

Infrastructure in South Australia

Five Yearly Report to the Council of Australian Governments

February 2007



BUILDING
South Australia



Government
of South Australia

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Contents

Page

EXECUTIVE SUMMARY	1
INTRODUCTION	7
TRANSPORT	15
ROADS	15
Supply	15
Demand	16
Performance	18
Investment	20
Planning and regulation	22
RAIL	25
Supply	25
Demand	28
Performance	28
Investment	29
Planning and regulation	30
PUBLIC TRANSPORT	31
Supply	31
Demand	31
Performance	31
Investment	32
Planning and regulation	32
PORTS	33
Supply	33
Demand	35
Performance	36
Investment	38
Planning and regulation	39
AIRPORTS	40
Supply	40
Demand	42
Performance	42
Investment	43
Planning and regulation	43
Conclusion	44
ENERGY	47
Supply	47
Demand	56
Performance	58
Investment	59
Planning and Regulation	61
Conclusion	62
WATER	65
Supply	65
Demand	67
Infrastructure and Performance	68
Investment	74
Planning and Regulation	77
Conclusion	83

TELECOMMUNICATIONS.....85
 Supply 85
 Demand 88
 South Australian Government Activities 89
 Conclusion 92

BIBLIOGRAPHY95

Executive Summary

Overview

Modern infrastructure is essential to maintaining South Australia's economic prosperity and high standards of living. Responsibility for infrastructure provision is shared between all three spheres of government and the private sector. Timely and efficient investment in infrastructure capacity to meet industry and community needs therefore requires appropriate policy and regulatory frameworks, a business environment conducive to investment, long-term strategic planning and a high degree of coordination between infrastructure providers, both public and private.

To guide the provision of infrastructure for the state, the South Australian Government has established clear, long-term strategic goals and directions in *South Australia's Strategic Plan* and the *Strategic Infrastructure Plan for South Australia*. In the past two years significant progress has been made towards implementing these plans.

The South Australian economy remains strong with employment at record high levels and around \$30 billion worth of projects proposed or underway. The government has embarked on a new programme of public sector reform and action to reduce red tape to ensure that South Australia remains a competitive place for business and investment.

The 2006-07 Budget delivers South Australia's largest ever infrastructure investment. Expenditure on transport infrastructure is at record levels, with significant projects such as the Northern Expressway, the Port River Expressway, the upgrade of South Road, key rural road projects and investment in public transport.

State funded works on water infrastructure include augmentation of water supplied on Eyre Peninsula, a number of upgrades to water and wastewater infrastructure managed by the South Australian Water Corporation and ongoing programmes of work on Murray-Darling infrastructure.

This report to COAG draws on the State Government's strategic plans and covers the key infrastructure sectors of transport, water, energy and telecommunications. As agreed by COAG, this report presents:

- information on supply and demand;
- the planning and regulatory frameworks for provision of infrastructure; and
- plans to address future infrastructure demands and challenges.

An overview of infrastructure in each of the sectors covered in this report, outlining recent developments, emerging challenges and priorities and the State Government's plans to address them follows.

Transport

Major improvements have been made to the state's transport infrastructure in recent years. The Adelaide-Darwin rail link was completed late in 2003. The new Adelaide Airport terminal is fully operational and the deepening of the Outer Harbor shipping channel has been completed.

New buses and trams have been purchased, and the Glenelg tram line has been upgraded. The tram network will be extended during 2007 to connect with the main business and commercial precinct based around King William Street, Rundle Mall, the Adelaide Railway Station and North Terrace.

The Port River Expressway Stage 1, incorporating two new overpasses, has been completed and new road and rail bridges over the Port River as well as corridor upgrades along Le Fevre Peninsula are under construction. The Bakewell Underpass project is underway and a transport

interchange and new connector road have been developed at Mawson Lakes. Concept design is well advanced on the underpass on South Road at Anzac Highway.

These initiatives have gone a long way towards addressing the key priorities identified by the government for transport infrastructure in the state, which include:

- deepening Outer Harbor, substantially improving infrastructure at the Port of Adelaide and improving land transport links to the port;
- improving the north-south transport corridor;
- developing and maintaining regional freight networks; and
- increasing use of public transport.

The focus for the next five years will be the further development and delivery of these initiatives. Key projects will include a series of grade separations at key intersections along South Road and the development of the Northern Expressway to provide more efficient freight links to the Port of Adelaide. Works to upgrade major sections of the Sturt Highway are also underway.

Infrastructure enhancements to support the movement of freight in regional areas are also proposed on Eyre Peninsula and in the south east. The potential for developing new port facilities in the Whyalla-Port Bonython area also needs to be evaluated.

Further upgrades are proposed for Adelaide's public transport system.

Energy

The privatisation of the South Australian energy industry has seen responsibility for energy supply transferred from the government to the private sector.

Electricity generation and the retail sectors of the electricity and gas industries comprise a number of competing providers, all subject to the operations of the market. The State Government has ensured that regulatory arrangements are in place to govern the investment decisions of monopoly businesses which operate in the transmission and distribution networks of the electricity and gas networks.

The State Government has a key role in ensuring that regulatory and institutional arrangements also protect consumer interests and promote timely investment in infrastructure to support the delivery of services throughout the state. A shift from state-based to national institutional and regulatory arrangements governing the industry is underway. The government, as lead legislator, is working with other jurisdictions and industry to complete planned reforms to the policy and regulatory frameworks for the national energy market.

The key priority for South Australia is the supply of affordable and reliable energy to consumers and the long-term sustainability and security of supply.

A critical issue for South Australia is the impact of peak demand, mainly associated with the high use of air conditioning on hot summer days. The State Government will continue to seek new economic activity to improve the load factor for base-load electricity generation and will undertake demand-side measures to ensure that the peak load is better managed.

Even so, based on Electricity Supply Industry Planning Council (ESIPC) advice on the supply-demand balance, investment in new generating capacity is likely to be required to meet increasing demand while maintaining appropriate levels of reliability in the combined South Australia-Victorian market. There are a number of generation options which could potentially meet this need.

South Australia is the nation's leader in renewable energy and it aims to increase the proportion of renewable electricity generated to make up 20% of electricity consumed in South Australia by 2014.

South Australia is highly dependent on gas for electricity generation and industrial use. In the longer term sourcing fuel to meet the state's ongoing and growing demand for energy will need to be considered. Possible options include sourcing gas from the north of Australia or bringing a potential sustainable solution of geothermal energy to the market or both.

