial telecommunications purposes.⁶⁵

Consideration should be given to how the State could potentially benefit from further harnessing spare capacity within existing telecommunications assets. For example, the State Government's SWiFT networks may be able to be leveraged to improve the availability and speed of data services across health and other sectors to provide broader benefit to South Australian communities.

Emerging technologies

Shifting needs will continue to drive innovation that will change the way infrastructure is used, managed and delivered. The exact nature of this innovation over the next 20 years cannot be predicted with any precision; however, some of the emerging technologies of today can begin to provide an indication of what might come.

Examples of some of these emerging technologies include:

- **Technologies to support the Internet of Things (IoT)** – Technologies that support the growth of IoT include examples such as low-power wide-area network technologies like LoRa (Long Range). This is a networking protocol for wireless communication that allows IoT devices to communicate over large distance with minimal battery usage. While this is not a technology for mass communication, applications include

smart homes (lighting, fridges, air-conditioning), smart city applications (lighting, parking), agriculture (environmental monitoring, remote sensing for vineyards) and health (monitoring, falls detection, personal alarms).

- **Space technologies** – Future space technologies such as microsatellites (low earth orbit) have the potential to provide digital connectivity across the globe. Microsatellites are being planned by a number of private space and communications companies to create a global broadband network. Comprising large constellations of microsatellites (possibly in the thousands), this technology could provide ubiquitous coverage for internet connectivity regardless of location. Unlike larger satellites, microsatellites offer the potential for lower latency – an essential feature for real-time applications. As the cost of developing microsatellite networks is high, this may be a medium-term proposition.
- **Controllable loads** – Demand response in energy markets is the voluntary reduction or shift of electricity use by customers, which can help keep a power grid stable by balancing its supply and demand.⁶⁶ This flexibility in the system delivers greater efficiency in meeting peak demand and providing lower energy systems costs overall. This is being enabled by a range of technologies that centrally control demand response initiatives. Digital technologies such as smart meters, Bluetooth connections and virtual control rooms enable broad-scale participation in schemes offering consumers discounted energy in exchange for agreeing to certain kinds of controllable loads (e.g. air conditioning, heaters, pool pumps and the likes) being switched off during times of peak demand.

Skills

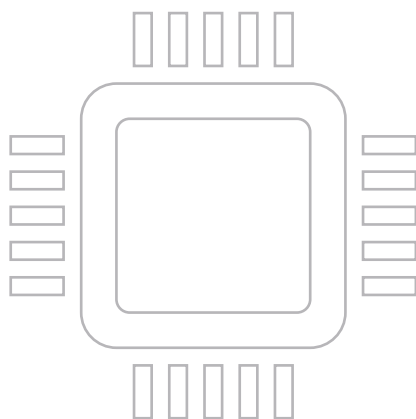
More than 90% of Australians will require some level digital literacy at work within the next five years;⁶⁷ however, evidence suggests there is a growing deficit in skills required to effectively implement the new highly digitised and mechanised systems of work.⁶⁸

The Digital Pulse report notes that meeting the voracious demands for more technology workers from Australia's businesses will be a huge challenge. The report projects that national demand for technology workers will grow by 100,000 between 2018 and 2024 in trend terms, with the technology workforce increasing to 792,000 workers.⁶⁹

While the pipeline of technology workers and skills is gradually improving due to increasing numbers of ICT graduates from Australian universities, in 2017/18 there were 26% fewer visas granted for skilled technology workers from overseas than the previous year. This cohort is an important source of technology skills.⁷⁰

In the VET sector, there was also a significant decline of 11,875 ICT subject enrolments between 2016 and 2017, largely attributable to a fall in ICT subject enrolments at the diploma level or higher and driven by a reduction in domestic students' ICT subject enrolments.⁷¹

While not strictly an infrastructure issue, this highlights the need for continuous learning and training to ensure that South Australia has the workforce it needs to take advantage of digital transformation at all levels.



Future priorities

PRIORITY 3: DEVELOP A DIGITAL CONNECTIVITY STRATEGY TO POSITION SOUTH AUSTRALIA TO TAKE ADVANTAGE OF THE OPPORTUNITIES ARISING FROM DIGITAL INFRASTRUCTURE

There is a clear case for a whole-of-state digital connectivity strategy that seeks to identify goals, measurements and timeframes for delivering reliable, fast and affordable communications for regional and metropolitan South Australia, with an aim of ensuring infrastructure is scalable as new requirements and technologies emerge.

The Strategy should be developed as a partnership across all levels of government and the private sector, and consider where strategic investment is required to address gaps for both mobile and fixed-line connectivity. It should also take into consideration the City Deal arrangement with the Commonwealth Government to deliver a plan for digital service delivery, enhanced connectivity and data capacity within Adelaide.

In developing the Strategy, an audit of all existing public and private sector networks should be undertaken to identify the current status of network capacity and capability, as well as proposed private sector network investments to understand the assets that could be leveraged and maximised.

The Strategy should consider private and public sector funding alternatives to address connectivity issues where there are gaps. Where funding is required, a clear and compelling business case should set out benefits commensurate with investment required. It should also seek to address deficits in digital skills in target groups identified by the Australian Digital Inclusion Index.



Fostering industries of the future

The Adelaide Innovation Strategy and City Deal aim to support local innovation while attracting talent, business and industry leaders from around the world. Adelaide is already home to precincts catering to various sectors of the innovation economy – Tonsley, Osbourne, Edinburgh, Mawson Lakes and Waite – and has Lot Fourteen in development. Together, these position Adelaide and the State as the hub of innovation to underpin future growth.

EDUCATION



Role of education infrastructure

Education is critical to growing the economy by providing the skills needed for future industries. It also lifts people out of disadvantage to improve social cohesion.

Education infrastructure must respond to population growth and provide the spaces and assets necessary to enable and promote modern, flexible and relevant education. For the purpose of the Strategy early learning, primary and secondary education, and tertiary education at universities and vocational training providers have been considered.

453 primary schools	78 secondary schools	160 combined schools	15 schools for students with a disability
16 Aboriginal/Anangu schools	5 universities	39 TAFE SA campuses	450 private VET providers

Figure 16:
Education providers by type

Source: Australian Curriculum Assessment and Reporting Authority, Department for Education and Infrastructure Australia
Note: Total school numbers include public and private schools

Buildings, classrooms, laboratories, and equipment – education infrastructure – are crucial elements of learning environments in schools and universities. There is strong evidence that high-quality infrastructure facilitates better instruction, improves student outcomes, and reduces dropout rates, among other benefits.

– World Bank, 2017

Early childhood education and care (ECEC)

Current state

Value of early learning

Research has shown investment in quality ECEC leads to improved health, education and employment outcomes for children. These improved outcomes have economic impacts that reach beyond children and their families. Encouraging enrolment of vulnerable and disadvantaged children in childcare is also an avenue to help break the cycle of poverty by improving long-term benefits of educational outcomes.⁷²

According to the Organisation for Economic Co-operation and Development (OECD), women’s labour force participation has increased significantly over the past 30 years. The rise in ECEC provision over this period has been cited as greatly contributing to this change.

Current supply

The ECEC market is a mixture of public, private and community facilities, and subject to a National Quality Framework that sets guidelines for requirements of facilities.

There are diverse types of ECEC services including preschool, children’s centres, rural care, occasional care, family day care, out of school hours care (OSHC) and in-home care (nanny, babysitting services). An ECEC centre may offer more than one service type, such as centre-based day care and OSHC. The most common type of integrated service is a preschool program delivered within centre-based day care.⁷³

In 2018, there were 815 ECEC services approved for the Commonwealth Government Child Care Subsidy (CCS). Of this, 51.9% were centre-based day care, 1.5% family day care and 46.4% OSHC.⁷⁴ The Department for Education (DE) operates 384 preschools. Participation in preschool and other early

childhood services delivers significant educational, social and emotional benefits for the children who attend.

A 2018 study by Urban Economics estimated that of the early learning centres operating in South Australia, around 92% were in metropolitan areas, with the remaining spread across regional and remote areas. The study estimates the average occupation rate is 73%, but this varies significantly across the State and between centres.⁷⁵

Needs and challenges

Uneven supply and demand

Growth in need is largely dependent on population growth in the relevant age cohorts but also impacted by increased availability and accessibility of childcare, improved quality and amenity of facilities, and cost of living pressures that have contributed to increased dual-income families and demand for childcare. Urban Economics forecasts show that by 2041, 1,707 new places and 23 new centres will be required.⁷⁶

The Australian Childcare Alliance of South Australia (ACASA) has advised that there are over 100 new centres providing long day care and/or preschool programs either proposed or in development in Adelaide. Based on the projected demand and a viable standard occupancy rate of a 70%,⁷⁷ the metropolitan market is heading towards an oversupply in some areas. This is consistent with the national trend.

Council requests that the State Government invest in future expansion of child care centres in regional towns, as provision of such services is important to families and professional people living in regional towns, and to attracting and retaining further professionals.

– District Council of Lower Eyre Peninsula

In regional areas the picture is very different. Sparser populations and seasonal workforces make it difficult to maintain the viability of ECEC centres, hence supply is limited. This is not only limiting opportunities for children but also for (predominantly) female workforce participation due to a lack of suitable childcare.

DE acknowledges the complexities of operating sustainable ECEC centres and operates many rural facilities and a mobile rural care service due to issues with financial viability. It is currently undertaking a review of rural early childhood services with a view to considering options for future supply.

In both metropolitan and regional locations, support for shift workers or those on variable hours is very limited as services offer little flexibility for extended hours. With the increasing casualisation of the workforce, demand for flexible services is likely to grow.

Skills

Although there has been substantial growth in the number of qualified early childhood teachers and educators since the commencement of the National Quality Framework in 2012, workforce shortfalls to meet qualified staff-to-child ratio requirements continue to exist in some locations across Australia. In December 2019, Education Ministers endorsed the development of a new ECEC national workforce strategy to support the recruitment, retention, sustainability and quality of the early childhood services workforce.

There have been recent national changes in requirements for ECEC qualifications which may be constraining supply of ECEC services, especially in regions, through lack of an appropriately skilled workforce to maintain necessary ratios. Workforce matters in ECEC are complex and intersect between government and non-government providers. In South Australia, there are a variety of different initiatives underway that aim to support the workforce, such as a project by the Department for Innovation and Skills to upskill existing workers from a certificate III to a diploma qualification under a traineeship model.

South Australia is also considering application of a three-month probationary period for new educators without an approved qualification to be counted as a certificate III qualified educator for the purposes of educator-to-child ratios in centre-based services that educate and care for children preschool age or under.

Artist's impression, New Whyalla High School
Image courtesy of Cox Architects



Primary and secondary education

Current state

South Australia currently has 354 public primary schools and 65 public secondary schools. A significant number of students are also educated within the independent schools and Catholic education systems.⁷⁸

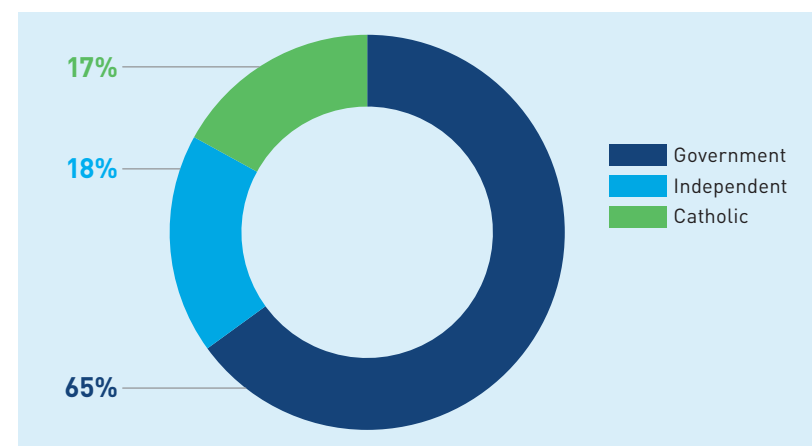


Figure 17:
School enrolments by sector, 2018

Source: ACARA

With an extended period of low population growth, there was no new public school between 2011 and the opening of Adelaide Botanic High School in 2019, although several high schools were expanded over this time and additional accommodation was provided for a number of other schools. This is reflected in South Australia having the lowest aggregated capital spend per student across Australia from 2013 to 2017, noting that during this time period, some states (Western Australia and Queensland) implemented

a policy to move Year 7 to high school, which would have impacted school capital investment programs in those jurisdictions.

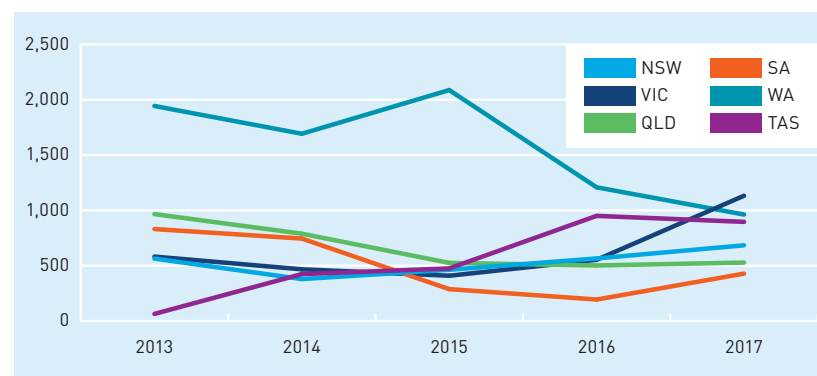


Figure 18:
Public school CAPEX, \$ per student, 2013–17

Source: ACARA school funding dataset

However, the recent increase in public school enrolments has resulted in a significant investment in the public school system:

- Adelaide Botanic High School as the first vertical school for the State.
- The new state-of-the-art Whyalla Secondary School opening in 2022, which consolidates three existing secondary schools and co-locates with TAFE SA and the University of South Australia to form an education precinct.
- New Birth to Year 12 schools in the outer north (Angle Vale) and outer south (Aldinga) that also cater to students with a disability, delivered as a public-private partnership and to open in 2022.
- Capital works to improve facilities at 99 government schools and provide additional capacity including supporting the transition of Year 7 to high school (\$890.5 million), providing flexible learning spaces and creating

additional places for students with disability across government high schools.

- \$250 million investment in STEM facilities across public schools, plus the rollout of the \$89.5 million SWiFT (Schools With internet Fibre Technology) investment program in partnership with Telstra to connect 514 of the 518 public schools in the State to high-speed fibre-optic cable.

Performance of the education sector

While infrastructure plays an important role in providing the foundation for education, the most important drivers of school quality have been identified as teaching practice and quality, classroom organisation and environment, and school leadership.⁷⁹ Australia's schooling system has consistently been ranked as one of the highest performing in the world; however, in recent times international comparative testing has indicated a decline in results and scope for improvement.⁸⁰

In February 2019, DE released its *Towards World Class Education Action Plan*.⁸¹ This outlines a program of work to achieve world-class education in South Australia, including each school producing a three-year school improvement plan for annual review. The Department is also offering leaders and teachers access to a new professional learning academy that will offer literacy and numeracy teaching courses and instructional leadership courses to accelerate improvement in schools. The academy will expand its offerings over time.

Aboriginal students

South Australia currently has 16 Aboriginal/Anangu Schools across the State.

Closing the Gap is a Commonwealth Government strategy, developed in collaboration with state and territory governments and released in 2008, that aims to reduce disadvantage among Aboriginal people with respect to life expectancy, child mortality, access to early childhood education, educational achievement and employment outcomes. A 2018 review of Closing the Gap found that the State is on track for two of the four targets relating to education outcomes, as follows:

- The target to have 95% of all Aboriginal four-year-olds enrolled in early childhood education by 2025 is on track.
- The target to halve the gap in Year 12 attainment by 2020 is on track.
- The target to close the gap in school attendance by 2018 is not on track.
- The target to halve the gap in reading and numeracy by 2018 is not on track.

A State Government *Aboriginal Education Strategy* released in 2019 establishes DE's direction in closing the gap for children and young people in South Australia. This strategy sets out the vision and principles viewed as essential for Aboriginal children and young people to achieve growth and success.

In addition, the Clontarf Foundation football academies program is being piloted in six public schools from 2019 to improve the education, discipline, life skills, self-esteem and employment prospects of Aboriginal boys. The program is receiving funding of \$2.75 million and includes the provision of new and refurbished facilities at six schools across the State.

Needs and challenges

Responding to growth

Population growth in the relevant age cohort is a significant driver for demand on education infrastructure. Total numbers in the public system remained reasonably stable between 2009–2013, but these have increased significantly in recent years to a total of 176,376 in 2019, amounting to a 10% total increase over a 10-year period. This is due in part to a combination of factors:

- an increase in school-age children attributable to the baby bonus
- an increase in overseas migration with larger families, and
- a broader shift towards public education.

The Department of Planning Transport and Infrastructure has prepared population projections out to 2041 where the medium series sees an 18,820 increase in the 5–17-year-old cohort in Greater Adelaide and the high series projects an increase of 51,643. Over the same period, the medium series sees a decrease of 2,130 in this age group outside of Greater Adelaide and the high series projects an increase of 7,413. This demonstrates the challenge in long-term capacity planning within a wide range of potential capacity requirements. Where these numbers settle will also have a significant impact on the capacity of the school system to absorb additional students and the location of new school infrastructure. Consideration should also be given to the Government's ambition to increase population growth to the national average, which would see an even greater need for increased capacity than the high series projections.

Unbalanced growth

Growth in enrolments has not been consistent across the State. In the 10 years to 2019, schools in Greater Adelaide experienced a 15% increase in enrolments. Meanwhile, in the rest of the State, enrolments declined by 3%. The Inner Metro region of Greater Adelaide (consisting of the City of Adelaide and immediately surrounding councils – Prospect, Walkerville, Norwood Payneham and St Peters, Campbelltown, Burnside and Unley) experienced the greatest increase in enrolments: 27% in the 10 years to 2019. This is consistent with broader population and settlement patterns and a shift towards infill development.

A school is typically deemed to be experiencing ‘enrolment pressure’ if the number of students enrolled is proportionately greater than the school’s mainstream enrolment capacity. Enrolment pressure can occur for a number of reasons including:

- local enrolment growth due to population increases and changing demographics, and
- unsustainable enrolment management practices, whereby students live outside the school zone or catchment.

The strategies currently employed by DE to support schools that are experiencing enrolment pressure include the introduction of a capacity management plan, school zones and the provision of additional modular accommodation when required, where adequate land space is available. DE actively communicates the enforcement of zoning to parents.

These strategies have limitations where parents are exercising greater choice for their children, with the local zoned school not always the preferred option. Parents are showing a willingness for their children to either travel some distance to attend specific schools, subject to zoning and access to special programs, or to relocate to an area that is in the catchment for their preferred school. This is increasing demand for certain schools disproportionately and has left the system with some schools with surplus capacity while other schools are significantly under capacity.

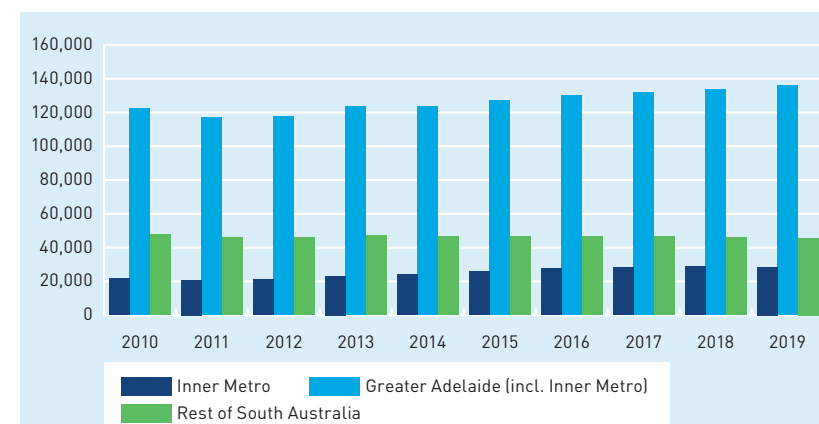


Figure 19:
Public school enrolments by area, 2010–19

Source: Department for Education

Older, not fit-for-purpose facilities

While significant capital is being invested in building new education facilities and modernising existing facilities, some public schools are beyond their design life and some building assets are no longer fit for purpose or able to cater for contemporary approaches to inclusive education. This makes it a challenge to provide an equivalent educational experience at a school that has not had a significant upgrade compared to those with new facilities. While it is acknowledged that teaching practices and quality are the most significant determinant of educational outcomes, certain equity issues can arise at schools that do not have contemporary facilities. Significant investment in schools can also increase the perceptions of certain schools being more ‘desirable’ and accentuate uneven demand across the portfolio.

Temporary transportable classrooms have been in use since the 1950s to cater for enrolment fluctuations. Of the approximately 1,400 such classrooms, a number have been in situ for decades and cannot be relocated

to other sites in need of additional capacity due to their age, condition or location. Programs should be developed to replace these older facilities with more contemporary fit-for-purpose spaces over time.

There is also a significant maintenance backlog across the portfolio. The total Annual Capital Program budget for public schools and pre-schools in 2018/19 was \$51.4 million. While this is unlikely to be adequate on an ongoing basis to address the backlog, further work is required to quantify maintenance requirements and develop an appropriate programmed maintenance schedule to address the backlog.

The removal of asbestos will also be an ongoing priority for DE. Asbestos management and risk mitigation strategies are in place and any urgent repair and removal is actioned promptly as the need is identified. However, no dedicated program to remove all asbestos from sites is in place.

Changing educational needs

Contemporary learning spaces are different to the traditional 'chalk and talk' model and need to reflect a connected reality. They incorporate a diversity of settings that accommodate different learning styles and needs. Public schools will be better able to provide options for new and more immersive learning experiences due to the investment in SWiFT. There is also an increasing prevalence of VET within the school environment.

Infill and urban growth

Traditionally, new schools were built in urban growth areas where land is more freely available and able to be reserved. The trend towards urban infill has increased population – hence demand – in inner urban areas; however, land required to build new schools in these areas is limited and expensive. One infrastructure response looks to build larger schools on existing sites or more vertical schools such as Adelaide Botanic High School; however, this is a more expensive construction method.

To inform future infrastructure planning and priorities, DE is prioritising the ongoing monitoring of residential development activity including minor infill, large infill sites, urban corridor zones and greenfield development. Particular attention should also be paid to addressing areas of greatest immediate and predicted enrolment pressure, such as the inner eastern suburbs and high-growth areas such as the inner west, northern suburbs and Mount Barker. Where possible, provision for additional school capacity should be considered and reserved on significant releases of land that are likely to increase demand.

Over the next 30 years, by 2049, the Mount Barker population is anticipated to rise to 50,000, with approximately 10,000 of those people students (primary and secondary).

– District Council of Mount Barker

Quality education in regions

Due to low population densities and declining numbers at some schools, it is a challenge to provide the same educational experience in regions in terms of both diversity of subjects and level of interaction with peers. Where appropriate, amalgamations have been implemented to provide a higher level of service.

Amalgamations provide an enhanced educational environment for students and teachers, with an efficient supply of resources, a more comprehensive curriculum and more opportunities for improved co-curricular experiences, both of which offer significant benefits to students. Implemented in consultation with the communities involved, they may involve combining and converting existing primary or high schools to government's preferred model: Birth to Year 12 schools.

Shared facilities

School infrastructure is a significant capital asset that is often under-utilised for large parts of the year. DE has communicated its vision of schools as community hubs, where government schools, preschools and facilities are more accessible and shared across communities. While many schools do share facilities with local community groups to some degree, implementation of the policy currently resides with individual principals. Schools being able to utilise other public facilities may also be an efficient solution to providing facilities for students, especially in the inner urban or regional areas.

The co-location of schools with other community facilities provides opportunities for integrating and optimising assets through community use of school facilities and vice versa, helping bring communities together. The strategic planning and development of community hubs can assist in distributing the cost between multiple providers. Where new facilities are required, there may be opportunity to work with other community groups for joint funding and use arrangements to get better utilisation.

CASE STUDY

Joint use and funding

In order to provide Kadina Memorial School and Wallaroo Mines Primary School students with access to quality sports facilities, DE made a capital contribution towards the redevelopment of the council-owned Copper Coast Sport and Leisure Centre. The agreement granted the schools exclusive access to parts of the centre during school hours.

Collaboration across the sector

While the public, independent and Catholic systems cooperate on curriculum and education policy issues, there is limited collaboration in terms of sharing or planning for new infrastructure. The Aberfoyle Park Campus site, which consists of Thiele Primary School, Pilgrim School and School of Nativity, is one example where public, independent and Catholic schools share the same campus and many activities. This model should be given greater consideration as part of the infrastructure response to growth in demand in certain areas.

Maximise investment in digital infrastructure for educational programs

Investment in the expansion of fibre-optic connectivity to public schools across the State via the SWiFT program provides a significant opportunity to improve digital connectivity across the regions and give students access to the best educational opportunities. This could, however, be better linked to the *Towards World-Class Education Action Plan* and incorporated into individual school improvement plans.

Tertiary education

Current state

An effective tertiary education sector is critical to ensuring the State's future workforce has the necessary skills to secure rewarding careers and participate effectively in the economy. There is an increasing emphasis on 'job ready' graduates that can meet current and future skills needs.

The tertiary sector comprises five public and private universities, TAFE SA and over 30 private VET providers. In 2018, there were approximately 118,000 people enrolled in a university course⁸² and 222,000 in vocational courses.⁸³

TAFE SA and the universities are generally well-serviced for digital connectivity through access to SABRENET, a fibre-optic broadband network linking major research, education and innovation sites in Adelaide, and AARNET in regional areas.

International students

According to ABS data, international students spent close to \$1.5 billion on education fees and other goods and services in South Australia in 2016/17. International education is, therefore, the State's largest services export and second largest overall export behind alcoholic beverages.⁸⁴

The State Government's *International Education 2030* plan sets an ambitious target of close to doubling the number and value of enrolments by 2030 to 71,000 students and \$3 billion respectively, and sets out a series of initiatives to support the growth target. The State's universities and TAFE SA all have growth ambitions for international students and are actively marketing to this sector.

Student accommodation

In response to the growth in international students, there has been a boom in student accommodation. While some universities offer the option of university-managed housing with a variety of facilities, the market is predominantly serviced by the private sector.

Adelaide's private student accommodation market is operating at 85–95% occupancy. By 2022, there are expected to be 7,376 student accommodation beds across inner Adelaide, and the current projected capacity should accommodate strong growth in international student enrolments through to at least 2025.⁸⁵ This will need to be monitored as student numbers grow.

Flinders University has also flagged significant investment in student accommodation within Flinders Village as part of creating a well-rounded urban precinct.

VOCATIONAL EDUCATION

TAFE SA has a significant portfolio of assets across the State, currently comprising 39 campuses across metropolitan and regional South Australia.

In 2017, the Australian Skills Quality Authority (ASQA) identified accreditation issues with TAFE SA, which triggered a reform program that has seen a change of the leadership and board, and in 2019 ASQA granted TAFE SA the maximum term of seven-year registration as a national VET registered training organisation (RTO) for local and international students.

Other developments have also impacted the sector:

- To better understand skills and workforce development needs, the Government has reset the agenda for the Training and Skills Commission (TASC) and established Industry Skills Councils. Through these, it will play a key role in the design and development of vocational pathways for each industry sector.
- In 2018, the State Government announced an investment of \$100 million combined with an additional \$102.6 million Commonwealth funding to deliver 20,800 apprenticeships and traineeships over four years.
- TAFE SA has signed a memorandum of understanding (MoU) with the independent Tertiary Education Council Australia that will give independent training providers more access to publicly owned sites and resources, and vice versa.
- The new VET for School Students policy also aims to recalibrate courses to match industry need and the potential for long-term employment.⁸⁶

Economic modelling undertaken by TASC has found that about 482,000 qualifications need to be delivered between 2015–2025 to meet industry demand for skills, approximately two-thirds of which are VET qualifications.⁸⁷ This significant focus on vocational training as a key component of future skills development will require the right assets in the right locations to be able to support the training program. This will be essential to South Australia's aspirations for economic growth.



Adelaide College of the Arts
Image courtesy of TAFE SA
Photographer: Sam Roberts

UNIVERSITIES

Universities have grown to effectively be large businesses and significant investors and shapers of infrastructure. They also play a significant (and growing) role in jobs and industry precincts, forming key anchors and drivers of activity.

In recent times, South Australia's three largest universities have either completed or been progressing significant capital investments:

- The University of Adelaide: A \$246 million, 14-storey health and medical sciences research facility completed in 2017 consolidates four faculties into one, situated in the health and biomedical precinct on North Terrace.
- University of South Australia released blueprints in 2018 for over \$400 million in new campus spaces, including a \$247 million, 14-storey Cancer Research Institute.
- Flinders Village: Flinders University is undertaking a private-public partnership to deliver the \$1.5 billion Flinders Village at its Bedford Park campus. The integrated health and education precinct leverages the new Flinders Station, due to open in 2020.

Over the next decade, The University of Adelaide is exploring further investment at the city east precinct, while the University of South Australia is seeking to consolidate its campus presence onto the City West and Mawson Lakes campuses.

Universities have advised that new investment in infrastructure is likely to be focused primarily on R&D, administrative, social and collaborative spaces as opposed to traditional lecture theatres. There is an emphasis on integrating commercial operations onto campuses to drive an industry-focused approach and provide critical employment linkages for students.

The university sector has seen significant growth in online course delivery, albeit primarily by postgraduate students or undergraduate students studying remotely, either within Australia or internationally. To date, there

remains a consistent demand for on-campus delivery of undergraduate programs, with students continuing to value the social and collaborative aspect of the campus experience.

Needs and challenges

Delivering the right skills as they are needed is complex and requires coordination. The predicted boom in the shipbuilding program, for example, is an opportunity to get policy settings right. Collaboration between industry and universities will be critical.

VET reform

While VET training continues to evolve, the sector is facing a number of challenges:

- The need for lifelong learning is more important than ever and will continue to be. The VET system must ensure it is flexible and keeps pace with change by offering a broad range of courses to cover the diverse learning needs of students.
- As technological advancements such as simulation technology offer opportunities to change the way courses are delivered, fewer facilities requiring specialised equipment may be needed.
- Underutilised facilities with inflexible layouts will need to be adapted to respond to future needs.

A key focus for TAFE SA will be continued implementation of the reform program and responding to the training priorities established by TASC.

Master planning TAFE assets

As part of the ongoing reform program, TAFE SA has gained control of its assets following their transfer from Renewal SA. A master planning process should consider how assets can be maximised to meet future needs.

Young people already experience a range of challenges when accessing or completing VET courses but geographical remoteness, a lack of choice of VET providers and a lack of flexible learning options are major barriers to undertaking VET courses.

– Youth Affairs Council

TAFE SA is developing a master plan for campus assets that considers options for 'right sizing' the portfolio, sets the organisation up to flexibly respond to future challenges, and maximises underutilised assets in both metropolitan and regional locations to support a range of shared uses. This presents an opportunity to expand the role of TAFE SA campuses, opening them up to other providers, secondary schools and the university sector. In some areas, TAFE SA campuses are being utilised as Regional University Centres to provide study spaces, video conferencing, computing facilities and Internet access, as well as academic support and pastoral care for students studying long distance at partner universities.

In January 2020, the Commonwealth Government announced a \$50 million TAFE revitalisation program that is intended to deliver infrastructure projects, refurbish facilities and purchase specialist training equipment. Details of the program are yet to be released.

Regional access to university

Ensuring that people in regional and remote areas can access higher education is an ongoing challenge that can see young people migrating to Adelaide or undertaking long commutes. The uptake of online courses is expected to grow in response to this need. Although this method of delivery requires limited built form infrastructure, it hinges on ubiquitous and reliable digital connectivity. The current lack of regional digital infrastructure is a major constraint. Utilising existing spaces as university

hubs and collaboration between universities for the delivery of courses can increase options.

Major disruptors

The traditional model of the teaching and research institution is set to change. Business models and the pace of change for the tertiary sector is anticipated to increase rapidly, with EY⁸⁸ noting the following major disruptors:

- Blurring industry boundaries, which not only require new course offerings to keep pace but give rise to new educational services that challenge traditional university offerings, and
- Rise of continuous learning, where delivery of micro-credentials will ensure a workforce that's constantly updating its skills. This may see the introduction of other non-university players enter the market.

Recognising the important role of universities in innovation precincts

Successful innovation precincts have strong partnerships between industry and universities to create shared intellectual property and commercialised research. They benefit from direct patronage of a university, specifically where it has strengths that are aligned with the precinct purpose. The involvement of a university in an innovation precinct is one of the key factors in ensuring a precinct is more than just a property development or infrastructure development project.⁸⁹

The important role universities play in key economic precincts – as asset owners, economic contributors and generators of commercial R&D – must be better leveraged.

Transport connectivity

Transport links to support university campuses need to be considered to ensure stronger and more integrated connectivity. This will support both domestic and international students and encourage greater patronage of the public transport network. The Flinders Link project is a good example of transport responding to student needs and preferences.

Research infrastructure to support economic growth

The growth sectors identified as part of the State Government's *Growth State* plan are all hi-tech research-enabled industries. Any investment in research infrastructure should be prioritised to support growth in those globally focused sectors as well as industry collaboration.

One initiative is the EXCITE (Excellence, Collaboration, Innovation and Translation, and an Enabled Future Workforce) strategy being developed under the guidance of the Chief Scientist, with a key outcome being a research infrastructure roadmap that will articulate future investment needs and drivers.

Skills shortages

The pace of technological change requires skills development for future generations. Cognitive and digital skills, as well as strong creative, social and translational skills will take on new importance. Although Australia currently performs well in areas like collaborative problem solving, the most recent OECD Programme for International Student Assessment (PISA) results highlight a steady decline in areas such as mathematics and science. Addressing these declines is important as small improvements in workforce cognitive skills can have very large effects on GDP and future wellbeing.⁹⁰

At a national level, Reserve Bank of Australia (RBA) reports suggest that there are currently shortages of certain types of engineers, workers with specialised IT skills and some tradespeople associated with public infrastructure work. Businesses in regional areas are also more likely to report a greater degree of difficulty finding suitable labour.⁹¹

TASC is currently undertaking detailed analysis across all skills categories to understand where South Australia has gaps, and will be working with the education sector and Industry Skills Councils to address shortages through detailed roadmap plans.

Future priorities

PRIORITY 4: ADDRESS REGIONAL LACK OF SUPPLY OF EARLY LEARNING FACILITIES

There is a shortage of early childhood education and suitable childcare in the regions, which is inhibiting outcomes for children and working families, impacting on equity of access to these services and inhibiting workforce participation. Efforts should be made to understand demand in the regions and explore how shortages can be addressed through a range of interventions, including changes to policy and the role regional schools can play.

PRIORITY 5: PREPARE AND MANAGE GROWTH IN DEMAND FOR SCHOOLING

The school system will continue to see growth in demand as population grows. The ability to efficiently respond to this growth is challenged by uneven demand across the portfolio and from region to region.

While DE continues its current capital program to address enrolment pressures at certain schools, there is a need to spread demand to better utilise capacity across the portfolio. This should include a range of interventions – from DE continuing and possibly expanding

its non-capital demand management strategies through to strategic investments in schools in areas of forecast demand that have the potential to better utilise surplus capacity through a strategic repositioning.

Where demographic projections forecast the need for new schools, efforts should be made to reserve land where possible, and potential educational needs should be considered when surplus government land becomes available.

Designs for new builds of schools should adhere to facility guidelines where possible to get efficiencies in construction and consider PPP arrangements.

PRIORITY 6: RECOGNISE EDUCATION FACILITIES AS COMMUNITY ASSETS AND PROMOTE SHARED USE WHERE POSSIBLE

The education sector has significant assets that are underutilised for large periods of time in each year. The sector – schools, TAFE colleges and universities – should consider options that open up assets and facilities for other uses, including for other educational purposes and for community and business (while maintaining child-safe environments).

In developing new facilities, schools and educational institutions should also consider utilising other community assets before looking to build new facilities to improve utilisation of current resources.

**Artist's impression,
Flinders Village**
*Image courtesy of
Flinders University*



HEALTH



Role of health infrastructure

An efficient and accessible health system is vital to modern society. The South Australian health system generally provides high quality and safe care to all communities; however, like health systems worldwide, it is faced with several challenges that threaten service sustainability.

Health services, infrastructure and the sector workforce are all under increasing pressure, challenged by population growth, ageing and an increase in the rate of chronic disease, including mental illness, as well as occasional shocks such as COVID-19. Changing community expectations and advances in medical and surgical technology are also factors. Within this environment, well-planned and managed infrastructure is critical for efficient and effective service delivery.

Current state

South Australian health system performance

The health system involves a mixture of public and private services with complex funding arrangements involving Commonwealth and State Government and private funding streams. The complex, shared and overlapping responsibilities of a wide range of stakeholders involved in the provision of care can complicate health service and infrastructure planning.

Consistent with all other states and territories, health expenditure is increasing and, in 2017/18, total expenditure on health services in South Australia was approximately \$13 billion, equating to over \$7,000 per person.⁹²

The Commonwealth Government funds the largest portion of health expenditure for South Australia, followed by State and local governments, and out-of-pocket costs of individuals (see Figure 20).⁹³

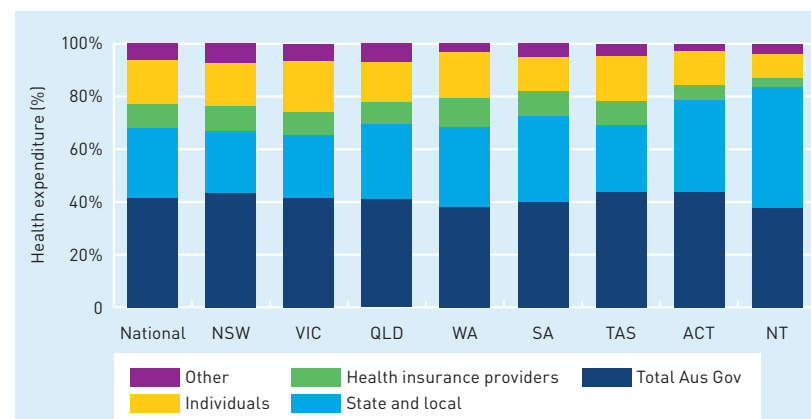


Figure 20:
Health expenditure by funding source, states and territories, 2017/18

Source: Australian Institute

In 2017/18, spending increased on nearly all areas of health across Australia. Recurrent expenditure in South Australia increased by 5.7% between 2016/17 and 2017/18. In the same period, expenditure on hospitals increased by \$669 million (16%) and spending on primary health care by \$79 million (2%).

South Australia's public health system operates through a network of 10 Local Health Networks,⁹⁴ 77 public hospitals,⁹⁵ over 4,800 public hospital beds⁹⁶ and an infrastructure portfolio valued at over \$7 billion.

Compared to other states and territories, South Australia had the highest hospital expenditure (43%) and one of the lowest expenditures (33%) on primary health care (see Figure 21) as a proportion of total health expenditure.⁹⁷

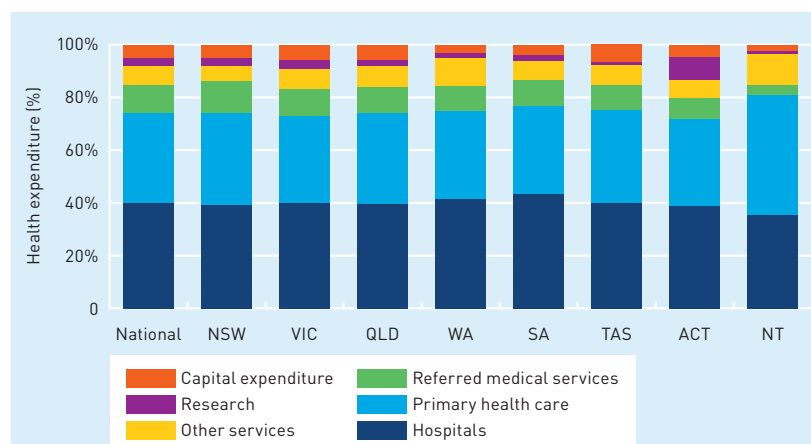


Figure 21:
Health expenditure by area of expenditure, states and territories, 2017/18

Source: Australian Institute of Health and Welfare

The largest single expenditure sector in the state budget, health care received over 37% of allocations in 2019/20. Hospital efficiency is assessed based on the cost to treat patients. In the most recent IHPA report, the average cost per inpatient separation varies between states and territories. South Australia (\$6,032) had the highest average cost per separation and Northern Territory the lowest (\$3,697). This variation is attributable to several factors including differences in policies and procedures, the complexity of treatment, and patient age and location.⁹⁸

To account for these differences, the complexity of each state and territory work profile should be considered using a weighted separation. Within this context, South Australia continues to have one of the highest average costs per admitted acute separation (\$5,644), third behind Western Australia (\$5,821) and Northern Territory (\$6,231), and is higher than the average of \$4,885.⁹⁹

South Australia (\$483) had the second highest cost per non-admitted service event, after the Northern Territory (\$521), exceeding the national average (\$318).¹⁰⁰ For emergency department presentations, South Australia (\$741) is higher than the national average (\$705).¹⁰¹

While the State's ratio of an average 2.67 hospital beds per thousand people¹⁰² is marginally higher than the other jurisdictions, it does not necessarily indicate higher accessibility of hospital services. The key issue for efficient spend in health infrastructure is not necessarily developing more beds; rather, investment in hospital avoidance and substitution models, as well as optimising the use of existing built assets, is needed to reduce reliance on expensive hospital infrastructure and services. Improving the flow of patients out of hospital and between systems is important to improve the efficiency of the system as a whole.