Water

South Australia's surface water resources are variable and the state is highly dependent on reliable surface water supplies from the River Murray and the Mount Lofty Ranges. Groundwater resources are more evenly distributed, generally less variable and are a vital resource in many areas of the State.

The state takes only 7% of the water extracted from the entire Murray-Darling system annually. South Australian Murray-Darling irrigators produce relatively high economic returns for the amount of water used compared to upriver regions.

The key long term challenge for South Australia is to secure water supplies to meet the future demands from irrigated agriculture, population growth, new mining developments and other business needs, while ensuring the long term sustainability of its water resources and ecosystems. The state's water supply is particularly vulnerable to climate change.

The state-owned South Australian Water Corporation is the key provider of infrastructure for water supply, sewage and major urban and rural drainage systems. Local governments manage urban stormwater systems and community waste management systems in country towns. Local government and the private sector, often with State Government support, have taken on an increasing role in recycling and stormwater re-use projects for non-drinking purposes. Irrigation infrastructure is predominantly owned and managed by the private sector.

South Australia's approach to meeting the challenges of water supply and management is underpinned by three themes: sound management of existing resources, responsible water use, and fostering innovation and the development of additional water supplies. Water demand and supply projections to 2025 indicate that, through implementation of *Water Proofing Adelaide – a thirst for change: 2005 – 2025* and other initiatives, future demand for drinkable water supply can be met in a typical (median runoff) year. Demand is also expected to be met in most dry years, with the exception of extreme droughts, until at least 2010. Ongoing review of water supplies and demands will be used to develop strategies for beyond this time.

The current sustained drought conditions in both the Murray-Darling Basin and the Mount Lofty Ranges are an exception with flows into the state through the River Murray the lowest on record. These conditions will have serious implications for the state's River Murray water supply if they continue through 2007 and contingency measures are being developed.

Investment in water supply infrastructure and the development and evaluation of options to augment water supplies in the state is ongoing. Opportunities for further re-use of stormwater, and recycled water from wastewater treatment plants for non-drinking purposes are being pursued. Investigations are underway into the feasibility of a large-scale desalination plant to provide water for proposed expanded operations at the Olympic Dam mine. The project would reduce the need to draw additional water from the Great Artesian Basin and may also provide an opportunity to reduce the region's use of River Murray water by supplying the Upper Spencer Gulf and Eyre Peninsula water needs.

The South Australian Government has introduced a range of measures to improve the management of water resources including water policy reforms under the National Water Initiative Intergovernmental Agreement.

South Australia was also the first to establish a designated Minister for the River Murray and to enact specific legislation, the *River Murray Act 2003*, to protect restore and enhance the river system. The State Government is also a signatory to the 2004 Intergovernment Agreement for Addressing Water Over-allocation and Achieving Environmental Objectives in the Murray-Darling Basin to return 500 gigalitres per annum of environmental flow to the river by 2009. Significant

funds have also been allocated to South Australia's River Murray Improvement Programme to undertake environmental works and other measures along the river, including salt interception infrastructure.

Important progress has also been made in water allocation planning and management of water resources in key irrigation regions across the state. There has been significant investment in managing dryland salinity and flooding issues in the south east and in rehabilitating artesian bores and piping open bore drains in the Great Artesian Basin.

The State Government, working closely with local government, is developing a programme of priority stormwater works to reduce flood risk and improve the quality of stormwater discharged to the environment as well as promoting cost-effective stormwater re-use opportunities.

Joint state and local government action is being taken to reform community wastewater management schemes, including the establishment of works priorities, funding options and innovative management arrangements.

Telecommunications

Most legislative and regulatory powers relating to communications rest with the Australian Government. The market has been progressively deregulated since the early 1990s and there are now over 150 licensed telecommunications carriers, although Telstra is still by far the most dominant player. Market forces and commercial imperatives largely determine decisions about investment in new infrastructure.

South Australia presents a relatively small market to telecommunications carriers and is often placed toward the end of national telecommunications product rollouts.

The most significant strategic priority for South Australia is to accelerate the uptake and use of affordable broadband services to connect South Australians nationally and internationally, strengthen economic competitiveness and improve household and business access to government services.

In 2003, the State Government created Broadband SA to develop and implement a broadband strategy and to identify activities that will contribute to the development and use of broadband services. A broadband development fund of \$7 million over four years was set up as a catalyst for new broadband infrastructure in regional South Australia and to deal with metropolitan 'black spots'.

The Australian Government's Connect Australia programme is making a significant contribution to improve broadband services available to regional, rural and remote communities, enhancing the work undertaken by the Broadband SA team.

The State Government has also improved the state's Information and Communication Technology (ICT) capabilities through the construction of the SABRENet broadband network connecting research and education sites, the Educonnect project to increase broadband in schools and the CineNet broadband network for the film and multi-media industry.

The government's Future ICT project seeks to improve the efficiency and cost-effectiveness of the delivery of government networking services.

The Australian and South Australian Governments have made significant investments in building competitive telecommunication infrastructure in South Australia. Yet according to the ABS, South Australia has the lowest uptake of broadband of any mainland state and business use of broadband in South Australia is below the national average. Targeted investment must continue if all South Australians are to access reliable and affordable services.

Conclusion

The South Australian Government will continue to work cooperatively with the Australian Government and local government to ensure the timely development of infrastructure to support sustained economic growth and community well being. Nevertheless there are challenges in matching infrastructure capacity with growing demands in a sustainable way.

The biggest immediate challenge is the worst drought on record in Australia. In collaboration with other states and the Australian Government, the South Australian Government is investing in the rescue of the River Murray and a number of other projects to secure water supplies for the future.

The state also faces an ageing population and real demand pressures for skilled labour. To deal with this the government is investing in programmes to build the skilled workforce required for infrastructure construction and other industries.

Longer term, climate change carries significant risks, particularly for water and energy supplies. South Australia is leading the nation in tackling climate change and aims to ensure its infrastructure provision contributes to a reduction in greenhouse gas emissions.

Major resource development projects are underway with more expected to commence in the north and west of the state in the next few years. These will each bring their own demands for infrastructure services, particularly in transport, energy and water. The South Australian Government will continue to work closely with mining companies to achieve efficiencies in providing infrastructure services for the industry and the state.

The South Australian Government is committed to infrastructure spending as an essential foundation for economic growth and will continue to develop partnerships with other spheres of government and the private sector to deliver strategic infrastructure.

Introduction

Background

Investment in infrastructure is key to sustaining high rates of economic growth and maintaining high standards of living for current and future generations. Because infrastructure assets are long lived and expensive, it is important to plan, finance, deliver, manage and use them as efficiently and effectively as possible.