While South Australia performs relatively well in many aspects relating to cost and available hospital beds, there is room for improvement in the following areas:

- Median waiting time for emergency department presentations in 2018/19 was 26 minutes – one of the longest.¹⁰³
- The proportion of Australasian Triage Scale (ATS) Category 2 patients seen on time is the lowest in the country.
- The proportion of ATS Category 3 patients seen on time is the second lowest.
- The average waiting time for elective surgery exceeded the national average in 2018/19 (41 days at the 50th percentile).¹⁰⁴

In addition, inpatient average length of stay (ALOS) for an overnight hospital admission in 2017/18 was 2.68 days for South Australian hospitals, which is slightly higher than the national average of 2.4 days. The ALOS for overnight inpatient separations in South Australian hospitals increases to 4.43, which is also slightly higher than the national average of 4.19 days.¹⁰⁵ South Australia's hospital utilisation rate of 229 admissions per 100,000 population was the lowest of all states and territories, although similar to NSW.¹⁰⁶

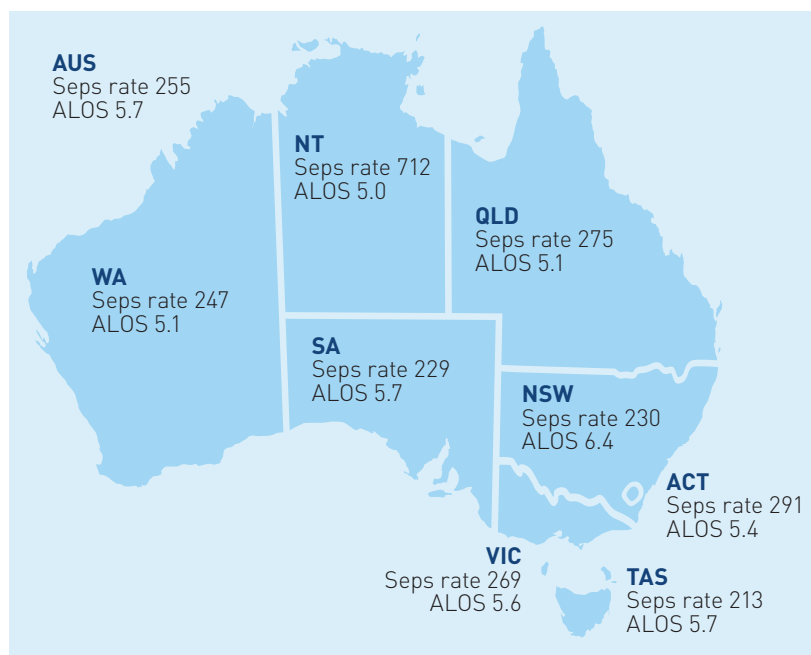


Figure 22:
Separation rates per 100,000 population and overnight ALOS, 2016/17

Source: Department for Health and Wellbeing

Population

Population growth, changing demographics and the geographic spread of the population across metropolitan and regional areas all contribute to increasing demand on health services and, ultimately, the need for new, expanded or refurbished health infrastructure.

While the population increase in South Australia is slower than that experienced by Victoria, New South Wales and Queensland, it must still be accommodated. Critically, the population has aged, with the proportion of

people who are 65 years and over increasing from 16.6% in 2013 (277,467 people), to 18.4% in 2018 (319,501 people).¹⁰⁷ By 2031, over 400,000 South Australians (22% of the population) will be in the 65+ age group.

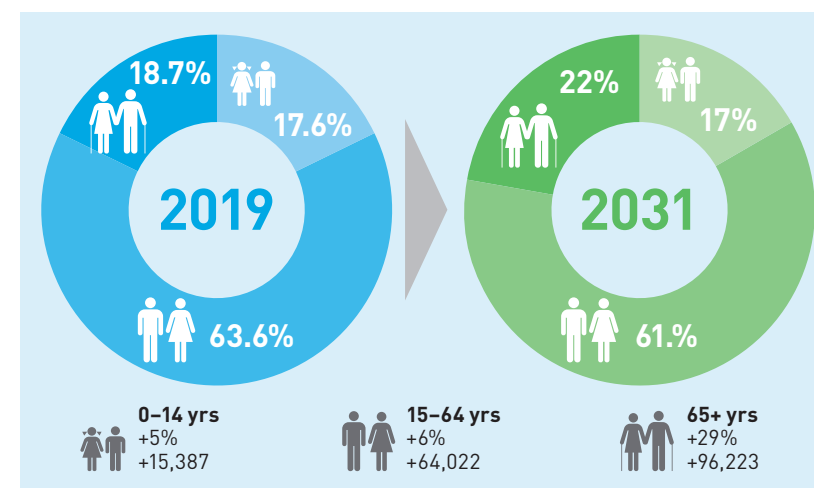


Figure 23:
Age structure, 2019 versus 2031

Source: Department for Health and Wellbeing

As people live longer, often with multiple chronic diseases, there is increased pressure on health services. People aged between 65 and 75 years are twice as likely to be admitted to hospital compared to the rest of the population. Those aged 85 years and over account for 3% of the population yet are more than five times as likely to be admitted and make up 15% of bed days.¹⁰⁸

Regional communities

People living in regional and remote areas generally have poorer health outcomes than those who live in metropolitan areas. Several factors contribute to poorer outcomes in regional communities: higher rates of smoking, risky alcohol use, overweight or obesity and physical inactivity¹⁰⁹ as well as geographic isolation and inability to access health services easily. Mental illness is also proportionally higher in regional areas, and help-seeking behaviours are generally lower.

It is not viable to maintain a full range of specialist medical services (such as those required to support maternity wards) in all smaller regional hospitals. This is as much a result of lack of access to adequately skilled staff as adequacy of infrastructure. As a result, it is often necessary for patients in rural and remote areas to travel to larger metropolitan hospitals where specialist skills and equipment are available. Self-sufficiency rates (health service access in locations close to patients' place of residence) are also lower in regional communities and the rate of full-time (resident) general practitioners per 100,000 people in remote communities is lower than the national average (see Table 4).¹¹⁰

	NSW	VIC	QLD	WA	SA	TAS	ACT	NT	AUS
Major cities	110.7	107.3	118.6	94.8	113.2	-	81.8	-	108.8
Inner regional	113.0	110.5	113.0	88.9	94.2	103.1	np	-	109.3
Outer regional, remote and very remote	np	np	99.0	79.1	82.4	82.1	-	53.8	91.6

Table 4:
General practitioners per 100,000 people by state and territory, 2016/17

Source: Productivity Commission

Note: np indicates data not provided

Figure 24:
Deaths from cardiovascular disease by Aboriginal status and age, 2006–12

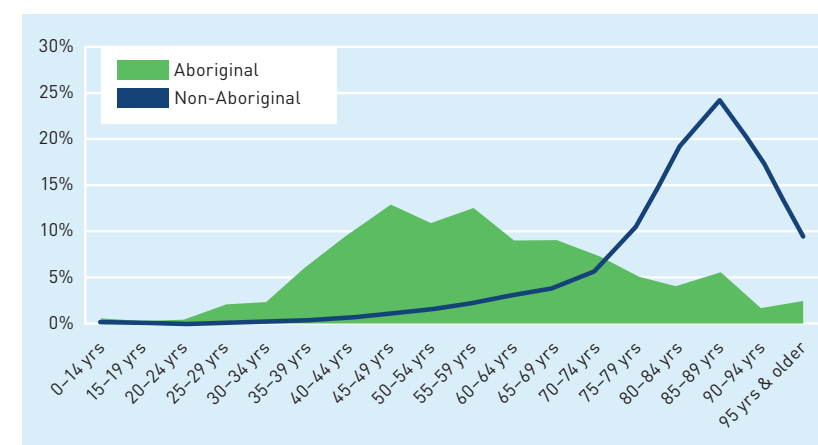
Source: SA Aboriginal Chronic Disease Consortium Road Map 2017–2021

The development and maintenance of alternatives to traditional health infrastructure in regional areas, such as telehealth, technology-enabled models of care (including remote monitoring) and partnerships with organisations such as the Royal Flying Doctors Service (RFDS) is critical for regional communities. The use of telehealth technology (such as video conferencing and remote diagnostics) can also enable specialist healthcare services, information and health education to be provided to people in rural and remote areas.¹¹¹

Aboriginal South Australians

Aboriginal people experience poorer health and health outcomes in a range of areas when compared to non-Aboriginal South Australians. As a result, they are among the most disadvantaged population groups in the community.¹¹²

The median age of Aboriginal people in South Australia is 23 years compared to the State's overall median age of 40 years. Chronic disease such as cardiovascular disease is a major cause of death between the ages of 45–59 years, compared to 85 years for non-Aboriginal people¹¹³ (see Figure 24).



The prevalence of type 2 diabetes is also significantly greater (see Figure 25), and this remains a leading cause of disability and premature death. Reducing the impact of the condition is a joint priority of Aboriginal community and health organisations.¹¹⁴

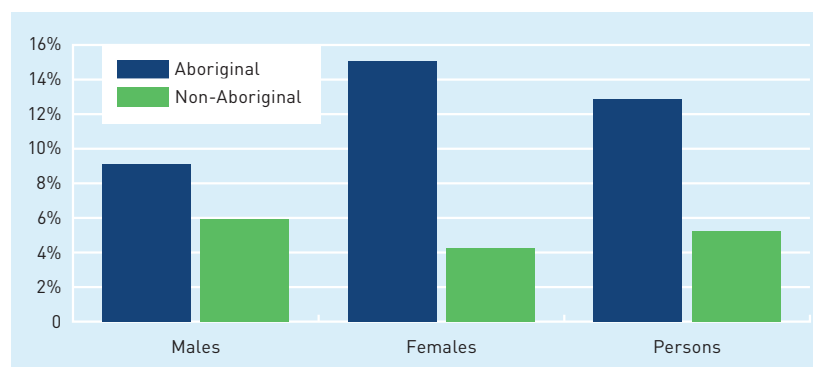


Figure 25:
Prevalence of type 2 diabetes in adults by Aboriginal status and sex, 2011–13

Source: SA Aboriginal Chronic Disease Consortium Road Map 2017–2021

Adequate access to infrastructure to support the delivery of essential and other services in regional and remote communities is fundamental to improving the lives of Aboriginal people in these communities and ‘closing the gap’ in health outcomes between Aboriginal people and the rest of South Australia’s population. Having safe and secure housing with basic facilities such as electricity and clean running water for drinking and washing is a key foundation to improving public health.

Planning for health infrastructure

The South Australian Department for Health and Wellbeing (DHW) has a portfolio of approximately \$7 billion in physical built assets including public hospitals, community health centres, ambulance services and mental health

facilities. There is also approximately \$600 million worth of biomedical equipment (BME) necessary for clinical care. Both health building maintenance and BME capital replacement face significant backlogs.

DHW has developed an infrastructure program that supports the future delivery of health services across the State, including a focus on enabling more complex and higher volumes of services to be delivered in the community, where this is safe and appropriate.

Business cases are being developed for significant planned investments in public hospital facilities, and a new 340-bed private hospital with a 24-hour emergency department was recently completed in the Adelaide CBD by Calvary Healthcare to replace its ageing Wakefield facility. This is complemented by DHW’s recent investments in new, refurbished and expanded infrastructure.

DHW is also focused on non-infrastructure solutions to address growing demand. Key initiatives range from establishing priority care centres and utilising peri-urban hospitals to help free up beds for acute and urgent care in metropolitan Adelaide, to improving the timeliness of discharge and working with extended care paramedics to support patients’ return to home as soon as possible. In addition, a new patient panel has been established which allows public hospitals to access services in private facilities, resulting in reduced waiting times and increased capacity within the public setting. Technology will play a key role in supporting each initiative, supporting care within the home and community settings, and connecting regional and remote staff to metropolitan services.

Statewide Health and Wellbeing Strategy

DHW is developing a statewide, system-level Health and Wellbeing Strategy which aims to stem the growth in the number of people with chronic health problems associated with lifestyle behaviours such as smoking, inactivity, poor diet and risky alcohol consumption. It will specifically focus on South Australia’s health priorities for the next five years but also seek to adopt a longer-term perspective to 2030. It is expected to be released in late 2020.

With the aim of being more responsive to the changing health needs of South Australian communities, DHW will seek to harness the opportunities provided by innovation and technology in the future. The process to develop the Strategy has relied heavily on stakeholder consultation. Two key themes to emerge from this are improved use of technology and a new patient-centred culture of care.

ISA supports investment in infrastructure that underpins the following high-level objectives identified:

- Improve the health of the South Australian population by implementing health prevention, health literacy and disease prevention programs.
- Rebalance the health system by expanding and enhancing community-based programs to assist people to stay healthier longer and provide appropriate alternatives to hospital-based care.
- Improve tertiary-based services by including comprehensive population-based planning to develop end-to-end models of care.
- Employ innovative practice that links prior learning, research and partnerships to improve patient outcomes and population health.

These objectives should drive a robust, integrated health service and infrastructure planning framework.

Private sector

South Australia has a number of large private health and hospital service providers, with approximately 1,900 private hospitals beds¹¹⁵ as well as supporting infrastructure (such as operating theatres and procedure suites).

The private sector in many jurisdictions is playing an increasing role in supporting the public sector to manage demand for health services. This has been demonstrated through the COVID-19 crisis. Private health providers bring a similar set of skills and additional capacity and resources that can assist the public sector to manage fiscal and infrastructure constraints. This is in addition to providing expanded opportunities for the health workforce to work across sectors.

DHW is currently pursuing an arrangement through the establishment of the Patient Services Panel. The panel supports public hospitals to access services in private facilities, providing more streamlined coordination of services, reducing wait times and increasing capacity in public hospitals.

Increasingly, opportunities to expand private sector engagement beyond hospitals are being pursued. These include but are not limited to agreements between private and public sectors to share knowledge and public health data as well as new partnerships between commercial and not-for-profit entities.

Needs and challenges

A health system must cater to existing community and service delivery needs, as well as anticipate how health care is likely to evolve to ensure infrastructure that is fit for purpose for years to come. Health infrastructure planning increasingly needs to take account of changing models of care and move away from expensive, hospital-based infrastructure solutions. Demand for all aspects of health care is growing; however, performance for some services is deteriorating.

Primary health care

- Full-time service equivalent (FSE) general practitioners (GPs) per capita have increased from 1,428 in 2011/12 to 1,805 in 2017/18.¹¹⁶
- Per person out-of-pocket expenses for primary health care increased across all South Australian primary health networks.
- Number of patient-end telehealth support services per 10,000 population increased from 6.7 services in 2011/12 to 18.2 services in 2016/17 (22% growth per annum).¹¹⁷



Multi-dimensional developments

Redevelopment of the five-acre Herston Quarter site in Brisbane is underway and set to transform it into a world-class health precinct that integrates housing, aged care, childcare facilities, retail, eateries and public transport. Due for completion in 2028, the project was awarded Best Social Infrastructure Project and Best Financial Structure at the 2017 PPP Awards.

Emergency departments (EDs)

- Over the last five years, there has been an 11% increase in presentations to South Australian metropolitan EDs and a 21% increase in presentations to EDs by ambulance.¹¹⁸
- Performance has deteriorated – the median wait time has increased from 20 to 26 minutes (between 2014/15 to 2018/19) and only 58% of patients were seen on time (2018/19).
- Based on current population and activity trends, ED presentations across South Australia are projected to grow by 9.9% between 2016/17 and 2021/22, an average of 1.9% per annum.
- Looking ahead, the projected absolute growth in ED presentations is expected to increase from 587,464 in 2016/17 to 707,667 by 2026/27 – an increase of 9.6% overall.

Inpatients

- Between 2012/13 and 2016/17, separations for public hospitals increased by 6%.
- Between 2012/13 and 2017/18, ALOS decreased across all but two major hospitals in South Australia by up to 1.7%.¹¹⁹
- Based on current population and activity trends, absolute growth in inpatient activity for overnight separations is projected to increase by 7.7% (from 210,619 in 2016/17 to 246,761 in 2026/27), higher than the rate of population growth.

Outpatients

- Based on current population and activity trends, outpatient occasions of services across South Australia are also projected to increase at a higher rate than population growth.

- Outpatient occasions of service may involve individual 1:1 consultation, non-admitted procedures, multi-discipline team processes and group sessions requiring a wide range of resource and treatment space requirements.

Health needs of an ageing population

There is currently a strong reliance on hospitals to provide care to elderly people, mainly due to patients experiencing multiple conditions and lack of access to appropriate care in alternate settings. This is despite evidence of the risk that acute care settings pose to the health and wellbeing of elderly patients.^{120,121} Greater investment in health care within residential aged care facilities and support for patients to remain at home will be important to help manage the healthcare needs of this growing population cohort.

There is also an estimated 40,000 people living with dementia in South Australia, and this figure is expected to grow to about 50,000 by 2030.¹²²

The development of a clinical services plan will address the community's expectations of continued access to high quality services for people as they age, who increasingly are living alone and with fewer available family members able to provide support.

Therapeutic impact of the built form

There is evidence highlighting the direct and significant impact that the design and physical and ambient environment of hospital and healthcare facilities has on health outcomes of patients, wellbeing of staff and costs of providing healthcare.

This is recognised as particularly relevant in the context of an ageing population. Older cohorts are among the major users of healthcare services and, given they present increasing rates of dementia, the physical built environment can lead to major safety and quality-of-care risks, and contribute to increased patient confusion, functional decline, complication rates and lengths of stay.

Evidence identifies benefits arising from a number of features including views of nature, access to daylight and sunlight, noise minimisation design features and areas for patients' families within the care environment.

Hospital and healthcare environments have traditionally been designed to maximise efficiency, with a focus on the needs of staff and technology. However, with changing contemporary models of care and a focus on patient-centred healthcare services and facilities, the importance of a continued program of upgrading ageing health infrastructure to best meet the needs of the patient population should be considered as part of planning to efficiently deliver better patient outcomes.

Increasing prevalence of chronic disease

Many South Australians continue to live with one or more chronic diseases, with many more at risk. According to the Australian Institute of Health and Wellness, chronic diseases are the leading cause of illness, disability and death in Australia, accounting for 87% of all deaths in 2016.¹²³ An increase in the proportion of people living with or at risk of chronic disease will therefore drive increased demand for all health and social services and infrastructure. Early intervention through promotion, prevention and primary care will be critical to managing demand for health services (particularly hospital-based services) due to chronic disease.

Mental health

Mental health and substance misuse are also becoming increasingly prevalent across South Australia. The rate of mental illness in South Australia is 1.6% higher in 2016/17 compared to 2012/13.¹²⁴ About 20% of people aged 16–85 years of age experience a mental illness in any year (equal to about 340,000 South Australians per year). The most common mental illnesses are depression, anxiety and substance use disorder.

Productivity Commission research indicates that mental health concerns cost Australia up to \$180 billion a year – equating to \$500 million every day – in lost productivity and participation.¹²⁵ According to DHW, mental illnesses

are a leading cause of disease burden in South Australian communities, behind cardiovascular disease and cancer.¹²⁶ In addition to hospital capacity, mental health services are resource intensive and, if not managed within the appropriate setting, can be unsafe for the patient, staff and other patients and community members within the facility.

Investment in appropriate mental health infrastructure is an important priority for South Australia. Emphasis must be placed on infrastructure that supports the management of mental health outside of the acute hospital setting, where appropriate, to enhance patient safety, wellbeing and health outcomes. Focus should be on developing urgent mental healthcare facilities outside a hospital setting to help avoid emergency department presentations, as well as more appropriate community care facilities in the regions that are more consistent with contemporary care models.

This need is echoed by the South Australian *Mental Health Services Plan 2020–2025*, which proposes investment in new and refurbished infrastructure to support better management of mental health in South Australia. The Plan also aims to establish a more integrated interagency process and infrastructure that supports social inclusion, challenges stigmatising attitudes and demonstrates mentally healthy workplaces and initiatives.

New models of care

Despite the pressures being placed on health services and facilities, there are opportunities for South Australia to deliver health care – including infrastructure – differently. Digital and other technology is enabling new solutions that are addressing fragmentation of care, delivering personalised health care, shifting the focus from illness to wellness and pursuing new models that acknowledge the significant contribution health makes to the productivity of the economy.

Adoption of digital technology has the potential to change the way health services are provided by reducing the need for face-to-face consultations. It also redefines 'health' infrastructure. Data plays an important role in facilitating these new models of care – both in terms of accessing

individual records efficiently to enable more personalised medicine and avoiding errors in treatment, but also at a system-wide level to inform the prioritisation of investment so that it is as efficient and effective as possible.

In some circumstances, South Australia is already delivering models that leverage these advancements. These include programs focused on managing demand for acute services through better use of technology and partnerships with private facilities. The response of the South Australian health system to the COVID-19 crisis demonstrated an ability to adopt new models of care, expand telehealth and increase utilisation of private assets to support additional capacity in the public health system at times of peak demand.

There are many examples of reform where health systems have adopted new and innovative approaches to infrastructure and service delivery, focusing on community wellness rather than treating illness. Increasingly, the success of these reforms is attributed to fundamental shifts in the planning, funding and management of health and other social services.

CASE STUDY

Denmark hospital reform

Denmark achieved a 16% reduction in inpatient hospital beds between 2007 and 2016 via significant system-wide reform. The drivers for change were the same as those currently faced by South Australia.

Measures implemented included shifting inpatient care to outpatient/ambulatory care while increasing the number of unique patients treated and continuing to reduce inpatient bed days. A critical enabler was community engagement as well as investment in an integrated patient record and portal where consumers could readily access their own health records. Some services such as diagnostic scanning, radiotherapy and vascular surgery became regional specialties, and others such as transplant surgery were classed as highly specialised and only carried out in one hospital.

By 2018, Denmark's healthcare system was characterised by:

- comprehensive and increased investment in primary care (between 2010 and 2017 share of GDP increased by 6.0% per year)¹²⁷
- a high degree of acute specialisation and a decrease in acute care spending as a proportion of the total (between 2010 and 2017 share of GDP decreased by 2.3% per year)
- widespread and increasing use of IT, not just for emergency care but to support home care and self-management, and
- increase in hospital productivity, slowed increase in overall healthcare expenditure, decrease in hospital standardised mortality rate and increase in patient satisfaction.

Managing demand through illness prevention

Investment in health and wellness initiatives is proven to yield better health and cost-effectiveness outcomes than focusing solely on treating illness.¹²⁸ Implementation of health prevention, literacy and disease prevention programs is one of the four objectives of DHW's future Health and Wellbeing Strategy.

A focus on prevention and improved management of chronic disease will require targeting populations with the greatest need, especially Aboriginal and low-income segments, establishing better links between primary, acute and rehabilitation services and developing new and innovative ways to deliver health care in rural and remote communities.

Hospital avoidance and substitution

There has been significant growth in demand for health services and, in particular, hospital-based services which will continue to grow (potentially at a faster rate as the population ages and becomes more susceptible to illness). This will have a considerable impact on the amount of infrastructure and investment required.

Strategies to reduce this demand include service-based responses as well as the delivery of more services in lower acuity, community or home-based settings.

Increased investment in home care will help reduce cost and ease pressure on the public health sector through greater use of telehealth and other emerging technologies including advanced monitoring, more flexible ways of working and getting people assessed, and pathways for timely and effective discharge back to the primary and community care setting.

Several DHW infrastructure investment plans include alternatives to hospital-based infrastructure and services, including:

- establishing priority care and urgent care centres to provide an opportunity to shift chronically ill patients from hospitals to the community

- enabling increased mental health services and associated infrastructure to meet demand
- increasing primary health care, prevention and early intervention capacity, and
- establishing health and wellbeing hubs in partnership with local health service providers for easier access to services.

In addition, while several e-health initiatives such as telehealth, electronic medications management and medical imaging are already in place to support new models of care, the rapid growth and uptake of these new capabilities will require a structured and ordered process to maximise efficiency and consistency of application.

Health precincts as economic development opportunities

Health precincts integrate health services with education, research and commercial organisations. The intent is to enhance and incentivise collaboration between researchers, academics and healthcare providers to better translate research into clinical practice, as well as inform the research and education agenda. It also provides for shared investment in infrastructure and some services.

In addition to the delivery of integrated and coordinated health services, health precincts provide a hub for collaboration in research and clinical practice and can be a driver of investment, jobs growth and economic and environmental benefits.¹²⁹ This can enhance international competitiveness, particularly due to research and educational components.¹³⁰

CASE STUDY

Gold Coast Health and Knowledge Precinct

Gold Coast Health and Knowledge Precinct (GCHKP) is home to Griffith University, Gold Coast University Hospital (GCUH) and Gold Coast Private Hospital (GCPH). The precinct was designed to create a collaborative environment for diverse health and knowledge organisations to invest, cluster and grow. A combination of factors has enabled this location to become a nation-leading health and knowledge precinct that has attracted significant investment.

- **Land area:** 200 hectares intended to facilitate the creation of a world-renowned, knowledge-based, mixed-use community with a particular focus on health knowledge
- **Public hospital:** Gold Coast University Hospital – 750 beds
- **Private hospital:** Gold Coast Private Hospital – 284 beds
- **University:** Griffith University – 18,000 students, a comprehensive range of courses and on-campus accommodation
- **Co-located health facilities:** The Menzies Health Institute and Institute for Glycomics.

Key outcomes

- The precinct has generated over \$5 billion in investment and is the Gold Coast's largest ever urban development project, contributing 12,400 new high-value jobs, \$2.9 billion in GRP and a 1.8% increase in productivity.¹³¹
- Griffith University will house more than 1,500 researchers and a workforce over 9,000. The medical school will have direct access to training and education within the GCUH and surrounding precincts through partnership agreements with GCUH.

Medical research and Growth State objectives

Partnerships between government, medical research institutes and medical and other health-related faculties at universities and laboratories can lead to high-quality research outcomes, medical breakthroughs and improved patient care and treatment.

Health care currently accounts for about 10% of South Australia's GSP. South Australia has the opportunity to position itself as a leader in innovative medicines and diagnostics, which could not only deliver benefits in improved experiences for patients and health consumers, but also economic growth through investment and trade. For example, the South Australian Health and Medical Research Institute (SAHMRI) has established extensive health research databases that could provide a strategic competitive advantage for certain aspects of biomedical research.

ISA supports the facilitation and development of private enterprise investment in health services and encourages greater collaboration among South Australia's universities, the Chief Scientist, SAHMRI and other organisations involved in medical research such as those in precincts at North Terrace and the Tonsley Innovation District.

Future priorities

PRIORITY 7: IMPLEMENT AN INTEGRATED HEALTH SERVICE AND INFRASTRUCTURE PLANNING FRAMEWORK THAT CLEARLY ARTICULATES THE SERVICE NEED AND CONSIDERS AND PRIORITISES A RANGE OF INFRASTRUCTURE AND NON-INFRASTRUCTURE RESPONSES

This framework should provide a needs-based methodology to prioritise infrastructure investment. It should identify the challenges and opportunities facing the health system now and into the future to optimise health services and existing infrastructure, look to improve the efficiency of health services and patient flows, and consider substitution strategies to avoid hospital presentations where possible. This framework should provide a system-wide approach to managing demand and be embedded through a hierarchy of documents from the Statewide Services Plan, Local Health Network Clinical Services Plan, Local Health Network Master Plans and Asset Plans to individual business cases that inform prioritisation.

PRIORITY 8: DEVELOP AND FUND INTERVENTIONS THAT REDUCE DEMAND FOR HOSPITAL-BASED SERVICES AND CONTRIBUTE TO IMPROVED HEALTH OUTCOMES

Service responses should include prevention initiatives that support the development of healthy behaviours from a young age and reduce engagement in risk factors for poor health. They should also comprise new and improved clinical interventions and technologies that empower consumers to manage their own health and enable care outside of the traditional hospital setting.

Infrastructure responses should include designing and investing in assets that support this shift in focus to wellness and care outside of the traditional hospital setting, such as community health centres, sub-acute facilities, step-up/step-down facilities, non-acute mental health facilities and health precincts.

Where an infrastructure response is required to build additional capacity, designs should follow the Australian Health Facilities Guidelines where possible to improve efficiency of design and construction. The most appropriate and efficient built form solution for non-core facilities and services should be explored as part of the business case. Health and wellbeing should be fully integrated in all government long-term infrastructure planning across all sectors.

PRIORITY 9: **CONSIDER AVAILABLE CAPACITY WITHIN THE PRIVATE** **HEALTH SYSTEM TO AUGMENT PUBLIC HEALTH** **SYSTEM SERVICES APPROPRIATELY**

Service and infrastructure planning should utilise the available capacity within the private sector – particularly when planning for new or expanded hospital-based services – and assess the viability of utilising this sector in lieu of expensive new builds. Infrastructure business case processes also need to have a robust commercial delivery model options assessment that (broadly) considers options for contracting of services and/or capacity with the private sector through to full PPP models.

**South Australian Health and
Medical Research Institute**



HOUSING



Role of housing infrastructure

Housing is an important economic and social enabler. Housing that is located close to jobs, education, transport options, health facilities and other services promotes social inclusion and facilitates greater workforce participation and labour productivity. When housing is not well integrated, it can increase transport and infrastructure costs, reduce environmental sustainability and engender areas of social and economic disadvantage.

While access to housing is an important economic enabler, housing can also be leveraged to stimulate economic activity and other strategic objectives. The housing construction industry itself is a significant contributor to the economy. In the year to September 2019 the value of residential construction work done in South Australia was \$3.42 billion (trend).¹³²

South Australia's housing system is made up of many interrelated parts. It covers all areas of housing – from crisis accommodation to social housing, private rental and home ownership.

Interventions are needed to ensure lower income people and households have access to the social and economic opportunities arising from appropriately located housing in order to contribute and benefit from the State's growth target. Issues of homelessness and other disadvantage that can arise from a lack of appropriate affordable or social housing must also be addressed.

Public housing leads to a wide range of economic and social benefits such as increased employment, education, community participation, better health outcomes, and reduced crime and incarceration rates.
– Shelter SA

Current state

Housing affordability in South Australia

Across South Australia there are around 673,000 occupied private dwellings and 46,624 social housing rental properties.¹³³ The amount of housing in South Australia has generally aligned with population growth. However, there is a current lack of appropriate, affordable and accessible housing for low-income households. Smaller dwellings and those designed for single-person households and for rural and regional workers are also in short supply in some areas.

Home ownership is trending down in Australia, with the number of people living in private rental growing at four times the rate of population growth. While the price and availability of housing in South Australia, and Adelaide in particular, is still a competitive advantage relative to other states and capital cities, housing affordability is decreasing for South Australians.¹³⁴

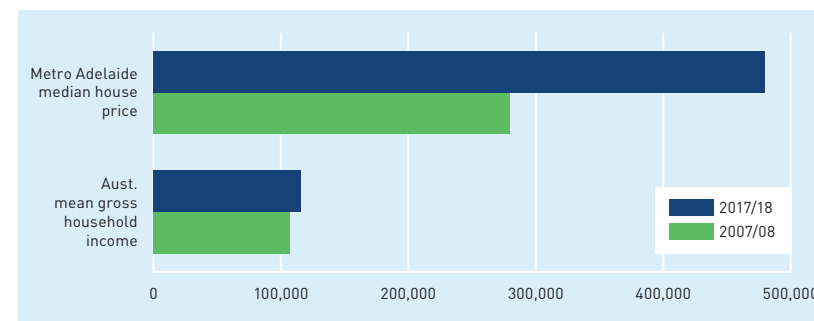


Figure 26:
Median house price vs average income

Source: ABS series 6523.0 2007/08 and 2017/18; Government of South Australia



Housing First – a Finnish principle in practice

Viewing stable and secure housing as the means to getting people back on their feet rather than the ends has seen long-term homelessness fall in Finland by over 35% since 2008. Construction and acquisition of affordable rental housing stock has been supported at all levels of government as well as by other organisations, and related savings in social costs are estimated at 15,000 euros a year for each long-term homeless person housed.

Since 2011, the number of lower income households in South Australia experiencing rental stress (household rental above 30% of net income) has risen by 2%, increasing to 32% in 2017/18.¹³⁵ This remains lower than the national average of 43% in 2017/18. In 2018, the Australian Housing and Urban Research Institute (AHURI) estimated 56,600 households required rent assistance to avoid rental stress and 45,100 households were unable to enter the market at all due to very low incomes.¹³⁶

State housing and homelessness strategy

In 2019, the South Australian Housing Authority (SAHA) released the *Our Housing Future 2020–2030* strategy, which takes a holistic view of both infrastructure and service needs in the sector.

It seeks to improve the supply of the following types of housing in South Australia:

- Social housing – the combination of public housing (housing owned by SAHA on behalf of the State Government) and community housing (housing managed or owned by registered community housing providers (CHPs) and other not-for-profit entities).
- Broader market-based affordable housing that may be supported by a mix of financial assistance/investment, urban planning, policies and regulatory processes.

It aims to deliver over 20,000 affordable housing solutions, including an investment of \$453 million into new affordable home ownership opportunities and new social housing. An additional \$75 million over 10 years is allocated for deferred capital maintenance and to improve energy efficiency within social housing.

Composition of the social housing portfolio

Despite population growth, social housing in South Australia has declined from around 63,000 dwellings in the mid-1990s to 46,624 dwellings in 2019.

Of these, SAHA currently owns and manages around 35,580. The number of dwellings owned and/or managed by CHPs has increased, primarily through transferring the management of 5,134 dwellings from SAHA between 2015 and 2018.

The community housing industry manages approximately 13,000 properties with a portfolio value of around \$2.5 billion.

– Community Housing Council of SA

Figure 27 shows the overall decline in social housing and the change in management of the dwellings from SAHA to CHPs.

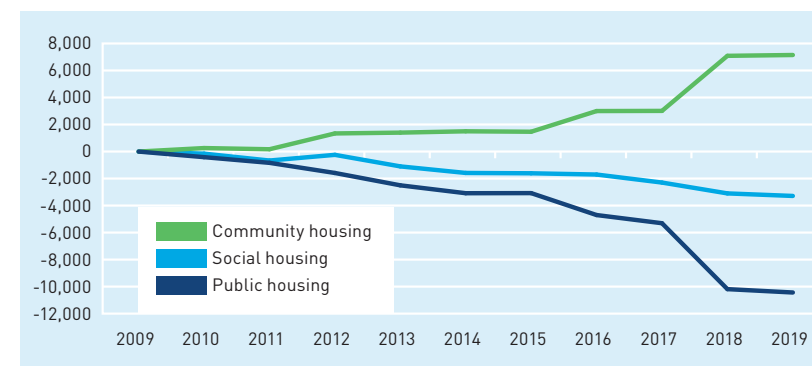


Figure 27:
Change in social housing dwellings, 2009–18

Source: SA Housing Authority

Needs and challenges

Changing social housing cohort profiles

Historically ‘workers’ accommodation, public housing has come to cater to more high-needs tenants over time. SAHA places clients into three needs-based categories and Table 5 shows the number of applications received for each as at 30 June 2019.

Table 5:
Public housing categories and demand, June 2019

Source: SA Housing Authority

* Total includes 78 applications classified as low demand or pending.

Category	Profile	No. of applications
1	At risk of being homeless	3,668
2	Low income with health issues affecting their ability to work	5,438
3	Low income	11,197
TOTAL		20,381*

In 2018/19, around 86.4%¹³⁷ of public housing was allocated to greatest needs clients. This cohort often presents complex sets of needs and potentially high associated costs. While the overall waiting list for public housing has remained stable over time, the number of high needs clients has grown significantly.

SOUTH AUSTRALIA’S SOCIAL HOUSING SNAPSHOT¹³⁸

Public housing tenants:

- 9% wages as primary income
- 79% single or single parent households
- 59% over 55 years of age
- 33% disability support recipients.

Community housing head tenants:

- 13% wages as primary income
- 71% single or single parent households
- 52% over 55 years of age
- 31% disability support recipients.

By 2036, an additional 61,900 social and affordable homes need to be constructed in South Australia to meet current and projected need for households living in housing stress in the private rental market.
– Community Housing Council of SA

A continued shift towards a ‘housing first’ approach seeks to better address social needs by providing secure housing supported by wrap-around services such as drug rehabilitation and mental health support. A 2016 study by Mission Australia found their Sydney-based housing first program for 74 long-term homeless men resulted in:

- 97% of clients remaining housed after 12 months
- estimated savings of \$1,880 per client in the first 12 months of being housed, and
- total net savings of \$140,000 to CHPs.¹³⁹

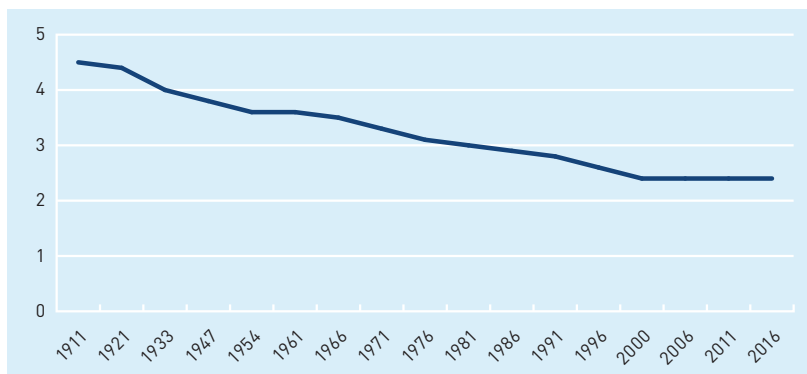
South Australia has piloted Aspire, a social impact bond that is looking to reduce the social costs of hospital presentations and interactions with the justice system by providing a housing first solution. While these programs place an increased burden on supported accommodation, they can deliver better outcomes for people for the longer term.

Changing housing composition and needs

Across the market, the average size of households has been declining, reaching a low of 2.4 people in 2016¹⁴⁰ (see Figure 28). Much of the current social housing stock was built in the 1960s when the average household was around 3.5 people. Accordingly, much of it is not designed for current needs and family structures.

Figure 28:
Mean household occupancy, 1911–2016

Source: ABS Cat. No. 41300;
ABS 1301.0 Year Book
Australia, 2001



Approximately half comprises three bedrooms, whereas most Category 1 clients are singles or couples. Conversely, many new migrant families needing short-term social housing tend to require 4–5 bedrooms, which few dwellings offer.

Well planned and incentivised affordable supply should be part of economic drivers to stimulate growth in GSP whilst delivering positive social returns.

– Community Housing Council of SA

Lack of supply of housing in regions

The lack of supply of appropriate and affordable accommodation, particularly rental, in regional areas makes it difficult to support regional employment opportunities and new migrant placement programs in areas where workers are needed. One recent example is Naracoorte, where limited availability of affordable accommodation is constraining the workforce required for expansion of the abattoir. This could also prove an issue for planned activity in Whyalla.

Maintenance backlog

Maintenance expenditure can be classified into two broad categories: responsive and planned. Planned maintenance expenditure, which encompasses capital maintenance expenditure, is preventative in nature as maintenance is performed in a planned way to ensure building quality. Responsive maintenance expenditure is reactive to a certain situation, for example breakdowns or accidental damage to a property.

Historically, the majority of maintenance expenditure on public housing stock has been on responsive maintenance, with limited amounts on planned maintenance. This has coincided with an increase in the average age of public housing dwellings and is likely to result in higher future maintenance costs and disruption to service delivery due to decreasing quality of housing.

Figure 29 below shows the proportion of spending on planned versus responsive maintenance as well as the increasing average age of public housing.

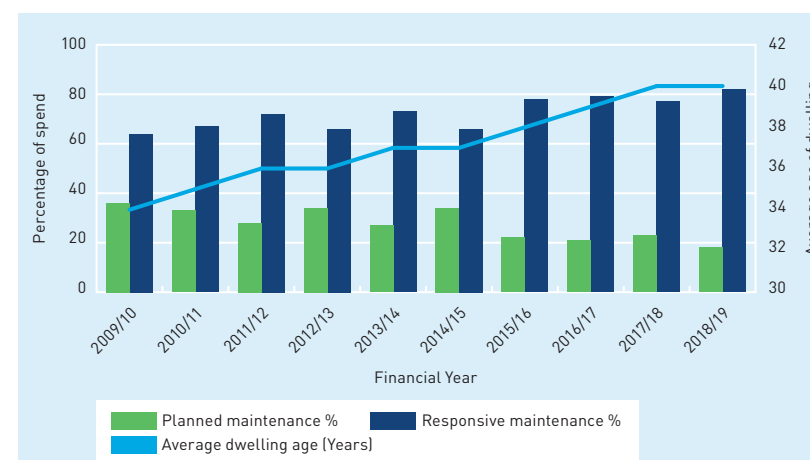


Figure 29:
Maintenance expenditure and average dwelling age

Source: SA Housing Authority

In 2018, SAHA commenced its asset condition inspection program to examine most of its residential dwellings. Until this process is complete, estimates for the size of the maintenance backlog are not reliable; however, it is likely to be substantial.

A new strategic asset management approach is being developed, following from the *Our Housing Future 2020–2030* strategy, which aims to shift the balance towards a greater emphasis on portfolio planning (including planned maintenance). This new approach includes strategic divestment and renewal plans for targeted properties to assist in improving the condition of the overall ageing housing stock and work towards a more sustainable social housing system.

Public, social and community housing in SA is valued at over \$10 billion, comprises approximately 50,000 dwellings, with the existing stock estimated to have an unfunded maintenance debt in the order of \$700 million.

– UnitingSA

Environmental sustainability

Climate change and increasing living costs are driving measures to improve energy efficiency and thermal comfort for housing tenants.

Our Housing Future 2020–2030 provides \$75 million over 10 years to start addressing the public housing capital maintenance backlog to 2030, and to improve sustainability and energy efficiency of existing public housing, including draught-proofing and upgrade of insulation, where appropriate and possible.

All new houses meet the minimum six-star energy rating and quite often exceed this through passive solar design and other design and construction approaches.

Solar photovoltaic (PV) systems and batteries are also being installed on public housing to support the South Australian Virtual Power Plant (VPP). The VPP is a program to install photovoltaic panels on eligible SAHA properties that will either feed excess energy into the main electricity grid or store it onsite in a Tesla Powerwall home battery for later use. Unlike an individual solar PV system, the VPP stores and releases energy to the grid. Tenants in public housing properties who sign up to the program will benefit from reduced power bills, not just those living in the homes where they are installed.

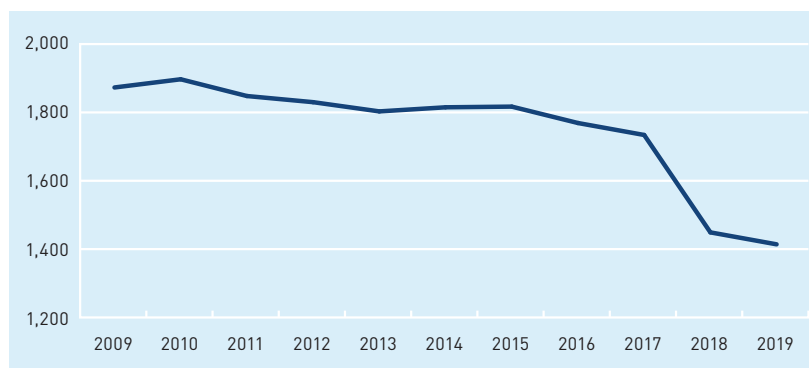
Aboriginal housing

Aboriginal people continue to be over-represented in those experiencing homelessness. At 273 per 10,000 of the South Australian population in 2016, the rate of homeless persons in Aboriginal people was around nine times higher than for non-Aboriginal people (30 per 10,000). This over-representation was recorded for other jurisdictions and nationally.¹⁴¹

Figure 30 shows the decrease in the number of state-owned and managed Indigenous housing (SOMIH) dwellings.¹⁴² It should be noted that this includes the transfer of 225 SOMIH dwellings to community housing in 2017/18, which drives a sharper decline in numbers. The transferred dwellings remain as social housing.