The role of government in providing infrastructure has changed significantly following the microeconomic reforms and privatisations of the last two decades. Social infrastructure continues to be delivered primarily by government. Economic infrastructure, which is the focus of this report, is often delivered by private sector providers operating in competitive markets and responding to consumer and shareholder interests.

In areas where the private sector is responsible, such as energy, the government plays an important role as facilitator, coordinator and regulator. In other areas, for example roads, responsibilities are shared between spheres of government. Close working partnerships between public and private infrastructure providers are therefore critical to delivering and maintaining infrastructure that is affordable, accessible and reliable.

In June 2005 the Council of Australian Governments (COAG) agreed that each jurisdiction will provide a report to COAG on infrastructure every five years. These reports are to provide a strategic overview of existing infrastructure, a pragmatic outlook for infrastructure demand and a forward looking strategic assessment of future needs.

This report presents an overview of the current status of South Australia's significant infrastructure in transport, energy, water and telecommunications, based on existing available data and in accordance with the structure agreed by COAG. The report also describes the strategic policy and regulatory frameworks which guide infrastructure development in this state.

Further information is available in the Australian Government's five yearly infrastructure report to COAG, which covers its areas of responsibility particularly in transport and telecommunications, as well as in a number of references provided in this report.

A 2005 infrastructure report card by Engineers Australia rated the status of South Australia's assets and planning processes in most areas of transport, energy and water as adequate to very good. Nevertheless there are challenges in ensuring that infrastructure capacity matches growing demands in a sustainable way.

The report canvases some of the major challenges to be addressed by public and private sector infrastructure providers in meeting business and community demands for infrastructure and related services.

Overview of South Australia

Population

South Australia's population grew by 0.8% during the year to June 2006, the highest annual growth rate since the December quarter in 1991. Net overseas migration has been a major driver of population growth in the last two years. The state's estimated population of 1.6 million makes up 7.5% of the national population.

Population numbers, the rate of new household formation, the age profile and geographic distribution of the population all have implications for the provision of infrastructure. South Australia's population will continue to age. There is a trend toward smaller households and a

continued population shift towards Adelaide, the peri-urban areas around Adelaide and fast growing coastal towns.

The South Australian Government's population policy aims to reach a population of 2 million by 2050 with a milestone of 1.64 million by 2014. This will be achieved by increasing the state's share of overseas migration and reducing the net outflow of people interstate.

This population target is one of a number of targets in *South Australia's Strategic Plan* which is being factored into the State Government's planning for infrastructure and services.

Gross State Product

South Australia's Gross State Product (GSP) accounted for 6.7% of Australia's Gross Domestic Product (GDP) in 2005-06. According to the Australian Bureau of Statistics (ABS), South Australia's GSP grew by 2.2% in real terms during 2005-06. In per capita terms South Australia's GSP grew by 1.4% in 2005-06, marginally below national growth of 1.5%.

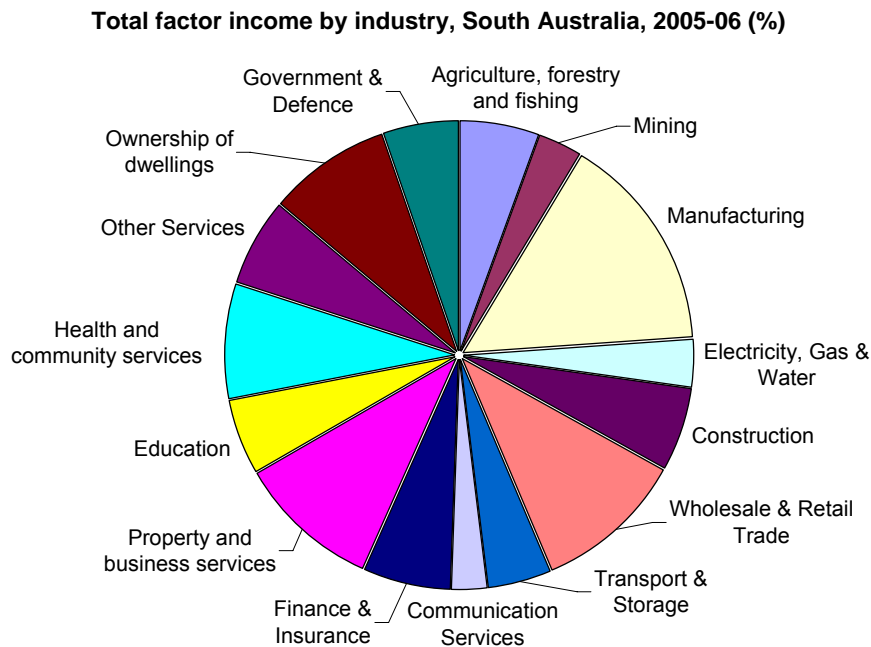
Employment

South Australian employment growth has also been strong, with a trend unemployment rate of 5.5% in January 2007. The strength of the local labour market is also evident in a significant increase in labour force participation during 2006 to its highest level in more than 15 years.

Industry structure

A breakdown of GSP by industry indicates strong output growth in 2005-06 over 2004-05 in mining (34%), finance and insurance (14%), education (13%), electricity gas and water (11%) and health and community services (11%).

The following chart provides information on the structure of industry in South Australia. Manufacturing remains South Australia's most important industry, contributing a higher output share than in any other state. The mining share is lower than the Australian average, with recent growth coming off a relatively low base.