Figure 30:
Number of SOMIH dwellings, 2009–19

Source: Productivity Commission



SAHA will be developing an *Aboriginal Housing Strategy* in collaboration with Aboriginal communities around the State to address particular disadvantages faced by Aboriginal South Australians. It will consider the full housing continuum – from crisis services and social housing to affordable housing options and home ownership.

Crisis accommodation

South Australia has a limited supply of short-term emergency accommodation options. This has led to a sharp increase in the use of hotels and motels for emergency accommodation over the past four years. In 2018/19, expenditure reached \$7.2 million.¹⁴³

Investment in more appropriate accommodation solutions, including for people escaping domestic and family violence, is needed. Initiatives such as the 40 Beds program is one example.

ISA supports initiatives outlined in *Our Housing Future 2020–2030* to reduce the need for emergency and transitional housing and to move away from using motels as emergency accommodation for families experiencing domestic violence. ISA also supports the establishment of the Office for Homelessness Sector Integration.

Efficient market mechanism to invest in affordable housing

With the growing need for more affordable housing, contemporary investment and ownership models need to be pursued. Build-to-rent projects are typically large-scale residential developments that have been specifically designed, built and managed as a single asset for long-term ownership and rental. This model can attract significant private capital and investment into affordable and social housing outcomes. Returns to investors are generated through long-term rental income, which drives an increased focus on tenant experience and satisfaction.

Affordable housing options... should be integrated into high- and medium-density developments, mixed-use projects and located near transportation hubs to minimise transportation costs.

– Planning Institute of SA

CASE STUDY

Building to rent

In Victoria, PDG Corporation is developing a build-to-rent apartment building in the Melbourne CBD. This includes Mirvac's acquisition of 490 completed apartments for \$333.5 million (funded through equity raising and backed by JP Morgan, UBS and Macquarie Capital). The build-to-rent apartment tower is part of the \$450 million Munro development, a sustainability focused, mixed-use development including social infrastructure, event and laneway spaces, as well as hospitality and retail uses. It is a key project of the broader Queen Victoria Market Precinct Renewal Program.¹⁴⁴

Future priorities

ISA is supportive of the Government's *Our Housing Future 2020–2030* strategy and the provision of funding towards supporting its objectives.

PRIORITY 10: REPOSITION THE SOCIAL HOUSING PORTFOLIO TO BE MORE FIT FOR PURPOSE

ISA supports the development of a strategic asset management approach that fosters a strategic repositioning of the social housing portfolio and enables the provision of a more fit-for-purpose and well-maintained housing supply.

PRIORITY 11: INCREASE PRIVATE SECTOR INVESTMENT IN THE SUPPLY OF AFFORDABLE HOUSING

ISA recognises the private sector's potential to play a key role in increasing the supply of affordable housing and supports efforts to increase private sector investment. Opportunities should also be explored to renew the current public housing portfolio to attract private sector investment.

Historically, the idea of housing as a basic human right, and the economic benefits that derive from it, were well understood in South Australia and provided the moral and economic imperative for significant investment into public housing building programs.

– Shelter SA

Artist's impression, Kidman Park streetscape
Image courtesy of Housing SA



JUSTICE



Role of justice infrastructure

The justice system ensures the safety of the community while supporting programs and measures that facilitate rehabilitation and reduce recidivism (reoffending). It is responsible for law reform, policy, policing, legal support, courts, alternative dispute resolution and corrections.

Current state

The criminal justice sector is comprised of highly connected entities, with different agencies and service providers at various touch points. Policy and legislative changes, new systems and investment in infrastructure in one organisation can potentially impact all involved.



Supreme Court, Adelaide

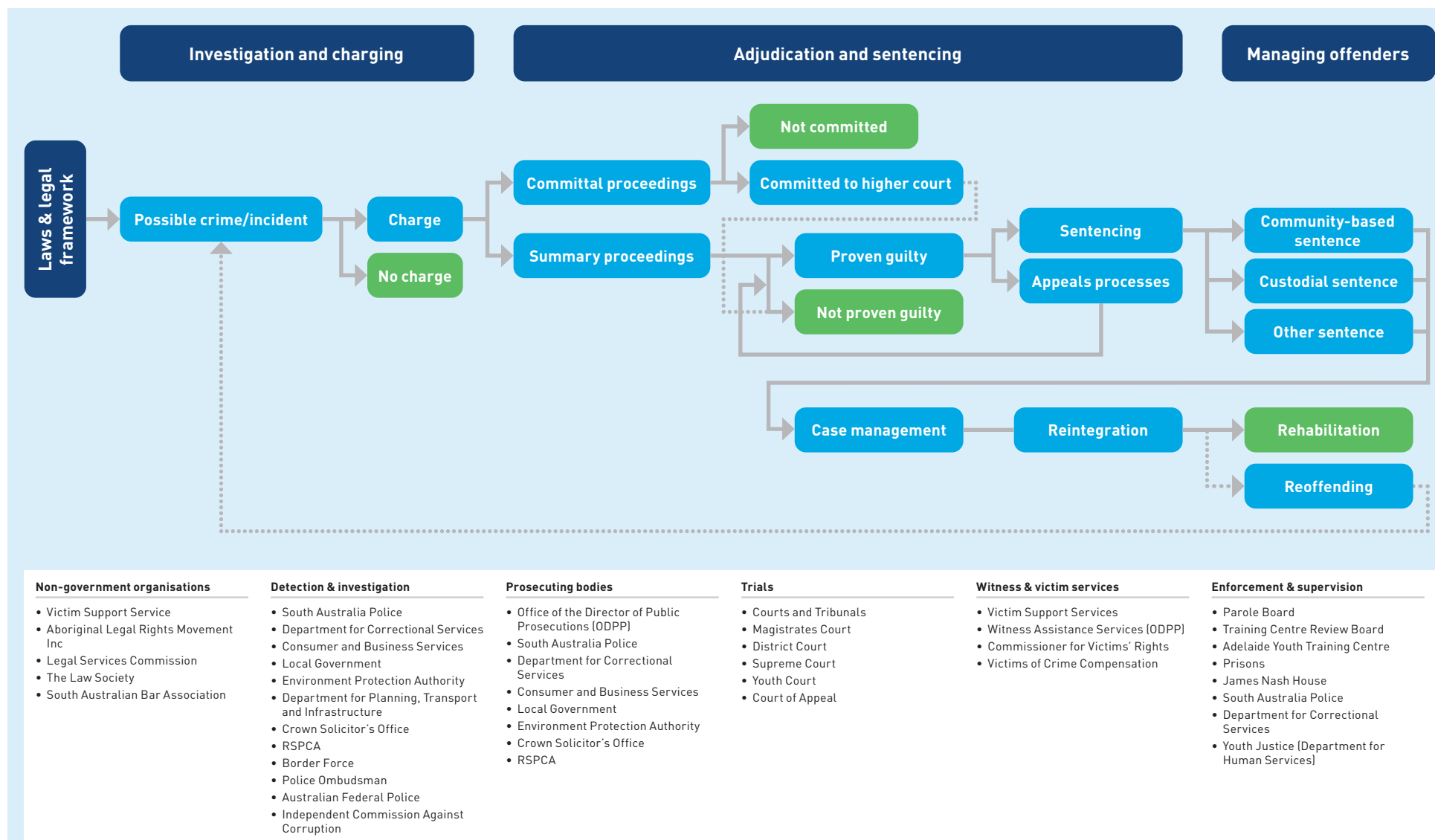


Figure 31:
Journey to justice, criminal system and relevant entities

Source: Deloitte, Criminal Justice Centre Reform Council

The 2019 Infrastructure Australia Audit¹⁴⁵ has made a number of observations at the national level, which hold true for South Australia:

- While rates of crime are declining, the complexity of offences and sentencing is increasing, resulting in court backlogs and pressure on remand infrastructure.
- Globalisation has increased the prevalence of crimes such as terrorism, while technology advances have resulted in new types of crime such as cybercrime.
- Due to historical settlement patterns and expectations of service, justice services are sometimes unevenly distributed in relation to population density and poorly located in proximity to other services.
- Demographic changes (such as population growth and urbanisation) can affect patterns of demand for justice infrastructure, and changes in policy (such as stances on particular crimes or bail arrangements) can have real and significant impacts on the level of demand.

While the human cost to incarcerated individuals is substantial, a 2015 survey by the Australian Institute of Health and Welfare (AIHW) found that over a third of prisoners were in employment in the 30 days before imprisonment, with another third either seeking employment or studying.¹⁴⁶ The average loss of the economic productivity to the individual has been estimated by the Australian Institute of Criminology as approximately \$9,700 for each prisoner.¹⁴⁷

Access to data

Despite the degree of interdependency between agencies in the justice sector, the approach to policy development, planning, delivery of interventions, asset management and demand management are generally siloed. A symptom of this is the lack of a common identifier for an individual across the criminal justice system, which compromises the flow of data and information, and sometimes leads to less than ideal transitions between agencies.

The quality of data collection varies significantly across agencies, depending on the level of need and resources available. There are no standardised

approaches to information collection, commonly used data sets or modelling to understand interdependencies and policy impacts.

The sector would benefit from improved coordination that could lead to a more holistic approach to demand management and asset planning.

Courts

Current state

Court	Sitting location
Higher Courts	
Supreme Court	Adelaide, Port Augusta and Mount Gambier
District Court	Adelaide, Port Augusta and Mount Gambier
Environment, Resources and Development (ERD) Court	Adelaide
Coroner's Court	Adelaide
Youth Court	Metropolitan and regional locations
Magistrates Court	
Metropolitan	Staffed registries in Adelaide, Elizabeth, Christies Beach and Port Adelaide
Regional	Staffed registries in Mount Gambier, Berri, Port Augusta, Port Pirie, Murray Bridge, Whyalla and Port Lincoln 15 circuit courts Roxby Downs, Anangu Pitjantjatjara Yankunytjatjara (APY) Lands and Yatala, where there are no court assets and hire facilities are used



Reflecting a shift in emphasis

The court building in Austria's Justice Centre Leoben is open and transparent, signalling a shift in the principles of justice towards greater transparency and access. The adjoining prison complex, too, replaces outdated punitive principles with those of dignity and respect. The scalable facility's detention units borrow a flat-sharing design that provides inmates with relative freedom to move while reducing the need for staff oversight.

Higher Courts Redevelopment Project

The Courts Administration Authority (CAA) recommenced master planning in 2019 to consider future infrastructure requirements for its Higher Courts precinct. Higher Courts consist of the Supreme Court, District Court and ERD Court, which are based in Adelaide.

The first stage of this process has led to a \$31m Higher Courts Redevelopment Project (HCRP), which is scheduled for completion in 2020 and will convert some of the existing civil court facilities into criminal courts to meet urgent demand and reduce a backlog of cases.

The HCRP will see the existing 10 criminal jury court capacity within the Sir Samuel Way Building increase to 13. Given their complexity, criminal proceedings are unable to be convened in a civil courtroom, although civil proceedings can utilise criminal court facilities; hence, the increase in criminal court capacity has come at the expense of five civil courts. The project has refurbished six courtrooms and accommodation within the Supreme Court Building.

The HCRP addresses the need for criminal court facilities in Adelaide in the short to medium term, satisfying demand for the next 5–10 years only. Once this project is complete, CAA will have exhausted all additional court capacity development within the existing footprint of the precinct.

Access to courts

CAA's *Modern Courts, Smarter Services* strategic plan recognises that court services must be fully accessible to the public, including court users with a disability, Aboriginal people and users in remote areas. While physical attendance at court remains a central element of the justice system and is part of the experience of many court users, providing access to justice requires making better use of technology to strengthen and extend digital services to benefit all users.

A contemporary approach to court infrastructure must, therefore, consider both the optimal location of court services and technologies needed by courts to be effective in the modern era. It must differentiate between criminal and civil infrastructure requirements and address the challenges of older infrastructure that impacts court users and their access to justice.

Needs and challenges

Case backlog

According to the Productivity Commission's *Report on Government Services*,¹⁴⁸ the case backlog in South Australia is on par or slightly higher compared to other jurisdictions for Supreme Court cases and higher for District Court cases.

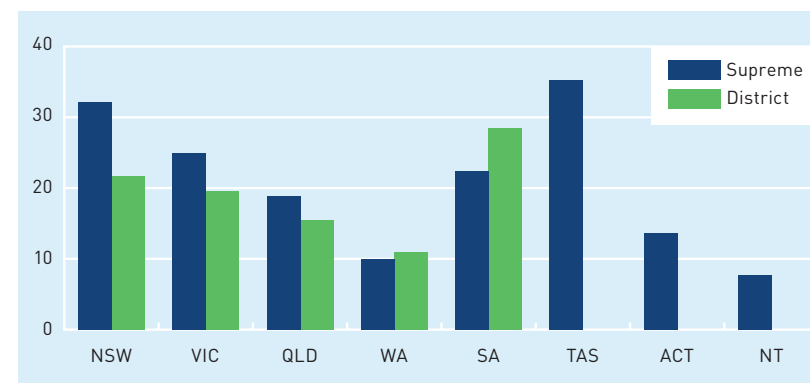


Figure 32:
Proportion of criminal cases facing a backlog of over 12 months, by state and court

Source: Productivity Commission

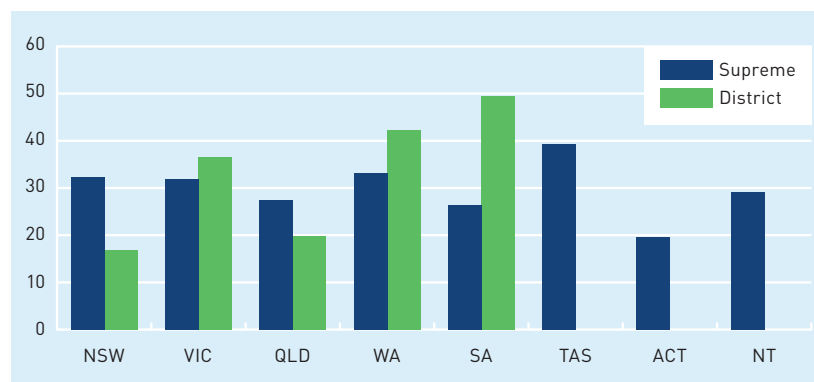


Figure 33:
Proportion of civil cases facing a backlog of over 12 months, by state and court

Source: Productivity Commission

CAA is identifying both infrastructure and non-infrastructure measures (see *Adoption of technology* below) to address backlogs. This includes recommendations by Hon Brian Ross Martin AO QC in a 2019 report¹⁴⁹ to the Attorney-General to consider a range of policy and legislative measures to address criminal case timeframes.

Higher Courts master plan

The next phase of master planning will consider the needs for all higher court facilities. The master planning process offers the opportunity for consolidation of justice services that currently operate in Adelaide. Services that could be consolidated through this process may include the Coroner's Court and the South Australian Employment Tribunal (previously the Industrial Court).

Administrative support for courts and related justice services is currently distributed across multiple locations, including outside of the existing

precinct, and could also be consolidated for greater efficiency in these support functions.

ISA supports CAA's master planning to identify the longer-term need for higher courts, including a civil justice precinct, and strategic planning to identify future infrastructure requirements for Magistrates Courts assets.

Magistrates Court Strategic Asset Plan

A strategic asset plan is currently being developed by CAA to consider the current and future needs for Magistrates Court infrastructure assets. The planning process commenced in 2019 and is anticipated to be delivered in 2020. It will involve using population information, building condition assessments and service delivery modelling.

In regional areas, court infrastructure is retained to provide access to justice for the public. These sites are not permanently occupied, as court proceedings are undertaken via circuit. (A circuit is where matters are considered in a block of time in a particular region, before progressively moving to other areas of the State). The circuit Magistrates Court facilities are generally utilised for hearings related to minor procedural matters. Most major indictable offences are considered in Adelaide, although some are heard in Mt Gambier or Port Augusta.

While technology can improve the efficacy of justice, face-to-face contact between judicial officers and the community remains an essential characteristic of fair and effective justice. The retention of specialist court facilities in acceptable condition is necessary to allow for court proceedings to be held. The plan will consider how the Magistrates Court's older infrastructure should be modernised to maintain community access to justice in regional areas.

Asset maintenance

CAA sites have significant repairs and maintenance requirements. A significant portion of court infrastructure is older and does not comply with accessibility requirements or building standards, offering very basic

facilities. The Strategic Asset Management Information System (SAMIS) has documented \$29 million of works required up to 2030. Based on current allocations, funding from CAA's budget base is expected to provide only \$10 million towards this, leaving a shortfall exceeding \$19 million by 2030.

The majority of the projected asset maintenance is for Adelaide-based assets, particularly the Sir Samuel Way building, where significant issues have been identified with the heritage-listed façade.

CAA's asset maintenance program does not include substantial capital maintenance, redevelopment or asset replacement of regional assets. The majority of regional court sites – which are essential for access to justice in remote areas – are in an older and deteriorating condition. Many of these facilities have not received substantial investment since the 1960s and 1970s. While projected maintenance costs are low, any major breakdowns will require sites to comply with the building code, necessitating comprehensive refitting or replacement.

Adoption of technology

Use of audio visual links (AVL) has reduced the need for transportation of individuals between facilities for court appearances and has significantly increased access to legal representation and health services (including mental health) in regional centres. This has the potential to increase the number of court appearances possible in the span of a day. There is also the potential to expand the use of AVL in remote areas such as the APY Lands to provide greater accessibility to legal and other justice-related services.

Expanding the use of AVL, particularly for regional and remote applications, has significant potential to improve access to the justice system for all. Justice agencies have identified current data connectivity and capacity issues as significantly impeding the expansion of these services.

CAA is implementing an Electronic Courts Management System (ECMS) that will see most civil and criminal court paper-based processes being digitised. Significant work changes will arise from this digital implementation, which is due for completion in 2021.

Reliable telecommunications infrastructure (with redundant built in network systems) is essential; especially the provision of optical fibre to hospitals and SAPOL and the Courts to carry increased use of videoconferencing.

– City of Playford

New court design

All modern courts need to be constructed with thorough consideration of circulation paths, court security, sustainability factors and technology integration.¹⁵⁰ New court design should also be sensitive to Aboriginal cultural requirements.

Criminal courts need specialised facilities with separate circulation paths, custody areas and jury facilities. The nature of civil court proceedings enables a more flexible design that accommodates different court processes and multi-purpose hearing rooms. According to the Department of Justice Western Australia, courts could “incorporate features like movable furniture, facilities for simultaneous evidence and break-out rooms for conferencing. Courtrooms themselves should be adaptable so they can handle traditional hearings or conference hearings.”¹⁵¹

Video will be ubiquitous in courtrooms in the near future, which will influence design of new facilities. Options could include separate viewing facilities within the court or livestreaming proceedings that are open to the public.

Prisons

Current state

The Department for Correctional Services (DCS) is responsible for improving the State's prison system in order to accommodate the growing prison population, strengthen security, improve productivity and system performance, and drive down the rate of reoffending.

The State has nine correctional facilities – two that are privately managed (Mount Gambier and Adelaide Remand Centre) and seven operated by DCS. Some sites are multi-security classification prisons – i.e. role-specific high, medium and low security prisons or medium and low security only.

Prison capacity

Over the past 10 years, the number of prisoners in correctional facilities has grown by 63%. DCS has noted that social issues such as a marked increase in methamphetamine addiction and reporting of domestic violence have contributed to the increase in people entering the criminal justice system. Such factors can be difficult to predict and plan for.

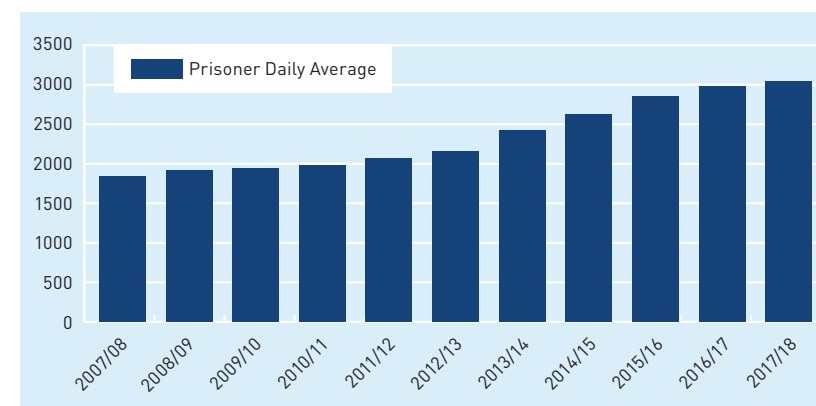


Figure 34:
Prisoner daily average (by FY)

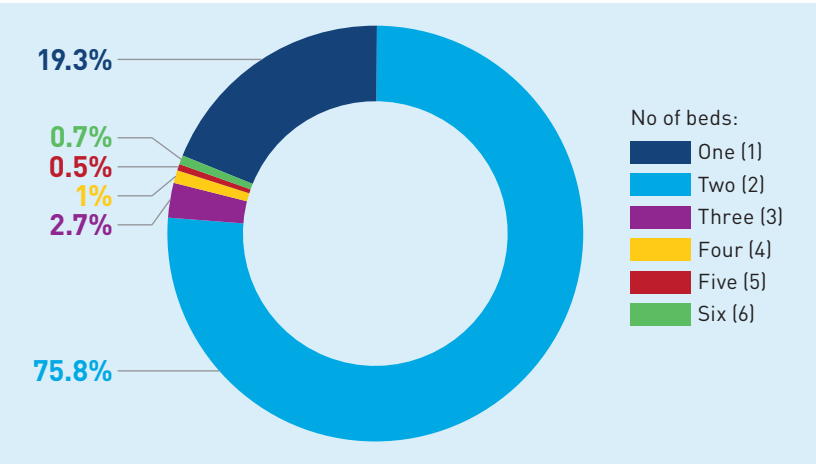
Source: Australian State and Territory governments (unpublished), Productivity Commission

The approved bed capacity for DCS prisons in 2019 is 3,291. The Department has responded to significant growth in prisoner numbers since 2009/10 in two ways:

- Single-occupancy cells have been converted to accommodate additional bed configurations. While this has provided flexibility to address emergency shortages incrementally as required, it has resulted in the prison system operating at 157% of its design capacity and prisoner peaks exceeding approved bed capacity.
- An additional 1,371 prison beds have been commissioned. A further 310 beds across the Yatala Labour Prison (YLP) and the remaining at Adelaide Women's Prison (AWP) have been approved but are yet to become available. However, this will be insufficient to meet future projected demand.

The ideal rate of prison utilisation is 85–95% due to the need for spare capacity to cater for the transfer of prisoners and different security levels, provide special-purpose accommodation such as protection units and management of unforeseen events and short-term fluctuations in prisoner numbers.¹⁵²

Figure 35:
Utilisation of prison accommodation
Source: Department for Correctional Services



Over-utilisation also means that during periods of peak prisoner numbers, DCS relies on the limited number of emergency beds available. This ‘surge capacity’ provides the additional capacity to manage unforeseen events, routine maintenance or peak demand from time to time. Historically, DCS has utilised South Australia Police holding cells to accommodate remand overflow.

Infrastructure condition

DCS infrastructure represents different periods of penal design from 1852, the 1960s to mid-1980s. New infrastructure add-ons have partially addressed growth and begun to move toward more contemporary modes of management.

The combination of overcrowding and not fit-for-purpose design drives high operational costs and inefficient and ineffective service delivery. Some of the State’s oldest corrections infrastructure bears the heaviest delivery burden, which is unsustainable for the longer term.

Facility	Initially built	Current capacity (no. of inmates)	Cost/prisoner/day (\$)
Adelaide Remand Centre*	1986	274	314
Adelaide Women’s Prison	1969	176	261
Adelaide Pre-Release Centre	1984	84	261
Cadell Training Centre	1960	204	174
Mobilong Prison	1987	466	207
Mount Gambier Prison	1995	653	154
Port Lincoln Prison	1965	178	185
Port Augusta Prison	1969	617	240
Yatala Labour Prison	1852	575	302

Table 6:
Profile of South Australian prisons, 2019

Source: Department for Correctional Services

* Costs for Adelaide Remand Centre are based on 2018/19 figures. Its management and operation transitioned to a private provider in August 2019, and a reduction in prisoner costs per day is anticipated to occur from 2019/20.

Old and poorly designed corrections infrastructure poses a number of issues. It:

- limits expansion options across the system, as the majority of cells are not designed or constructed to meet safe cell standards, and the hazards and costs that afflict older infrastructure impact cost-effectiveness

- reduces DCS's ability to provide effective and appropriate rehabilitation to change attitudes and behaviours, resulting in higher recurrent costs
- requires higher staffing levels to compensate for outdated design and manage associated safety and security risks
- reduces the resilience of the network overall when major incidents or emergencies occur, and
- constrains capacity to shift individuals within the system to manage the level of risk for specific cohorts and cater for the needs of prisoners that may require additional services.

In addition to completing the current program of capital works to address growing demand and over-capacity infrastructure, DCS is considering the following measures:

- A new rehabilitation prison that incorporates facilities to support prisoners with complex needs, multiple support needs, high-risk prisoners and a maximum security facility for management of violent and extremist prisoners.
- The delivery of a master plan for the Northfield Precinct (YLP, AWP and Adelaide Pre-Release Centre).
- Investment in an ICT solution to provide a platform for greater use of technology, improved decision-making and better management of higher-risk offenders.
- An investment plan for more non-custodial interventions and community rehabilitation.

ISA supports DCS master planning for the Northfield Prison precinct.

Non-custodial interventions

Incarceration impacts on the economy, with costs incurred through deteriorating physical and mental health of prisoners, and families of prisoners relying on crisis and income support.¹⁵³ As an example, the

Queensland Productivity Commission recently estimated that indirect costs for each prisoner amount to at least \$40,000 a year.¹⁵⁴

Non-custodial interventions such as home detention and community-based accommodation, adopted on a risk-assessed basis, take pressure off the prison system by diverting first-time offenders from entering custody, minimising time in custody and reducing recidivism through treatment, rehabilitation and transition to community supports.

	Per day	Per year
In custody	\$228.68	\$83,239
Non-custodial interventions	\$20.82	\$7,600

Table 7:
Average cost to manage one prisoner

Source: Department for Correctional Services

Recidivism

The Government's '10by20' target has sought to reduce recidivism by 10% by 2020. Breaking the cycle of crime achieves a range of benefits, including safer communities, fewer victims and cost savings.

The DCS offender management and rehabilitation approach is central to lowered rates of recidivism; however, overcrowding constrains effectiveness and there is no purpose-built space designed for prisoner rehabilitation programs. It is noted in *Guiding Principles for Corrections in Australia*¹⁵⁵ that agencies must "avoid overcrowding and ensure that prisoners and offenders have access to appropriate facilities and interventions to engage in effective rehabilitation and reintegration."

In 2017/18 the recidivism rate in South Australia was 45.7%,¹⁵⁶ which is lower than the Australian average but considerably higher than best practice (Norway's recidivism rate is currently 20%).

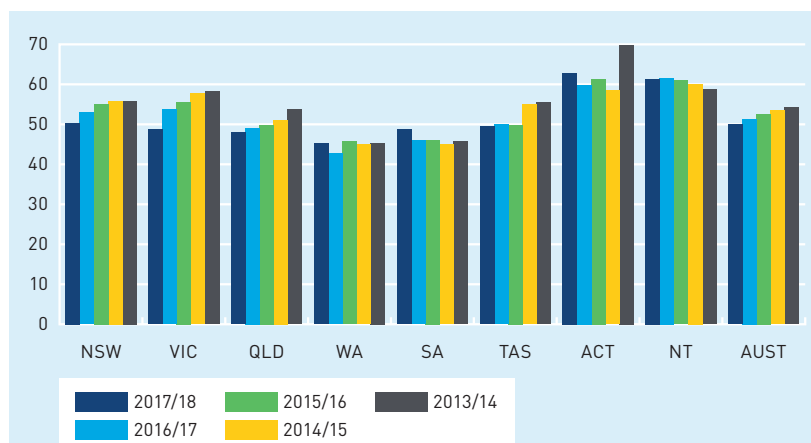


Figure 36:
Recidivism rates for Australia and by jurisdiction (by FY)

Source: Productivity Commission

ISA supports and encourages programs that address recidivism, reduce demand on the system and lead to improved outcomes for individuals.

Demographics picture

Projections regarding total population growth are less relevant to justice sector planning than shifting demographics and factors such as changes to justice policies and practices, including approaches to policing, mandatory sentencing and more stringent bail conditions. There are also underlying economic and social determinants that contribute to criminal behaviour.

Nationally as at 30 June 2018, there were 5,554 prisoners aged 50 years and over: 94.3% male and 5.7% female. This marks an increase of 81.6% between 2001 and 2010, and a further increase of 67% from 2010 to 2018.¹⁵⁷ While this partly corresponds with the broader ageing of the State's population, it is also linked to changes in sentencing and parole laws, including mandatory minimum sentencing and reduced options for early release.

An increase of first-time prisoners incarcerated at an older age due to historical offences is another factor.

Aboriginal people are vastly over-represented in the South Australian prison system, constituting 24% (approximately 681 people) of the total prison population (as at 30 June 2019)¹⁵⁸ despite comprising only 2.5% of the South Australian population.¹⁵⁹ Furthermore, Aboriginal youth account for approximately 50% of incarcerated children.¹⁶⁰ Aboriginal prisoners are more likely to have experienced earlier and more frequent contact with the criminal justice system, have higher rates of complex needs and have more convictions and imprisonments than non-Aboriginal prisoners.

People with mental health diagnoses are also over-represented within custodial settings, with 49% of prisoners reporting they have experienced a mental health condition, including substance use.¹⁶¹ Difficulties with mental illness are compounded in the Aboriginal population. Recent research in Victoria revealed that 72% of male Aboriginal prisoners and 92% of female Aboriginal prisoners met the criteria for a diagnosis of a major mental illness. This research parallels similar findings in Queensland, New South Wales and Western Australia.¹⁶²

The delivery of mental health care in custodial settings should be planned and must encompass a statewide approach to comprehensive forensic mental health services. Where possible, the system should divert people with mental illnesses out of prisons and provide greater care to those in custody and on release from prison.¹⁶³ In South Australia, these issues are intended to be addressed by the *Mental Health Services Plan 2020–2025*.

Medicare does not extend to prisoners, so all in-custody mental health services, along with other health services, must be funded within the State's health and justice budgets. There are also further costs associated with managing the circulation and logistics for higher need prisoners, with flow-on demands on prison infrastructure.

This is also the case with the National Disability Insurance Scheme (NDIS), which specifically excludes prisoners. Nearly all forms of disability are more common among prisoners than the general population yet access to services can be limited during incarceration.¹⁶⁴ DCS has implemented a program in collaboration with NDIS that aims to have an approved plan in place for individuals in correctional facilities prior to release to enable immediate access to services upon return to the community.

Needs and challenges

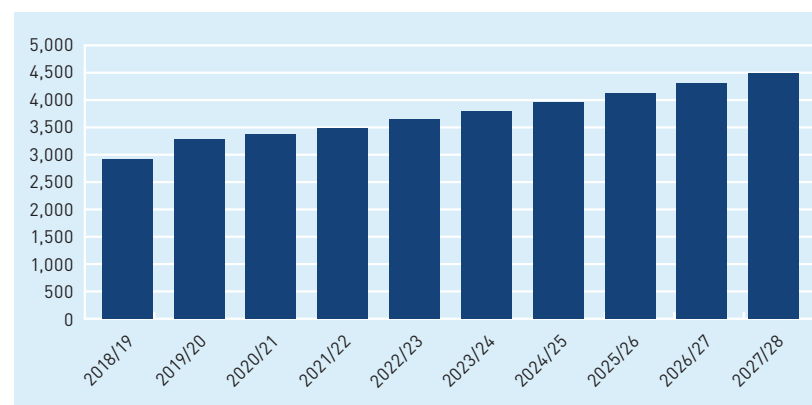
Projected growth

The prisoner population is expected to reach 3,945 by 2023/24, with a shortfall of 614 beds. Given most prisoners (80%) share cells, should a major incident occur, DCS would have no additional capacity to draw upon.

Figure 37 below shows that the longer term prisoner daily average is projected to increase from 2,883 as of March 2019 to almost 4,500 in 2027/28, when the expected shortfall will be 1,326 beds.

Figure 37:
Prisoner daily average
projections (by FY)

Source: Department for
Correctional Services



Imprisonment rates are strongly affected by factors within the justice system, such as legislation, policing, bail and the courts, which can be influenced by unplanned critical incidents that drive public and political imperatives for action.

Maintenance

The increase in South Australia's prison population has placed pressure on over-utilised and old infrastructure. Due to the nature of prison operations and a 24/7 operating cycle, the risks associated with breakdowns are high. Assets must be built and maintained to a high standard, the cost of which is significant and ongoing. Yet the annual programs budget allocated to address maintenance issues has remained the same since 2009/10, despite the number of beds increasing by 1,371.

The asset maintenance backlog in 2019 was estimated at \$12.6 million. Without further funding, this is estimated to rise over the next 10 years to \$34.2 million.

Housing

Stable housing is a critical factor in a persons' ability to assimilate back into the community and establish a normal life. DCS has advised that the ability to find stable housing is the biggest challenge faced upon release, and one of the greatest determinants of whether rehabilitation is likely to be successful.

There are currently a number of housing services available to offenders within the prison system that are provided by a combination of government and the not-for-profit sector, including a bail accommodation support service delivered by Anglicare SA. Despite these services, suitable housing options for prisoners returning to the community are also limited, and demand is outstripping supply. This is likely to continue as the prison population grows.

DCS is investigating the establishment of a reset facility that could be utilised for individuals on parole that subsequently commit a minor breach. This would enable them to be placed temporarily in short-term

accommodation with appropriate wraparound services to support rehabilitation and maintain employment and social links.

The financial cost to the State to imprison a person is far greater than the cost of social housing provision.¹⁶⁵ Further work is required to quantify the financial impact of providing stable social housing compared to the cost of supporting an individual in a correctional facility.

Public housing is a crucial infrastructure requirement for people leaving prison who are at high risk of homelessness, which in turn can lead to recidivism. Stable, affordable housing is associated with staying out of prison and increased social integration.

– Shelter SA

Social impact bonds

A social impact bond (SIB) is a contract with the public sector or governing authority, which pays for better social outcomes in certain areas and passes on part of the savings achieved to investors.

SIBs have been used successfully in the United Kingdom to address homelessness in individuals exiting custody. In 2017/18, the State Government commenced a SIB homelessness trial through the Aspire program using referrals from homeless service providers, housing providers, hospitals, prisons and domestic violence services. The program included a cohort of women exiting custody on referral from DCS and achieved encouraging results, with the number of custody days for these individuals lower than baseline.

As an outcome of the Mental Health Services Plan, the Department for Health and Wellbeing (DHW) will work to develop a SIB proposal to fund

an integrated service that delivers prison in-reach to women prisoners and follow-up on release.

ISA supports and encourages investigation of social impact bond programs as a funding mechanism that addresses homelessness issues and improves outcomes for the criminal justice sector.

Fit-for-purpose design

Infrastructure must be responsive to changes in demographics, policy, evidence, emerging practice, legislation, economics and technology. This necessitates provision of contemporary prison infrastructure design that enables effective and efficient operations and makes sites accessible and appropriate to meet security and management requirements, as well as promote rehabilitation outcomes. Such design must reflect a shift from institutional settings to more normalised environments with open-plan interiors, an absence of hard fixtures and furnishings, maximum use of natural light and access to outside space.

Prison standards and regimes are generally developed for Western society and applied to all prisoners regardless of their cultural background. The Royal Commission into Aboriginal Deaths in Custody observed that there 'are important cultural differences between Aboriginal and non-Aboriginal detainees for which accommodation can and should be made in the context of custodial procedures and cell design'.¹⁶⁶ Future development of prison environments should give consideration to Aboriginal people and other cultural groups.

Ageing population

While several examples exist internationally of specialised prisons designed to accommodate older prisoners, other correctional facilities have instead established special needs units within prisons to service these cohorts. The reported benefits of such units are similar to that of nursing home prisons, with centralised resources reducing costs associated with staffing and medical care. Depending on projections for demand, this could be a consideration in new prison construction.

Forensic mental health

Current state

In South Australia, Forensic Mental Health Services (FMHS) provides specialist services within the mental health system to meet the needs of offenders with mental disorders. Services provided include:

- inpatient acute and continuing care
- rehabilitation services
- mental health services provided within custodial settings, and
- provision of mental health services within the community (e.g. for offenders on community orders).

DHW's Mental Health Services Plan aims to rebalance the system towards community alternatives focused on early intervention and prevention, reduced reliance upon emergency services and improved service accessibility, integration and continuity across the continuum of care.¹⁶⁷

This reflects a long-term trend towards deinstitutionalisation, and community-based mental health services are primarily responsible for a decrease in patients residing in mental health facilities. Where there haven't been sufficient community-based services, this has inadvertently seen some people with poor mental health flowing through to criminal justice, creating difficulties across a system that is crowded and ill-equipped to appropriately manage these individuals and their needs.

There are several other reasons for the comparatively high rate of mental illness among people in Australia's prisons. Contributing factors are general disadvantage, including poverty, homelessness and unemployment, substance abuse, a lack of early intervention and a lack of mental health services in the community.¹⁶⁸

Forensic mental health facilities

James Nash House, which opened in 1987, and the newer Kenneth O'Brien Rehabilitation Centre comprise the High Security Inpatient Service (HSIS) in South Australia. FMHS operates both these facilities. In addition to the HSIS, an additional 10 'step-down' beds operate within FMHS at Ashton House.

South Australians need more resources dedicated to community care, mental health care, and end-of-life care; more care for people from CALD communities, in Aboriginal communities and for people in at-risk situations.

– Australian Medical Association, South Australia

The growth of infrastructure to support FMHS has not kept pace with the growth of correctional facilities. Between 1987 and 2019, FMHS beds grew from 30 to 50 while the prison population grew from approximately 800 to almost 3,000.

FMHS provides limited psychiatric in-reach across the State's nine prison sites and Child and Adolescent Mental Health Services provide in-reach into youth corrections. The ability of FMHS to provide in-reach services to prison sites is becoming constrained due to the increasing numbers of people within correctional facilities.

Yatala Labour Prison also has a unit that specialises in prisoners with complex needs and, due to lack of beds within FMHS inpatient units, Psychiatric Intensive Care Units of Flinders Medical Centre and Royal Adelaide Hospital need to be utilised at times.

The Mental Health Services Plan highlights the difficulty of predicting forensic bed numbers, as this depends not only on clinical need but decisions by courts related to the mental impairment defence and fitness to plead, and when release into the community on licence can be granted.

In South Australia, FMHS are also used as a facility for prisoners who live with an intellectual disability but may not have a mental illness.

Mental health services in South Australian prisons have also failed to keep pace with the growth in women prisoners. Adelaide Women's Prison does not have step-up facilities to cater for women with mental health concerns, therefore women prisoners experiencing serious mental health issues are sometimes admitted to Yatala's high dependency unit. Although there is security and separation, this solution does present some complexities. James Nash House does not have separate facilities for males and females, which can also present issues.

Needs and challenges

Development of facilities

Unlike treating mental health patients in a mainstream hospital, FMHS patients are often unable to be discharged on clinical grounds without a court order or judicial decision. Some individuals are long-standing residents as a result of court orders and cannot simply be discharged as a medical/psychiatric decision. This makes it difficult for FMHS to manage or control demand and flow of patients.

Facilities at James Nash House are considered to be outdated, not conducive to facilitating positive rehabilitation outcomes by modern standards and unable to meet current and projected demand. This view was supported by a 2015 independent *Review of the South Australian Forensic Mental Health Service*. The Review found that the current physical build of James Nash House is not consistent with contemporary designs of mental health facilities and recommended environmental and structural deficiencies be addressed without delay.

The Mental Health Services Plan has also reaffirmed this situation and recommended that James Nash House be demolished and replaced as it is not conducive to contemporary care. The Plan has suggested that a rebuilding program could occur over a number of years in the medium to long term, initially building replacement beds at the current James Nash site, followed by additional beds.

Based on current demand, the number of forensic inpatient beds needs to increase from 50 to 80 by the conclusion of the Plan to support acute, subacute and rehabilitation services. Within this total, the most pressing requirement is for additional acute/subacute beds at James Nash House. There are 22 currently available and this needs to grow by 30, with capacity for future expansion as numbers increase.

Future demand for FMHS facilities would also need to take into account the impact of the broader Mental Health Services Plan and the potential for services delivered under this plan to reduce the number of people with mental health issues from entering into the justice system.

Skill issues

To compound the above landscape for forensic mental health, an emerging issue for the sector is ongoing recruitment of staff to support the State's future needs. Universities in South Australia no longer support a specific mental health nursing course or stream within qualifications for training nurses. The number of new qualified nurses choosing mental health nursing is diminishing. The average age of mental health nurses is around 50 years, leaving the sector vulnerable to a shrinking workforce.

Youth justice

Current state

The typical youth justice population across the State varies between 250–300. Approximately 40 of these children and young people are in custody; the remainder are managed in community under supervision strategies. Around 30% are under the guardianship of the Chief Executive, Department for Child Protection.

In contrast to the adult system, overall numbers of children in youth justice have approximately halved in the past five years, although the numbers of Aboriginal children in custody remained relatively consistent over this time. The cause of the overall reduction has not been ascertained. However, in line with the adult system, issues such as stable housing and mental health service provision are critical service areas.

There is also a strong correlation between the child protection system and youth justice, with the majority of children entering correctional facilities having well-established histories with the Department for Human Services and/or the Department for Child Protection.

Youth Justice is responsible for the management and operation of the two campuses of the Adelaide Youth Training Centre (AYTC): Kurlana Tapa (a phrase meaning *New Path* in the Kaurna language).

Youth Justice is currently trialling consolidation of the AYTC into one campus to provide all young people in custody with equitable access to newer facilities and rehabilitative opportunities. Age and gender cohorts remain appropriately segregated at the consolidated site.

The accessibility of transport and access to appropriate health and mental health services, particularly in outer metropolitan and rural and remote locations are two frequently raised issues that impact significantly on young people.

– Youth Affairs Council of SA

Needs and challenges

Youth Justice facilities presently have sufficient capacity to meet demand. However, it is difficult to anticipate the future population in youth justice and whether the current capacity will suffice. More work is needed to understand factors that have influenced demand, including for Aboriginal children.

The current minimum age of criminal responsibility in all states and territories, and under federal law, is 10 years of age. The Law Council of Australia has recently amended its policy position to advocate for lifting this to 14 years to improve justice outcomes for vulnerable children. It argues that children under 14 are incapable of properly reflecting before acting and do not have the full capacity to comprehend the consequences of criminal action. As such, they should not be subjected to the same criminal prosecution as older children or adults. Should an increase be enacted into law, demand for youth custodial services may fall.

Future priorities

PRIORITY 12: DEVELOP A HOLISTIC JUSTICE SECTOR STRATEGY WITH AN AIM TO HAVE A COORDINATED APPROACH TO FUTURE INFRASTRUCTURE INVESTMENT

ISA recommends that a whole-of-system justice strategy is developed to take a more integrated approach to sector planning and asset management. This would seek to identify, to the extent possible, where efficient and effective investment in infrastructure is required to meet demand, opportunities for shared facilities (e.g. for courts and police) and ways to leverage technology to improve system outcomes and maximise the use of current assets.

This should include a review of systems to determine opportunities to better utilise data analytics to identify at-risk individuals who would benefit from early interventions that may prevent them from entering the system.

The system approach should comprise all key stakeholders including, but not limited to, South Australia Police, Courts Administration Authority, Department for Correctional Services, Youth Justice, Forensic Mental Health Services and SA Housing Authority.

PRIORITY 13: DEVELOP NEW INFRASTRUCTURE ASSETS FOR CORRECTIONAL SERVICES AND FORENSIC MENTAL HEALTH SERVICES

Data indicates that there will be a need for additional correctional and forensic mental health facilities. Planning for these should be integrated to establish whether there are any efficiencies in a joint facility or how they would operate as separate entities within an integrated system, and should give consideration to design settings that encourage rehabilitation and are culturally appropriate. The preferred option should be subject to a robust business case, and private sector funding and operational options should be considered. Options should be assessed with a view to consider whole-of-life asset impacts and costs per prison per day.

PRIORITY 14: EXPLORE ALTERNATIVE MODELS TO INCREASE SUPPLY OF CRISIS, TRANSITIONAL AND POST-RELEASE HOUSING

There is currently a shortage of crisis accommodation, with commercial hotels and motels often used as alternatives. This is an inefficient and expensive solution to meet the need.

Secure and fit-for-purpose housing is a key element of addressing recidivism, yet there is a severe shortfall in the supply of emergency and bail and post-release housing. The South Australian Government has had some success with the Aspire social impact bond and ISA sees the benefit in exploring further opportunities for social impact bonds or other alternative models that could address this need.



Reconciling past, present and future

Countries with Indigenous populations are increasingly incorporating the principle of reconciliation in their conceptualisation of landmark buildings. New Zealand's Supreme Court, Wellington, is an example in the justice context. Its ovoid-shaped, beech-panelled courtroom with glass viewing panel is a departure from authoritative design, while its copper-clad exterior invokes the form and texture of a cone from the totemic kauri tree.

TOURISM, SPORT & CULTURE



Tourism

Role of tourism infrastructure

Tourism is considered one of South Australia's growth sectors and, as the State recovers from the COVID-19 crisis, will be a vital contributor to the economy. Its growth has outperformed manufacturing, agriculture, healthcare, and financial and insurance services over the last decade.

The State offers a wide range of tourism assets, particularly in the areas of food and wine, events and festivals, road trips, and immersive nature-based and cultural tourism. Adelaide is the gateway to outback tourism in the State's north.

Adequate and well-maintained infrastructure is critical for building visitation to Adelaide and South Australian regions. The visitor economy would not function without appropriate investment in supporting infrastructure. This includes airports, road, rail and ferry networks, as well as hotel accommodation and experiential offerings. While the core purpose of this infrastructure is not purely tourism, its quality and accessibility greatly impacts the visitor experience.¹⁶⁹ Meanwhile, iconic, cultural and sporting infrastructure assets can be demand drivers for tourism.

Current state

Latest figures indicate that visitor economy expenditure has increased by 13% from the same period last year – from \$6.8 billion to \$7.8 billion. There are 18,000 businesses across South Australia that dedicate all or part of their workforces to servicing the visitor economy. Almost 8,000 of these businesses are sole proprietorships or partnerships.¹⁷⁰ The visitor economy accounts for a wide range of jobs and directly employs more than 38,900 South Australians.

For the year to September 2019, total South Australia visitor expenditure comprised \$1.1 billion from international visitors and \$6.7 billion from domestic. The 10-year profile of visitor expenditure (see Figure 38) indicates a growth in accommodation demand over time and shows international numbers fluctuating.

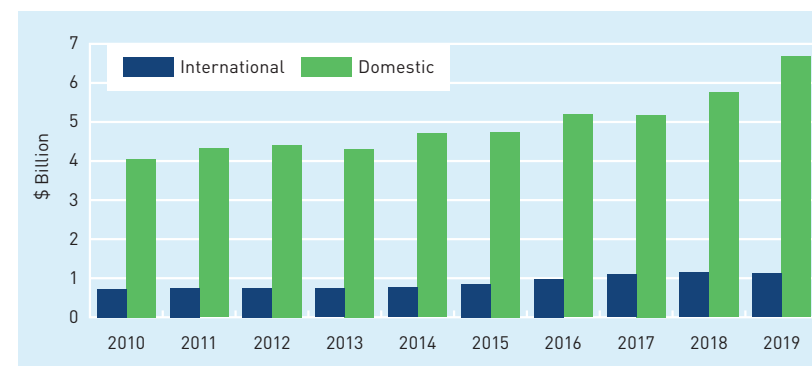


Figure 38:
Tourism expenditure by visitor segment

Source: South Australian Tourism Commission

Note: Domestic expenditure includes both overnight stays and day trips.
Years end September.

Core drivers for visitors to South Australia include business events and conferences, food and drink experiences, immersive nature and wildlife experiences, Aboriginal cultural experiences, sports events, study and festivals.

Visitor Economy Sector Plan 2030

In 2019, the State Government released the *South Australian Visitor Economy Sector Plan 2030*.¹⁷¹ Developed following extensive industry consultation, it seeks to grow the South Australian visitor economy to \$12.8 billion by 2030.

While some of these targets may need to be reviewed in light of the impacts of COVID-19, the visitor economy will remain a strong growth sector as the economy rebuilds.

To achieve this target, growth is required across all visitor types – international, interstate and intrastate – with international market growth being key. This is anticipated primarily from traditional western markets; however, visitor numbers from the expansion of eastern markets are expected to grow.

Across all markets, the trend is towards shorter average length of stay. This reflects, in part, the changing profile towards eastern markets, which tend to have shorter stays, albeit with higher spends.

Adelaide as a destination

In recent years, Adelaide has seen major developments such as the expansion of the Adelaide Convention Centre, activation of the world-class Riverbank Precinct and redevelopment of Adelaide Oval. These are additions to existing attractions such as the Adelaide Zoo, Art Gallery of South Australia, South Australian Museum, State Library of South Australia, Cleland Wildlife Park (Adelaide Hills region) and Museum of Discovery.

The city's restaurant and bar offerings combine with an extensive program of events offered throughout the year to add to its vibrancy. Major events include the Adelaide Festival, Womadelaide, Adelaide Fringe, Cabaret Festival, Tasting Australia, Tour Down Under and the Superloop Adelaide 500.

While Adelaide has experienced a recognised shortage in hotel accommodation at peak event times in recent years, the city is seeing significant investment in hotel accommodation of global appeal, including the Sofitel, Westin and SkyCity hotels currently under construction. The Hyatt Regency has also announced plans for a new hotel. These developments serve as indicators of market confidence in continued demand.

Future additions to the tourism asset base include the redevelopment of Festival Plaza as a key destination along the Riverbank, expansion of Adelaide Casino, expansion of Adelaide Airport, development of the Heysen

Gallery and Cultural Precinct and development of the Aboriginal Arts and Culture Centre and Space Discovery Centre at Lot Fourteen. The Space Discovery Centre will be run by Questacon – the National Science and Technology Centre – as its first permanent exhibition outside Canberra.

Regional tourism

Regional tourism generates 13,000 direct and 6,000 indirect jobs and \$2.6 billion in visitor expenditure, equating to 40% of the State's total visitor spend. It is anticipated that this could grow to \$3.55 billion by 2020, and the Visitor Economy Sector Plan 2030 outlines an ambitious goal to grow the regional contribution to the visitor economy to \$5.1 billion by 2030. Regions are, therefore, critical to the State's visitor economy and achievement of its growth target.

Regional South Australia offers a diverse range of festivals and events, internationally renowned wine regions, natural assets and experiences, and unique and diverse tourism offerings, including the D'Arenberg Cube (Fleurieu Peninsula region), Monarto Zoo and The Bend Motorsport Park (Murray River, Lakes and Coorong Region), Port Lincoln Shark Cage Diving (Eyre Peninsula region) and the Flinders Ranges (Flinders Ranges and Outback region).

Convention and business event market

Visitors to international business events spend, on average, twice as much as leisure visitors and offer benefits beyond an immediate revenue injection into the economy, such as showcasing the State's capabilities, developing trade and investment relationships, and being catalysts for information sharing.¹⁷²

Adelaide offers a range of business event spaces. In 2017, the State Government completed a \$397 million redevelopment and expansion of the Adelaide Convention Centre (ACC). This upgraded its capacity and capability, responding to market need for larger, multi-purpose spaces with up-to-date facilities and technology, to ensure its continued competitiveness.

It also allows the State to bid on a greater range of international and national business events, such as larger conferences and exhibitions.

Adelaide's attraction as a city for business events is enhanced by the proximity of the biomedical precinct and development of Lot Fourteen, Tonsley Innovation District and other innovation precincts.

Cruise ships

The cruise industry has been the fastest growing tourism sector in Australia and South Australia, contributing significantly to the State's economy over the past decade.

The South Australian Tourism Commission (SATC) developed the *South Australian Cruise Ship Strategy 2020* that aims to attract 100 ship visits with a value of \$200 million to the local economy by 2020. Last season, the State welcomed 82 cruise ship visits at the Port Adelaide Passenger Terminal (Outer Harbour). This injected \$145 million into the State visitor economy, up 18.6% on 2017/18.¹⁷³

The *South Australian Cruise Ship Strategy* is currently being updated to reflect projected growth and potential for market expansion. It is due to be released during 2020/21 and will seek to maximise the economic opportunities this industry can provide for the State through encouraging investment in infrastructure, enhancing the visitor experience and increasing regional dispersal.

Needs and challenges

Accommodation and business events venues

According to the Adelaide Convention Bureau, recent infrastructure commitments in Adelaide for high-end accommodation are expected to suffice for the next decade once current construction is completed. The new developments will address the need for five-star accommodation, which is the base demand for many international visitors, particularly those travelling from Asia.

In the longer 10–20-year timeframe, another cycle of infrastructure development will be required to both expand and refresh accommodation. To enable the State to stay competitive, this future infrastructure cycle should aim to be of a high standard to mirror or better that which is available in other Australian states.

The picture for regional accommodation is more challenging, with few hotels able to service larger numbers of visitors or the market for business events and conferences. There are only a handful of four- and five-star accommodation venues outside Adelaide. Older accommodation stock doesn't meet the quality demanded by tourists, particularly from the international market.

SATC has undertaken an extensive regional audit of accommodation, which has reinforced this view and identified:

- the standard of tourist accommodation in regional South Australia is lagging behind other states
- more unique and experiential accommodation is needed in regions, and
- caravan parks are in a phase of growth and renewal.

Many regional operators find it difficult to secure financing for upgrades and new accommodation developments as these ventures are viewed as higher risk. Despite this, recent proposed investments in the regions include a new \$30 million Nora Creina luxury golf course and resort near Robe in the State's south-east, a five-star luxury winery resort at Wirra Wirra winery in McLaren Vale, which is anticipated to cost \$30 million, a \$40 million development of the Anchorage Hotel and car park at Victor Harbor, and a \$50 million, six-star luxury hotel at Seppeltsfield winery. High-end accommodation developments like these will deliver much needed options for tourists and encourage longer stays.

Convention infrastructure is critical for the business market and has flow-on benefits to other sectors. In the medium to long term, further investment may be required to ensure that the ACC maintains its competitiveness and the State can continue to bid for large conferences such as Land Forces Conference and the International Astronautical Congress.



Instant icon

A destination combining wine, food and art has been a boon to McLaren Vale tourism, attracting around 1,000 visitors a day. The d'Arenberg Cube comprises a five-storey multi-function centre that combines a cellar door, private tasting areas, modern art gallery and a (recently closed) multi-award winning restaurant. The attraction showcases how entrepreneurial thinking can transform a region and help put it on the world map.

Air access

Airport links are critical for both the interstate and international tourist market, with Adelaide Airport receiving 8.4 million passengers in 2018/19. Of these, 7.3 million were domestic and 1.1 million international, an increase of 19% and 125% from a decade ago, respectively.¹⁷⁴

Growing international visitation relies largely on increases in passengers through Adelaide Airport. The \$165 million expansion of Adelaide Airport will provide better international facilities, and the airport master plan is forecasting passenger growth to 19.8 million by 2039.¹⁷⁵ Adelaide currently has eight direct international connections. Opening new direct links, especially to new markets such as the west coast of America that will not cannibalise existing markets, will support this.

International visitors are often time poor, so growing affordable regional aviation options will aid visitor dispersal rates. To service this market, existing regional flights must be maintained and new flights introduced where demand can be justified. Building efficient connections through regional flights will also assist tour operators to develop their offerings.

Consider how development of the State's smaller "airports", which are often little more than a runway in a paddock, can be upgraded – in possibly PPP arrangements – to allow increased economic growth through visitors to SA.

– Adelaide Convention Bureau

Touring aviation includes activities such as sightseeing experiences, charter flights, touring products and self-fly access to regions. Some of these activities operate on privately-owned unsealed airstrips. Infrastructure requirements include improving regional runways, landing strips, fuel availability, lighting and fencing.

Road network

Roads play an important role in enabling the dispersal of visitors safely to all corners of the State. At present, 74% of the State's road network is rated at one or two stars out of five, significantly below the national target of 80% above three stars. Improving the self-drive visitor experience and safety is required via:

- sealing specific routes and upgrading some unsealed roads to broaden regional appeal for new visitor markets
- road widening, shoulder sealing, passing lanes and fixing bottlenecks on popular regional routes, and
- road-related infrastructure including new or enhanced parking bays and pull-out areas.

Targeted investment in South Australian touring routes is needed, particularly for the Epicurean Way, Southern Ocean Drive and the Mighty Murray Way, to facilitate trip planning, encourage visitation and build engagement with wine regions.

Updating, repairing and extending visitor-related signage is also a priority across all regions, particularly on major touring routes, and should comprise:

- directional signage
- signage welcoming visitors to a region or town, and
- interpretive and information signage for regional points of interest.

Of priority are the better quality (and safer) rural roads which are expected by visitors, as is a wider offering of international standard quality (and larger) hotels.

– Adelaide Convention Bureau

Experiential offerings

South Australia is blessed with unique and significant natural assets that encompass reserves, national parks, coastal areas and waterways. Infrastructure is needed to not only access these but also facilitate an enriched and memorable experience. Its design should be sensitive to the surrounding environment and implemented in a sustainable way.

The State has several hiking and cycling trails throughout the regions and in national parks that link visitation points of interest. These should be maintained and upgraded where there is demand, and opportunities to develop new trails and strategically link existing ones should be explored to provide a more complete trail network and support ongoing demand for experiential tourism.

Cruise ship facilities

In the short term, facilities for cruise ship visits in South Australia, in particular the Port Adelaide Passenger Terminal (Outer Harbour), are considered sufficient to meet current projected demand. While it is noted that there have been proposals for cruise ship infrastructure at Glenelg, the depth of water and lack of suitable operating facilities for processing passengers would preclude this option in the absence of substantial investment.

The current facilities at the Port Adelaide Passenger Terminal (Outer Harbour) are flexible and fit-for-purpose for transit and processing embarking and disembarking passengers. The recent \$45 million dredging of the channel has provided the opportunity to welcome the next generation of larger vessels into port, including cruise ships. In the long term, further investment will need to be investigated and consideration given to a new terminal building or a new dedicated facility. At this time, the State Government would need to work in partnership with Flinders Ports to be responsive to the market and proposals would be subject to a business case.

Other cruise destinations, including Ceduna and Whyalla, as well as anchorages at Robe, Victor Harbor and the islands around Eyre Peninsula are currently being considered and investigated for future opportunities to expand cruise ship touring programs.¹⁷⁶

Coastal and marine infrastructure

Water-related infrastructure such as jetties, wharves, boat ramps and navigation aids are critical assets that activate tourism experiences. Ongoing maintenance and upgrades can be a challenge for local communities and councils.

The visitor experience at both Penneshaw and Cape Jervis for tourists accessing Kangaroo Island is limited, and some of the marine infrastructure is in poor condition. This is unlikely to meet the expectations of high-value tourists. In 2018, the State Government announced a competitive tender process for the provision of the Kangaroo Island ferry service in the lead up to the expiry of SeaLink's current licence in July 2024. Upgrades are expected to be considered in collaboration with the successful tendering company.

Tourism product

The ongoing development of quality tourism product – the facilities, assets and services designed to meet the needs of visitors – is critical for the success of the sector in a competitive global market and provides a compelling reason for visitors to travel to South Australia.

South Australia's 11 tourism regions each have distinct product offerings and appeal factors.¹⁷⁷ Improving the assets, experiences, activities and program of events to create new and exciting tourism product in each region that leverages its natural advantages will enhance the opportunity to package tourism offerings. This will enable operators to build itineraries to suit a range of target markets and support both short and long stay options. This, in turn, should create market conditions that will drive visitation numbers and demand for regional accommodation and enhance the case for investment in facilities.

This could include reviewing existing trails and tourism routes with a view to better leverage natural assets, parks and roads, create new trails and circuits, and improve the visitor experience through strategic upgrades to assets and signage, where required.

The development of the d'Arenberg Cube in McLaren Vale – which combines a wine sensory room, virtual fermenter, 360-degree video room and the Alternate Realities Museum (and, until March 2020, a multi-award winning restaurant which closed due to the COVID-19 pandemic) – has successfully demonstrated the value of investing in innovative tourism assets, with 1,000 people a day visiting since it opened.¹⁷⁸ The Cube is an example of a successful tourism asset that leverages the State's internationally renowned wine industry, while building a product that is unique and has broad appeal.

Similarly, the \$40m investment in expanding the Monarto Zoo to offer what is anticipated to be the biggest safari experience outside of Africa is expected to be a similar attractor for tourists and drawcard for the Murray River, Lakes and Coorong region.

Tourism and Transport Forum Australia supports the view that iconic attractions such as stadia, national parks, museums, art galleries, zoos and aquariums are demand drivers that encourage visitation to a destination.¹⁷⁹ These key tourism assets need to be maintained and further developed, as required, to keep pace with market expectations and to achieve growth targets.

Vibrant mixed-use public precincts including commercial, retail and hospitality services can also serve to attract both local residents and visitors to a destination. Continuing the transformation of the Riverbank Precinct to leverage other development happening in and around Adelaide will position it as the heart of the city and a focal point for tourism activities. It is important to connect assets and spaces along the Riverbank, including the cultural precinct along North Terrace and up to Lot Fourteen, to provide a seamless tourism experience.

Planning reform

To attract destination investment in regional tourism, planning policies should facilitate the development of tourism product that is sensitive to its location and is sustainable and preserves the State's heritage. While the Government is implementing a once-in-a-generation planning system reform, efforts should continue to reduce red tape and provide greater certainty for appropriate development. ISA supports work in progress to review the Environmental and Food Production Areas (EFPA) and consideration of other possible policy or regulatory changes that maintain the intent to preserve important character, heritage and environmental attributes while developing appropriate tourism product to leverage these assets.

Technology

Accessible and reliable digital connectivity can improve the regional tourism experience by providing information on attractions and enabling bookings, navigation through online maps, recommendations and immediate social media advocacy. Ensuring reliable Wi-Fi availability in popular tourism towns by addressing telecommunications black spots is critical, as it impacts on both visitors and tourism operators.

Improved connectivity in South Australia's many tourist attractions would also significantly enhance its economic benefits to the State, in particular in supporting local businesses to capitalise on the burgeoning influx of tourists from Asia. One key example of this is Kangaroo Island, which suffers from consistent internet connectivity issues.

– Australian Information Industry Association

Changing climate

Extreme weather events linked to climate change are already having an impact on the tourism industry. The CSIRO expects that average temperatures across Australia will rise, projecting an increase in extremely high temperatures, extreme fire weather, extreme rainfall events, tropical cyclone intensity, extreme sea levels and droughts in southern areas.¹⁸⁰

These events can not only have a devastating impact on natural assets and infrastructure, but may serve as a detractor for tourists visiting in some areas. The extreme bushfires over the 2019/20 summer season are an example of the impact that weather events can have, particularly in regional areas.

In response to the environment becoming more unpredictable, investment in new and upgraded facilities should take into consideration where and what to build and to ensure infrastructure is resilient to weather events to the extent that this is possible. The rebuilding of key infrastructure to support tourist areas, such as Kangaroo Island and the Adelaide Hills impacted by bushfires, will need to give careful consideration to what and where construction should occur to maximise both tourism value and resilience to future events. However, it does provide an opportunity to strategically plan for infrastructure and product that can reposition those areas on the global stage.

Future priorities

Relatively low levels of funding for maintaining and enhancing tourism product can have a significant impact on regional tourism. For example, there is a need for an increased number of high-quality tourist accommodation in regional South Australia. Government should work with industry to develop a program that supports its development.

PRIORITY 15: DEVELOP TOURISM ASSETS AND PRODUCT TO ENHANCE THE STATE'S APPEAL TO INTERSTATE AND INTERNATIONAL VISITORS

There is an opportunity to leverage South Australia's unique natural and cultural attributes to create distinct, high-impact and instantly recognisable attractions to drive visitation. Planning should be at a regional scale so that products complement each other and create a diversity of offerings in the region to encourage greater visitor nights and spend. To support this, government should consider expanding resources to work with industry to foster the development of tourism assets and preparation of business cases for viable product that supports the Visitor Economy Sector Plan 2030 and the South Australian Regional Visitor Strategy. While funding the development of tourism assets should primarily be led by the private sector, subject to viable business cases and an identified need, there may be opportunities to leverage public sector investment in product.

PRIORITY 16: PROVIDE BETTER TRANSPORT CONNECTIVITY TO FACILITATE EASE OF ACCESS TO TOURIST ATTRACTIONS

Accessibility to the State's tourism assets is critical to driving visitation and improving the visitor experience. Over the life of the Strategy, there will need to be significant investment in improving regional roads, airports and marine infrastructure. This includes access to Kangaroo Island. Frameworks should be developed that value the economic contribution from tourism utilising this transport infrastructure that goes beyond traditional *travel time saved* metrics of transport economics.

Sport

Role of sporting infrastructure

Sport is at the heart of many communities, where over 80% of Australian adults surveyed by Ausplay reported at least weekly participation in sport and active recreation. Sporting infrastructure enables participation, supports health and wellbeing, improves liveability and, at the elite level, can boost the economy through events and tourism.

In regional areas, access to modern sport and recreation infrastructure is critical for sustaining communities, developing liveable towns, attracting and retaining a skilled workforce and improving people’s health and wellbeing.

Current state

The Office for Recreation, Sport and Racing (ORSR) is currently developing the *State Sport and Active Recreation Infrastructure Plan*. The Plan will focus on how sport and recreation infrastructure is supporting government objectives including increasing levels of participation, creating jobs and stimulating economic growth.

Key assets

Across South Australia there is a mix of sporting and recreational facilities. Ownership ranges from State Government, councils, not-for-profit groups and sporting clubs to private individuals.

South Australia has several large sporting stadia. This includes the historic Adelaide Oval, which primarily hosts cricket and Australian rules football. Between 2009 and 2014, the oval underwent a \$535 million redevelopment, increasing its seating capacity to around 53,500 while retaining its status as one of the world’s most picturesque cricket grounds.

The State’s premier tennis venue, Memorial Drive, has recently undergone a \$10 million upgrade to include a roof over centre court, court resurfacings and improved amenity across the site. The centre court has seating for 5,000 people and the playing surface is at international standard.

Coopers Stadium comprises the State’s major rectangular sporting field, which is home to Adelaide United Football Club. It has capacity for around 16,500 people and sees almost 200,000 visitors each year. Season games for elite court sports such as basketball and netball are currently played at the Adelaide Entertainment Centre (AEC) due mainly to capacity/amenity issues with other available venues.

All tiers of government recognise the importance of sporting and recreational facilities to a community, and while many are owned and operated by councils, some receive significant funding through State and Commonwealth Government grants.

	Owner/ operator	Project value	State funding	Federal funding
The Bend Motorsport Park	Private	\$100m	\$10.5m	\$7.5m
The ARC Campbelltown	Campbelltown City Council	\$27.5m	\$3m	\$7.5m
Port Pirie Sports Precinct	Port Pirie Regional Council	\$24m	\$5m	\$5m
Port Augusta Central Oval	Port Augusta City Council	\$21m	\$5m	\$5m

Table 8:
Recipients of significant grant funding

Source: Office for Recreation, Sport and Racing

Office for Recreation, Sport and Racing facilities

ORSR has developed and maintained around 1,346 kms of riding and walking tracks and trails across South Australia.¹⁸¹ It also manages or outsources management of 28 properties. Table 9 lists the 10 sporting facilities controlled by ORSR, the operation and management arrangements of which vary.

Stadium	Sports	Annual Visits	Capacity
SA Athletics Stadium	Athletics & soccer	145,000	4,200
Adelaide Super-Drome	Track cycling	18,355	3,000
SA Aquatic & Leisure Centre	Swim, diving & water sports	1,105,347	4,500
State Hockey Centre	Hockey	65,429	3300
Priceline Stadium	Netball	423,352	3,000
A.M. Ramsay Regatta Course	Rowing	134,278	n/a
Heini Becker Park	Speedway & motocross	10,484	8,000
State Shooting Park	Various shooting disciplines	20,148	Variable
Monarto Shooting Complex	Various shooting disciplines	5,282	Variable

Table 9:
ORSR facilities

Source: Office for Recreation Sport and Racing

A significant portion of ORSR assets are ageing and in need of capital investment. The current value of the ORSR facilities is over \$284 million, with accumulated backlog maintenance in the order of \$115 million (excluding the South Australian Sports Institute (SASI) replacement).¹⁸² This indicates that many of the complexes are at the end of their useful life and either need to be extensively refurbished or replaced to maintain expected services levels. This is certainly the case for both the Coopers and Priceline stadia, which lack the amenity expected to host national-level sporting events.

Many of the stadia were designed for single sport use, which has led to underutilisation. In the case of Coopers Stadium, there is only one change room, therefore men’s and women’s events cannot be held back-to-back on the same day. This constrains sports offerings to the public.

Elite court sporting teams such as the Adelaide 36ers don’t have ongoing access to a facility capable of hosting their season games and have a makeshift wheel-in court at the AEC. Elite netball has a similar arrangement, where teams also play at the AEC due to their home facility, the Priceline Stadium, not having sufficient seating capacity for many season games and lacking the amenity required to host national-level sporting events.

...parks and open spaces, gymnasiums, sporting facilities, arts, libraries, walking/bike trails, public toilets...[are important for] attracting more permanent residents to the region.

– Upper Spencer Gulf Common Purpose Group

In regional areas, most sporting facilities are provided by local governments. Providing well-maintained, fit-for-purpose sporting facilities in many regional towns is difficult due to establishment and ongoing maintenance costs, yet without these assets it’s difficult to keep viable competitions running.



Creating vibrant places

Sporting facilities – large and small – are spaces that enable the expression and celebration of cultural values and identity. They are a great unifier of young and old, all genders and backgrounds, residents and visitors. Their contribution is as broad, generating both social and economic returns.

Needs and challenges

Key drivers for participation

In 2019, the ORSR undertook a statewide consultation process to better understand key barriers to participation in sports and active recreation. This identified:

- lack of facilities
- ageing infrastructure and restrictive/non-inclusive design or condition of available infrastructure, and
- the cost of participation.

Other identified drivers for participation in organised sports are seen to include:

- access to good equipment, which is often an inhibitor to some sports, especially in lower socio-economic areas
- minimising the cost of participation, and
- high profile elite teams and individuals doing well on the international stage.

A growing population and greater focus on health and wellbeing also increases demand, both in active organised participation and more unstructured activities such as walking and cycling.

Connecting... tennis centres with other community facilities and spaces, such as aquatic centres, libraries and shopping centres provides greater options for local communities to connect socially and undertake physical activities.

– Tennis SA

As Adelaide's population densities increase through urban infill¹⁷⁶ and land sizes decrease, there will be a greater need for open spaces to compensate for housing with little to no backyard space.

Current planning requirements enable developers to give back 12.5% of land to councils to manage as green space; however, this can be reduced provided developers pay a levy on each additional land parcel. With block sizes reducing on average across the State, the State Planning Code may need to consider this linkage to maintenance of liveability.

Young people regularly call for a greater number of free, safe and easily accessible public spaces to engage in sport, recreation and artistic expression... where [they] can feel safe, exercise their right to use public space and feel included and connected to the communities they live in.

– Youth Affairs Council of SA

Utilisation of facilities

Across South Australia, there are many community assets such as schools that have extensive sporting facilities and green spaces (e.g. ovals). These facilities are used extensively during the day but under-utilised in the evening and on weekends – times when people generally play organised sports. Conversely, many sporting facilities are extensively used in the evening and on weekends but lay unused during the day.

As urban areas become more densely populated and open spaces decrease, operators of community assets will need to work closely together to get the maximum use out of infrastructure. New facilities will need to be designed to cater for a range of different sports and activities to enable higher rates of utilisation and benefit to the community.

CASE STUDY

The ARC Campbelltown

Built in the 1960s, the original facility had three indoor courts. A significant upgrade in 2016 has seen it increase to five indoor courts, plus a pool, gym and five squash courts. Visitation numbers have since increased from 8,000 users a month to more than 40,000 during peak months and nearly 2,200 members. The project was led by Council with financial input from both State and Commonwealth Governments.

Healthy living

Regular physical activity is an important factor in preventing and managing chronic illnesses, such as type 2 diabetes and heart disease. In 2017/18, 25% of children and adolescents aged 2–17 and 33% of adults were overweight or obese.¹⁸³ Ease and cost of access to attractive open spaces and playing fields is a key determinant in whether or not a person will go for a walk, ride a bicycle or play an organised sport.

Government should encourage event spaces that are multi-purpose in their nature. Various innovations and advances in engineering and construction techniques have made activities that it would have been unfeasible to combine previously very much possible.

– Royal Agricultural & Horticultural Society of SA

Ageing population

Between 2019 and 2031, the number of people aged over 65 in South Australia is estimated to increase by around 29%, or 96,223 people.¹⁸⁴ Provision of accessible trails that include shade and seating at regular intervals, suitable safe surfaces and lighting, as well as toilets within a reasonable distance will help incline this cohort to activities such as walking.¹⁸⁵

By making the environment walkable, it remains possible for people to maintain mobility and their social networks beyond retirement age.

– Walking SA

Elite training

SASI is the State's high performance training organisation and a part of the National High Performance Network. The current elite training centre for SASI is a repurposed school building that has been maintained well beyond its original design life. Due to its age, the facility has high maintenance and running costs. Its location provides no synergies with any elite-level sporting groups or infrastructure, and its design does not provide the inspiration or amenity needed at an elite-level training facility to attract and retain world-class athletes and coaching staff.

Future priorities

PRIORITY 17: DEVELOP BUSINESS CASES FOR INVESTMENT IN SPORTS INFRASTRUCTURE BASED ON STRATEGIC NEED AND PRIORITISE MULTI-USE FACILITIES

To ensure sporting facilities maximise utilisation and viability, it is important that investment is prioritised towards multi-use and shared facilities where practical. This could include new facilities being designed for multiple sports and events, a consolidation of facilities into sporting hubs that allow for shared uses, or better shared use of school and community facilities. The *State Sport and Active Recreation Infrastructure Plan* (the Plan) should identify strategic needs.

Projects proposed in the Plan should be assessed and prioritised according to short-, medium- and long-term needs. Their capacity to encompass multi-user facilities to address a number of identified needs should be considered. Any new investments should then be subject to rigorous business cases, including identifying potential options and a range of funding sources. Grant funding of projects should be aligned with the strategic objectives in the Plan.

South Australian Aquatic and Leisure Centre

Image courtesy of the Office for Recreation, Sport and Racing



Culture

Role of cultural infrastructure

Cultural infrastructure provides the spaces to enable the expression and collection of South Australia's history and evolving identity, which is important for vibrant, engaged and empowered communities in both metropolitan and regional areas. Aboriginal and Torres Strait Islander arts are a rich contribution to the world's culture and part of Australia's diverse contemporary culture and national identity.

The cultural and creative sectors are incredibly diverse, ranging from small galleries and businesses to the largest events and institutions. Creative and cultural sector investments foster lively and compelling cities and regions. Such places become hubs – magnets for all kinds of intellectual capital encompassing world-class thinkers, academics, artists and innovators. Such denizens are a dynamic force for enterprise in all spheres of life,¹⁸⁶ extending beyond traditional economic measures.¹⁸⁷ South Australia needs the cultural infrastructure to ensure that Adelaide and the regions are attractive and desirable places to live in order to attract and retain talent in a way that makes a positive economic contribution to the State.

Current state

Australia's cultural and creative activities contributed 6.4% to GDP in 2016/17, amounting to \$63.5 billion and \$99.7 billion, respectively.¹⁸⁸ In 2017/18, over 82% of Australians attended at least one arts and cultural venue or event, including arts galleries and museums, music performances and theatres.¹⁸⁹

Reflecting the national perspective, South Australia has high audience engagement in the arts, with about 85% of residents engaging as audience members and 23% creating art.¹⁹⁰

The State's arts and cultural sector is supported by grants from the three tiers of government (Commonwealth, State and Local) private donations and philanthropy, sponsorship, earned revenue (ticket sales, sale of artworks) and investment income.

Over recent years, individual state and territory government expenditure on cultural activities has closely reflected population size. Figure 39 shows funding increasing over the past three financial years.¹⁹¹

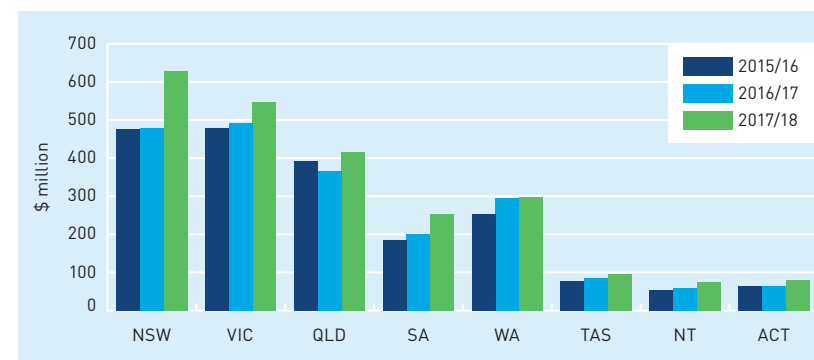


Figure 39:
State and territory governments total cultural expenditure

Source: Meeting of Cultural Ministers Statistics Working Group, 2019

Assets across the sector are a combination of:

- significant state-owned assets such as the Adelaide Festival Centre
- collecting institutions such as the Art Gallery of South Australia (AGSA), South Australian Museum (SAM) and State Library of South Australia, and
- a network of smaller spaces and facilities, such as Tandanya National Aboriginal Cultural Institute and the Migration Museum, that are either owned by the State or by private or not-for-profit organisations.

The presentation of art can also occur across a mix of non-traditional spaces (e.g. parklands, vacant commercial spaces and pubs).¹⁹²

Arts Plan

The *Arts and Culture Plan South Australia 2019–2024* is the first such plan in a decade and 20 years after the last significant review of the State's arts and culture offering. It was developed by independent consultants with extensive community and industry consultation "to guide the growth of and investment in the State's leadership in the arts and cultural sector".¹⁹³

With a more expansive remit than infrastructure, it seeks to take a broad view of the sector that focuses on South Australia as more than simply a festival state. The Plan balances the needs of the whole sector, considering large cultural institutions, small-to-medium organisations and individual artists. It notes the diverse strengths of arts in the State, including culture collections, libraries, Aboriginal collections, youth arts focus, craft and design, gaming, film and designation of Adelaide as a UNESCO city of music.

...an affordable, well-designed and developed space for artists to create and present work, and for audiences to enjoy that work, will lead to benefits for artists and audiences alike and add to Adelaide's vibrancy and cultural depth.

– State Theatre Company SA

Key findings include the following:

- The sector, both private and public, is siloed and there are opportunities to more effectively connect and collaborate.
- There is a demand for multi-purpose rehearsal and performance spaces for small-to-medium sized arts organisations.
- There is a need to revitalise regional arts centres as creative community hubs.
- The sector has a high level of dependence on government support and there is an opportunity for some institutions and organisations to take a leadership role in pursuing alternative funding streams.

Port Pirie Railway Station Museum

Image courtesy of the South Australian Tourism Commission



The consultants made 45 recommendations to Government, of which 22 were accepted, a further 22 supported in principle and one subject to further consultation. Table 10 lists recommendations that have infrastructure implications.

Recommendation	Status
Develop a space activation plan for use by independent artists and small to medium organisations to optimise existing venues and spaces across Adelaide and regional centres.	Accepted
Fund a business case to assess the viability of an acoustic venue (concert hall) to serve the local music industry and the Adelaide Symphony Orchestra and Adelaide Youth Orchestras.	Supported in principle
Fund a feasibility study to identify options for the creation of a black box theatre for Adelaide.	Supported in principle
Develop a five-year revitalisation plan of regional arts centres as creative hubs within their respective communities.	Supported in principle
Revitalise existing regional arts centres as creative community hubs and invest in new centres to meet the needs of local communities.	Supported in principle
Undertake a review assessing the demand and feasibility of creating a Performing Arts High School/College in Adelaide.	Supported in principle

Table 10:
Arts Plan recommendations with infrastructure implications

Source: Arts SA

Aboriginal Arts and Cultures

As a key commitment to the State, the South Australian Government has expressed a vision to create a major Aboriginal Arts and Cultures Centre at Lot Fourteen as an iconic cultural institution of world significance. Using traditional storytelling techniques along with unique physical collections and modern technology, the centre aims to tell the story of Aboriginal culture and history in a new way.

It will be designed as an international attraction to drive year-round cultural tourism to Adelaide. ISA considers it important for the design of the new centre to reflect its status as an iconic cultural asset.

The project has attracted an initial funding commitment of \$65 million from the State Government and \$85 million from the Commonwealth Government.

Cultural collections

South Australia's three main collecting institutions comprise the North Terrace cultural precinct, which is a key destination within the broader Riverbank Precinct. They play a vital role in the arts, cultural and tourism sectors by displaying, interpreting, making accessible and preserving the State's shared cultural, scientific and historic heritage.

The combined value of the arts and cultural heritage collections is around \$1.2 billion. Only a small percentage of the collection is on display at any given time.

Festival State

Adelaide is home to 11 major arts festivals which generated more than \$109 million into the State economy in 2018, an increase of 27.7% on the previous year.

According to Festivals Adelaide, gross economic expenditure generated by its events – which include the Adelaide Festival, Fringe, WOMADelaide and Cabaret Festival – rose by 29.2% to \$345.9 million and created 1,045 full-time equivalent (FTE) jobs.

Arts sector

South Australia has a thriving boutique performing arts sector. This is characterised by a rich diversity of practice and practitioners, unique and historic assets and facilities, world-renowned festivals and collections and state-of-the-art creative industries.¹⁹⁴

The State has strengths in the local theatre scene, with a number of internationally renowned small-to-medium companies developing and performing content for both local audiences and for export, including through the State Theatre Company. South Australia is internationally recognised for its youth theatre productions, with companies such as Patch Theatre Company, Slingsby and Windmill Theatre regularly touring shows internationally and winning awards.

Screen sector

The screen production industry in South Australia contributed a total of \$119.5 million to GSP in 2017/18, with 1,170 direct and indirect FTE positions across the State.

The screen sector is a key contributor to creative industries in South Australia which, given their relevance to many other sectors, have been recognised as one of the State's growth areas. For example, skills needed to create digital games are also in demand in industries such as defence, mining, health, education and manufacturing that use simulation, visualisation and virtual reality.¹⁹⁵

Creative industries and entertainment are fast growing industries with meaningful jobs, particularly for youth.

– RDA Barossa Gawler Light Adelaide Plains

Adelaide Studios, managed by the South Australian Film Corporation (SAFC), is a creative hub for South Australian screen businesses and practitioners for the creation of quality screen content across film, television and digital platforms. In addition to two sound stages, studio facilities include a Dolby Premier Mixing Theatre, ADR and Foley studios, a screening theatre with dry-hire edit suites and a suite of modern production offices offering access to high-speed internet.

The State also supports a number of thriving post-production companies, including Rising Sun Pictures, Kojo, Resin and, more recently, Technicolor's Mill Film and game development companies, Mighty Kingdom and ODD Games.

Music industry

Adelaide is one of 31 cities around the world to be designated as part of UNESCO's Creative Cities Network. The South Australian music industry comprises a diverse range of artists, businesses and entrepreneurs that supply the live and recorded music sectors across the full value chain, from teaching through to touring and rehearsing through to recording.¹⁹⁶

The live music industry in South Australia operates through mostly small and independently owned venues, with the Lion Arts facility an exception. The 2018 *South Australian Music Industry Strategy* identified 425 venues, including all venues that hold an APRA live music licence – from dedicated music venues through to businesses such as wineries that occasionally host live music.¹⁹⁷

The Music Industry Strategy notes that while live music is growing, regulatory complexities, slow ticket sales and sometimes sparse audiences are key issues facing the sector. The Government has committed \$550,000 per year to support music events and festivals through the Live Music Events Fund.

Needs and challenges

Cultural institutions

Arts and cultural assets can be expensive to build and maintain.¹⁹⁸ Key cultural organisations are operating in an increasingly demanding environment. Common drivers for change include:

- the need to maintain and renew buildings
- opportunities for digital excellence
- literacy and engagement, and
- business/commercial growth.

Key cultural institutions are also facing competition for audiences and exhibitions from institutions in other states and territories. Alternative commercial models and revenue streams should be explored to ensure cultural institutions remain competitive in this environment.

None of the three major cultural institutions have undergone a major revitalisation and redevelopment for over a decade. There are also substantial operating liabilities in maintaining such institutions, and all are facing issues with a maintenance backlog.

Unlike their counterparts in other jurisdictions, AGSA and SAM face constraints in terms of available exhibition space for ticketed touring exhibitions and adequate space for food and retail facilities. This restricts the number of exhibitions these institutions can attract and display on an annual basis and impacts their capacity to generate external revenue.