Source: ABS catalogue no. 5220.0, Table 5, 2006

Exports

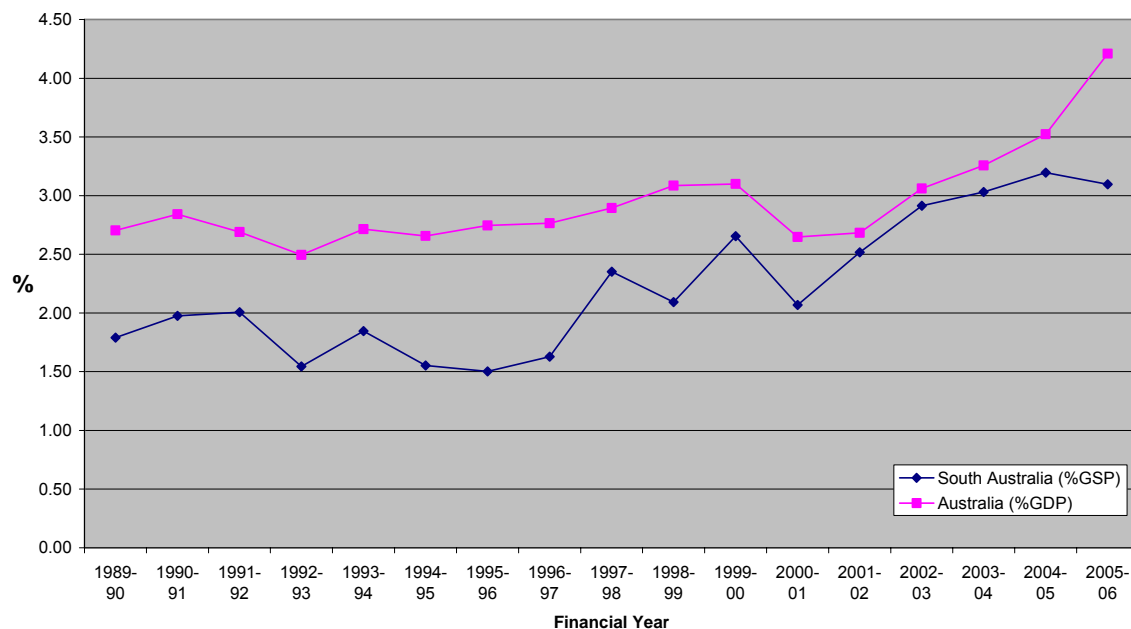
During the 12 months to December 2006 South Australian overseas goods exports grew by 9.5% and totalled \$9 billion. South Australia's major exports are wine, metals and metal manufactures, road vehicles, parts and accessories and grains.

Business investment

Business investment in South Australia is at an historically high level. Real private new capital expenditure in the September quarter 2006 was 8.8% higher than the previous year.

An indication of the level of public and private investment in infrastructure is shown by data on new engineering construction. This has been growing steadily as a share of total economic activity in South Australia and nationally since 2000-01, as shown in the graph below. Recent growth in activity in South Australia has been particularly strong in roads, electricity and telecommunications.

**Australian and South Australian total new engineering construction
(Share of GDP and GSP, %)**



Source: ABS catalogues, 5220.0, table 1 and 87620.0, table 22.

Levels of business investment and confidence remain high, with more than 200 projects worth around \$30 billion either proposed or underway. Solid investment levels should be maintained in the medium term, with the proposed \$7 billion BHP Billiton Olympic Dam expansion and the \$6 billion air warfare destroyer project.

Business environment

A recent survey found that Adelaide is the world's third most cost-competitive city in which to do business, up from tenth position just two years ago.

KPMG's 2006 edition of *Competitive Alternatives* compares business costs for 17 industries in 99 cities, in nine developed countries in North America, Europe and the Asia-Pacific. In relation to other Australian cities, Adelaide is the cost leader (or tied) in more than two-thirds of the 17 industries. Adelaide also rates highly compared to overseas cities, ranking second in the Asia-Pacific and third (tied) among all cities surveyed.

The South Australian Government has set a target of a 25% reduction in the regulatory burden on business by July 2008 to ensure that South Australia maintains this competitive edge in business and investment.

Economic outlook

According to South Australian Government forecasts released in December 2006, growth in South Australian GSP is expected to be 1% in 2006-07. This has been revised down significantly from the September budget forecast of 2½%. This is due to the impact of the drought on farm sector production which is expected to reduce GSP growth by 1¾ percentage points. Despite this, South Australian employment growth is estimated to be 2¼% in 2006-07, revised up from 1½% at budget time. While the poor rural season is likely to reduce farm output and incomes significantly, the impact on employment is much less significant and ABS data indicates that outside of the farm sector the labour market remains strong.

Assuming a return to more normal weather conditions in 2007-08, South Australia's GSP growth is forecast to bounce back to 3¼%. Projections for 2008-09 onwards take into consideration the expected performance of the national economy (as forecast by the Australian Treasury) over the medium term and relative population growth rates. In addition, the impacts of an assumed farm recovery from the drought and some major projects anticipated to come on stream in this period are expected to provide a boost to the South Australian economy. Accordingly, South Australia's GSP growth is projected to be 3¼% in 2008-09 before easing back slightly to 3% in 2009-10.

The Policy and Planning Framework

South Australia's Strategic Plan

South Australia's Strategic Plan sets a pathway to a stronger economy and a more prosperous, sustainable community. First released in March 2004, the plan presents ambitious targets to focus government, business and community efforts on six key strategic objectives:

- growing prosperity;
- improving wellbeing;
- attaining sustainability;
- fostering creativity;
- building communities;
- expanding opportunity.

Modern infrastructure is required to support the achievement of many of these targets including a population increase, investment and export growth and improved access to social services. The need for an infrastructure plan to identify infrastructure priorities, over five and ten year timeframes to focus both government and business investment was recognised as a priority action in the first edition of the plan.

An update of *South Australia's Strategic Plan* was released early in 2007. It contains an infrastructure target to match the national average in terms of investment in key economic and social infrastructure, as well as specific targets in areas such as water, energy, telecommunications and transport.

Strategic Infrastructure Plan for South Australia

Achievement of the state's long-term strategic goals, as well as economic, demographic, environmental and technological changes, all have implications for infrastructure demands, and need to be considered in managing existing infrastructure and in planning for future upgrade or expansion of infrastructure capacity.

In April 2005 the South Australian Government launched the *Strategic Infrastructure Plan for South Australia*, which marked a major step forward in developing a more coordinated and long-term approach to infrastructure provision. The plan provides an overarching statewide framework for planning and delivering infrastructure to guide all government and private sector providers.

Strategic priorities to guide new infrastructure investment for the next five and ten years are identified for 14 infrastructure sectors and seven regions of South Australia. The plan details opportunities for improving the management and use of the state's existing infrastructure assets, as well as options for managing demand better so as to defer costly capital expenditure.

The plan provides the basis for coordination of State Government planning, where appropriate, with other spheres of government. For example, the government works with local government on local roads and stormwater, with other states and territories and the Australian Government on the AusLink land transport network and with the other Murray-Darling Basin states and the Australian Government on the River Murray.

The plan is being implemented through a rigorous five-step approach to developing and assessing government infrastructure proposals as a strategic basis for funding decisions. A number of the projects in the plan are now completed or underway.

The government has taken a number of steps to improve the public sector processes that underpin the government's capital investment programme, including:

- building public sector skills and capabilities in business case development, procurement and contract management;
- reforming government policy for managing real property; and
- adopting more innovative approaches to procurement and funding of capital projects.