Limited space and budgets also restrict capacity to display a larger proportion of collections, hence the State's cultural assets remain underutilised.

The Aboriginal Art and Cultures Centre at Lot Fourteen will draw on the State's unique collections, including the Aboriginal collections held by the leading institutions who can, in turn, display other aspects of their collections.

Further investment in existing arts infrastructure may be required to realise these opportunities.

The three institutions have or are developing strategic plans to improve services, collection presentation and sustainability.¹⁹⁹ Implementation of these plans would have a positive impact on North Terrace as a cultural hub and expand capacity to host touring exhibitions and provide interactive education programs. Consideration should be given to opportunities to collaborate and potentially share assets such as exhibition spaces.

Art in the digital era

Digital technology, connectivity and other online innovations are providing cultural institutions with the opportunity to overcome traditional geographic barriers to sharing their collections with a broader cross-section of the community and improve opportunities for engagement in the arts.

The institutions have strategies to progressively digitise collections, which have been reinforced by the Arts Plan. This can be a costly and time-consuming process but will extend the life of some collections and enable them to be accessed by broader regional and global audiences.²⁰⁰ Digital technology can also be harnessed to build engagement to sustain the relevance of cultural collections. Rather than being an 'add-on', it is an integral part of ensuring these collections are valued and available for generations to come.²⁰¹

[Invest] in broadband and digital technology in regional areas (or provide access to existing Government owned infrastructure) to provide access to global arts opportunities and for regionally created work to be exported around the world.

– Country Arts SA

Venue constraints

Common issues across the sector include availability of fit-for-purpose rehearsal and presentation spaces and the cost of venue hire. Selected venues such as the Festival Theatre, Duncan Playhouse and Adelaide Town Hall are highly utilised; however, cost and availability have been identified as issues for small-to-medium arts organisations.

While a range of other smaller venues are available, maintenance issues and under-investment in technology and accessibility can be limiting factors for professional productions. Availability of space for administration and other back-of-house functions are also sector-wide issues.

Festivals Adelaide has noted that most festival cities, including Edinburgh, Montreal and Krakow, have vast 'festival infrastructure', including a number of 2,000-plus seat theatres, 500–700 seat theatres, experimental art spaces, music and concert halls, transformable outdoor venues and galleries. An internal audit conducted by Festivals Adelaide of performing art venues in South Australia shows that there has been a decline in venue space in recent years that is out of step with the 10% per annum growth that the festival sector sustains year on year.

This sentiment is supported by the State Theatre Company, which has also cited a lack of affordable, professional-quality performance venues and rehearsal spaces that enable local arts companies to produce and present high-quality works for local production and for export. State Theatre Company has also advised that other arts companies such as Zephyr Quartet, Slingsby, Australian Dance Theatre, Windmill Theatre Company and Patch Theatre Company have limited access to suitable available rehearsal and performance venues.²⁰²

The Arts Plan has recommended a feasibility study considers the creation of a flexible black box theatre, to address some of the issues identified. The scope of the feasibility study should focus on the proposed theatre as a multi-purpose and flexible venue and consider potential investment in existing facilities as an option.

Collection storage

The Arts Plan has highlighted the critical need to address current storage arrangements for State collections – the museums, galleries, libraries, archives and botanic collections. This is currently being considered within State Government by the Cultural Institutions Storage Steering Committee. Collections are currently stored across a range of sites, including on North Terrace. A significant proportion of storage facilities are in sub-optimal conditions that could threaten the preservation of irreplaceable collections.

A number of previous studies and projects have been contemplated over time to resolve the ongoing cultural storage requirements for the major collection institutions. A more fit-for-purpose facility could help preserve and secure the collection and provide better viewing opportunities for the public.

The potential for a shared storage facility for key South Australian collections should be considered. This should incorporate the best contemporary practice in climate-controlled environments to suit diverse collections. Rethinking access to the collection is also critical, as is investing in digital solutions that respond to audience expectations.

Festival and event infrastructure

Maintaining infrastructure to host globally attractive festivals and events has been identified by the industry as an important factor in their success. Due to the temporary nature of these activities, organisers for individual events regularly need to install minor infrastructure for fencing, power, digital capacity and seating for the duration of an event. This adds to the complexity and cost of running events.

The use of non-conventional and non-traditional venues across art mediums has been noted,²⁰³ particularly the trend towards pop-up venues for festivals and events. This results, in part, from the lack of suitable traditional venue spaces.

Festivals Adelaide has recommended supporting activation of outdoor event spaces, upgrading facilities in all CBD park lands and squares, including three-phase power, sullage and digital capacity. An improved Wi-Fi service in the Adelaide CBD would also support the visitor and patron experience.

Consideration should be given to installing permanent facilities and infrastructure such as retractable fencing in strategic locations with high event use, where the upfront cost would have a longer-term benefit and encourage expansion to the current events program. Installation of permanent assets for events should be balanced with mitigating impact on visual amenity or ongoing use of facilities.

An example is the need for improved digital infrastructure and faster Internet connections, which is becoming a significant issue across the sector to support festivals, performance and research.²⁰⁴ Faster digital connectivity could facilitate improved access to ticketing, abilities for livestreaming performances to a broader audience, opportunities for incorporating digital technology into performances, way-finding for events and the ability for venues to provide special offers to consumers.

Country Arts SA

Country Arts SA has proposed taking a planned approach to the ongoing renewal of South Australia's regional arts centres, ensuring they continue to meet the needs of regional audiences, artists, hirers and other users, comply with current building standards, ensure the safety of patrons and staff, and maximise arts experiences for all.

Ongoing funding will be required to address critical building issues and undertake a program of rejuvenating the regional arts centres across the four main regional arts centres:

- Middleback Arts Centre, Whyalla
- Northern Festival Centre, Port Pirie
- Chaffey Theatre, Renmark, and
- Sir Robert Helpmann Theatre, Mount Gambier.

Studio infrastructure

Adelaide Studios at Glenside are landlocked, with expansion constrained by the Cedar Woods development surrounding the perimeter. The SAFC is currently master planning the site to plan for future growth of the studios and facilities to support industry tenants. Further investment may be required to support expansion in the medium to long term.

Future priorities

PRIORITY 18: GOVERNMENT SHOULD PRIORITISE THE CONSIDERATION OF INFRASTRUCTURE INITIATIVES IDENTIFIED IN THE ARTS PLAN 2019–2024

Progressive implementation of the Arts Plan recommendations should include development of business cases before any investment decisions are made. Priority should be given to projects that support economic and cultural activity, facilitated by shared spaces and facilities, and provide opportunities for delivering alternative revenue streams.

PRIORITY 19: PLAN THE CULTURAL PRECINCT ON NORTH TERRACE TO POSITION IT AS A MAJOR ATTRACTION FOR THE STATE

Planning for the North Terrace precinct to inform any possible future redevelopment within the area should maximise opportunities for shared multi-use spaces and facilities. Efforts by the three collecting institutions to review operating models and explore options to generate more commercial revenue or other funding mechanisms should also be supported.

PRIORITY 20: DEVELOP A BUSINESS CASE TO INVESTIGATE OPTIONS FOR ADDRESSING CULTURAL STORAGE NEEDS

A business case should be developed to investigate options for appropriate solutions to address culture storage and public access needs, with a view to identifying a preferred approach. Options for shared storage facilities and a program of digitisation of the collection should be explored.

Main Corner Complex, Mount Gambier

Image courtesy of South Australian Tourism Commission

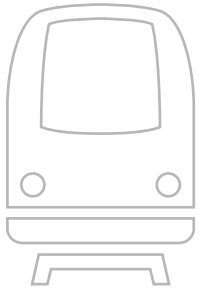




From vision to fruition

The Waterview Connection has changed the way Aucklanders travel and has also improved regional links. First envisioned in the 1950s, progress faltered due to site and geotechnical constraints. The roadway finally came to fruition in 2017 following a five-year construction period, with its twin tunnels bypassing the city centre and reducing traffic on the Auckland Harbour Bridge and a major highway, and lowering commute times from the CBD to the airport by some 20 minutes.

TRANSPORT



Role of transport infrastructure

Transport plays a fundamental role in supporting economic growth through improved supply chain productivity and efficient and safe access to jobs and markets. Transport also has the ability to shape cities and communities and contribute to liveability and ability to access services. Transport infrastructure needs to be well planned to facilitate and support growth so the cities and regions remain liveable and productive. Transport is also traditionally the biggest component of any government capital budget and the capital program makes a direct contribution to the economy.

When transport systems are efficient, they provide economic and social opportunities and benefits such as better accessibility to markets, employment and additional investments. When transport systems are deficient in terms of capacity or reliability, they can have an economic cost such as reduced or missed opportunities and lower quality of life.

– Jean-Paul Rodrigue, scholar of transportation geography

Scope of transport sector

The size and scope of South Australia's transport infrastructure is significant. The net value of state-managed road infrastructure and related land and facilities is over \$19.8 billion as at June 2019.²⁰⁵ South Australia has 10% of the national land transport network, including 23,000 km of sealed and unsealed state roads and a further 70,000 km of local government roads. There are 10 major ports in South Australia and various other boating and marine facilities. The Australian Rail Track Corporation owns the interstate rail lines, Genesee & Wyoming Australia and other private businesses own regional rail infrastructure, and there are 132 km of passenger rail (heavy and light) in Adelaide owned by the State Government. Adelaide Airport is the major international gateway, but there are also 23 regional regulated aerodromes that are generally owned and operated by local councils, as well as many more unregulated or remote airstrips. These are significant assets providing an essential service with significant maintenance obligations.

This chapter separately distinguishes passenger transport as the sector that moves people from freight transport that looks at the supply chains that move goods and freight. While they use much of the same network, they do have different needs and challenges and serve a different purpose.

Passenger transport

Current state

Passenger transport facilitates movement of people and connects and shapes communities. It consists of the road network, public transport systems and dedicated cycle and walking paths, as well as airports and marine facilities. The nature of the network is shaped by historic settlement patterns and geography of the region. The current Adelaide network reflects the fact that Adelaide is a long, narrow city that has traditionally grown to the north and south but has relatively low population density.

Car dependency

Adelaide is heavily dependent on car travel, with approximately 85% of daily trips using motor vehicles. The road network is characterised by pronounced but relatively short peak periods in the mornings and evenings, with many of the daily trips being to and from the CBD employment centre. As at 2016, approximately 20% of the population lived in the CBD and inner metro suburbs while over 40% of employment is located in this same area. Adelaide has the highest percentage of people travelling to work by car of all the capital cities, with only 8.8% trips by public transport. Adelaide also has relatively low levels of active transport (cycling and walking), with 3.3% travelling to work entirely by these modes.

Used one method	2011	2016	% Change
Train or tram	9,383	11,711	19.9
Bus	28,939	28,580	-1.3
Car (as driver or passenger)	399,487	414,137	3.5
Motor bike/scooter	3,262	2,771	-17.7
Bicycle	6,495	6,677	2.7
Walked only	14,291	12,930	-10.5
Other (incl. taxis)	4,938	4,773	-3.5
Total – used one method	470,989	484,831	2.9
Total – used more than one method	13,744	14,714	6.6

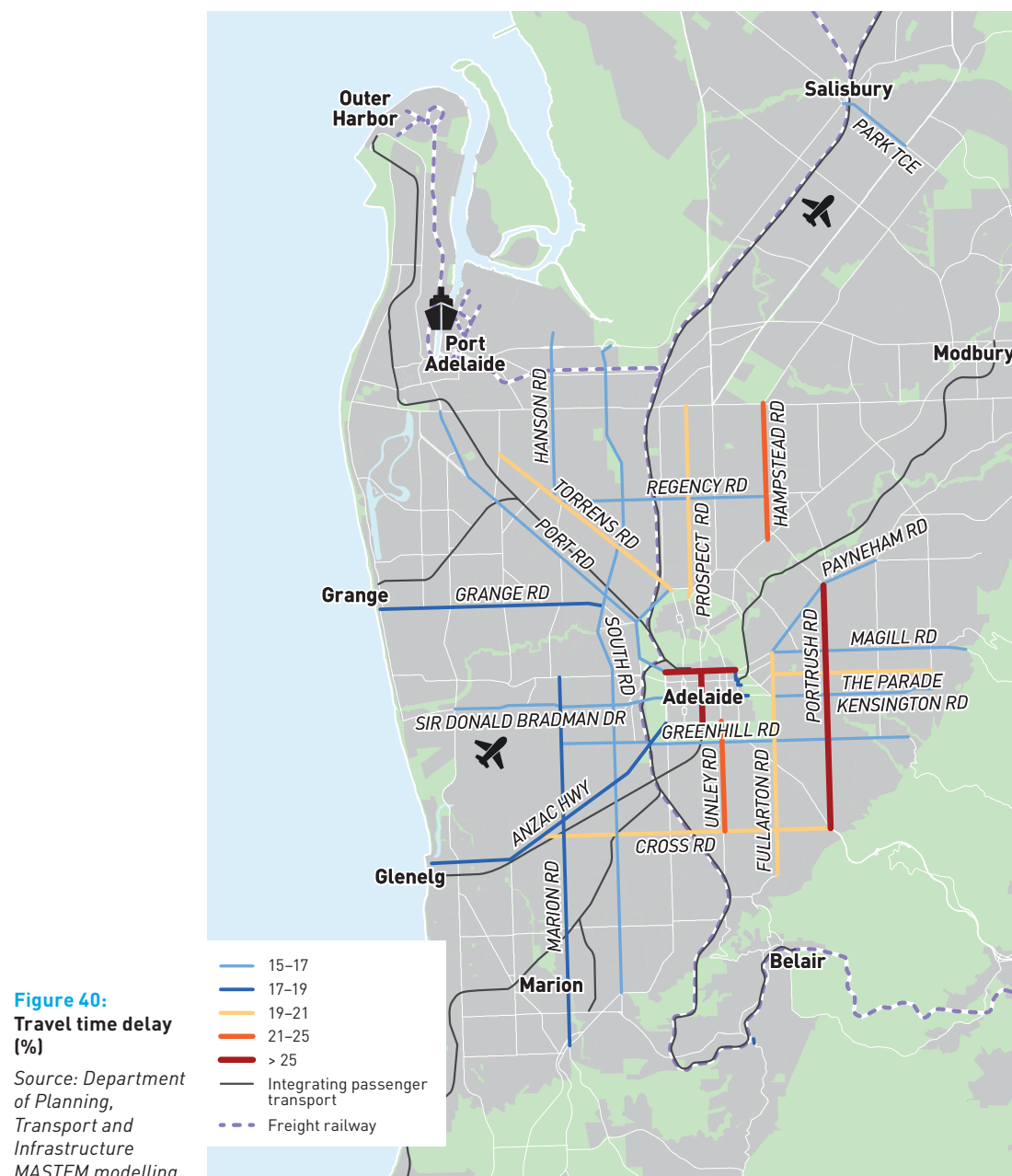
Table 11:
Number of people utilising different modes of transport, 2011 and 2016

Source: ABS Census 2011 and 2016

This can be partially attributed to user preference, historically low levels of congestion and the fact Adelaide has the greatest availability of car parking in the CBD of all capital cities (25.2 parking spots per 100 workers) and the second lowest daily parking price.²⁰⁶ Adelaide's relatively low density also makes it challenging to provide efficient and accessible mass public transport.

The grid-like road network has historically served Adelaide relatively well, providing access to destinations with relative ease and choice of routes. However, the network has many intersections that are approaching or exceeding capacity and can act as choke points causing delays and variability in travel times. Figure 40 shows over 85 intersections at 85–95% saturation and a further 65 at over 95% saturation during peak times. In such conditions, spot investment in at-grade intersection widening may have limited network benefit without a coordinated approach.

Adelaide is reaching a tipping point due to increasing congestion, with the 2019 Australian Infrastructure Audit estimating congestion cost Adelaide \$1.44 billion in 2016 and predicting this to rise to \$2.6 billion in 2031.²⁰⁷ As Adelaide continues to grow, it is likely that this congestion cost will grow without a more efficient network that includes free flowing motorways and greater share of demand serviced by public transport.



Public transport

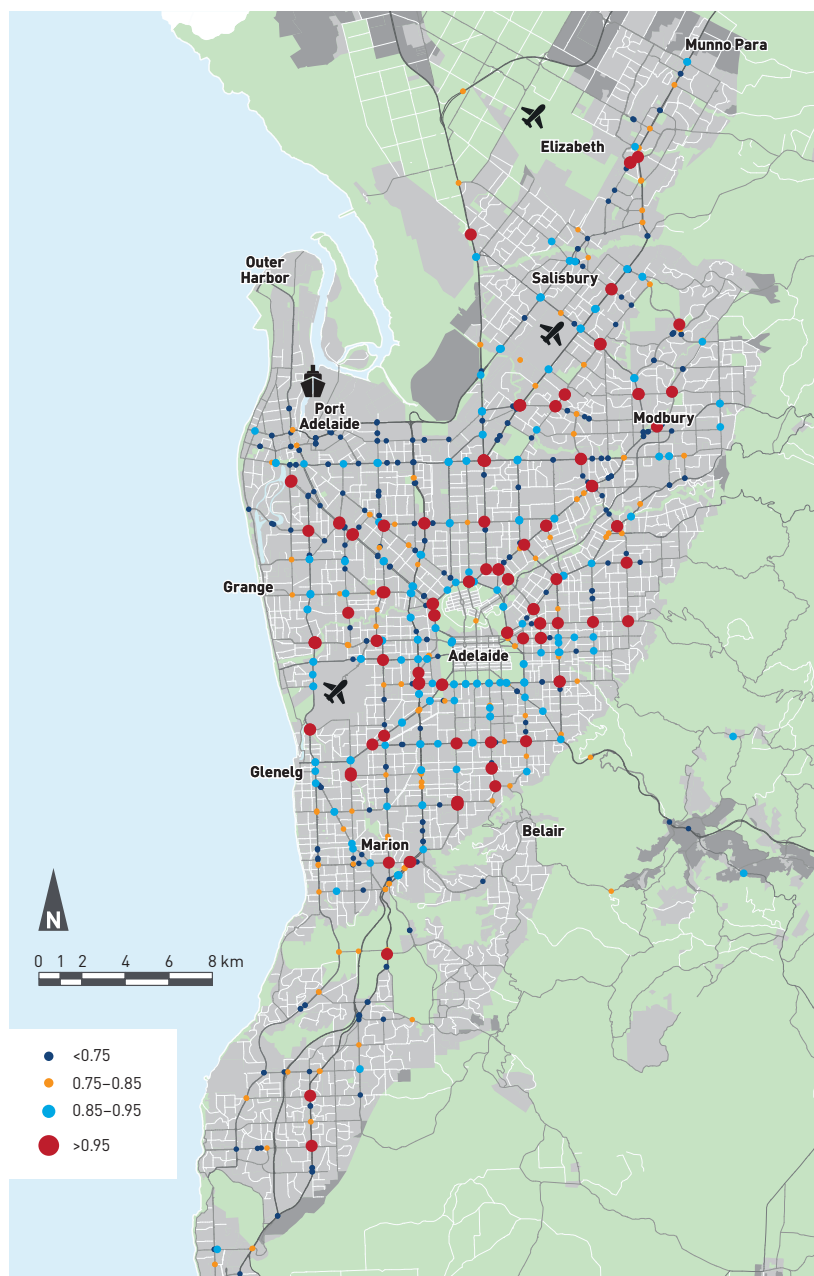
Across the Adelaide metropolitan area, there are four main dedicated heavy rail corridors (north, south, south-east and west), while light rail services the south-west (CBD to Glenelg). However, these fixed rail lines have a relatively small catchment within a reasonable distance (500 meters), hence the majority of commuters utilise buses. In 2017/18, 68% of public transport trips were undertaken on buses.²⁰⁸ The O-Bahn is the most heavily patronised service in the network, with the Adelaide Metro ticketing system showing that there is an average of approximately 32,500 to 35,000 boardings per weekday. It provides a highly effective service to the north-eastern suburbs, given the dedication of function. There is, however, limited dedicated road space for other bus services on the road network around Adelaide, resulting in buses being caught up in the same congestion as private vehicles, which significantly affects travel times and reliability.

Public transport is supported by significant State Government subsidies, with fare revenues currently covering around 23% of Adelaide's public transport operating costs. Historically, bus service design has maximised coverage across Adelaide; however, this results in circuitous routes and low patronage on many services, which undermines cost effectiveness.

Mode	2013/14	2014/15	2015/16	2016/17	2017/18	% Change
Bus	39.957	41.435	41.104	51.065	51.123	21.8
Tram	2.288	8.867	8.885	9.484	9.258	75.3
Train	8.230	10.938	11.367	14.481	14.381	42.8
Total	50.475	61.249	61.365	75.029	74.763	32.5

Table 12:
Annual trip numbers (millions)

Source: Department of Planning, Transport and Infrastructure annual reports



In conjunction with a broader City Access Strategy, studies are being undertaken to complete the CBD tram loop and/or extension to North Adelaide. This could provide opportunities for further development and urban uplift along the corridor.

The South Australian Public Transport Authority (SAPTA) has been formed to concentrate on more customer-centric public transport. It is currently undertaking a round of competitive tendering and reforms to transition to publicly owned, privately operated public transport service delivery.

Needs and challenges

Servicing population growth

The population of Adelaide is forecast to grow at trend rates by over 230,000 people over the next 20 years. The Government's ambition to increase growth rates to the national average would further increase this. The passenger transport network will need to improve its efficiency to be able to manage this growth in a way that maintains Adelaide's liveability. Traditionally, this growth has occurred in the urban growth areas to the north and south of Adelaide, although the Department of Planning, Transport and Infrastructure (DPTI) forecasts approximately 85% of new development across the Adelaide metropolitan area will come from urban infill projects. There is also significant growth potential in the Mount Barker growth corridor. Sections of the South Eastern Freeway will reach capacity as Mount Barker grows, and an appropriate mass transit solution for the corridor needs to be explored while treatments to improve capacity and safety on the freeway are pursued.

As the trend towards greater density in urban infill continues, it provides opportunities to plan for a more efficient public transport system as well as more walkable communities. The need to service this population and ensure safe and efficient travel to the key economic precincts should drive investment in the passenger transport network. Planning should occur for future mass transit options where population growth is forecast, and corridors preserved for future optionality where possible.



Integrated planning to support a common vision

Copenhagen boasts over 469 km of bike paths and 41% of all trips by workers and students to and from the city are made by bike. While cycling is supported through urban planning policies and high new car taxes, the city is also building cycling superhighways into its suburbs. Some local councils have even installed angled bins and footrests along bike paths, setting the city apart as truly cycle centric.

Increasing mode shift to public transport

The long period of relatively low population growth has put limited strain on the network, but as the population of Adelaide grows, a greater mode shift to public transport will be needed to maintain the efficiency of the network and to avoid the congestion experienced in other states. A modern liveable city should not rely on private vehicles as the primary mode for commuter traffic.

There is also lack of integration between various public transport modes, resulting in extended travel times for journeys with interchange and fewer total viable connections, making public transport less attractive. Amenity around many public transport interchanges does not meet customer expectations and there are legacy accessibility issues at many railway stations. The delivery of public transport infrastructure needs to enable improved service integration by SAPTA, thereby improving efficiency and reducing travel times.

Making public transport more attractive in a constrained budget environment requires evidence-based trade-off decisions to strike optimum policy settings that balance overall network coverage with frequency on key corridors for journeys to work. For public transport to carry a greater number of passengers, it should shift to more frequent headway-based services where the frequency is such that a timetable is not required. For this to occur, services should be concentrated on key trunk routes that are supported by greater integration across modes and a range of more innovative services for local communities, such as on-demand services.

SAPTA should, as a priority, complete evidence-based analysis to identify and implement measures to increase the frequency and speed of services and adjust policy settings to re-balance universal network coverage, with frequency on key higher-demand corridors for journeys to work. Stopping patterns and stop spacing also need to be objectively examined with a view to optimising journey times and increasing patronage. Complementary policy settings that increase public transport attractiveness also need to be examined objectively, including fare and parking-related policies, to ensure

the right pricing signals and appropriate incentives are in place to shape and influence travel demand.

The current process to transition remaining public services to being publicly owned and privately operated has the potential to drive greater efficiencies across the network (the bus network has been operated under a similar model for many years). This sees government retain a strategic role in planning the network and ownership of the fleet and key assets while the private sector operates services. The initial cost savings between 1996–2000 under this model have been estimated at 38%.²⁰⁹ Infrastructure Australia commissioned PwC to undertake a study into potential savings from customer-focused public transport franchising across Australia.²¹⁰ This report found that in the undiscounted conservative savings scenario, there was the potential to save \$1.63 billion (an average of 17.5% per year) on Adelaide Metro services between 2017 and 2040. This could provide a significant amount of capital for re-investment into improved services. To achieve these savings, appropriate contractual incentives and management need to be put in place.

There are also a number of other constraints that should be addressed to improve public transport patronage, such as lack of amenity around some key transport nodes and legacy disability access issues across the network. Relatively small incremental investments on the rail network should be prioritised for stations where urban uplift is happening now or will occur soon to make these accessible and better connected to their urban domain – including for users with a disability. Park'n'Ride services are a legitimate strategy to improve access to public transport; however, this should be concentrated in outer urban areas where access is limited.

A step-change can be facilitated through the provision of high capacity and high frequency bus corridors, such as a Bus Rapid Transit (BRT) network, that are integrated with (rather than competing against) the existing rail corridors. Immediate priorities are the Mount Barker and Adelaide Hills area and the north-western suburbs in line with infill development when it occurs.

The terminus nature of the Adelaide Railway Station puts a natural constraint on the rail network as it limits the number of trains that can be put into service at any one time and results in frequencies of 15–30 minutes for most services. Some services are currently running to capacity and additional carriages could be added; however, the length of many platforms does not allow for more than three carriages across the whole network. Options to improve frequencies in train services should be explored, and these could include improvement to signalling systems. In the long term, the terminus nature of the Adelaide Railway Station will need to be reviewed with the potential to create a CBD rail loop. While this will provide operational efficiencies, any study should also consider the potential economic benefit of enabling more intensive development of CBD employment precincts when needed, and a shift to greater public transport use in existing intensive employment zones such as the Royal Adelaide Hospital and BioMed City precinct.

Unlike in other Australian cities, the current mass transit corridors in Adelaide have relatively low population densities in immediate catchments (within 500 m). As a result, there is opportunity to revisit policy settings for land use and urban development to leverage the latent capacity. These developments need to be considered within the local context and the Adelaide market to ensure optimal outcomes. Initial priorities should comprise areas where there is urban uplift occurring or likely to occur in the short term.

The relatively low populations in regional centres also makes it very challenging to provide extensive public transport services. The regions have limited to non-existent public transport and are almost entirely reliant on private vehicle travel. Based on data provided by country bus operators, patronage in 2017/18 was estimated at 700,822, a decrease of 5.98% from the previous year.²¹¹ This limits connectivity between regions and access to services for people unable to access private vehicles. Government currently provides limited grant funding to regional councils for the provision of public transport services, which tends to be allocated to major regional centres.

The role public transport can play as a social service in the regions should be considered. Connectivity to regional hubs should be a focus to facilitate access to services. It is likely that innovative models need to be explored to improve the service.

Need for a more efficient road network

While rail plays an important role within the public transport network, the majority of public transport trips are on the bus network. Buses are likely to remain the dominant mode for the foreseeable future due to lower capital costs and greater flexibility and adaptability to technology change. It is, therefore, important to identify key trunk corridors and focus investment and interventions on these. Current congestion data suggest they are likely to include some of Adelaide's more congested corridors.

Interventions should first consider low cost or operational solutions such as bus priority lanes and clearways through to incremental solutions such as indent bus stops, improved traffic signalling, intersection upgrades and removal of level crossings. This will require targeted capital investment and should be delivered at the corridor- or area-level rather than spot investments. A program of level crossing removal should be focused along key corridors to provide maximum benefit to those corridors and opportunities for good place-making outcomes. In the longer term, the viability of a BRT network should be explored.

Active travel

After decades of investment in private vehicle infrastructure, the resulting urban form now comprises a mix of human and vehicular scale. The resulting road widening and road space dedicated to vehicles has reduced space for pedestrians to narrower footpaths and longer crossing distances over roads. This includes multiple crossings to cross one road, narrow medians, a history of non-DDA-compliant ramps, limited priority for pedestrians to cross a road, excessive waiting times at traffic signals and limited access to public transport, which all disincentivise active travel.

Active travel will play a smaller (by volume) but equally important role in supporting a liveable city. Given Adelaide’s geography and extensive grid network, active travel can become a legitimate alternative to the use of private vehicles for a whole trip, or to form the last mile of a longer trip using public transport.

The State Government, in consultation with stakeholders, should develop an active transport strategy that maps an optimal integrated network that supports greater use of walking, cycling and other forms of active transport for connection between residential and employment areas for the CBD, inner suburban ring and other key centres across metropolitan Adelaide, including key rail interchanges and their catchment. This should be matched to a prioritised program of staged development on key active transport corridors, where feasible, parallel to rather than on arterial roads to minimise risks of conflicts.

Maintenance backlog

South Australia has a relatively low annual expenditure of around \$30 million to maintain its 13,000 km of sealed roads. Table 13 compares this with New South Wales and Western Australia.

	Km of sealed roads	Annual maintenance expenditure
South Australia	13,000	\$30m
New South Wales	18,000	\$328m
Western Australia	18,500	\$100 m

Table 13:
Length of sealed roads and annual maintenance expenditure

Source: Department for Planning, Transport and Infrastructure

The maintenance backlog is estimated at \$780 million and, unchanged, is estimated to increase to \$1.2 billion by 2024 (see Figure 42). Better funding a maintenance program would be an effective economic stimulus that would be distributed across the State. Maintenance programs should be prioritised on an outcomes basis to ensure they are well targeted and provide maximum benefit.

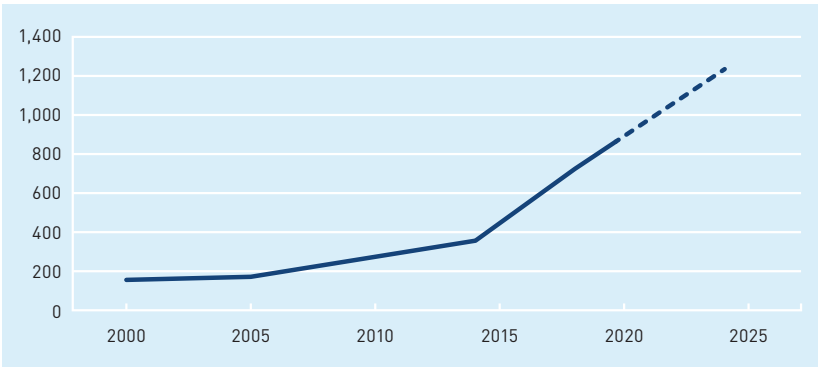


Figure 42:
Historic and estimated future backlog maintenance cost

Source: Department for Planning, Transport and Infrastructure

As a result of sustained underinvestment, 75% of South Australia’s road surfaces are now in poor condition. To ensure safety is not compromised, speed limits on some sections of road have been reduced.

Road safety

Since 1989, South Australia has seen a steady decline in the number of road fatalities. While this rose to above 100 deaths in 2019, the five-year average is currently around 95 people²¹² (see Figure 43).

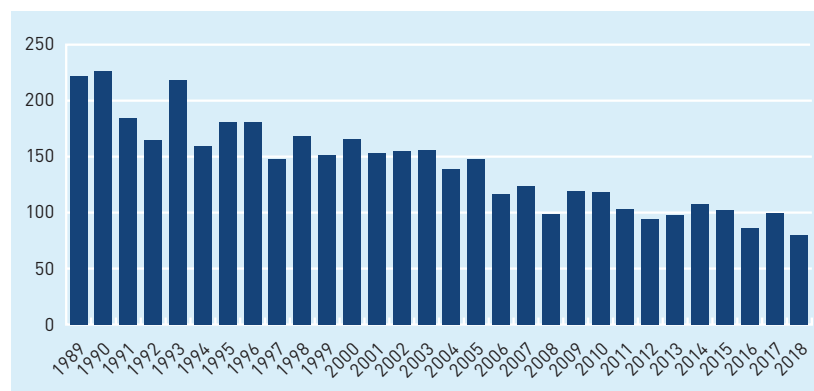


Figure 43:
South Australia's road fatalities with five-year moving average

Source: Bureau of Infrastructure, Transport and Regional Economics (BITRE)

In Adelaide, urban driving generally involves higher traffic volumes, numerous intersections and increased road use by pedestrians and cyclists when compared to the rural road network. As a result, metropolitan Adelaide sees the majority (86%) of minor injuries, 44% of all fatalities and 59% of all serious injuries, with 43% of all serious casualty crashes occurring at intersections.

Regional roads are, however, statistically over represented in fatalities, accounting for 59% of fatal road crashes despite regional trips being only 30% of the total. This is due, in part, to 74% of the statewide road network being rated at one or two stars out of five, significantly below the national target of having 80% above three stars.

A consideration of safe-system road design is needed as part of the road maintenance program to incorporate interventions such as sealed shoulders, overtaking lanes, centre- and edge-line treatments, rest areas and protective barriers.

Changing consumer preferences

People are also changing the way they engage with transport given the introduction of more on-demand and flexible services. This has been shown with the rise of rideshare services such as Uber and Ola. While expanding choice, it has also increased the number of passenger vehicle trips within the CBD. Rideshare trip numbers increased from 8 million to 10.1 million in 2018/19, with registered point-to-point vehicles increasing from 2,000 to 5,500.

Mobility as a Service (MaaS) is another innovation changing traditional business models and the way people engage with transport. MaaS links up planning and payment of multiple modes of travel used in one journey, such as train to e-scooter, through a single platform. With increasingly variable travel options, MaaS could make using public transport more attractive and accessible for those who work some distance from their central train station or bus stop.

Research has shown that a loss of mobility, especially for older people, leads to a decrease in both quality and longevity of life. As older people transition out of car ownership and less younger people take up driving, more flexible mobility options will be needed.

– RAA

A flexible strategic approach to future mobility should be maintained, influenced by deployments in other Australian jurisdictions and beyond, while setting a framework whereby trials are focused on well-defined problem spaces with transformative value. It is also important to shape this environment through investment in new modes to enable fast adoption of proven future mobility technologies that provide long-term benefit to Adelaide's transport networks.

Electric and alternate fuel-led vehicles

In 2019, South Australia's transport sector became the largest source of greenhouse gas emissions, overtaking the energy sector for the first time. For future emissions reductions, zero-emission electric vehicles (EVs), including hydrogen fuel cell vehicles, will need to replace the current petrol and diesel fleet. These alternate-fuel led vehicles not only have the potential to lower carbon emissions but also vehicle operating costs.

The uptake of EVs in South Australia has been slowly increasing. In 2018, of the more than 1.4 million registered vehicles, only 290 were EVs, an increase of 70% since 2013, which is in line with eastern capitals.²¹³ Infrastructure Australia estimates that in 10–15 years, 30% of new vehicle sales in Australia will be electric.²¹⁴

A significant barrier to uptake of EVs is range anxiety, which relates to insufficient charge leaving occupants stranded. While range varies across EVs, most are now able to travel 275 km on a single charge and newer models travel over 400 km. The rate of charge also varies. Some current models available in Australia support ultrafast charging, which can add up to 350 km range in 10 minutes at fast charging stations.

The Commonwealth Government is supporting an industry rollout of 42 fast charging sites (with ultrafast capability), all powered by renewable energy. These sites will be installed at roadside service centres connecting Adelaide, Melbourne, Canberra, Sydney and Brisbane, plus destination charging in

Far North Queensland, Tasmania and Perth. Spacing of sites is designed to align with Australian geography, population areas and highways, and to be well within range of even the most affordable EV models.²¹⁵ While governments have played a role in facilitating demonstration sites, it is expected the market will roll out a network of charging stations.

The Government could accelerate the decarbonisation of the transport sector by stimulating the local EV market through modest incentives for EV owners and Government support for public charging infrastructure.

– SA Power Networks

As the relative price of EVs falls and availability and accessibility of fast charging stations increases, it is expected that a much larger proportion of new vehicles purchased in the State will be electric. Government should explore how it can economically transition its vehicle fleet to zero-emission vehicles.

One challenge that zero-emission vehicles will present at a national scale is loss of fuel excise revenue. As the uptake of EVs and hydrogen fuel cell vehicles increase, the amount of fuel excise will substantially decrease. An alternative source of revenue will need to be found to continue to fund the necessary infrastructure investments. An alternative that should be explored is the viability of applying a distance-based network charge to zero-emission vehicles.

Autonomous vehicles

Due to technological advancements in the automotive sector, vehicles with varying degrees of automation are emerging. These technologies range from driver assistance such as collision-avoidance systems and automatic parking to full driverless vehicles. Governments will need to ensure legislation and infrastructure requirements do not unnecessarily restrict the efficiencies and improvements these new technologies can bring.

How an environment with full autonomous vehicles operating will look is not yet known; nor is the timeframe for the majority of the fleet to transition to autonomous vehicles. Autonomous vehicles present many potential benefits through improved road safety, more efficient traffic flows, new business models to deliver transport services and improved mobility options to promote better social inclusion. However, much of the benefit will only be realised when a significant portion of the fleet is autonomous. The transition will need to be managed to some extent to ensure there are no unintended impacts. Benefits are also most likely to be realised when there is a step-change in the uptake of shared mobility. However, if autonomous vehicles only replace private vehicles, this is likely to result in an increase in vehicle kilometres travelled. This may lead to greater congestion and urban sprawl, where removal of the driving task sees people adopting longer commutes during which they can be productive. Governments at the COAG level have been planning for the introduction of autonomous vehicles, and that work will need to continue through the transition. As with other disruptive technology, South Australia needs to retain a watching brief and remain flexible to become a 'fast adopter' once these technologies and benefits are demonstrated.

Future priorities

PRIORITY 21: IMPROVE PUBLIC TRANSPORT PATRONAGE TO TAKE A GREATER SHARE OF DEMAND AS ADELAIDE GROWS

To remain a globally attractive, economically productive and liveable city as its population grows, Adelaide will need to transition from its heavy reliance on private vehicles to a more efficient public transport network that takes a greater share of daily trips. The public transport network should be built around key corridors that are able to provide efficient and frequent services. Integrated services, including mobility on-demand, are needed to feed commuters from broader catchments into these key corridors. There is the opportunity to make evidence-based incremental investments across the network to make public transport more efficient and attractive. Policy settings and price signals should also be considered to increase patronage. ISA supports the franchising of the operation of the rail and tram services, which has shown to provide efficiency savings that could be reinvested in the network, provided appropriate contractual incentives and controls are put in place. Studies on how to best service growing areas of urban infill, particularly in the north-west of Adelaide and the Mount Barker growth corridor should be undertaken.

PRIORITY 22:

MAKE STRATEGIC INVESTMENTS TO IMPROVE CONNECTIVITY TO, BETWEEN AND WITHIN KEY ECONOMIC PRECINCTS

The key economic precincts will generate much of the daily commute as well as the economic activity within Adelaide. These precincts should be accessible and attractive places, and investment should be prioritised to improve the accessibility of these precincts. All non- or low-capital solutions should be explored before committing to any new build. ISA supports work by the State Government and Adelaide City Council to undertake a City Access Strategy and early work to master plan the LeFevre Peninsula, which will see a significant increase of activity with Naval Shipbuilding.

PRIORITY 23:

IMPROVE THE SAFETY OF THE ROAD NETWORK

A significant proportion of the State's road network is in poor condition that compromises safety and does not have appropriate treatments to improve safety. Road maintenance programs need to be more fully funded and should incorporate safe-system principles to fund treatments that will improve road safety and contribute to lowering the road toll.

PRIORITY 24:

TAKE A MORE STRATEGIC APPROACH TO PROMOTING ACTIVE TRANSPORT OPTIONS

Places that encourage cycling and walking through appropriate design contribute to positive health and wellbeing and to improving the liveability of communities. Active travel is also an effective first/last mile option to support public transport patronage. Adelaide has relatively low levels of active transport and investment in supporting infrastructure has historically been piecemeal. A more strategic approach that looks to build an active transport network that is accessible and safe should encourage greater participation in cycling and walking.

PRIORITY 25:

DEVELOP A FUTURE MOBILITY STRATEGY

Transport is subject to ongoing technological change. Developing a Future Mobility Strategy that captures opportunities presented by electric and autonomous vehicles and other innovations will position South Australia to best take advantage of the benefits of innovation and minimise any unintended consequences.



Best practice in risk and impact management

In 2019, Flinders Ports Holdings completed widening of the Outer Harbour shipping channel and swing basin at the Port of Adelaide, securing the State's position as a major import and export hub. The company worked closely with relevant authorities, community groups and stakeholders, and applied best practice techniques to minimise risks and impacts on the marine environment during dredging operations and vessel movements through the channel.

Freight transport

Current state

Efficient freight is fundamental to South Australia fulfilling its growth ambitions. While significant benefits have been achieved with improvements to freight networks, these have traditionally been fragmented and modally focused. Improvements to freight movement must be considered on a whole supply chain basis. ISA is encouraged by the development of the *National Freight and Supply Chain Strategy*, which adopts a national, multimodal and supply chain approach.

Contribution of different modes

Freight is carried by road, rail, air and sea, and a breakdown of the volumes is set out below.

	Tonnes (000)					Percentage
	Road	Rail	Air	Sea	Total	
International	-	-	32	27,988	28,020	12%
Domestic	175,150	11,662	27	11,472	198,311	88%
Total	175,150	11,662	59	39,460	226,331	
Percentage	77.39%	5.15%	0.03%	17.43%		

Table 14:
Freight volumes by mode

Source: AECOM

Road carries the majority of freight volumes. Of the 87% of journeys that are intrastate, 37% take place within Greater Adelaide. In total, 70% are less than 200 km.

Rail still carries significant volumes, but this has been shrinking with the closure of regional grain lines in recent years. Non-bulk goods comprise 80%, with 35% of inbound freight arriving from Victoria and 46% of outbound freight destined for Western Australia.

Shipping has been a growing market, with ship calls rising by 23% in the past five years. The majority (71%) is international shipping and 29% is coastal shipping.

Aviation moves relatively low volumes of freight but significantly higher values. There has been a 31% increase in air freight, largely due to new international passenger connections, with the majority (80%) of freight being carried in the belly of passenger planes.