In addition, action has been taken recently to integrate land use and infrastructure planning in South Australia more effectively.

The South Australian Government will continue to work with other infrastructure providers and the Australian Bureau of Statistics to address data gaps and improve the information base for future infrastructure planning.

It will also continue to liaise regularly with key industry groups, including manufacturing, mining and defence, to ensure that their expected infrastructure requirements can be factored into the state's planning processes.

Critical infrastructure protection

The South Australian Government has established a partnership with other Australian governments to implement nationally consistent arrangements for the protection of infrastructure in the face of a range of natural and other hazards or threats.

The government is also working collaboratively with owners and operators of critical infrastructure throughout the state to ensure its protection. This includes the establishment of robust risk management standards and plans, emergency responses and rapid recovery arrangements supported by appropriate training and strong communication links.

Planning Strategy for South Australia

The *Development Act 1993* requires the State Government to publish the *Planning Strategy for South Australia*. This provides direction and certainty on land use and physical development over a 10 to 15 year period. It is presented in three volumes: Metropolitan Adelaide, Outer Metropolitan Adelaide and Regional South Australia.

The strategy covers a range of social, economic and environmental issues and aims to assist local councils in preparing strategic and infrastructure plans and consistent Development Plan policies.

Metropolitan Adelaide Industrial Land Strategy

A draft *Metropolitan Adelaide Industrial Land Strategy*, was released by the State Government in 2006. The strategy identifies a range of actions to deliver an adequate supply of suitable industrial land in metropolitan Adelaide over the next five to 15 years, including improved monitoring of supply and demand, integration of land use and infrastructure planning, improved use of existing industrial sites and timely development of new sites. The strategy will be implemented in partnership with local government and the private sector.

Economic regulation

The South Australian Government's approach to the economic regulation of infrastructure services is to ensure that regulatory regimes provide certainty, consistency with other jurisdictions and strike an appropriate balance between promoting access by users, competition and timely investment by infrastructure owners.

The Essential Services Commission of South Australia (ESCOSA), established under the *Essential Services Commission Act 2002*, is responsible for regulating essential services, which currently include electricity, gas, maritime and rail. In performing its primary objective of protecting the interests of South Australian consumers ESCOSA must have regard to the need to promote competitive and fair market conduct, economic efficiency, and consistency in regulation with other jurisdictions.

South Australia's regulatory regimes were rated as 'good' overall, by the Australian Council for Infrastructure Development (AusCID) scorecard on economic regulation of key infrastructure sectors, released in July 2006. South Australia's sector ratings ranged from 'very good' for ports to 'fair' for water exceeding or equalling ratings for all other jurisdictions.

In February 2006 COAG signed the *Competition and Infrastructure Reform Agreement* to provide for a simpler and consistent national system of economic regulation of nationally significant infrastructure, including ports, railways and other export-related infrastructure. The agreed reforms aim to reduce regulatory uncertainty and compliance costs for owners, users and investors in significant infrastructure and to support its efficient use.

Environment policies

A key focus of *South Australia's Strategic Plan* is to encourage strong economic growth without compromising the environment or quality of life. To support the environmental targets in the plan the *Strategic Infrastructure Plan* emphasises the importance of sustainable approaches to infrastructure provision.

The State Natural Resources Management Plan sets the direction for sustainable management and use of South Australia's natural resources.

The government is actively pursuing demand-side management initiatives for dealing with peak demands, congestion or other capacity constraints. These measures can offer more sustainable outcomes by enabling more efficient use of existing capacity and deferral of costly additions to infrastructure capacity.

State-local government collaboration

The state and local governments in South Australia are committed to maintaining a collaborative and productive working relationship. This commitment was formalised with the signing of the State-local Government Relations Agreement in March 2004, which provides a framework for focusing joint efforts on agreed priorities. Key priorities, which are reviewed annually, currently include improving the efficiency and certainty of South Australia's planning and development assessment system, improving stormwater infrastructure and the potential for re-use, providing sustainable wastewater management systems and integrated approaches to natural resource management.

Facilitation of private investment

The South Australian Government aims to provide policy and regulatory frameworks which are conducive to investment in infrastructure.

To attract and secure private investment, the government offers a one-stop-shop arrangement for major investment projects. Proponents of major private infrastructure projects are assisted by the Office of Major Projects and Infrastructure, which provides a single point of contact within government, coordinates input from government agencies and facilitates completion of necessary government approvals to streamline private sector dealings with government.

The State Government also uses the Crown development provisions of the *Development Act 1993* to streamline government processes and provide certainty to private sector infrastructure providers for strategically significant projects.

South Australian Government investment programme

The South Australian Government's investment programme for 2006-07 totals \$1192 million, up from \$914 million in 2005-06. The budget provides more than \$3.7 billion over the next four years in investment expenditure, a 49% increase on the level of investing expenditure provided in the 2001-02 budget. The investing programme is guided by the strategic planning and policy framework outlined in the previous section. It includes significant spending on transport and water infrastructure, detailed later in this report, as well as major works in health, education and justice.

Some of this capital expenditure is funded by the Australian Government, including the majority of the AusLink major transport works. The State Government has also committed to using moderate levels of debt and to public private partnerships to finance major infrastructure projects.

Further information:

www.stateplan.sa.gov.au – South Australia's Strategic Plan

www.infrastructure.sa.gov.au/strategic.asp – Strategic Infrastructure Plan for South Australia

www.planning.sa.gov.au/go/strategy/land-use-planning-strategy-for-sa – Planning Strategy for Metropolitan Adelaide

www.statebudget.sa.gov.au – State budget papers

www.majorprojects.sa.gov.au – South Australia's major projects directory

Transport

ROADS

Supply

South Australia has an extensive sealed arterial road network across the state that links metropolitan Adelaide, major regional activity centres and regional areas with each other and the rest of Australia.

There are approximately 97000 kilometres of road in South Australia. Australian, State and local governments are responsible for the provision and maintenance of these roads as shown in the table below.

South Australian road network

Road category ¹	Financial responsibility	Length of road (kilometres)		
		Sealed	Unsealed	Total
National roads	Federal/State	2 775	-	2 775
Arterial roads				
Urban	State	891	-	891
Rural ²	State	8 566	53	8 619
Local roads				
Urban	Local	7 051	633	7 684
Rural	Local	9 427	57 358	66 785
Unincorporated	State	30	10 080	10 110
Total		28 740	68 124	96 864

1. The South Australian Government is responsible for 112 kilometres of local road and the Adelaide City Council maintains 38 kilometres of arterial roads.