Ports

South Australia has ten key sea ports. The newest, Lucky Bay, began receiving grain in November 2019 and is scheduled to begin shipping in early 2020. There are also potentially two new ports with planning approvals at Cape Hardy and Port Spencer, and other port locations are being explored by the private sector. It is noted that the Commonwealth Government recently committed \$25 million towards the development of a port at Cape Hardy. There is also a proposal currently being assessed by DPTI to develop a sea port at Smith Bay on the northern side of Kangaroo Island. The current operational ports – other than Whyalla, Port Bonython, Ardrossan and Lucky Bay – are owned and operated by Flinders Ports, who acquired the ports as part of the privatisation of the Ports Corporation. This includes South Australia's only containerised port at Outer Harbour in Adelaide.



Figure 44:
Location of South Australia's key ports

South Australia also has a significant number of marine facilities, such as jetties, wharfs, boating facilities and River Murray ferries spread across the State. Significant assets at Cape Jervis and Penneshaw provide a vital ferry link for Kangaroo Island.

It is noted that the recent bushfires on Kangaroo Island have precipitated a need for additional freight capacity to bring and remove materials to the island. Options are being considered, including a potential barging operation from Kingscote.

The Port of Adelaide is by far South Australia's largest port. In 2018, it handled over 400,000 TEU of containers, 200,000 tonnes of bulk and break-bulk goods for export and almost 500,000 tonnes for import.²¹⁶ In 2017/18, there was also approximately 2.3 million tonnes of grain exported through Port Adelaide.²¹⁷ Outer Harbour has South Australia's only container port as well as a passenger terminal capable of processing international visitors.




The Port of Adelaide is well positioned to manage future forecast growth due to strategic investments by Flinders Ports. In 2005, Outer Harbour was dredged to a depth of 14.2 meters and the channel was widened to accommodate the larger Post Panamax size vessels in 2019. In 2015, Flinders Ports also installed two new ship-to-shore cranes at a cost of \$24 million. The cranes reduced ship turnaround times by 25% and will play an important role in increasing the port's handling capacity to 2.5 million containers per year.²¹⁸

Adelaide Airport

Adelaide Airport is the fifth largest in Australia, with 8.5 million passengers passing through it in 2018. In 2019, Adelaide Airport had direct international connections to Dubai, Doha, Kuala Lumpur, Singapore, Denpasar, Hong Kong, Guangzhou and Auckland. However, there is scope to increase the number of international connections, especially given Adelaide has 40% fewer connections than Perth.

In 2018, the airport moved 58,000 tonnes of freight, which is approximately 2.8% of the total international air freight movements for Australia by weight.

Activity at Adelaide Airport 2018/19:²¹⁹

	Total flights (in + out) 2018/19 <ul style="list-style-type: none"> • Domestic 73,787 (up 3.5% since 2008/09) • International 5,080 (up 49% since 2008/09)
	Total passengers (in + out) 2018/19 <ul style="list-style-type: none"> • Domestic 7,306,666 (up 19% since 2008/09) • International 1,061,511 (up 125% since 2008/09)
	International air freight change since 2008/09 <ul style="list-style-type: none"> • In +49.5% (10% higher than national increase) • Out +85.9% (on par with national increase)

Forecasts for 2039:

- International passengers increase to 3.3 million
- Regional passengers to increase from 0.56 million to 1.1 million
- Total aircraft movements to increase from 106,075 to 168,500
- Freight to increase from 58,500 tonnes to 146,000 tonnes.

Source: Adelaide Airport Limited

As a part of its master planning, Adelaide Airport Limited assessed the capacity in the cargo hold of aircraft (both current and forecast) and found there to be significant capacity available in both international and domestic flights.²²⁰ Adelaide Airport operates under the *Adelaide Airport Curfew Act 2000* that imposes a curfew from 11pm to 6am, with regulations allowing some flexibility in the shoulders between 11pm to midnight and 5am to 6am.

Regional airports

South Australia has 23 regional regulated airports/aerodromes and numerous small unregulated aerodromes/airstrips spread across regional and remote areas. Of the 20 public airports, seven airports are certified (i.e. cater for Regular Passenger Services) with the Civil Aviation Safety Authority (CASA) and 13 are registered (i.e. have met set standards) with CASA. All 17 regional public airports are owned and operated by local governments. There are also three private CASA-certified aerodromes at Prominent Hill, Olympic Dam and Moomba. These are owned and operated by their respective mining companies and are used exclusively for access to mining sites. Port Lincoln is the busiest in terms of passenger numbers and the only regional airport in the top 40 in Australia for passenger volumes.

Rex Airlines has regular flights to all certified regional airports, which includes an exclusive route licence between Adelaide and Port Augusta under the *Air Transport (Route Licensing – Passenger Services) Act 2002*. It is noted, however, that flights to Kingscote on Kangaroo Island will cease. Qantas also services Port Lincoln, Whyalla and Kangaroo Island. An RAAF air base located at Edinburgh approximately 30 km from the Adelaide CBD is used strictly for military purposes.

Remote airstrips

Remote airstrips provide a link for freight and mail in and out of remote communities as well as serving as a retrieval point for the sick and injured requiring urgent medical treatment and/or evacuation. Many regional aerodromes also provide amenities for tourism, with scenic flights regularly available from many regional towns including William Creek, Maree and Wilpena Pound in the Flinders Ranges.

Needs and challenges

Forecast growth

Forecasts show road freight volumes increasing by 20% by 2030. The Government's ambition of 3% average growth will place a greater demand on the freight network and require improvements in efficiency. Decisions on where to invest in the freight network must be based on evidence. Studies should be undertaken to determine the most efficient investment to support growth and maintain safety on key freight networks. Often, targeted incremental investments to the network can provide better returns.

Need to aggregate demand

South Australia is at times challenged by a lack of demand needed to make investment in new efficient freight infrastructure economically viable. Few projects provide sufficient scale to support substantial upfront investment in infrastructure. Volumes in South Australia are modest by international scales. By comparison, the Port of Pilbara exported almost 700 million tonnes in 2018/19²²¹ relative to the total South Australian sea freight of approximately 40 million tonnes. Aggregating demand can provide sufficient volumes to make a project economically viable, increasing throughput and volumes that may enable more efficient larger scale solutions that reduce unit costs for users. ISA appreciates there can be complex commercial tensions and trade-offs between proponents when being party to a multi-user facility, but the potential benefits need to be modelled and understood.

Need for an efficient freight network through Adelaide

Significant freight volumes move through Adelaide given it is the major population centre and also offers the key international gateways of Port Adelaide and Adelaide Airport. This makes it vitally important for State productivity that the transport network is as efficient as possible. However, as indicated in this chapter's *Passenger Transport* section, the network in Adelaide is characterised by a lack of free flowing motorways, with arterial

roads shared with commuter traffic and many intersections that are approaching or exceeding capacity. Key freight routes through Adelaide such as Portrush Road are heavily congested and pass through highly urbanised environments. Adelaide has the lowest proportion of arterial roads with a speed limit above 50km/h in Australia, and average speeds on arterial roads have declined by 1.1% per year over the last decade.

Once completed, current investments in the North-South Corridor to the north of Adelaide will create a non-stop motorway from the Barossa to Port Adelaide and into the northern suburbs of Adelaide. However, there is no motorway connection to Adelaide Airport or from the South Eastern Freeway, which carries two thirds of the interstate road freight. Planning studies should be completed to identify the most efficient solutions that provide the greatest economic benefit to expand the network, with a focus on key links from the South Eastern Freeway and North-South Corridor. Studies into creating a more efficient ring-route network should also be completed.

Completion of investigations into Globelink identified the potential opportunity for a new non-stop corridor from the South Eastern Freeway to the southern end of the North-South Corridor in the very long term; however, priority should be given to incremental improvements to existing corridors, including along Cross Road and Portrush Road, and the existing rail corridor through the Adelaide Hills. Government should continue to work with industry to identify efficient solutions that will provide a boost to productivity and safety.

Major investment in the network will comprise significant projects that need to be informed by evidence-based analysis. Flow-on effects across the network also need to be understood. The current strategic transport model for Adelaide was built in the 1990s and relies on some key travel information from surveys undertaken before 1999. While the model has been updated over the years, the approach to transport modelling has since evolved and the South Australian economy has changed, most notably with the closure

of vehicle manufacturing in both Elisabeth and Tonsley. To inform these studies, a new transport model for Adelaide should be developed so that more robust projections on the impact of proposed capital works on the network can be generated.

Funding network efficiency projects

Current funding models to maintain road assets in Australia primarily rely on federal fuel excise and state registration fees. It has been recognised in several reviews, including the 2015 Harper Competition Review and The Productivity Commission Shifting the Dial Productivity Review, that the current system has inefficiencies and lacks a strong link between user benefits and revenue raised.

As vehicles become increasingly fuel efficient and EVs become more prevalent, these models of road funding will also not be able to sustain desirable service levels for transport networks. As revenues from traditional funding sources for transport assets reduce, more funding will need to be allocated to transport.

Reform of road user charges should be considered to help improve efficiency of the system by strengthening the link between service levels and revenue raised. Industry has, in principle, indicated it could consider new road-user charges where there is a clear benefit that is linked to the charge. In the current fiscally constrained environment, this alternate revenue stream may also facilitate network efficiency improvements to be brought forward, enabling benefits to the State to be realised sooner.

Governments at the COAG level have considered pricing reform of the transport sector over many years. ISA recognises this is a challenging area of reform, but believes a reform of road-user charging should continue to be pursued.

Challenge of remote resources

Approximately 60–70% of South Australia's merchandise exports hail from the regions. The South Australian Government has developed plans with

industry to grow strategic sectors. These include the Magnetite Strategy, Copper Strategy and Red Meat and Wool Growth Program. Nevertheless, it is a challenge to cost-effectively get these resources and products to market. Much of the current road network supporting industry in the regions is in poor condition that limits efficiency and productivity. There are also limited options to get bulk minerals to market. For South Australia to fully capture potential growth opportunities from its iron ore resources, a more efficient bulk export solution must be identified. Government should work with industry and local governments to identify potential efficiency and safety improvements to supply chains. The solutions identified should be evidence-based and mode agnostic and should consider incremental investments in the network such as rail spurs and addressing pinch points or first/last mile constraints in the supply chain.

The *Improving Road Transport for Primary Production Program* has demonstrated how working with industry to identify incremental interventions can have significant benefits to the supply chain. There is a need to develop a framework that recognises and appropriately values the economic contribution that key freight routes provide in supporting identified key growth sectors. This should inform the prioritisation of maintenance and investment, and enable implementation of a rolling program in consultation with industry that addresses pinch points. Where there is an economic case, a user-pays model should be explored.

Trend towards high productivity road transport

Over the past decade there has been a shift away from the use of rail-to-ship freight in South Australia. In 2014, rail lines in the Mallee linking Loxton and Pinnaroo to Tailem Bend were closed. These lines shipped wheat; however, volumes were too low for rail to compete with road. In 2019, the rail line linking Eyre Peninsula grain to Port Lincoln was closed due to comparatively high operating costs. While the lower cost of road has resulted in supply chain savings for farmers, it has placed a greater burden on the road network.

High productivity vehicles (HPVs) increase the productivity of single trips made through a single prime mover due to a higher number of trailers.

While axle loadings do not increase, large freight vehicles can increase the maintenance burden on roads and shorten the life of assets. The challenge is to enable increased supply chain efficiencies by improving access for HPVs while investing incrementally in infrastructure to manage these impacts and ensure long-term sustainability.

In 2014 an Austroads study into the benefits of HPVs found that by providing access by HPVs to 80% of the national highway network the real dollar benefits to South Australia by 2030 would be in the order of \$440 million.

— Austroads

The impact of larger vehicles interacting with cars and other small vehicles is mitigated, in part, by fewer trucks on roads overall. Studies undertaken by Austroads comparing crash data between HPVs and conventional heavy vehicles found that “across all truck classes, HPVs have performed observably better than their conventional counterparts, reflecting a 63 per cent reduction in major accident incidents on a weighted fleet basis. This is expected to lead to an estimated saving of 96 lives by 2030.”²²²

HPV access to roads is restricted according to their size. RAVNet online is an interactive map system that displays approved heavy vehicle route networks in South Australia, where each class of vehicle can travel and any restrictions.

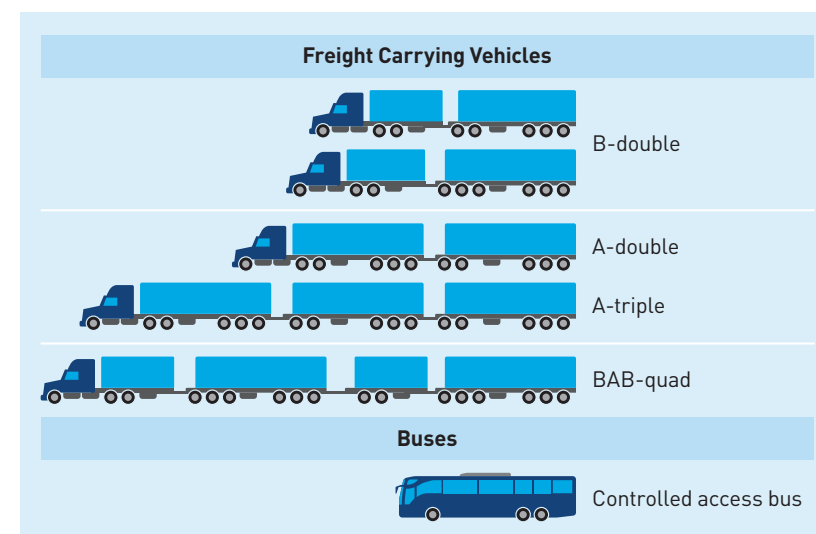


Figure 45:
Relative size of some HPV classes

Source: National Heavy Vehicle Regulator

To increase the RAV network, some roads along strategic freight corridors need to be upgraded. This will require shoulder sealing, rest areas, overtaking points and general road surface conditions to be improved. However, there are also portions of the network that may need a thorough risk assessment to determine suitability for larger vehicles, and State Government in conjunction with the NHVR should support local councils in conducting these. There are also key pinch points within the network which, if addressed, will result in significant improvements in efficiency and productivity.

Future port needs

Flinders Ports is undertaking a comprehensive master planning process of its ports to consider needs over the next 50 years. ISA will engage with Flinders Ports through this process. While there is likely to be some scope for improved efficiency or additional capacity over the period considered in the master plan, there is no apparent shortage of capacity at the ports in its portfolio. However, exports via Thevenard – the second largest port by volume in South Australia, which plays an important role in providing access to market for local grain, gypsum and mineral sands – are restricted by a shallow channel and single ship loader that must undergo a labour intensive washdown prior to loading a different commodity. Options for improved productivity at Thevenard should be explored.

The port of Whyalla has recently opened to third-party access and has some capacity to expand volumes; however, an expansion beyond 10–15 million tonnes is likely to require significant investment. Port Bonython is currently exclusively used for hydrocarbon import and export but has significant land available and potential for another jetty if necessary. Lucky Bay has recently commenced operations and will go through a ramping up process, but its trans-shipment model has capacity to expand and potentially take other commodities.

The Eyre Peninsula is a significant grain export region with an average annual grain harvest between 2–2.6 million tonnes. This has, however, ranged from 1.03 million tonnes per year up to 3.45 million tonnes in the record year. Currently, grain is shipped from Port Lincoln and Thevenard, with Lucky Bay beginning in 2020. Prior to the operation of Lucky Bay, Viterra had 100% market share of both commercial bulk grain storage and port bulk grain loading services on the Eyre Peninsula and 91% of the State market. There has been some suggestion that grain growers on the Eyre Peninsula are not receiving competitive pricing; however, a recent ESCOSA study did not find the grain supply to be inefficient or any irregularities with the actions of Viterra.²²³ End-user prices are often a function of the high fixed-costs structures of ports and international markets as opposed to local factors.

The impact on pricing of the entry of T-Ports into the market at Lucky Bay should be observed to see if competition reduces costs to growers. Viterra is subject to compliance with parts 3–6 of The Port Terminal (Bulk Wheat) Code of Conduct. This limits flexibility and, according to Viterra, adds cost to the supply chain. ISA notes that no grain ports in Western Australia or New South Wales are subject to the Code, and this places South Australian ports at a potential competitive disadvantage.

Proposals for grain terminals to be constructed by the private sector at Cape Hardy and Port Spencer have development approvals. These will increase the handling capacity on the Eyre Peninsula by up to 2.5 million tonnes per year. It is expected the new ports would provide some supply chain savings to growers in the immediate locality and the market may benefit from increased competition. However, they are not expected to increase grain production on Eyre Peninsula and there is a risk that assets will be underutilised.

ISA sees no immediate shortage of port capacity. There is scope within existing ports to further expand exports and imports and there may be capacity to optimise and better utilise current facilities and supply chains. Notwithstanding this, the market may see opportunities for lower capital cost port solutions. A significant new iron ore mine or potential hydrogen exports (whether as ammonia or hydrogen) would likely drive the need for a new deep-sea port. ISA supports multi-user access arrangements, and government should facilitate this for proposals that will contribute to economic growth.

Land-side access to international gateways

Efficient supply chains are contingent on land-side access to international gateways being as efficient as possible. Outer Harbour at Port Adelaide will remain the key import and export gateway for South Australia, and efficient access to the port will be key to improving productivity. The State Government is undertaking a transport study of the LeFevre Peninsula, which coincides with Flinders Ports master plan development. These will

both need to consider future investments necessary to improve the efficiency of freight movements in and out of the port as well as the amount of traffic and congestion on the Peninsula. This will see significant investment and activity through the naval shipbuilding program. Long-term solutions should be explored to potentially connect Coghlan Road to Pelican Point Road and address the level crossing at Pelican Point Road.

Adelaide Airport, as part of its master plan, forecasts freight increasing to 146,000 tonnes by 2039. It also has plans to develop Airport East as a freight and logistics hub with dedicated access via Richmond Road. This could potentially change traffic flows into and around the airport, and studies should be undertaken to understand when the surrounding network and intersections will need upgrades to maintain efficiency and productivity levels. Studies into completing the North-South Corridor should also consider the most efficient connection from the corridor to the airport.

Approximately 70% of grain produced in South Australia was previously hauled by road; however, the recent closure of the Eyre Peninsula rail has seen this increase. The State and Commonwealth Governments have announced \$32.9 million to improve the condition of key roads on the Eyre Peninsula in response to the closure of the rail corridor. Improvements will focus on enhancing road safety and community amenity, particularly in and around high-traffic areas, following the expected transition of freight from rail to road. This should also consider network improvements to enhance the efficiency of east-west movements to any new port. Viterra has also made some investment to improve the efficiency of grain receiving at Port Lincoln.

Changing technology

As with passenger transport, the freight industry is subject to change from new technologies that offers the potential to improve productivity or safety. This may necessitate enabling regulatory changes.

Future priorities

PRIORITY 26: IDENTIFY KEY ECONOMIC CORRIDORS THROUGH ADELAIDE AND THE REGIONS AND PLAN INTERVENTIONS TO CREATE MORE EFFICIENT SUPPLY CHAINS

Key economic corridors should be identified and the relevant supply chains understood so that triggers for asset upgrades are recognised and targeted investment can be used to improve efficiency and reliability by addressing pinch points. This should involve a rolling program that is developed through engagement with industry and local government. User charging should be considered where there is an economic case to ensure efficiency gains can be realised from investments that may otherwise be delayed.

PRIORITY 27: IMPROVE THE EFFICIENCY OF FREIGHT THROUGH ADELAIDE

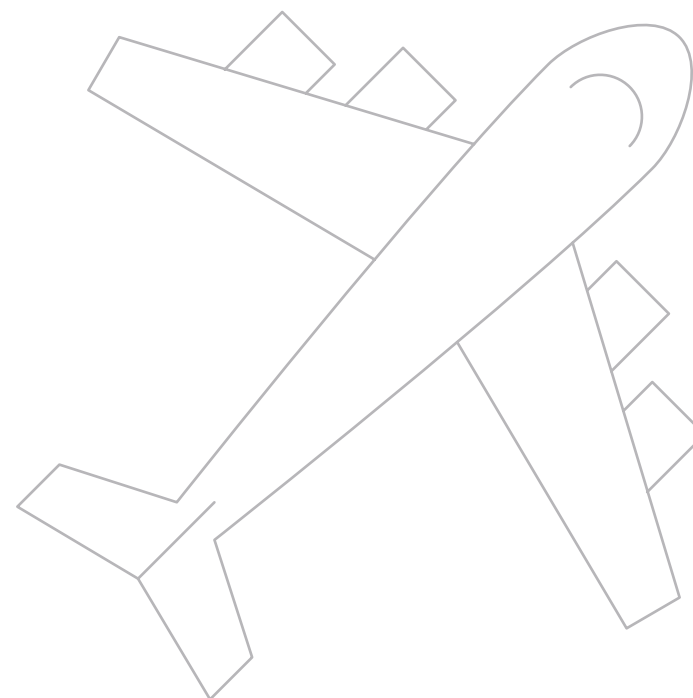
Interventions to improve the efficiency of freight movements through Adelaide should be implemented, particularly between the South Eastern Freeway and the North-South Corridor. All non- or low-capital solutions should be explored in the first instance, but a longer term connection between the South Eastern Freeway and the North-South Corridor and a free flowing ring-route network needs to be planned for.

PRIORITY 28: IMPROVE LANDSIDE ACCESS TO INTERNATIONAL GATEWAYS

The State's sea and air ports are its gateways to international markets, and having efficient supply chains through to those markets is key to making South Australia globally competitive and growing the economy. The last mile of landside access to these gateways often sees a concentration of volumes that have negative impacts on congestion and efficiency. Planning studies need to identify inefficiencies and potential solutions. Focus is needed on access to Outer Harbour and the interaction between road and rail, and commercial vehicle access to Adelaide Airport, particularly in light of any change in traffic patterns as Airport East is developed. Further road improvement on the Eyre Peninsula in light of the closure of the rail to Port Lincoln must also be considered.

PRIORITY 29: OPTIMISE AIR FREIGHT CAPACITY THROUGH MORE CONNECTIONS AND ADD FLEXIBILITY

International passenger connections will continue to carry the majority of air freight into the foreseeable future. While there may be some spare capacity in current connections, opening connections to new markets – particularly the west coast of USA and north Asia – will not only provide a boost to tourism but create more efficient supply chains for premium high-value South Australia produce to reach those markets. ISA sees benefits to providing some added flexibility to be able to attract flights within the shoulder periods of the curfew and believes restrictions within the Adelaide Airport Curfew Regulations should be reviewed.

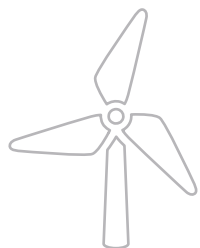




Innovative infrastructure funding

The Western Roads Upgrade is Victoria's largest single investment in arterial roads to date. The availability based public-private partnership between the Netflow consortium and the Victorian Government – the first of its kind in Australia – includes priority road upgrades and more than 260 kilometres of road rehabilitation across Melbourne's west. Image courtesy of Major Road Projects Victoria.

UTILITIES



Energy

Role of energy infrastructure

Energy infrastructure is critical to ensure South Australian consumers and businesses are able to access secure, reliable, affordable energy. This is essential to easing cost of living pressures and as a key input to industry so that growth opportunities can be captured and South Australia can remain a competitive place to do business. This needs to be done in a way that manages the transition to a decarbonised energy system.

Current state

Electricity

South Australia is characterised by low population density across the electricity network and long transmission lengths to major load points. Its generation is dominated by gas and renewables. The State has a demand profile that has a lot of variability over the day, with pronounced peaks in the morning and evenings and extreme peaks on hot days.

The State's electricity market comprises a complex system of mostly privately owned assets that consists of generators, a regulated transmission network service provider (ElectraNet) and distribution network provider (SA Power Networks), as well as retailers (market customers) who purchase electricity from the market and sell it to consumers (homes, businesses and industry).²²⁴ South Australia is part of the National Energy Market.

National Energy Market

The National Energy Market (NEM) is a wholesale spot price electricity market covering Queensland, New South Wales (and ACT), Victoria, South Australia and Tasmania. It was created in 1998 to drive efficiencies and to ultimately benefit electricity users through lower prices and better services.²²⁵ Over 300 registered generators sell electricity into the NEM (with 10 large generators accounting for about 70% of all electricity generated)²²⁶

and the output of these generators is matched to customer demand in real time. Electricity is moved across the NEM via a network of high voltage transmission lines and within an area via lower voltage distribution networks.

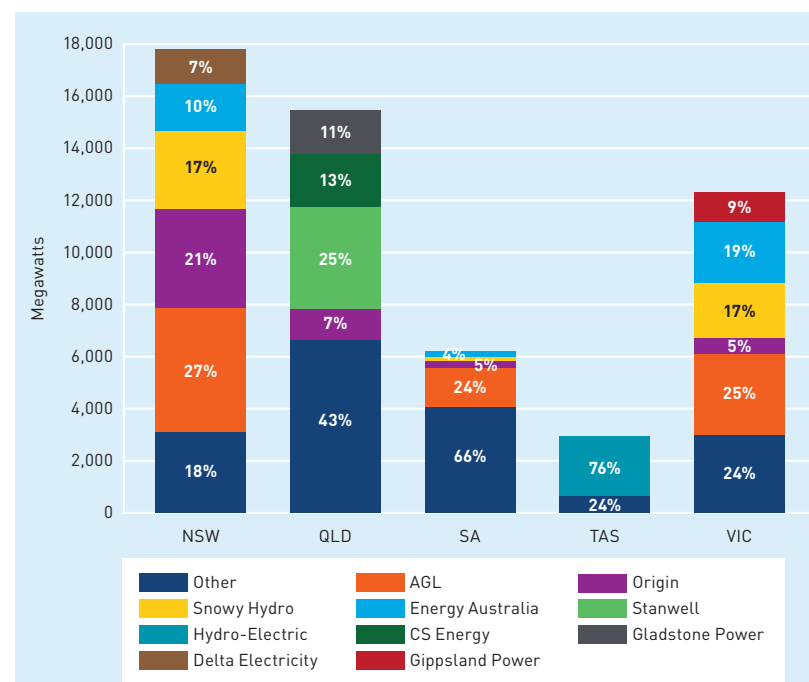


Figure 46:
NEM-wide market share by generation capacity, Jan 2020

Source: Australian Energy Market Operator

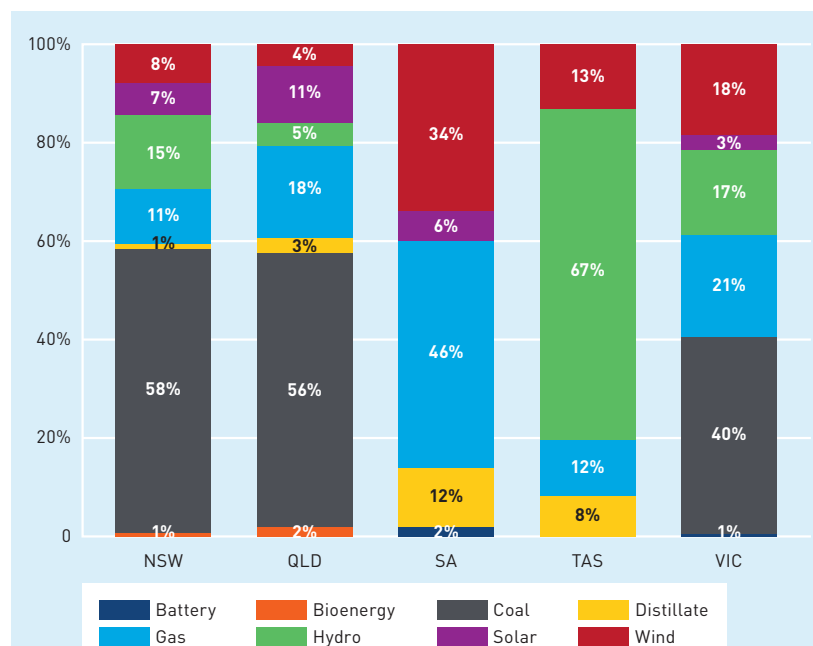
The NEM is subject to a regulatory regime of multiple parties including the Energy Security Board (ESB), Australian Energy Market Commission (AEMC), Australian Energy Regulator (AER) and Australian Energy Market Operator (AEMO).²²⁷

In addition to this, there is more than 1,600 MW of generation from behind-the-meter solar PV across the State. Distributed energy resources such as rooftop PV represented over 10% of total electricity generation in 2018/19. Approximately 34% of South Australian dwellings now have rooftop PV systems installed, which is the equal highest level of penetration in Australia (shared with Queensland).²³⁰

South Australia has been leading the transition to a decarbonised energy market with approximately 50% of demand supplied by renewable sources. Figure 47 shows the generation capacity by fuel source for each region in the NEM.

Figure 47:
Generation capacity of regions by fuel source, Jan 2020

Source: Australian Energy Market Operator



Wind energy is now a key source of electricity generation in South Australia, with about 2,000 MW of installed capacity as at September 2019. Meanwhile,

contribution by large-scale solar farms has grown to over 390 MW. About 7,200 MW of additional wind and solar generation is in the development pipeline and biomass and grid storage projects are also proposed.

There is also currently interconnection capacity of 870 MW with Victoria across the 650 MW AC Heywood Interconnector and the 220 MW DC Murraylink interconnector. The Australian Energy Regulator has also approved the RIT-T for a 750 MW new EnergyConnect interconnector to NSW. Further approvals are still required but it is expected to be operational within four years.

Electricity prices in South Australia

The retail price paid by consumers for electricity consists of several components, including the fixed network transmission and distribution charges for 'poles and wires' that is not dependent on energy use, the cost of wholesale electricity from the generators, environmental charges such as the subsidies for the solar feed-in tariffs and retail costs and margins.

Figure 48 shows this breakdown in 2019.²³¹

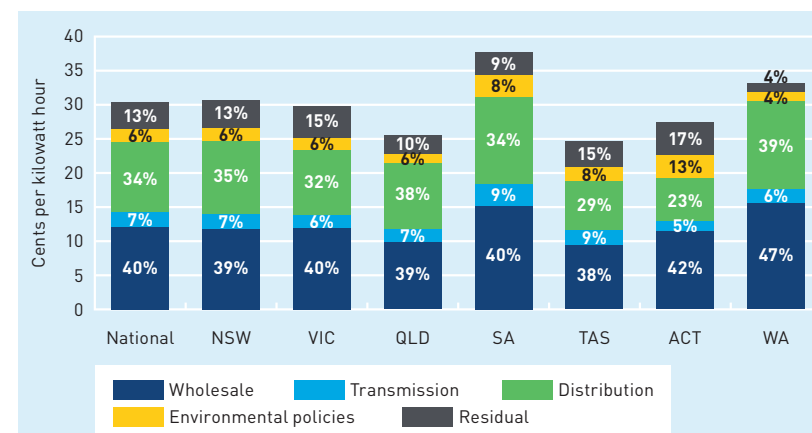


Figure 48:
Network costs as a proportion of retail electricity bills, 2019

Source: Australian Energy Market Operator

The wholesale cost of energy is a reflection of the average spot price that is impacted by the amount of volatility in the price. The high penetration of intermittent energy sources and shallow contracts market in South Australia has increased the volatility of prices in the State, with low prices when there are high amounts of wind or solar, with low marginal costs but high prices when there is limited wind and solar, and high cost generators are required to meet demand. South Australia has had the highest average wholesale spot price across the NEM to 2018/19, however in the year to date (YTD) for 2019/20 there has been a significant fall in average energy costs within South Australia.²³²

	SA	QLD	NSW	VIC	TAS
2008/09–2014/15	\$59	\$47	\$45	\$42	\$41
2015/16	\$67	\$64	\$54	\$50	\$97
2016/17	\$123	\$103	\$88	\$70	\$76
2017/18	\$109	\$75	\$85	\$99	\$88
2018/19	\$128	\$83	\$92	\$124	\$88
2019/20 (YTD)	\$84	\$65	\$81	\$93	\$73

Table 16:
Average wholesale spot prices by region (\$/MWh nominal)

Source: Australian Energy Regulator

This has flowed through to retail costs across the NEM with the Australian Competition and Consumer Commission (ACCC) finding average residential consumers have faced a real increase of 35% in their bills over the period from 2007/08 to 2017/18.²³³ Increases have occurred across most components of the retail electricity bill, with rises in wholesale costs and environmental costs accounting for the largest portion of the increase in South Australia.

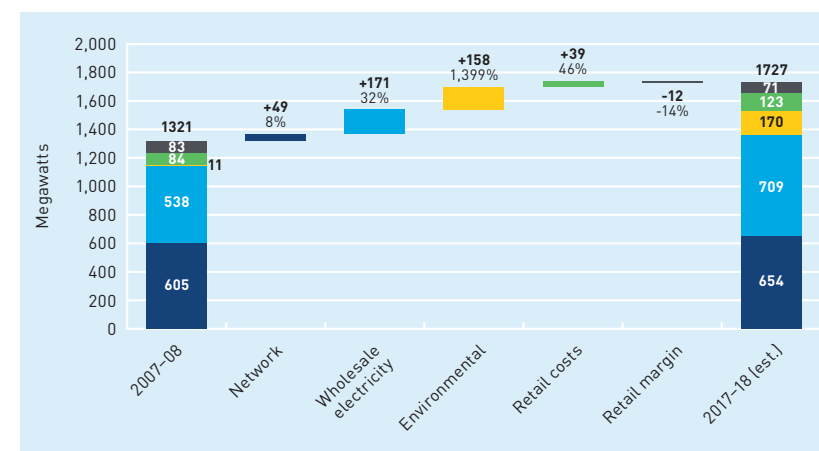


Figure 49:
Change in average residential customer bill, 2007–17, South Australia, \$2016/17 ex. GST

Source: Australian Competition and Consumer Commission

Gas

South Australia is part of the eastern gas market within the NEM, with a short-term trading market node to allow for trading of gas. The upstream petroleum industry is a significant contributor to South Australia, with gas production and processing occurring in the Cooper Basin in the north and the Otway Basin in the South East.

The main transmission pipelines that directly and indirectly deliver natural gas to the Adelaide metropolitan area and major regional areas are as follows:

- Moomba to Adelaide Pipeline System (MAPS)
- South East Australia Gas (SEA Gas) underground gas pipeline from Port Campbell in Victoria to Adelaide
- Moomba to Sydney Pipeline (MSP)

- Queensland, South Australia and New South Wales link, allowing gas to flow from Queensland into South Australia then through the MAPS or MSP
- South East South Australia pipeline, connecting the SEA Gas pipeline to gas facilities at Katnook/Ladbroke Grove
- South East Pipeline System, delivering gas from Katnook to Snuggery and Mount Gambier, and
- SA Riverland pipeline, which transfers gas from Angaston to Berri then onto Mildura in Victoria. A connection on the SA Riverland pipeline supplies Murray Bridge.

The majority (approximately 60%) of natural gas is used to generate electricity in South Australia and the rest is piped to households and business through the distribution network.

The integration of gas networks with hydrogen and the electricity network can improve the utilisation of existing infrastructure...

– Australian Gas Infrastructure Group

AEMO's 2019 *Gas Statement of Opportunities* (GS00) contains projections for demand and information from gas producers about reserves, as well as forecast production to assess the projected supply-demand balance and potential supply gaps under a range of plausible scenarios looking ahead to 2038 for the eastern and south-eastern Australia gas markets.²³⁴ There are nine power stations being supplied with natural gas in South Australia, and AEMO predicts that the State's consumption of gas will drop between 2023 and 2025 as a result of the proposed closure of the State's largest gas-fired power stations.

Figure 50 shows AEMO projections of some tightness in the supply of gas in the short term but no capacity constraints in the medium term.²³⁵

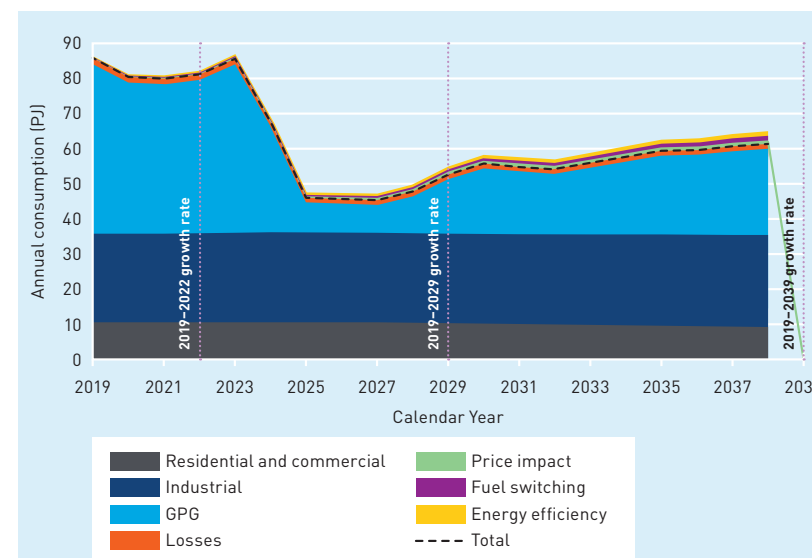


Figure 50:
Projected annual gas consumption, 2019-39

Source: Australian Energy Market Operator

Needs and challenges

Inconsistent policy through the energy transition

The global energy market is undergoing a transition as international commitments and growing market pressures are leading to a decarbonisation of the energy market. Much of the energy infrastructure within Australia is old and there is a need for investment to manage the transition. South Australia is in a similar position with a large amount of current gas generation likely to retire over the term of the Strategy. Recent high energy prices should have signalled market investment in the necessary infrastructure to replace ageing plant and manage the transition

to a decarbonised energy system, yet this has not eventuated.²³⁶ Investors seek policy certainty to make such significant investment, and this has been lacking for some years. Successive governments have proposed and rejected multiple emissions and carbon reduction policies. The inconsistent policy position has created uncertainty in the market that constrains investment.

In October 2019, the Grattan Institute found that high prices can, in part, be attributed to policy uncertainty. Hence, consistent and efficient policy across the NEM is required to give the market confidence to invest.

Affordable energy

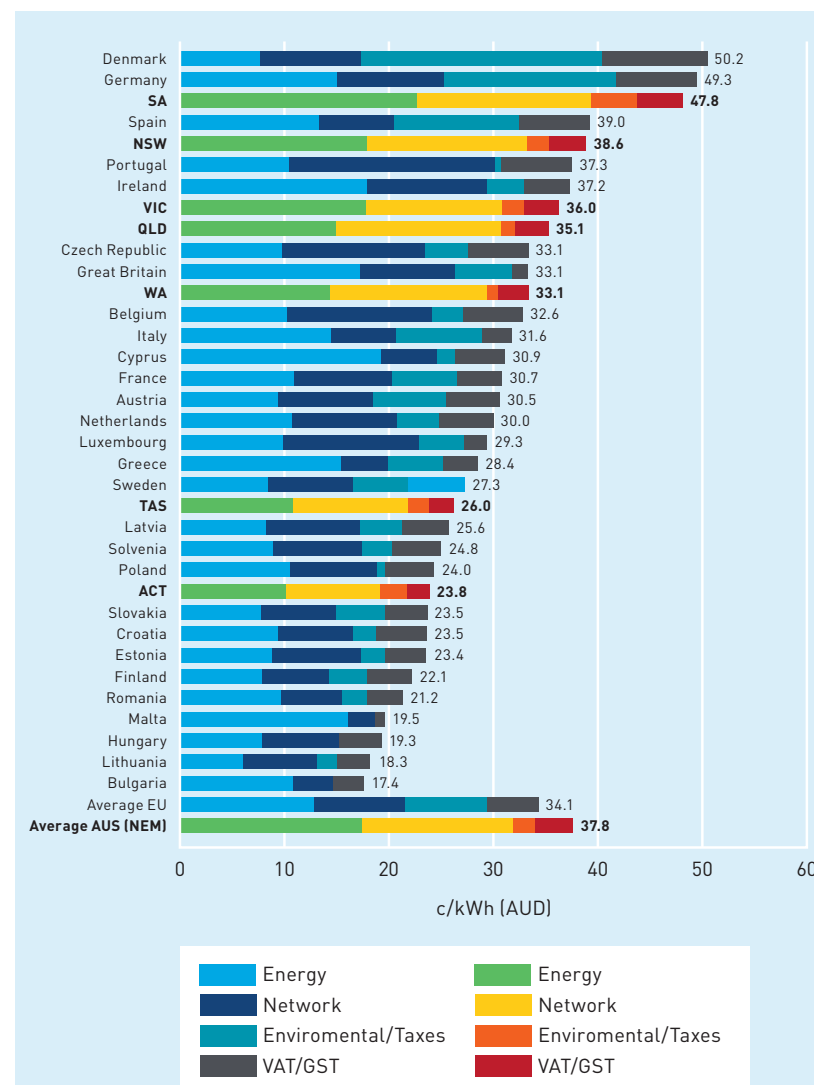
South Australia has had some of the highest electricity costs in the world, with an ACCC study showing in 2018 that it was the third most expensive market in the world, after Denmark and Germany. Four Australian states feature in the top 10 (see Figure 51). There has been a decrease in wholesale energy prices in the year to date, however last financial year saw the highest weighted price on record.²³⁷

Electricity network infrastructure presents a fire-start risk that requires ongoing investment in bushfire risk mitigation measures, including ensuring adequate clearance between vegetation and power lines in high bushfire risk areas. The challenge is to balance the cost of bushfire risk mitigation against the associated impact on electricity prices.

– SA Power Networks

Figure 51:
Nominal international electricity prices (c/kWh), 2018

Source: VaasaETT



High energy prices are an inhibitor to investment and economic growth, as well as increasing cost of living pressures. The increase in prices has been driven by several factors:

- The closure of the Port Augusta power station tightened supply and reduced competition in the contract market.
- The volatility in the wholesale spot price within South Australia has put upward pressure on contract prices for energy.
- South Australia has a high penetration of gas generation, which has seen the long-term average price of \$3–4/GJ rise to around \$10/GJ (although recent forward prices have seen some reduction).

Greater competition and reduced volatility in the spot price should put downward pressure on prices.

System security and reliability

As much as energy costs can impact investment and economic growth, so can system security and reliability. This relates to being able to produce and transport sufficient energy to meet demand as it occurs.

The system operators and regulators must juggle the operation of the competitive markets so that prices are minimised, supply is guaranteed and the laws of physics are obeyed. If the juggler is hesitant for an instant, the laws of physics prevail and the system crashes.

– **Matthew Warren, Blackout: How is energy-rich Australia running out of electricity?**

For the system to remain secure, it needs to operate within certain technical limits and defined bands of voltage and frequency. Operating outside of these can create instability and AEMO, as the network operator, must

manage the system accordingly. This involves simultaneously balancing supply and demand and a range of system support measures such as frequency control, inertia and system strength to maintain stability and security.

AEMO does this within the agreed 99.998% reliability standard. This sets the maximum amount of customer demand that is not able to be met, or unserved energy (USE), at a threshold of 0.002%. Within the recent *2019 Electricity Statement of Opportunities*, AEMO forecast that South Australia will be within the allowable USE tolerances.