2. Includes regional roads equivalent to NAASRA/Austrroads Class 3 roads

Source: Department for Transport, Energy and Infrastructure, June 2006, South Australian Local Government Grants Commission, June 2004

In some other states regional roads are maintained by councils and supported by a significant grant from the state, but in South Australia, all rural arterial roads are maintained and funded by the South Australian Government.

The South Australian Government maintains a network of roads which comprises AusLink, State arterial and some local roads (mainly in unincorporated areas). This road network is shown in the following map.

South Australian road network



Source: South Australian Government, 2005

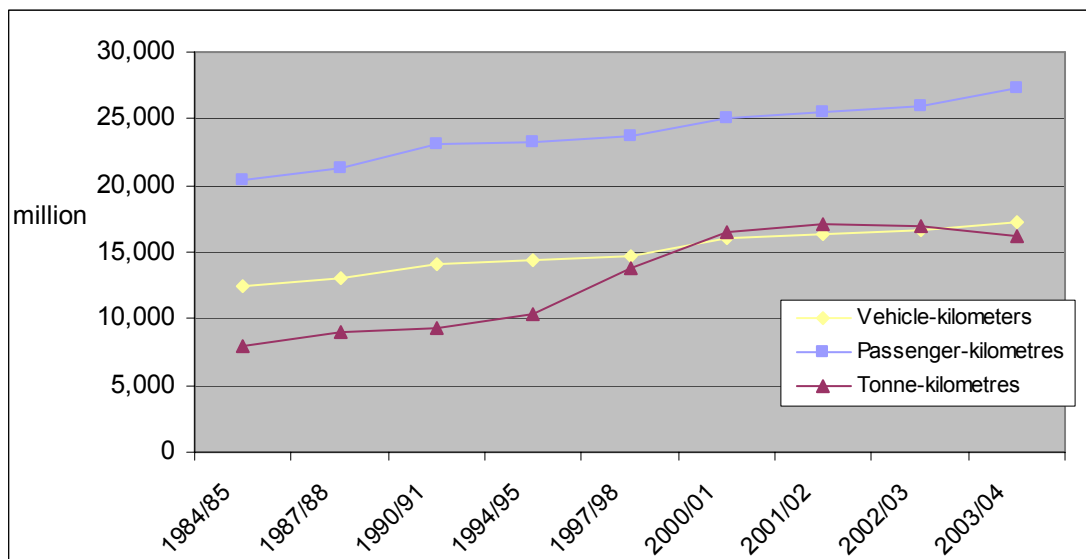
Demand

Road freight accounts for 44.7% of the total South Australian freight task (rail 31.8%, sea 23.2% and air 0.3%).

According to the Bureau of Transport and Regional Economics (BTRE), 8.8% of national tonne kilometres of road freight was carried on South Australian roads in 2003-04. The Australian Bureau of Statistics (ABS) reported that 7.8% of Australian passenger vehicle kilometres was carried on South Australian roads.

The South Australian road freight sector carried 168 million tonnes of freight in 2003-04. A summary of the South Australian road transport task, showing growth in activity since the mid 1980s, is provided in the following graph.

Summary of the South Australian road transport task



Source: Centre for Transport, Energy and the Environment, Table 3.1-8, April 2006

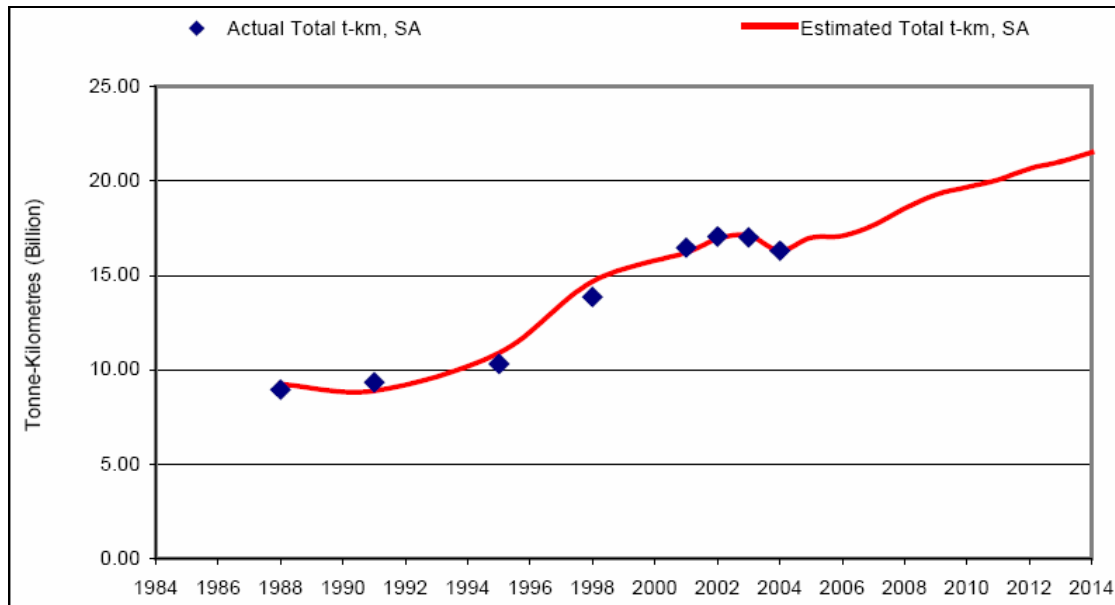
BTRE¹ forecasts that the total Australian domestic freight task (by all modes of transport) will grow at an annual rate of 2.8% per annum to 2020, while the total Australian road freight task is forecast to grow at an annual rate of 3.7%.

In comparison, the forecast annual average growth rate for road freight for the period from 2004 to 2020 is 3.8% per annum for South Australia. In Adelaide there is expected to be a 3% to 4% growth in truck movements per annum.

The Centre for Transport Energy and the Environment predicts that growth in economic activity and continued productivity improvement by the road freight sector will result in an increase in tonnes carried annually by road transport in South Australia of 63 million tonnes or 37.5% over the ten years to 2013-14. The South Australian annual road tonne-kilometre task is projected to increase by 32% to 21 500 million tonne-kilometres by 2013-14.

¹ Bureau of Transport and Regional Economics. *Freight Measurement and Modelling in Australia Report 112*. March 2006.

Outlook for the road freight task – South Australia



Source: South Australian Transport Facts (2006) Centre for Transport, Energy and the Environment

Population and income growth are also expected to result in continued growth in road passenger activity.