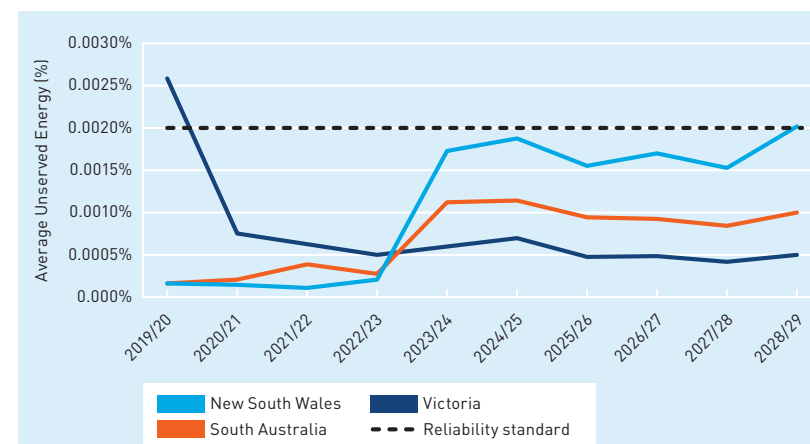


Figure 52:
Expected unserved energy, 2019/20 to 2028/29

Source: Australian Energy Market Operator

AEMO has certain powers within the National Electricity Law to ensure there is sufficient energy available at all times. Where there is insufficient energy to meet demand – whether through excess demand or sudden loss of generation capacity – rapid fluctuations in frequency result and the system

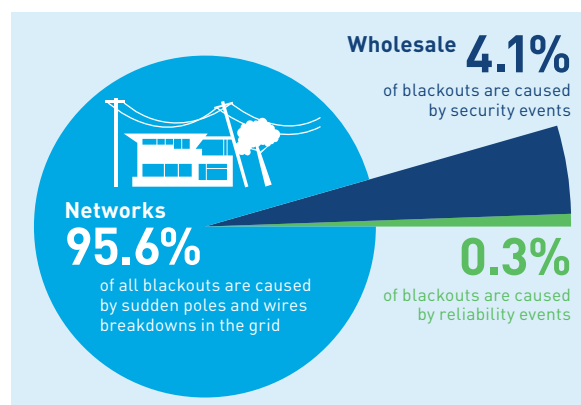
becomes unstable. In these situations, if the system cannot be corrected, AEMO has the ability to force load shedding to rebalance the system. This is essential to maintain system stability but can cause significant disruption.

The South Australian Minister for Energy and Mining used designated power under the National Electricity Law on 9 January 2020 to trigger the Retailer Reliability Obligation for the first quarters of 2022 and 2023 to support the reliability of the market in South Australia. This puts obligations on retailers to ensure sufficient contracts are in place to cover their share of demand and creates market incentives to ensure there is sufficient energy in the market to meet reliability obligations.

At present, the South Australia network is operating within the reliability standards, and the major cause of service disruption is not lack of energy, but rather network issues caused by storm or fire events. Sections of the network do, however, suffer from some capacity constraints that negatively impact on reliability. Increasing frequency of extreme weather events will also increase the risk of network events.

Figure 53:
Causes of blackouts
FY 2009–18

Source: Australian
Energy Market
Commission



The consequence of large system failures can be significant, as demonstrated by the system blackout in 2016 estimated by Business SA to cost South Australia \$367 million. In 2019, the AEMC developed a *System Security and Reliability Action Plan* to help ensure that the power system operates within defined technical limits, even when a major power system component disconnects, and that there is sufficient generation and demand response capacity to meet customer needs.

Considering intermittent generation sources do not provide the same system support measures as traditional synchronous generators, measures need to be put in place to ensure system security and reliability as the energy system transitions towards more intermittent renewables. To supplement development of the 2020 Integrated System Plan, AEMO commenced the Renewable Integration Study as a deeper review into the specific system implications and challenges associated with the integration of large amounts of variable inverter-based renewable generation and decentralised energy on the power system.²³⁸

Need for firm capacity to support a reliable system through the energy transition

Firm capacity in the electricity system is vital to ensure an efficient and stable network as well as limit the volatility in the spot price and allow for an efficient contract market. As an example of measures that may be required, in August 2019 the AER approved ElectraNet's \$166 million investment to deliver synchronous condensers that will be installed to support system security.

With the current fleet of gas generators due to retire over the term of the Strategy, alternatives to provide firm capacity to ensure the system operates within the reliability standards will also be required. This may come from bulk storage, greater diversity of supply or more interconnection. In the foreseeable future, gas (or diesel where gas is not available) generation and flexible fast-start gas generation in particular, is likely to play an important role in providing firm capacity. In the medium term it will be important to ensure there is an adequate supply of gas to avoid upwards pressure on

gas prices that will flow through to electricity prices. The recent PACE Gas grants to facilitate further gas exploration that have been successful in identifying further gas supplies are encouraging.

Figure 54 shows the types of storage and capacity and discharge rates by technologies.

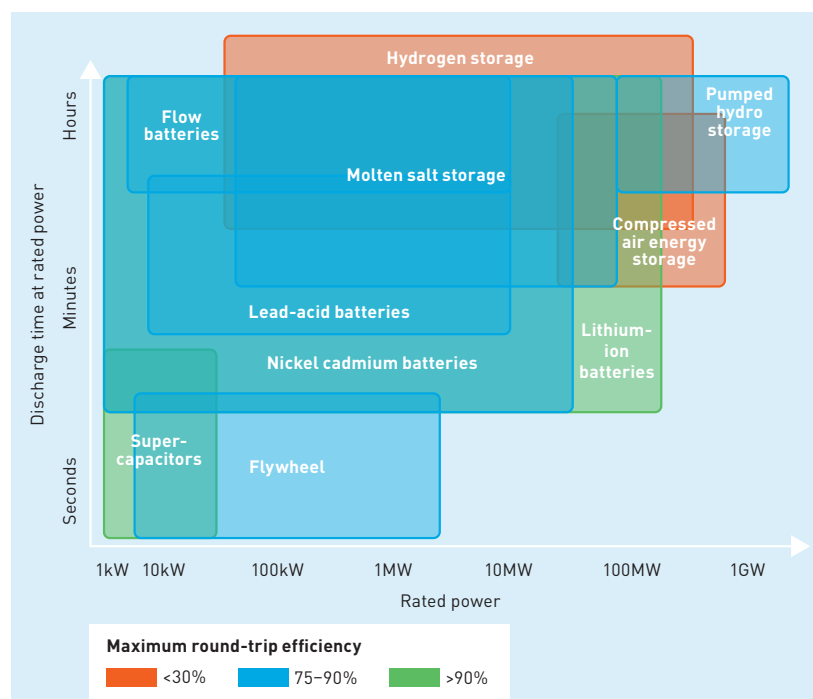


Figure 54:
Storage types and technology

Source: Deloitte Access Economics

Note: Power output and discharge time for hydrogen will vary depending on application.

While the cost of batteries is steadily reducing (see Figure 55), they remain an expensive form of energy and lack the storage capacity needed to support the system for long periods.

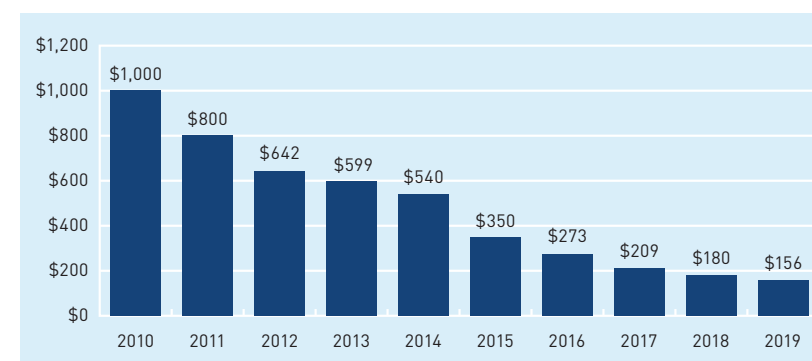


Figure 55:
Lithium-ion battery prices (\$/kWh), 2010-19

Source: Bloomberg New Energy Finance

They are, however, very effective at fast response and supporting system security, as demonstrated by the Hornsdale Power Reserve, also known as the 'Tesla Big Battery'.

The proposed Neoen Energy Park near Crystal Brook has shown the potential of combining multiple renewable energy sources and storage technologies to improve the ability for renewable energy zones to provide firm capacity. However, in the short to medium term it is likely that the majority of firm capacity will need to be underwritten by efficient fast-start gas generation or new pumped hydro projects. The State Government has announced a \$50 million grid-scale storage fund designed to facilitate the development of new storage technologies capable of addressing the intermittency of South Australia's electricity system by targeting projects that help mitigate cost impacts on the State's power system now and

into the future. In September 2019, the Australian Renewable Energy Agency (ARENA) also announced \$40 million in funding to fast-track the development of South Australia's first pumped hydro energy storage project.

Having viable pumped hydro projects enter the South Australian market will be an important addition to support sufficient firm capacity. Longer term, hydrogen storage could also play an important role in this regard.

Sufficient interconnection capacity will also help provide a diversity of supply through the transition. The proposed EnergyConnect interconnector will enable South Australia to access generation from NSW coal plants and increasing amounts of renewable energy that will be constructed in the renewable energy zones in NSW. It will also provide another market to export any excess renewable energy generated in South Australia. However, interconnectors are subject to being constrained for different technical reasons by the market operator and reliant on other markets having excess capacity to export to South Australia. The contract market for electricity traded over interconnectors lacks the reliability and liquidity of contracts underwritten by local firm capacity and is likely to remain so until that market matures.

The investment required to improve system security and reliability ultimately gets borne by customers, either through increased fixed network charges or market entrants needing to make an economic return. Thus, investments need to be economically efficient to manage the trade-off associated with a reliable energy system and lower energy prices.

Managing peaky demand

The energy demand profile in South Australia is characterised by significant peaks, as discussed. On 24 January 2019, record temperatures across South Australia saw demand increase to 3,140 MW. This compares to an average demand of approximately 1,500 MW. This peaky profile is reflected in a volatile spot price that increases significantly over the hotter months (see Figure 56).²³⁹

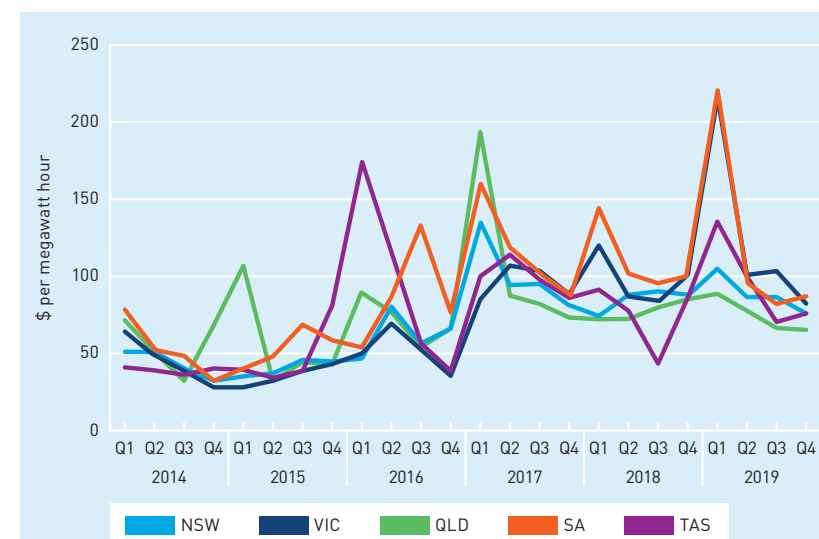


Figure 56:
Region quarterly volume weighted average spot electricity prices,
Q1 2014 – Q4 2019

Source: Australian Energy Regulator

To build generation capacity to meet demand that only occurs a few days a year risks assets being underutilised much of the time. It will also contribute to the volatility of the spot price, with high prices charged at those peak periods to make an economic return. A more efficient way to manage peaks is to have an effective demand response system that enables loads to be shed in a controlled manner.

Demand response – voluntary reduction of electricity use by customers – will be an important part of an efficient and reliable market in the future. Demand response measures can help to keep a power grid stable by balancing electricity supply and demand to reduce the need for standby

generation capacity, particularly during pronounced peak demand periods. They also increase the flexibility and reliability of electricity systems. This becomes increasingly important as the share of renewable energy generation of the total energy mix increases.

...energy efficiency measures and strong minimum standards to reduce energy demand... [include smart] appliances, planning and building code requirements, supporting green infrastructure (reduce air conditioning requirements) etc.

– Premier’s Climate Change Council

Mass participation in this type of scheme can achieve a step change in the operation of the network. Whether it is air conditioners being switched off for a few minutes each hour or factories being incentivised to change timing of certain operations, demand response provides a way of enhancing energy security and sharing benefits with consumers.

Sundrop Farms,
Port Augusta



Managing the trend to net negative demand

AEMO forecasts installed rooftop capacity (both residential-scale and commercial-scale industrial) to grow to over 2 GW in South Australia.²⁴⁰ Figure 57 shows the PV and battery storage forecast to 2037 across the NEM.²⁴¹

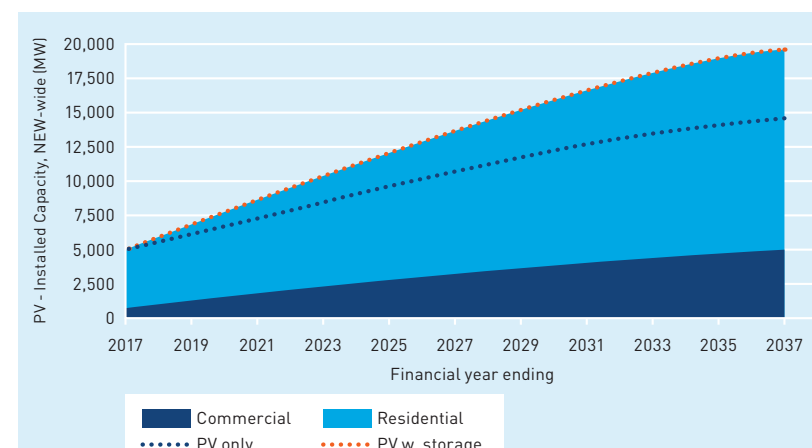


Figure 57:
PV and battery storage forecast

Source: Australian Energy Market Operator

The uptake of solar PV is changing the nature of electricity supply, with significant amounts of unscheduled energy being exported to the network. This has resulted in localised voltage fluctuations in the network and also means net demand on the network approaches zero on mild, sunny days.

For example, on 10 November 2019, rooftop solar PV accounted for 64% of the State’s operational demand when the combined output from solar panels totalled 832 MW at 2pm, shifting the time of minimum demand from the middle of the night to the middle of the day.

The transmission network infrastructure was designed to always have a minimum level of demand to remain stable, and significant capital investment could be required to address system control and stability issues. AEMC has called for a 'network for the future' to address this issue.

Being able to manage these distributed energy resources to mitigate this risk by spreading peak demand and providing other network support services will be important. The South Australian Government is supporting Tesla's Virtual Power Plant (VPP) program of solar and home batteries on South Australian homes. Tesla has now achieved both the Phase 1 target of 100 solar and battery systems and Phase 2 target of 1,000 installations. Tesla and the Government are now evaluating the trial phases and future options for the project. The VPP continues to break new ground in the NEM, being one of the first VPPs to be registered with AEMO to provide Frequency Control Ancillary Services (FCAS) in AEMO's Virtual Power Plant Demonstrations. These demonstrations aim to inform the effective integration of VPPs into the NEM.

The South Australian Government is also supporting the installation of 40,000 residential batteries through subsidies provided under the \$100 million Home Battery Scheme. A number of retail VPP offerings applying the scheme have now been launched.

Electric vehicles (EVs)

While the current number of EVs in the South Australian market is very small, Infrastructure Australia forecasts they will comprise 30% of new car sales within 10–15 years. If the entire fleet were to shift to EVs, significant new demand would be placed on the grid. However, AEMOS's ES00 forecast²⁴² indicates this will not eventuate (see Figure 58) provided re-charging occurs during lower cost, off-peak times rather than in the evening, which could exacerbate the evening peak of the demand profile. Strategies to mitigate this risk need to be considered. Smart charging of vehicles during off-peak periods will improve electricity system efficiency by increasing total energy delivered over existing transmission and distribution infrastructure.

As a flexible source of new demand, smart charging of electric vehicles will assist with management of net-negative demand by utilising controlled and uncontrolled solar PV output.

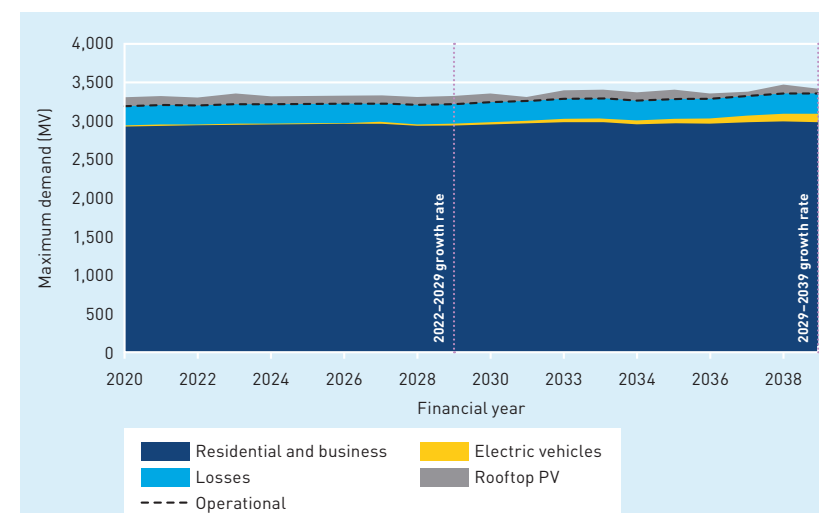


Figure 58:
South Australia's peak demand projections 2020–2038

Source: Australian Energy Market Operator

Future gas needs

The AEMO GS00 forecasts no medium- to long-term capacity constraints of gas supply. Gas will continue to be used for domestic use, some industrial use and gas generation, albeit in a reduced capacity as current generators retire. Much current gas infrastructure is ageing and will need continued investment in maintenance to sustain service levels. Laterals to the existing pipeline infrastructure may be required if there is a significant new industrial need; however, this should be demand driven. A future opportunity that could be explored is carbon capture and storage.

One consideration is how the contract market in gas can be supported if the predominant form of gas generation is for peaking plants that only operate on days of high demand. Under the current rules, gas must be contracted over the pipelines 24 hours in advance. Large users will be able to manage loads through their contracts and portfolio; however, smaller new entrants may not be able to contract for the necessary gas or need to take a risk position that there will be sufficient demand for their plants to operate the next day.

Emerging hydrogen industry

Hydrogen is an emerging future industry for fuel use and could play multiple roles in the energy market: de-carbonising for the natural gas network, specialised turbines for energy generation, as a form of bulk energy storage, fuel for fuel cells and as a demand response tool in the electricity market (via ramping up and down electrolyzers used to produce hydrogen). There is also a potential export market for hydrogen into the Asian region that could impact both water and electricity infrastructure requirements near port locations. There are further domestic opportunities for green hydrogen to decarbonise industrial processes such as green steel, ammonia and fertiliser production and as a zero emission fuel for land transport.

In 2017, the State Government released *A Hydrogen Roadmap for South Australia*, which set a pathway for the State to capitalise on its competitive advantages and accelerate its transition to become a clean, safe and sustainable producer, user and exporter of hydrogen.²⁴³ In September 2019, *South Australia's Hydrogen Action Plan* was released to support the national strategy for developing this industry. As a key action under the Plan, the South Australian Government has committed over \$1 million to work with industry on a landmark model of existing and potential infrastructure required for an international-scale renewable hydrogen export value chain.

Through the Renewable Technology Fund, the South Australian Government has provided grants and concessional loans to encourage projects seeking to demonstrate the feasibility of local hydrogen production and supply

capacity that can potentially be scaled-up as new markets emerge both internationally and within Australia. Developing local demand and industry capability will be an important step to build capacity to capture any future export opportunities. ISA supports studies in understanding the potential for hydrogen export and associated infrastructure implications.

Future priorities

PRIORITY 30: SUPPORT SUFFICIENT FIRM CAPACITY OR DISPATCHABLE POWER TO ENABLE AN EFFICIENT AND RELIABLE ENERGY MARKET IN SOUTH AUSTRALIA

Having sufficient firm capacity within the market is essential to ensure there is an efficient and reliable energy market through the transition to a decarbonised market. Firm capacity should not only limit price volatility in the spot market and enable an efficient contract market, but also provide other support measures that can help system strength and security. The South Australian Government has been active in supporting this through the grid-scale storage fund as well as triggering the Retailer Reliability Obligation. Any future intervention should be economically efficient to ensure that it does not put upward pressure on prices for consumers. An efficient market should have sufficient incentives for the market to make the necessary investments to provide sufficient firm capacity.

Waterloo Wind Farm*Image courtesy of Renewables SA*

PRIORITY 31: **SUPPORT ADDITIONAL DEMAND RESPONSE MEASURES**

Demand response has the potential to be an efficient way to manage the peaky nature of the South Australian energy market and improve its reliability. Being able to reduce demand from the grid in a controlled way should reduce some volatility in the spot market and the need for standby generation. The long-term goal should be to promote a market for demand response to incentivise large industrial loads to reduce demand during peak periods. There is also the potential for residential loads to assist through the greater uptake of smart meters and appliances such (e.g. air-conditioners or pool pumps) that enable loads to be switched off for short periods during peaks. Home battery installations also have the potential to spread peak demand. It is noted that the South Australian Government has supported these initiatives through various schemes and this should continue, as should efforts to refine regulatory settings and market incentives.

PRIORITY 32: **SUPPORT MEASURES TO MITIGATE A NET NEGATIVE DEMAND FROM THE GRID IN AN EFFICIENT WAY**

The trend towards net negative demand on the grid as the amount of uncontrolled solar PV increases will create challenges as the grid is not designed to have zero demand. Measures are required to mitigate this issue while a longer term consideration of the grid of the future plays out. Measures including but not limited to Virtual Power Plants and flexible loads such as hydrogen electrolyzers and managed electric vehicle charging should be explored and supported to help manage the flow of energy into the grid in a way that improves its reliability and reduces volatility.





Water

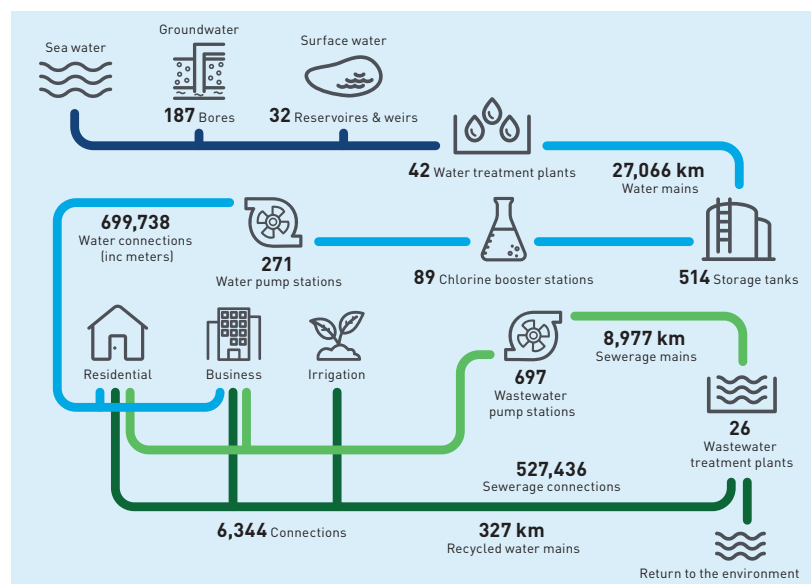
Role of water infrastructure

Water is the State's most valuable resource. South Australian businesses and consumers must be able to access secure, reliable, affordable and sustainable water supplies to meet essential human needs and to support key growth industries such as agribusiness, mining and tourism.

In such a large state with low and variable rainfall it is important to manage water resources holistically and efficiently. Infrastructure plays a critical role in storing, treating and transporting water efficiently to where it is needed, as well as managing environment flows and mitigating against flooding. This requires a complex and expansive network, and Figure 59 below demonstrates the scope of the SA Water network.

Figure 59:
SA Water network

Source: SA Water Plan 2020–24



In addition to this, there is a range of other private, government and local government infrastructure with different governance arrangements, and these service providers often have to manage complex issues associated with supplying water to remote areas with low rainfall.

Over the next 20 years, climate change, increasing urbanisation and population growth will increase the challenges in managing and planning for the infrastructure needs in the water sector.

Current state

Water sources

South Australia has become reliant on the River Murray as its primary water source (see Figure 60),²⁴⁴ with control infrastructure developments dating back to 1920.

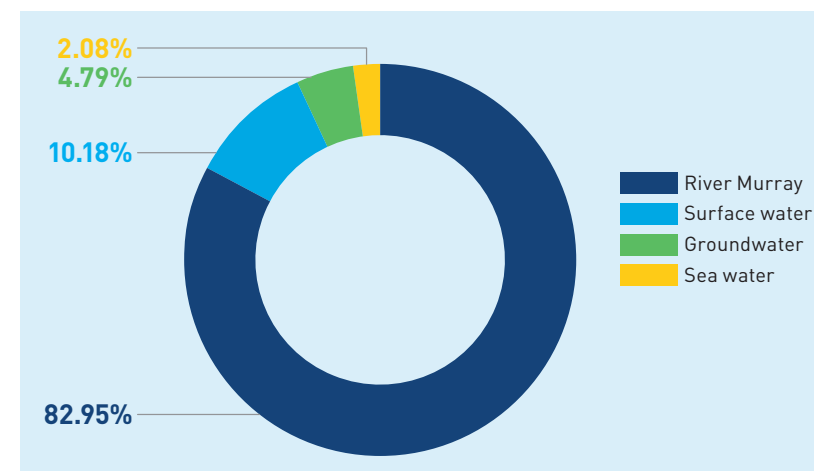


Figure 60:
Water sources 2018/19

Source: SA Water

The total South Australian entitlement to River Murray water under the Murray Darling Basin Plan is 1,850 gigalitres (GL).²⁴⁵

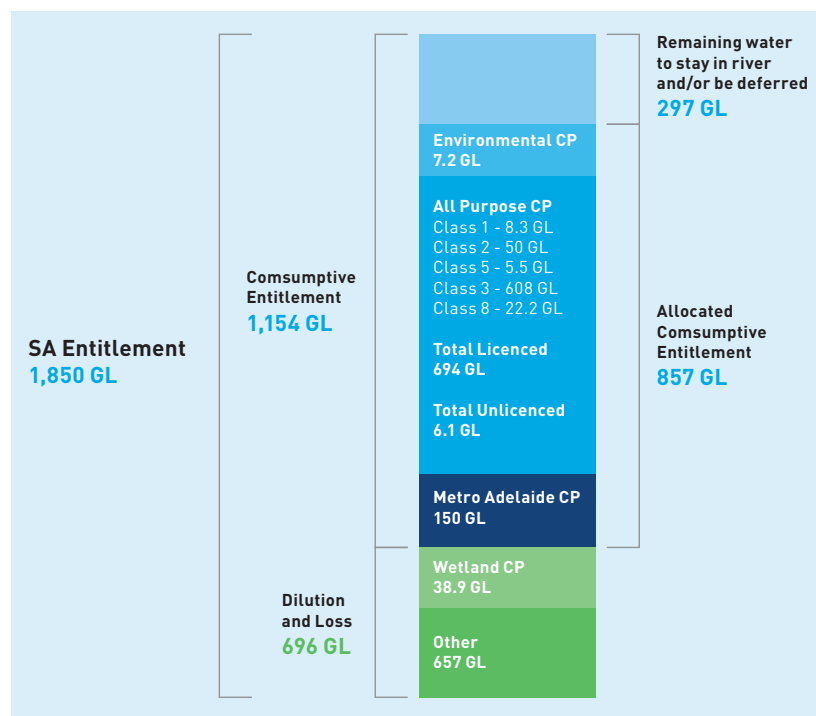


Figure 61:
South Australia's water entitlement under the Murray-Darling Basin Plan

Source: Department for Environment and Water

This allocation is split across various classes and uses (consumptive pools)²⁴⁶ as shown in Table 17.

Water Product	Allocation
All Purpose – Class 1 (stock and domestic)	100%
All Purpose – Class 2 (country towns)	100%
All Purpose – Class 3 (irrigators)	100%
All Purpose – Class 1 (industry and dairy)	100%
Metropolitan Adelaide – Class 6	90%
All Purpose – Class 8 (environmental land management)	100%

Table 17:
South Australia's water classes and uses

Source: Department for Environment and Water

The actual annual allocation varies year to year depending on reserves and inflows, with critical human water needs being prioritised. The volume of water available for irrigation from the River Murray and other sources has historically limited the size of the agribusiness industry along the river in South Australia. Additional water may be traded into South Australia from Victoria and NSW to meet additional demands if it is economically viable to do so; however, competition for water in dry years is intense. The median price of water traded in the Southern Murray-Darling Basin has significantly increased in recent years²⁴⁷ (see Figure 62).

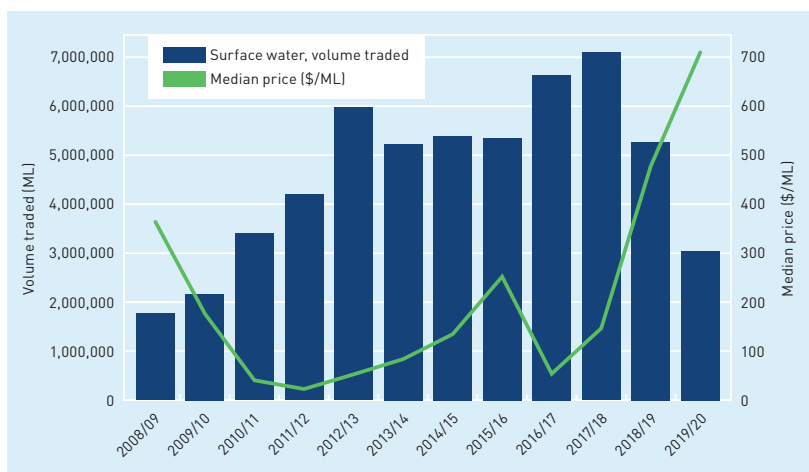


Figure 62:
Allocation trade history, Murray-Darling basin

Source: Bureau of Meteorology

The 2018 *National Water Reform Productivity Commission Inquiry Report*²⁴⁸ assessed progress against the National Water Initiative, which included the Murray-Darling Basin. It recommends changes to water governance arrangements, including:

- clearer roles and responsibilities for supply augmentation planning, improving economic regulation, enabling decentralised solutions and more outcomes-focused environmental regulation
- environmental water management, including better integration with waterway management, strengthened and streamlined institutional, governance and management arrangements, and improved monitoring and evaluation for adaptive management, and

- new infrastructure, where the focus is on ensuring environmental sustainability and financial viability before any government resources are committed for construction.

Many South Australian homes and businesses rely on underground water that occurs in fractured rock and sedimentary aquifers across the State and from surface water catchment sources. Drinking water bore sources mainly supply regional areas and communities in the Eyre Peninsula, the State's far north and south-east. Where there is a high demand for water, groundwater resources are prescribed, and the taking and use of water is managed via water allocation plans. Allocation of groundwater resources applies to all aquifers within the prescribed areas, and the majority of groundwater sources are already fully allocated. In 2017/18, about 430 GL of underground water was used. Total volumes extracted in non-prescribed areas has not been determined.

The Millennium Drought threatened water security for metropolitan Adelaide and regional South Australia and forced a change in the way the State planned and secured its water resources. One of the ways the South Australian Government responded was by building pipelines to deliver drinking water to Lower Lakes communities and to help sustain industry.²⁴⁹ The South Australian Government and Commonwealth Government jointly invested \$1.83 billion in the 100 GL Adelaide Desalination Plant (ADP), as well as approximately \$402 million in the related North South Interconnection System for metropolitan Adelaide.

With climate change driving longer and more severe droughts and our desire to move away from the dependence on ground water, a unified solution to long-term water supply is required.

– OzMinerals

Meanwhile, the \$265 million South Australian River Murray Sustainability (SARMS) program, funded by the Commonwealth Government under a National Partnership Agreement, is helping to secure the future health of the South Australian River Murray region and supporting the growth of strong and sustainable irrigation communities.²⁵⁰

Following those investments, Adelaide and the major regional centres currently have a relatively high degree of urban water security. Adelaide has an average annual drinking water demand of approximately 164 GL available from multiple sources including:

- Mount Lofty Ranges
- River Murray, and
- the Adelaide Desalination Plant.

The Mount Lofty Ranges (MLR) surface water catchments are a major source of Adelaide's water supply, normally comprising around 50% of Adelaide's drinking water supply. Water use from the MLR storage is prioritised; however, this source can be severely limited in dry years, as became apparent during the Millennium Drought (and some previous droughts). Modelling based on historical records has suggested historical minimum inflows have been as low as 18 GL (during 1982/83).

The State Government recently agreed to assist in national drought relief by using water from the ADP to increase supply to urban Adelaide. This offset water allocations from the River Murray and freed up available river water for communities and agribusinesses in the upper Murray catchment.

The ADP may provide an offset of up to 100 GL over an 18-month period. The increased cost of utilising ADP water to supply Adelaide will be met by the Commonwealth. It is recognised that while the ADP provides a high degree of water security for Adelaide, it comes at a cost (compared to the production costs of providing Adelaide with potable water from the River Murray and the MLR).

While Adelaide and the major regional centres have a relatively high level of water security, more remote regional areas have some water security constraints depending on available groundwater. Water supply in remote areas can also be difficult in low rainfall years, with some individuals and communities reliant on rainwater for their drinking water supply. Significant expansion or new mining or agricultural operations that will support the Government's growth ambitions generally require large volumes of water. This will likely need further investigations to locate appropriate water resources and require multiple wells to supply water or significant infrastructure to transport it.

Water infrastructure operators

South Australia has a large integrated water service provider in SA Water. SA Water services 99% of potable water customers and 87% of sewerage customers in South Australia and manages a water mains supply network of more than 27,000 km, nearly 9,000 km of sewerage mains and a recycled water network of over 370 km. This large network of pipes, pump stations and treatment plants is spread across the State.

In 2017/2018, SA Water supplied 1.7 million people with 224,615 ML of drinking water. The provision of these water services is subject to economic regulation by the Essential Services Commission of South Australia (ESCOSA), and SA Water submits comprehensive capital investment plans to the regulator as part of its regular four-yearly income determination. ESCOSA put customer interests and the consumer voice at the centre of the regulatory process and negotiated with SA Water to:

- provide water and sewerage services at the lowest sustainable price for the quality and reliability levels valued by customers, and
- have in place sound long-term asset management, operating and financing strategies that support the provision of those services for current and future customers.²⁵¹

The following maps indicate the location of major pipelines and assets.²⁵²



Figure 63:
SA Water's major pipelines and assets
Source: SA Water



Figure 64:
Sewage treatment plants by operator
Source: SA Water

In addition to SA Water infrastructure, there are numerous smaller Community Wastewater Management Schemes that are owned and operated by local government or the private sector. These can comprise a significant proportion of the council's asset base and operational expenditure.

There are a number of recycled water schemes that use treated wastewater from wastewater treatment plants (WWTP) for irrigation purposes. For example, the Virginia Pipeline Scheme, established in 1997, provides about 20 GL of recycled water from the Bolivar WWTP to approximately 360 agribusinesses in Virginia and surrounding areas – assisting farm production in the northern Adelaide plains. This can not only provide an important source of water security and additional water to support green infrastructure initiatives but also limits the discharge of treated effluent into the environment. Other by-products from the WWTP process include the use of bio-solids (sludge) for fertiliser production and biogases for co-generation and energy efficiencies.

Stormwater

State and local governments are responsible for an extensive stormwater network that in metropolitan Adelaide alone has recently been estimated as having a replacement value of more than \$4.2 billion. Adelaide's existing urban area stormwater management infrastructure and catchments include the Brown Hill and Keswick Creeks (BHKC) catchment stretching from Crafers in the Adelaide Hills to the Patawalonga Lakes System at Glenelg North in Adelaide's west. This plays an important role in mitigating flood risk.

In 2017, the Stormwater Management Authority approved the Stormwater Management Plan (SMP) for the BHKC catchment. For example, the water courses in the BHKC catchment have a relatively high flood risk, a history of flood events, and a low standard of flood protection.

The specialised Patawalonga Lakes and Barcoo Outlet facility at Glenelg North has a dual role of providing flood mitigation in Adelaide's western suburbs and as a recreational boating harbour.

The State boasts 34 operational stormwater harvesting schemes with a potential design production (yield) volume of up to 20 GL a year and a distribution pipeline network of more than 750 km.²⁵³ These schemes provide a possible water source for managed aquifer recharge (MAR), which can in turn provide alternative water supplies for irrigation and other uses across Metropolitan Adelaide. Despite the potential yield, in 2016/17 a maximum actual yield of 8.5 GL of harvested stormwater was achieved. In 2017/18, this volume was only 5.5 GL due to lower rainfall. The State Government is working with existing MAR scheme owners to identify infrastructure and other opportunities to increase the volume of water that is captured and used through existing MAR schemes.

South Australia has significant irrigation infrastructure. The first irrigation infrastructure in the Riverland was established well over 100 years ago. With an annual rainfall of less than 250 mm, Riverland operators understood the importance of conserving water and from the 1960s, all new developments and redevelopment of older districts utilised pipelines rather than open drains, which dramatically improved the efficiency of the irrigation distribution systems.

Since the 1990s, South Australia's viticulture and horticulture industries have invested in using alternative water supplies such as treated wastewater and harvested stormwater to supplement groundwater and surface water dams for irrigation. The investment included changing winery and intensive horticultural process operations to reclaim and reuse their production wastewater.

The South East Drainage scheme converted the south-east of the State into highly productive agricultural lands. With over 2,000 km of drains, the scheme was recently expanded and re-engineered to maintain the natural cycles of water of important wetlands within the region.

South Australia also has an extensive network of other water infrastructure assets used to monitor water quality, control environmental flows and protect public and private properties from potential flooding.

There are approximately 7,000 groundwater wells across the State that are used to monitor the quality and quantity of groundwater. The State also operates and maintains several hundred surface water monitoring stations, primarily along rivers and creeks. These monitor water quality and quantities, with some also providing flood warning information.

Earthen embankments protect valuable agricultural regions along the Lower Murray Reclaimed Irrigation Area as well as townships adjacent the River Murray. Originally constructed to reclaim wetlands for productive use, the levee banks now have a much broader purpose and context in terms of water security and environmental protection. A number of these embankments are managed by the State Government.

A growing network of water regulator infrastructure in the upper regions of the River Murray – from the Victorian border to Berri – is used to control water flows in and out of natural wetlands to simulate and improve natural wetting and drying cycles in river environments. This infrastructure has enabled more water to be available for agribusiness. A network of 13 river vessel waste disposal stations along the Murray supports tourism and minimises water pollution by allowing houseboats to unload wastewater at designated locations.

Needs and challenges

Secure supply for human use and to support economic growth

The primary need for water infrastructure is to efficiently secure water supplies not only for critical human needs but also to support and unlock growth in key growth sectors.

Agricultural and industrial users are the most significant consumers of water in the State, and security of supply is critical to achieving economic growth. Any significant new development or expansion is likely to either need to identify new water sources or transport water to site, sometimes over great distances. The amount of water required can also be significant. A new magnetite iron ore mine, for example, requires approximately 2–2.5 GL

of water per million tonnes of product. Water salinity can impact potential uses, so additional treatment may be necessary prior to its use. Any additional infrastructure required to supply suitable water will ultimately be reflected in the cost of water, and efforts should be made to aggregate demand where possible to ensure investment is efficient.

The Commonwealth Government established the National Water Grid Authority in 2019 to develop, in partnership with state and territory governments, a national framework for investment in water infrastructure. This entails identifying a series of priority water infrastructure projects that will increase the capacity, connectivity and resilience of Australia's water storage and supply infrastructure. Infrastructure Australia has also listed the development of a National Water Strategy in its 2020 *Infrastructure Priority List*.²⁵⁴ ISA supports this strategic approach to identifying needs and solutions that supports secure water for human and environmental needs and growth in primary industries and mining. Water resources need to be managed in a holistic way that requires national coordination, given water resources are not constrained by state boundaries. Implementation of the Murray-Darling Basin Plan is important to ensuring equitable water supply to the communities and industries across the basin.

Improve water efficiency

Water is a limited resource and its use must be optimised through efficiency measures that help manage the need for new investment. South Australia has already developed excellent capabilities in water management. This benefits the State and has the potential to be leveraged into an export service industry.

The smart water network installed by SA Water in Adelaide's CBD has provided significant water savings and service improvements for many customers. During 2017/18, SA Water set a benchmark for the water industry by adopting and integrating smart technology on a broad scale. This included the use of smart meters, pressure and acoustic sensors and water quality sensors and linkages to the operations centre. By managing the water network in this new way, it has minimised service disruptions and losses.

The smart network has resulted in proactive leak remediation, helping to prevent major breaks. These initiatives should be pursued and expanded where possible. There is also scope to improve water efficiency within homes and businesses.

The State's Riverland has shown excellent innovation in water efficiency at the farm level, whereby direct soil water measurement, based on soil water content change, estimates crop water use to support real-time irrigation scheduling to avoid applying excess water. Riverland irrigators are also using internet-enabled plant sensors to monitor plant health in real time, enabling optimum irrigation efficiency that reduces water use while maximising growth rate and maintaining non-stress conditions for plants.

Water use within the home can be decreased through improved technology, greater use of grey water diversion systems and rainwater collection. During the Millennium Drought, water restrictions were enacted to limit water consumption within the home. There is no forecast need for water restrictions in the foreseeable future within the metropolitan context; however, this type of demand management tactic could be employed should water supplies tighten significantly.

Improve utilisation of assets

The scale of water infrastructure assets across the State is significant. Investments in technology will improve the efficiency of those assets, but there are also opportunities to expand their use for other purposes. South Australia already has several recycled water schemes that use treated wastewater for irrigation. The first stage of the Northern Adelaide Irrigation Scheme is planned to divert up to 12 GL of treated wastewater for horticultural uses. Further use of recycled water into productive uses is possible.