Performance

Austrroads has established a set of national performance indicators for measuring the effectiveness of road system investment and management on a comparative national basis.²

South Australia considers three indicators appropriately measure the effectiveness of road system investment and management: road pavement surface condition, all day congestion (urban) and road fatalities and serious injuries.

Road pavement surface condition

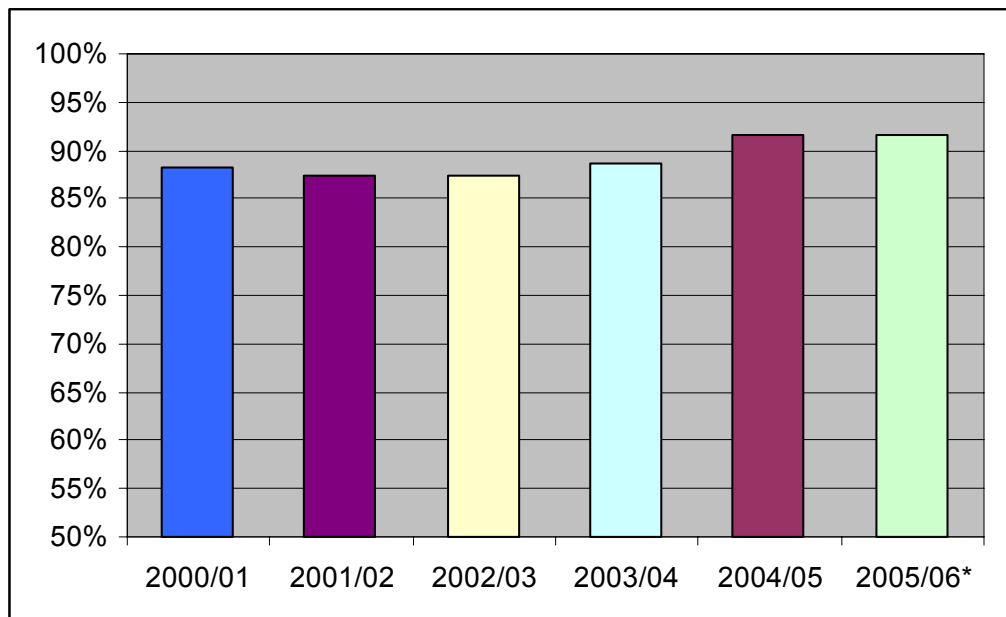
Road pavements deteriorate and the resulting condition can affect the comfort of vehicle occupants, increase vehicle wear and tear, exacerbate pavement deterioration, increase fuel consumption rates for a given travel speed, result in damage to products being transported and reduce safety.

The smooth travel exposure (STE) indicator represents the proportion of travel undertaken each year on urban and rural roads with surface roughness less than either of the defined levels of 110 NRM (NAASRA Roughness Meter) and 140 NRM. A roughness level that is less than 110 NRM will normally provide acceptable travel conditions. A roughness level greater than 140 NRM would provide less desirable travel conditions in most circumstances.

The following graph shows an increasing proportion of travel on roads below a roughness of 110 NRM over the last three years. Trends in the smooth travel exposure (STE) indicator need to be interpreted with care as road roughness data are collected and updated on less than half the sealed arterial road network each year with some roads only being tested every four years.

² Austrroads - About National Performance Indicators, <http://www.algin.net/austrroads/>

Road pavement surface condition: smooth travel exposure
Proportion of travel undertaken each year on all roads with a roughness level
condition of less than 110NRM %



Source: Austroads National Performance Indicators

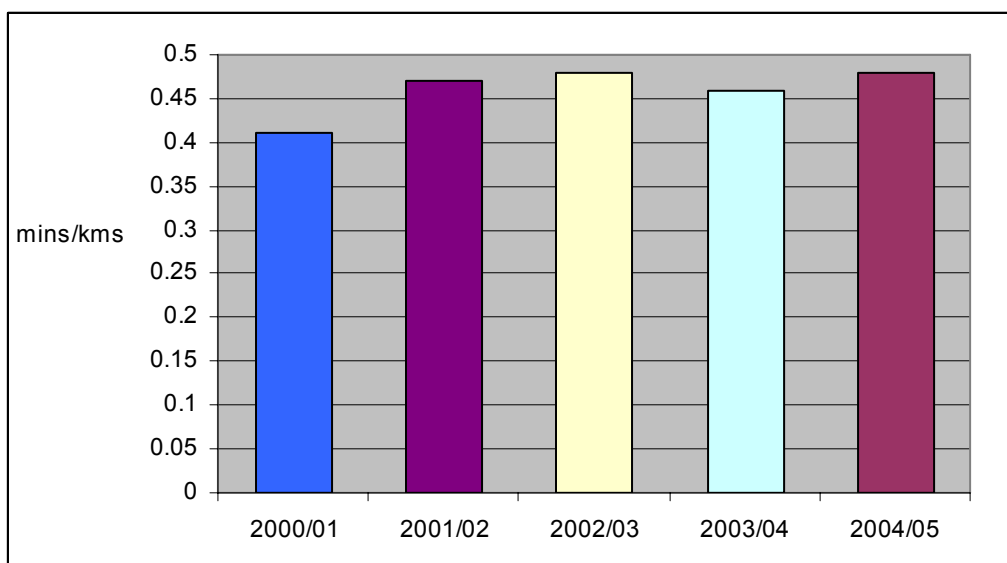
*Note: In 2005-06 the method of calculating road roughness was modified. This is considered to have contributed to a higher STE percentage than would otherwise have been reported in this year.

All day congestion indicator (urban)

The all day congestion indicator (urban) is an aggregation of delay per kilometre on a representative sample of arterial roads and freeways in the urban metropolitan area to monitor the impact on the level of service to road users.

The graph below indicates some increase in delays and hence congestion over time. It should be noted that planned investments in road improvements (see next section) will result in reduced delays on key freight routes.

All day congestion indicator (urban)
Difference between actual and nominal travel time/delay from traffic conditions
which do not permit travel at the posted speed limit: minutes/km



Source: Austroads National Performance Indicators

Road safety

In 2004 South Australia had 139 road fatalities, the lowest in 50 years. In 2005 South Australia had its second lowest road toll, with 147 fatalities. There was a further fall in the number of road fatalities on South Australian roads during 2006 to 117.

Serious injuries also declined from around 1600 per year earlier this decade to around 1300 in 2005. In the 12 months to September 2006 serious injuries numbered 1350, compared to 1276 during the same period in 2005.