The three wastewater treatment plants across Adelaide capture enough methane to meet about half their combined energy needs.²⁵⁵ SA Water is implementing a range of technologies with an aim to reduce its net electricity costs to zero. The proposed projects include use of floating solar PV arrays on reservoirs and silicon thermal storage to complement

existing biogas generation. Government has also started a program to open reservoirs for recreational use. Initiatives such as these should be pursued provided they do not compromise water safety and quality and are economically viable.

Managing the impacts of climate change

Climate change will likely result in lower average rainfalls. Multiple studies, including the Murray-Darling Basin sustainable yields project²⁴⁹ and the South Eastern Australian Climate Initiative (SEACI) found a greater likelihood of declining rainfall across the basin and declining water availability in the southern section of the basin. The average volume of available surface water is projected to decline by 11% by 2030 under a median climate scenario. Subsequent projections by SEACI found that a 1°C increase in the mean global temperature (by 2030) could potentially lead to changes in mean annual runoff – as much as 22% less in the southern Basin and 29% less in the northern Basin.²⁵⁶ There are also risks in relation to water resources in regional South Australia and to reservoir inflows in the MLR that will further increase pressure on the State's water resources. Meanwhile, more frequent extreme weather events such as storms will also need to be managed by stormwater infrastructure (discussed below).

Increasing urbanisation

Water infrastructure needs to be planned for population growth and the trend towards greater density. Higher density housing tends to use less water per dwelling, although infrastructure may need to be augmented to increase capacity or pressure to service multi-storey developments.

Increases in population and population density – particularly in Adelaide's inner metropolitan suburbs – also create a bigger wastewater task. SA Water is planning some upgrades to its wastewater treatment plants and investments will be considered through the regulatory revenue determinations. Appropriate forward planning will be key to meeting the needs of a growing population.

A bigger challenge that increasing urbanisation presents is the ability to manage stormwater and mitigate urban flooding. An increase in storm frequencies and intensities will impact both existing and new storm mitigation infrastructure. Greater housing density can reduce permeable areas, increasing the amount of run-off, which has implications for stormwater system capacity.

Stormwater harvesting provides an opportunity to both mitigate flood risk by reducing run-off volumes and provide an alternative water supply pending appropriate treatment. Key urban stormwater programs being considered by stormwater managers include new mitigation infrastructure, reuse projects, wetlands and other quality improvement measures to minimise harm to receiving water bodies. There will be requirements for upgrades to existing stormwater infrastructure as well as new flood risk mitigation infrastructure, in part because infrastructure is ageing. It will also manage the increased risks resulting from urban infill development and a changing climate. Appropriate planning policies are being considered to ensure that new urban development factors in the stormwater run-off implications.

For example, flooding of the BKC catchment has the potential to cause significant disruption to thousands of homes and businesses. It is estimated that a flood event in the BKC catchment with an annual exceedance probability of 1% would impact more than 2,000 properties and result in damages of \$122 million.²⁵⁸ The SMP program of flood mitigation works is the culmination of decades of investigations and planning for mitigation across local government areas.

The Gawler River catchment also presents another significant flood risk that could impact the horticultural lands in the northern Adelaide plains.

Infrastructure planning should... [provide] means for increasing the re-use of wastewater and stormwater for all uses including residential, as well as industrial process use and agricultural production.

– SA Wine Industry Association

Asset management

Much of the State's water infrastructure is ageing and poses increasing asset maintenance liabilities. As these assets are challenged to meet necessary service levels, there is a risk of more frequent failures that create disruptions to services. Water infrastructure (including River Murray locks, weirs and barrages) has been an important enabler for the State, and increases in investment will be required over time to maintain assets and deliver reliable services.

For example, the Glenelg gates at the mouth of the Patowalunga Lake System were built in the 1950s and need to be maintained to mitigate water inundation resulting from rain events or storm surges. Investment and renewal of regulated assets is considered as part of the revenue determination process, but non-regulated assets, including stormwater infrastructure, are reliant on asset management strategies of the asset owners and their ability to fully fund them.

Future priorities

PRIORITY 33: CHAMPION DEVELOPMENT OF A NATIONAL WATER PLAN TO SECURE WATER SUPPLY

Water flows do not respect jurisdictional boundaries and South Australia has traditionally relied on the River Murray for approximately 80% of its water supply for regional and urban use. A holistic and strategic approach based on science is needed to ensure secure and safe long-term water supplies to meet anticipated demand across Australia in the context of a changing climate and planned economic growth. The National Water Plan should enable effective implementation of the Murray-Darling Basin Plan to ensure there is sufficient and reliable water supply to meet the needs of regional and urban communities reliant on this basin.

PRIORITY 34: DEVELOP A SOUTH AUSTRALIAN SUSTAINABLE WATER RESOURCES FRAMEWORK

This framework would include:

- an urban water direction statement for Adelaide and South Australian towns that optimises the use of all water sources to support growth and greening in a changing climate, and
- water security strategies for priority regional areas to optimise the use of all water sources to support economic growth.

All available sources of data need to be integrated to identify the location, capacity and quality of water resources for productive use. This should be matched with demand forecasts so that supply can be planned and secured.

PRIORITY 35: DEVELOP WATER INFRASTRUCTURE TO UNLOCK ECONOMIC OPPORTUNITIES

Key economic growth opportunities in South Australia are constrained by access to secure, affordable and fit-for-purpose water. A South Australian sustainable water resources framework should identify augmentation of water supply and provide a transparent process for developing appropriate infrastructure to unlock economic projects that are otherwise constrained. To improve the economics of projects, there may need to be aggregate demand and development strategies to manage the different timeframes of individual customers. Potential opportunities could include expansion in wine regions such as the Barossa Valley or the mining provinces of the Far North or Braemar region. Projects should be market driven and subject to robust business cases.

PRIORITY 36: IDENTIFY NECESSARY FLOOD MITIGATION INFRASTRUCTURE

The increased risk of flooding in urban areas due to more frequent storms resulting from climate change, together with increased run-off caused by less permeable area and ageing infrastructure, could have significant economic, health and safety impacts. Potential mitigation strategies should be explored and business cases developed to identify the most appropriate and efficient solution.



Waste

Role of waste infrastructure

Generation of waste has traditionally been regarded as an unavoidable by-product of economic activity, including from inefficient production processes, low durability of goods and unsustainable consumption patterns by the community.²⁵⁹ Waste is generated by activities in all economic sectors and at each point in the industry production chain.

Table 18 breaks down waste infrastructure by class and type.

Table 18:
Waste infrastructure in use in South Australia

Source:
Green Industries SA

Infrastructure class	Infrastructure type	Description
Collection infrastructure	Kerbside source separation bin systems	Kerbside bins for collection of MSW.
	Skip bins	Bins for collection of C&I and C&D waste (which range from 120 litres up to 20 cubic meters).
	Collection vehicles	Vehicles to collect waste, including side-lift, rear-lift, front-lift, Pantech, flatbed trucks, hook lift and other waste collection vehicles.
	Vacuum systems	An automated collection system which transports waste underground from a series of waste inlets to a collection station through a closed pipe network.
Resource recovery infrastructure	Transfer stations (including compaction equipment)	Transfer stations are permanent sites set up to receive, perform minor sorting, and temporarily store waste and recyclables prior to being taken to a reprocessing or disposal facility. This infrastructure also includes compaction equipment, such as balers, to reduce the volume and associated costs for transport.
	Transfer vehicles	Large vehicles for bulk transport of waste (e.g. a walking floor trailer).
	Material recovery facility (MRF)	A facility where mixed recyclable materials are received, stored and sorted to specifications, then baled, shredded, crushed, compacted or otherwise prepared for shipment to market.

Infrastructure class	Infrastructure type	Description
Resource recovery infrastructure (cont.)	CDL facilities	Depots where container deposit legislation (CDL) bottles/cans can be dropped off by businesses or the general public for refund (currently 10 cents per container), and are sorted to specifications for shipment to market.
	Drop-off facilities	Depots where waste under product stewardship schemes (e.g. computers and TVs, waste paints) may be dropped off and are aggregated for transfer to suitable recyclers.
	Other	A facility that does not fit the above definitions, which receives and undertakes minor processing of a single waste stream, such as used motor vehicles, foundry sands, grease trap wastes, biowaste or bulky wastes.
Reprocessing infrastructure	Composting facilities (open windrow)	Facilities where source separated organics are composted using open windrow technology. The material is set out in long triangular cross section windrows in the open air with no enclosures or covers.
	Composting facilities (covered/tunnel)	Facilities where source separated organics are composted using covered windrow or fully enclosed tunnel technologies. These technologies minimise the potential for fugitive odour emissions from the piles and provide totally enclosed conditions where near-optimal composting conditions can be controlled and maintained.
	Energy-from-waste facilities – thermal treatment	Facilities where waste is thermally treated and energy is recovered.
	Energy-from-waste facilities – anaerobic digestion	Facilities where microorganisms break down biodegradable waste in the absence of oxygen to produce methane, which is recovered for energy.
	Mechanical biological treatment	Facilities that combine a sorting facility with a form of biological treatment such as composting or anaerobic digestion.

Infrastructure class	Infrastructure type	Description
Reprocessing infrastructure (cont.)	Construction and demolition processing facilities	Facilities that sort, crush, screen and recycle building materials.
	Other processing facilities (medium technology)	Other medium-technology waste processing technologies that are grouped based on having capital and operating expenditures in the same order of magnitude. This includes reprocessing facilities for glass, plastics, paper/cardboard, metals, grape marc and meat rendering.
	Other processing facilities (high technology)	Other high-technology waste processing technologies that are grouped based on having capital and operating expenditures in the same order of magnitude. Potential examples include low-volume, high-capital processing facilities such as nickel cadmium, lithium ion battery and CCA-treated post processing and mercury distillation.
	E-waste processing facilities	Facilities where e-waste is refurbished for reuse or disassembled manually, machine crushed or via automated equipment or high-tech smelting processes with various valuable components extracted and reprocessed.
Hazardous waste infrastructure	Hazardous waste facilities	Facilities that store and treat hazardous waste. Treatment types include recycling, chemical/physical treatment, thermal, energy recovery, immobilisation, biological and other.
	Soil storage and remediation facilities	Facilities that store and remediate contaminated soil so that it can be beneficially reused.
	Emerging waste streams facilities	Facilities that process emerging waste streams (e.g. e-waste).
Disposal infrastructure	Landfills	Facilities where waste is disposed into suitably constructed engineered cells.
	Medical waste disposal	Facilities that treat medical waste, including autoclave and incineration technologies.

Like energy and water utilities, waste and resource recovery services are essential for the health of the community and the environment. Waste infrastructure provides for collection, processing, recycling and disposal of municipal solid waste (MSW), and commercial and industrial (C&I) and construction and demolition (C&D) waste.

...waste and resource recovery services are... an essential component of the community's health, and protection of the environment's ecosystems.
– Waste & Recycling Industry Association SA

The Review of *South Australia's Waste Strategy 2011–2015*²⁶⁰ identified waste and resource recovery infrastructure planning and investment as a critical requirement to:

- support industry development and economic growth in the State
- maintain the State's world-class recycling performance, and
- transition to a more resource-efficient circular economy.

South Australia's goal has been to achieve global environmental leadership in the collection, processing and reuse of waste, eliminating landfill disposal and creating new circular economies and industries. Waste and resource recovery infrastructure planning and investment has a role to play in supporting future industry development and economic growth.

Current state

The State's waste management infrastructure is both local government and privately owned and operated, but State Government still plays a role in ensuring appropriate system design and regulation. Local government services for collection and recycling of household waste are generally managed by private providers or a consortium of urban councils (e.g. East Waste and the Northern Adelaide Waste Management Authority).

Population growth is a key determinant of waste streams. It increases MSW generation directly as well as indirectly through associated increase in C&I and C&D waste streams from community development. However, experience shows that waste generation in Australia has significantly outpaced the rate of population growth. For example, from 1997 to 2012 the population in Australia rose by 22% while waste generation increased by 145%.²⁶¹ Modern society is intrinsically wasteful.

In 2016/17, Australia generated an estimated 61 million tonnes (Mt) of waste, which is equivalent to 2.7 tonnes per capita. Table 19 shows the breakdown in materials.

Waste Material	Production per annum (Mt)
Masonry materials	17.1
Organics	14.2
Ash	12.3
Hazardous waste (mainly contaminated soil)	6.3
Paper and cardboard	5.6
Metals	5.5

Table 19:
Waste by type and volume in Australia, 2016/17

Source: Green Industries SA

South Australia is generating more waste than ever. Despite this, the State has the highest resource recovery rate nationally.

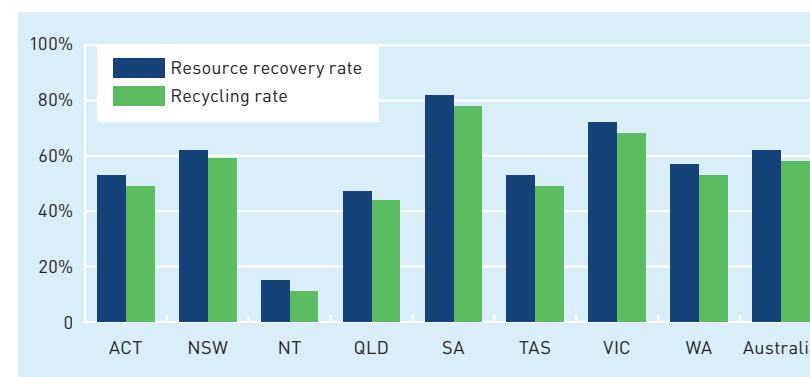


Figure 65:
Resource recovery rate by state

Source: Green Industries SA

The State has been a leader in recycling, with container deposit legislation (CDL) first implemented in South Australia in 1977. This has since spread to the Northern Territory (2012), New South Wales (2017), the Australian Capital Territory (June 2018) and Queensland (November 2018). Schemes are planned in Western Australia in 2020, Tasmania in 2022 and Victoria in 2023.

The South Australian CDL has resulted in a comprehensive collection network with more than 130 depots across the State. It has had a profound influence on increasing community awareness and behaviour change towards resource recovery and recycling.

The total landfill disposal for South Australia in 2017/18 was 0.88 million tonnes, while total resource recovery was 4.49 million tonnes. The latter comprised:

- 3.14 million tonnes of 'Standard Reporting Materials' (including metals, organics, cardboard and paper, glass and plastics), and
- 1.35 million tonnes of 'Separately Reported Materials' and clean fill (including soil, sand and rubble, which can fluctuate significantly across reporting years).

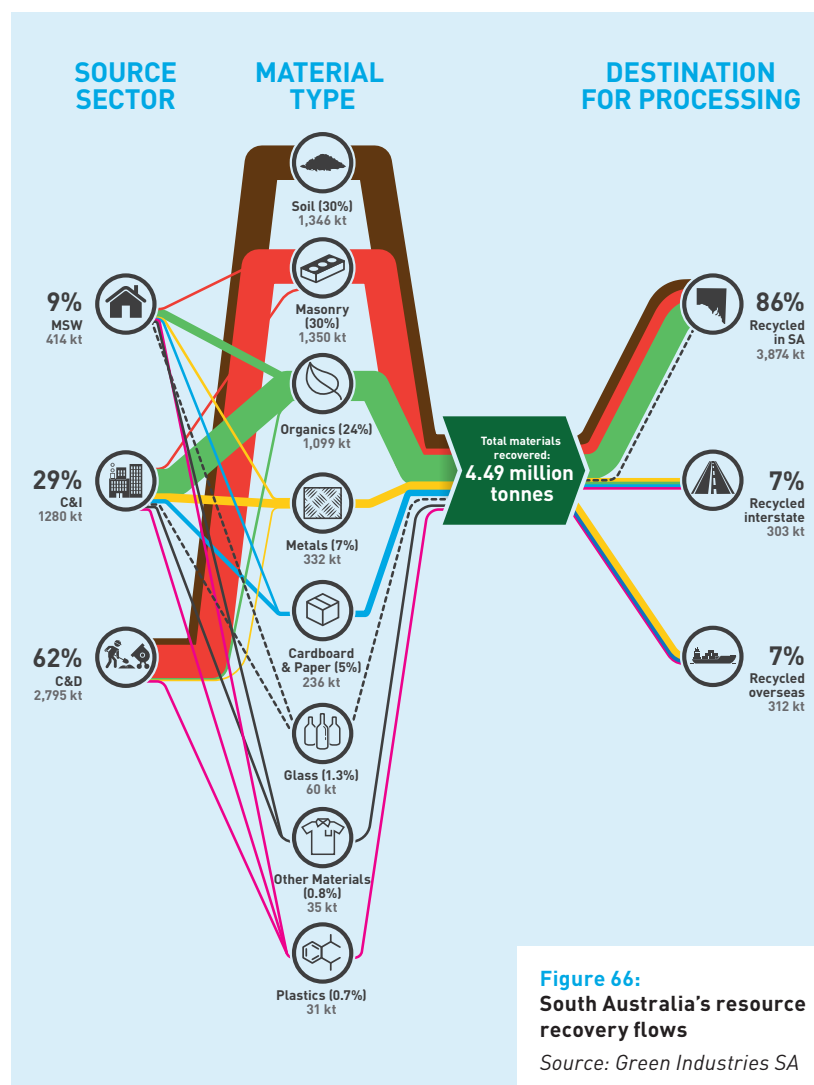


Figure 66 shows the contribution of different material categories to South Australia's resource recovery and recycling outcomes during 2017/18, the top three contributing material streams being soil, masonry and organics. The majority (86%) of recovered materials was recycled in South Australia.

South Australia has achieved a total diversion (waste material diverted to resource recovery) rate of 83.6%. Table 20 shows performance against the State's 2020 targets.

Target	Performance	Summary
35% reduction in waste to landfill from 2002–03 baseline	29% lower when including contaminated soil	On track
80% diversion for metropolitan C&I waste	82.6% diversion rate	Exceeding
90% diversion for metropolitan C&D waste	91.9% diversion rate	Exceeding
70% diversion for MSW	58.5% diversion rate	Behind
5% reduction per capita by 2020 from 2015 levels	8.7% increase as of 2017–18	Behind

Table 20:
Waste reduction achieved against targets

Source: Green Industries SA

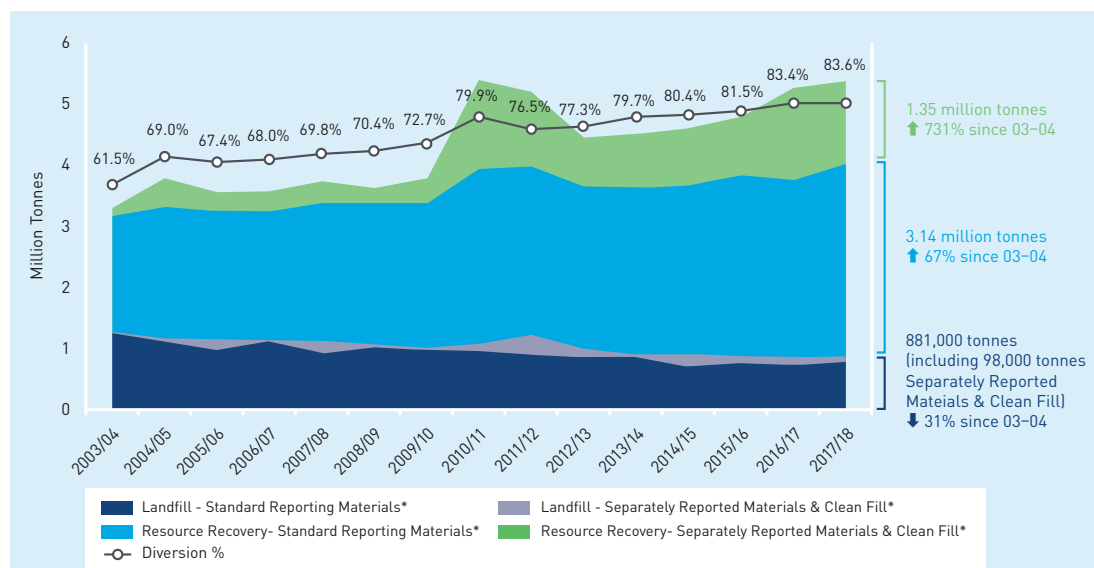


Figure 67:
Trend in resource recovery and landfill disposal, 2003/04 to 2017/18

Source: Green Industries SA

*Reporting of both resource recovery and landfill disposal is divided into Standard Reporting Materials and Separately Reported Materials & Clean Fill categories.

Figure 67 shows South Australia's level of resource recovery is trending up over time.

In 2017/18, the performance of South Australia's kerbside waste collection systems was a subset of the MSW waste stream. The performance measure only includes the three bins collected at kerbside and excludes waste from non-kerbside CDL returns, transfer stations, hard waste collection, e-waste and street sweepings.

An estimated 46% of materials is collected for resource recovery by weight.

Performance is higher in metropolitan councils (at 49%) compared to regional councils (at 38%). Food waste makes up a significant proportion of material remaining in kerbside general waste bins (and in landfills), currently estimated at over 150,000 tonnes per year and greater diversion of food waste from landfill is required.

The industry... remains a significant contributor to the SA circular economy and environment... through:

- GSP of \$500 million
 - Employment of 4,800 FTE persons
 - Reduction of GHGE by 1.25 Mt
- Waste Management & Resource Recovery Association of Australia

In 2017/18, the waste industry was greatly affected by China's waste and recycling policy 'National Sword'. This saw China changing its acceptance criteria for recovered materials, particularly plastics and fibre. As a result, Australian managed recycling facilities could not access the Chinese market, causing prices for mixed paper/cardboard and mixed plastics to drop significantly.

In August 2019, the Council of Australian Governments (COAG) agreed Australia should establish a timetable to ban the export of waste plastic, paper, glass and tyres that have not been processed into a value-added material, while building Australia's capacity to generate high-value recycled commodities and associated demand.

COAG's agreement reflects increasing concern in Australia and around the world about plastic pollution of oceans and the environment, and the need to ensure that exports of waste do not cause harm to human health

and the environment. Considerable infrastructure investment is likely to be required nationally to adequately respond and support the intent of the bans.

The South Australian recycling industry is transitioning to this new market situation and responding by:

- implementing measures to improve the quality of recovered materials (via education, infrastructure investment and process changes), and
- reducing its future reliance on international markets (e.g. through contracts and investment in infrastructure for local reprocessing and re-manufacturing of recyclables – measures which are expected to improve the quality and volume of locally processed plastics and fibre over time).

In January 2020, the Commonwealth Government identified a site near Kimba for the national radioactive waste management facility. The facility will permanently dispose of low-level radioactive waste and temporarily store intermediate-level waste. There may be further infrastructure implications from establishing and operating the facility that will be worked through in the planning stage.

Needs and challenges

The waste and recycling industry is dynamic, and future infrastructure needs will be influenced by a number of changing factors such as demand for recovered materials, local market dynamics, technological innovations and national and local policy settings (e.g. COAG export bans).

It is projected that 96% of South Australia's population growth will occur within the Greater Adelaide Planning Region (i.e. metropolitan Adelaide, Adelaide Hills, Barossa, Fleurieu, and Murray and Mallee). An increase in the amount of urban infill will likely increase the amount of C&D waste streams in urban areas.

Diverting more of MSW material via food and garden (FOGO) kerbside bins would lead to a large increase in kerbside performance and reduced costs for council collection and processing systems.

– Green Industries SA

As the community responds to the impacts of climate change, greater demand will be placed on related goods and services to reduce greenhouse gas emissions, including waste infrastructure investment, product development and new methods of waste collection, processing and disposal. In addition, community engagement has an important role in encouraging appropriate recycling behaviour and reducing contamination rates that may otherwise affect the viability of new technologies and investments aimed at maximising resource recovery.



Household kerbside-collected recycling in inner Adelaide

Image courtesy of Green Industries SA

Plastics bundled for recycling*Image courtesy of Green Industries SA***Opportunities in waste**

While South Australia should continue its leadership position in waste recovery and recycling to minimise waste going to landfill as part of sound environmental management, waste management and re-use is increasingly seen as an economic growth opportunity for new industries. To achieve both objectives, there needs to be further investment in waste recovery and processing infrastructure, and development of appropriate policy settings to provide certainty to encourage private sector investment.

Diverting waste from landfill and increasing levels of local reprocessing and remanufacturing can create more jobs for South Australia. The estimated direct full-time equivalent (FTE) employment in Australia per 10,000 tonnes of generated waste is 9.2 FTE for recycling compared to 2.8 FTE for landfill.²⁶²

Recycled materials are typically low-margin products in some markets, and products are still relatively new or emerging. The development of a market for recycled products will encourage private sector investment in the infrastructure and processing of waste streams.²⁶³

The waste, recycling and resource recovery industry in South Australia has an annual turnover of about \$1 billion.

– National Waste and Recycling Industry Council

The *Review of South Australia's Waste Strategy 2011–2015* identified waste and resource recovery infrastructure planning and investment as a critical requirement to addressing the future waste industry in South Australia. The study was the catalyst for the preparation of South Australia's *Waste and Resource Recovery Infrastructure Plan (2018)* that used 2015/16 waste data as a baseline and modelled the waste flow projection, corresponding infrastructure needs and economic impact assessment for two landfill diversion scenarios for 10- and 30-year timespans as well as business as usual (BAU) (see Table 21).

Scenario	Implications
Moderate additional diversion	<p>Estimated \$166 million of investment in new/expanded waste and resource recovery infrastructure will be needed across South Australia by 2025–26 to manage additional volumes of waste, resource recovery and landfill. This includes MSW, C&I and C&D infrastructure.</p> <p>Investment is required in skip bins, collection/transfer vehicles and facilities for CDL processing, compost, drop-off, energy-from-waste anaerobic digestion, waste soil storage and remediation, and other medium-level technology reprocessing facilities.</p> <p>Over the next 10 years an additional \$113.9 million in GSP and an additional 1,035 FTE jobs is estimated.</p>
High additional diversion	<p>An estimated \$990 million of investment in new/expanded waste and resource recovery infrastructure will be needed across South Australia over the next 30 years to manage additional volumes of waste, resource recovery and landfill. This includes MSW, C&I and C&D infrastructure.</p> <p>Investment is required in collection and resource recovery infrastructure and facilities for composting, energy-from-waste (anaerobic digestion), C&D processing and other medium-level technology reprocessing facilities such as waste soil and storage, remediation facilities and emerging waste stream facilities.</p> <p>Over a 30-year timeframe, investment in alternative technologies will be needed to recover waste from the residual stream. This would potentially include mechanical biological treatment facilities, energy-from-waste thermal treatment facilities or other future technologies.</p>

Table 21:
Alternate (to BAU) landfill diversion scenarios over 10 and 30 years

Source: Green Industries SA

New and expanded infrastructure will be needed over time to manage increased volumes of waste generation due to population and economic growth in the State. It will also assist national recycling and recovery efforts (e.g. plastics processing infrastructure based in South Australia may provide a solution for the effective recycling of plastic material generated interstate). Key considerations for siting large-scale waste, recycling and re-manufacturing infrastructure include suitable separation distances, logistical considerations relative to sources and destination of inputs/outputs, technology used (e.g. fully enclosed facilities with air filtration) and access to services such as electricity, gas and water.

It is likely that larger-scale, more intensive waste and resource recovery infrastructure would be positioned within the Greater Adelaide Area rather than in regional South Australia. This acknowledges the larger volumes of material generated in metropolitan areas, access to transport networks and proximity to many of the final markets for recycled products or ports for export to overseas markets.

Several potential large-scale key strategic industrial and employment land areas are identified within *The 30-Year Plan for Greater Adelaide*²⁶⁴ at Gillman/Wingfield, Greater Edinburgh Parks, Lonsdale, Monarto and Roseworthy.

Regional waste

The regions face unique challenges for waste management and related infrastructure. There is both a limited number of and access to landfills servicing regional South Australia. Figure 68 shows locations of existing resource recovery facilities in South Australia. Transporting waste from some locations – whether to landfills or recycling markets and industries – within a region (or to other regions) incurs long travel distances and high costs. The Regional Transport Subsidies Program delivered by Green Industries SA provides relief to South Australian local councils in rural and regional areas to support their continued recycling efforts and adapt to the challenging environment since China National Sword Policy.

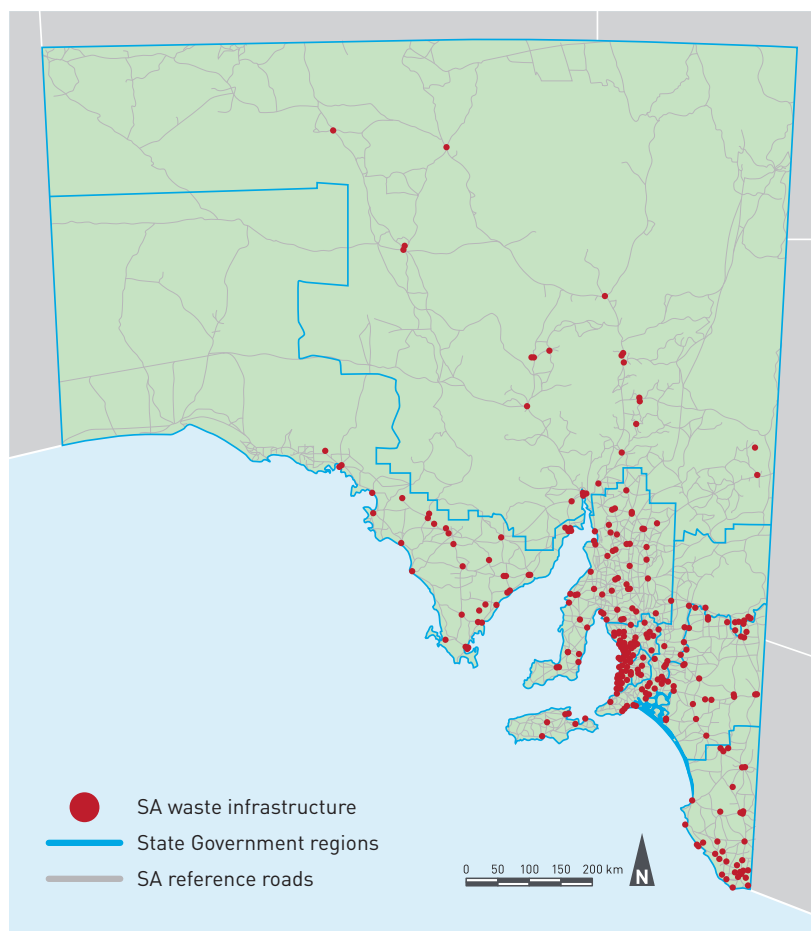


Figure 68:
Waste and resource recovery facilities in South Australia as at August 2017

Source: Green Industries SA

The objectives of the program are to:

- offset some of the total costs associated with the provision of kerbside recycling services, and
- support ongoing, uninterrupted delivery of kerbside recycling services.

Potential opportunities for infrastructure development include:

- investment in equipment and facilities for waste compaction and bulk hauling to reduce costs of transporting waste to end markets
- expansion/development of commercial composting to process organics from MSW sources and organics industries such as vineyards, orchards and other agriculture, and
- development of higher value products through organics reprocessing.

The Limestone Coast is considered a biomass hotspot due to the large forestry and agricultural industries. Renewable waste biomass presents an economic opportunity for regions with high value products able to be extracted or biomass utilised for energy production.

– RDA Limestone Coast

Technology and waste

Technological change will significantly impact existing and new infrastructure assets and their associated services. As well as enabling different and more efficient infrastructure, technological change facilitates new forms of real-time communication, which has the capacity to better respond to and shape the expectations and behaviours of consumers. Examples that are revolutionising waste management approaches include radio-frequency identification and the associated ability to track and record dynamic

information, energy-from-waste, greenhouse gas capture, and sorting and composting technology. These new technologies could also place different requirements on supporting infrastructure such as power and water.

Patterns of waste generation constantly change, as do the types of chemicals and materials used to make consumer products. With increasing material complexity (bio-composites, conductive polymers, nanotechnology, electronics), current recycling processes cannot extract all components from purchased products. Industry innovation and investment must address this and the changing forms of manufacturing, such as home 3D printing.

Solar PV panels installed 20 years ago are reaching the end of their design life, and PV panels and other e-waste streams such as lithium batteries will become significant and present challenges to manage. In the future, PV panels may be processed through e-waste infrastructure and/or more specialised processing infrastructure designed to capture component parts such as silicon.

In March 2017, the Commonwealth Government announced a review of the *Product Stewardship Act 2011*, which offers an opportunity to consider expanding the National Television and Computer Recycling Scheme to include other categories of electrical and electronic products not currently covered under the Scheme.²⁶⁵

Adelaide company, Reclaim PV, is developing processes to collect and recycle some of the 40 million PV panels already installed in Australia and is scheduled to commence operations at the end of 2020.

– Green Industries SA

The transformation of the Port Pirie smelter to a multi-metals processing and recovery facility may provide technology to process specific e-waste such as printed circuit boards, television screens, mobile phones, PV panels and alkaline batteries, depending on the compatibility of e-waste inputs to the furnace processing stream.

Other current and emerging waste streams include treated timbers and tyres.

Green waste processed into mulch and compost

Image courtesy of Green Industries SA



CASE STUDY

Roads to recycling

The City of Charles Sturt in Adelaide commenced a trial in 2019 for the use of recycled materials (road base and reclaimed asphalt pavement, tyres, plastics and glass) in road network construction. The Council worked with The University of Adelaide to recycle used tyres funded by the Australian Research Council.

The Council has commenced trials using a number of processes and products containing recycled materials for road construction, from the sub-base to the asphalt top seal, including:

- crumbed rubber subgrade stabilisation
- recycled building materials and aggregate for granular pavement layers
- recycled polymers, glass, plastic and reclaimed asphalt for asphalt mixes, and
- top coating with polymers and recycled materials to reduce community heat load.

Future priorities

PRIORITY 37: DEVELOP REGIONAL WASTE MANAGEMENT PLANS

With the relatively low margins generated by recycled products, it is a greater challenge for regional South Australia to economically process its waste. Further investigations are required to ensure that waste generated in the regions can be responsibly managed and delivered to recycling and processing infrastructure. Green Industries SA should support the updating and/or development of regional waste management plans to address specific logistics and provide solutions for efficient waste management.

PRIORITY 38: LEVERAGE CAPABILITIES AND INFRASTRUCTURE TO BUILD THE CIRCULAR ECONOMY AND EXPERTISE IN MANAGING NEW WASTE STREAMS

New strategies, technology and processes will be required to effectively manage new waste streams such as solar PV panels and lithium batteries. This is a national issue and South Australia can potentially position itself as a leader via development of an e-waste processing hub to create a market for processing these waste streams. Further work is required to develop a strategy to guide this and demonstrate economic viability. Green Industries SA should develop a strategy to support private sector investment in South Australia to recover and process these new waste streams.



Scalable assets that grow with demand

The Snowy Mountains Scheme supports around \$3 billion in annual agricultural production and provides around 34% of all renewable energy in eastern Australia, Adelaide and Tasmania. Its Snowy 2.0 expansion will almost double its on-demand generation capacity and add 175 hours of large-scale storage, features that complement energy markets of the future that have a higher penetration of wind and solar energy generation.

RESPONSE TO THE STRATEGY DISCUSSION PAPER

Individuals and organisations that made public submissions to the 20-Year Strategy Discussion Paper are listed below, with the exception of those who requested anonymity.

Adelaide Airport Limited	City of Onkaparinga	Inner West South Road Action Group	Regional Development SA
Adelaide Convention Bureau	City of Playford	iRAP	Roads Australia
Ai Group	City of Salisbury	Leyton Funds Management	Royal Agricultural & Horticultural Society of SA
Alexandrina Council	Civil Contractors Federation SA	Local Government Association	SA Community Transport Association
Allan Wycherley	ClimateWorks	Lodestone Group	SA Freight Council
Australian Road Research Board	Committee for Adelaide	Metcash Food and Grocery	SA Power Networks
Association of Independent Schools SA	Community Housing Council of SA	Motorcycle Riders Association of SA	SA Rock Lobster Advisory Council
Australasian College of Road Safety	Consult Australia	Mount Barker Council	SA Salaried Medical Officers Association
Australian Airports Association	Copper Coast Council	Nathan Atterton	SA Wine Industry Association Inc.
Australian Gas Infrastructure Group	Country Arts SA	National Heart Foundation (SA)	SABRENet
Australian Information Industry Association	Craig Wallington-Beddoe	National Waste Recycling Industry Council	SACOME
Australian Institute of Landscape Architects (SA)	CSIRO	NZ Treasury	SARTA
Australian Logistics Council	David Thomas	Office of the Commissioner for Kangaroo Island	Shelter SA
Australian Medical Association (SA)	District Council of Lower Eyre Peninsula	OzMinerals	State Theatre Company SA
Australian Naval Infrastructure	District Council of Streaky Bay	Parks & Leisure Australia SA/NT	Tennis SA
Australian Rail Track Corporation	DPC Aboriginal Affairs and Reconciliation	Pichi Richi Preservation Society	Tim Bright
Australian Steel Institute	Dr Anand Rose	Planning Institute Australia SA	Tourism Industry Council of SA
Barrie Harrop	Dr Hui-Peng	Ports Australia	Uniting SA
Bicycle Institute of SA	Dr Sally Cox	Prab Takhar	Upper Spencer gulf Common Purpose Group
Bioenergy Australia	Eastern Fleurieu School	Premier's Climate Change Council	Urban Development Institute of Australia (SA)
Botanic Gardens and State Herbarium	ElectraNet	Primary Producers SA	Viterra
Business SA	Environment Protection Authority	Property Council of Australia	Walking SA
Central Adelaide Local health Network	Festivals Adelaide	Public Health Association of Australia (SA)	Waste & Recycling Industry Association of SA
CEDA	Flinders Port Holdings	RAA	Waste Management & Resource Recovery Association of Australia
Cement Concrete & Aggregates Australia	Flinders University	RDA Barossa Gawler Light Adelaide Plains	Youth Affairs Council
Central Adelaide Local Health Network	Gayle Schmidt	RDA Limestone Coast	Zoos SA
Centre for Automotive Safety Research	Genesee & Wyoming Australia (GWA)	RDA Whyalla & Eyre Peninsula	
City of Adelaide	GFG Alliance		
	Heathgate Resources		
	Infrastructure Partnerships Australia		

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GLOSSARY

AARNET	Australian Academic and Research Network	AWP	Adelaide Women's Prison	ED	Emergency department
ACASA	Australian Childcare Alliance of South Australia	AYTC	Adelaide Youth Training Centre	EFPA	Environmental and Food Production Area
ACC	Adelaide Convention Centre	BAU	Business as usual	ERD	Environment, Resources and Development
ACCC	Australian Competition and Consumer Commission	BHKC	Brown Hill and Keswick Creeks	ESB	Energy Security Board
ACT	Australia Capital Territory	BME	Biomedical equipment	ESCOSA	Essential Services Commission of South Australia
ADII	Australian Digital Inclusion Index	BRT	Bus Rapid Transit	ES00	Electricity Statement of Opportunities
ADP	Adelaide Desalination Plant	C&D	Construction and demolition	EV	Electric vehicle
AEC	Adelaide Entertainment Centre	C&I	Commercial and industrial	FCAS	Frequency Control Ancillary Services
AEMC	Australian Energy Market Commission	c/KWh	Cents per kilowatt hour	FMHS	Forensic Mental Health Services
AEMO	Australian Energy Market Operator	CAES	Compressed air energy storage	FOGO	Food and garden organics
AER	Australian Energy Regulator	CALD	Culturally and linguistically diverse	FSE	Full-time service equivalent
AGSA	Art Gallery of South Australia	CASA	Civil Aviation Safety Authority	FTE	Full-time equivalent
AHURI	Australian Housing and Urban Research Institute	CBD	Central business district	FY	Financial year
AIHW	Australian Institute of Health and Welfare	CCS	Child Care Subsidy	GACC	Greater Adelaide Capital City
ALOS	Average length of stay	CDL	Container deposit legislation	GCHKP	Gold Coast Health and Knowledge Precinct
AR	Augmented reality	CHP	Community housing provider	GCPH	Gold Coast Private Hospital
ARENA	Australian Renewable Energy Agency	COAG	Council of Australian Governments	GCUH	Gold Coast University Hospital
ASQA	Australian Skills Quality Authority	Cth	Commonwealth	GDP	Gross domestic product
ATS	Australian triage scale	DCS	Department for Correctional Services	GL	Gigalitre
AUD	Australian dollars	DE	Department for Education	GP	General practitioner
AVL	Audio visual links	DHW	Department for Health and Wellbeing	GS00	Gas Statement of Opportunities
		DPTI	Department for Planning Transport and Infrastructure	GSP	Gross state product
		ECEC	Early Childhood Education and Care		
		ECMS	Electronic Courts Management System		

HCRP	Higher Courts Redevelopment Project	NT	Northern Territory	SARMS	South Australian River Murray Sustainability
HPV	High productivity vehicle	ODPP	Office of the Director of Public Prosecutions	SEA Gas	South East Australia Gas
HSIS	High Security Inpatient Service	OHSC	Out of school hours care	SEACI	South Eastern Australia Climate Initiative
IoT	Internet of Things	ORSR	Office for Recreation, Sport and Racing	SIB	Social impact bond
IRSAD	Index of Relative Socio-Economic Advantage and Disadvantage	OTR	Office of the Technical Regulator	SOMIH	State-owned and managed Indigenous housing
ISA	Infrastructure SA	PISA	Programme for International Student Assessment	SWIFT	Schools With internet Fibre Technology
ktCO2e	Kilo tonnes of carbon dioxide equivalent	PJ	Petajoule	TASC	Training and Skills Commission
LoRa	Long Range	PV	Photovoltaic	USE	Unserved energy
MaaS	Mobility as a Service	RAVNet	Restricted Access Vehicle Network	VPP	Virtual Power Plant
MAPS	Moomba to Adelaide Pipeline System	RBA	Reserve Bank of Australia	VR	Virtual reality
MAR	Managed aquifer recharge	RDFS	Royal Flying Doctor Service	WA	Western Australia
ML	Megalitre	RTO	Registered training organisation	WWTP	Wastewater treatment plants
MLR	Mount Lofty Ranges	SA	South Australia	YLP	Yatala Labour Prison
MoU	Memorandum of understanding	SABRENet	South Australian Broadband Research & Education Network	YTD	Year to date
MRF	Material recovery facility	SAHA	South Australian Housing Authority		
MSP	Moomba to Sydney Pipeline	SAHMRI	South Australian Health and Medical Research Institute		
MSW	Municipal solid waste	SAM	South Australian Museum		
Mt	Megatonne	SAMIS	Strategic Asset Management Information System		
MUNS	Municipal Services	SAPTA	South Australian Public Transport Authority		
MWh	Megawatt hour				
MW	Megawatt				
NBN	National Broadband Network				
NDIS	National Disability Insurance Scheme				
NEM	National Energy Market				

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