Investment

Planning, development, upgrade and maintenance of roads in South Australia is jointly funded by the three spheres of government.

The Australian and State Governments have joint funding responsibility for the national land transport (AusLink) network. The State Government is responsible for state arterial roads (including regional roads and local roads in unincorporated areas); and local government is responsible for the local road network.

The private sector also contributes funding to the development and maintenance of specific roads where there is an economic benefit to that particular industry or activity, for example, special access to mining areas or to large manufacturing complexes.

AusLink National Network

The AusLink Investment Programme is aimed at nationally important land transport infrastructure. Funding under the programme is limited to projects on a defined AusLink Network deemed by the Australian Government to be nationally important road and rail infrastructure links, including intermodal transfer facilities.

Additional funding assistance is also offered by the Australian Government for local roads and for innovation and research programs.

Maintenance of the national network is also now funded jointly by the State and Australian Governments, with maintenance allocations determined through a new funding distribution formula based on road length, traffic volumes and axle load statistics. The State Government is responsible for managing the maintenance of 2775 kilometres of the AusLink National Network in South Australia. In 2006-07 the AusLink road maintenance allocation for South Australia is \$26.38 million (a \$0.23 million increase from 2005-06).

Total funding and allocations to South Australia for the five year AusLink programme from 2004-05 to 2008-09 are shown in the table below.

AusLink programme	Total programme 2004/05 to 2008/09 (\$ million)	South Australia allocation (\$ million)	South Australian % of total programme
AusLink - National Network (including national projects)	9269.8	565.6	6.10
Roads to Recovery	1483.1	131.7	8.88
Strategic Regional	220.0	8.6	3.90
Black Spot	178.0	14.0	7.87
Improving Local Roads	307.5	27.7	9.0
Total AusLink	11512.8	747.6	6.49

Source: [http://www.auslink.gov.au/funding/allocations/funding_allocations_consolidated.aspx#2004 to 2009](http://www.auslink.gov.au/funding/allocations/funding_allocations_consolidated.aspx#2004_to_2009)

South Australia's 6.5% share of the AusLink National Network Programme funding compares unfavourably with other key indicators such as: population (7.6%), lane kilometres of the National Network (11.8%) and road freight task (tonne-kilometres) (8.8%).

State expenditure on roads

The South Australian Government is responsible for the provision and maintenance of a range of road infrastructure assets, including road pavements, bridges and structures, street lighting, traffic signals, pavement marking, road furniture, ferries, busways and interchanges, and public transport park and ride facilities.

The government funds construction on the arterial network and also provides funding toward construction works on the AusLink national network and local roads.

South Australian Government expenditure on road construction and maintenance activities is summarised in the table below.

State Government road expenditure

	Construction (\$ million)	Maintenance (\$ million)
2000-01	102	59
2001-02	84	63
2002-03	66	64
2003-04	79	74
2004-05	95	69
2005-06	104	73
2006-07 (estimated)	184	74

Source: South Australian Government, 2006

Expected expenditure by the State Government on roads in 2006-07 is the highest on record and reflects the government's commitment to deliver on the key road transport priorities identified in the *Strategic Infrastructure Plan for South Australia*.

The available maintenance funds are carefully prioritised to address priority areas, reduce crash risk and improve conditions for freight transport.

Road maintenance is a major task which will increase with the expected growth in road freight. Australian and State Governments through COAG are considering alternative approaches to road infrastructure pricing which should help to address this issue. There is also a need to consider how the AusLink programme could more effectively fund the growing road maintenance task.

The key drivers for investment in roads are safety and growth in freight movements related to economic growth. Investment is being focused toward safety improvements, improvements to existing freight routes (to reduce travel times and increase reliability) and extension of the road freight network.

A number of key investment projects identified in the *Strategic Infrastructure Plan for South Australia* are proposed or underway:

- South Road underpass (Anzac Highway);
- South Road upgrade (Grange Road to Torrens Road);

- South Road (Sturt Road Underpass);
- Northern Expressway;
- Port River Expressway opening road and rail bridges;
- Le Fevre Peninsula transport corridor;
- Eyre Peninsula Grain transport corridor;
- Sturt Highway five year upgrade program;
- Sturt Highway upgrade Gawler to Nurioopta;
- Bakewell Underpass.

Port River Expressway

Featuring new road and rail bridges across the Port River and linking export facilities and industrial areas with key road and rail routes, the Port River Expressway is a major government undertaking, with funding provided by both the South Australian and Australian Governments.

It will link South Australia's major port and rail terminals at the Port of Adelaide directly with the National Highway to Perth and Darwin, via Port Wakefield Road, as well as to the National Highway route to Sydney and Melbourne and to the interstate mainline rail network.

As well as potentially increasing trade revenue by facilitating international and national trade through the port, the \$178 million Port River Expressway project (Stages 2 and 3) is expected to boost tourism and to contribute to urban renewal around the Port Adelaide centre.

Piling in the Port River commenced in December 2005. Both bridges are scheduled for completion in 2007.

The South Australian Government has continued to invest in road safety infrastructure through successful programs such as the:

- State Black Spot programme which contains a specific allocation for black spot cycling projects and the Safer Local Roads Programme to address black spots on council roads;
- Responsive Road Safety programme to address local government and community concerns about road safety issues;
- Overtaking Lane programme which has been very successful in reducing crashes associated with overtaking;
- Shoulder Sealing programme on rural roads to provide a safe run-off area for errant vehicles, especially as a result of fatigue;
- Long Life Roads initiative, which also contributes to road safety outcomes; and
- Level Crossing Safety programme to undertake minor upgrading work on level crossings.

Local government is responsible for about 75000 kilometres of local roads. Capital spending by local government on construction and upgrade of roads and related infrastructure for 2005 was over \$48 million, while renewal and replacement was reported as \$81 million.

Planning and regulation

In South Australia, the overarching frameworks which guide planning and investment in roads are *South Australia's Strategic Plan*, the *Strategic Infrastructure Plan for South Australia* and the *Planning Strategy*.

South Australia's Strategic Plan contains two road safety targets: to reduce road fatalities to less than 90 a year and serious injuries to less than 1000 a year by 2010.

The *Strategic Infrastructure Plan for South Australia* sets out the following strategic priorities for road transport:

- improving the state's competitiveness through efficient freight transport networks and improved international links;
- minimising the impact of freight vehicle movement on the community and environment by appropriately locating and protecting freight routes;
- concentrating resources on maintaining and improving existing assets rather than extending the network.

The key focus areas include improving transport efficiency (particularly on major freight corridors), increasing accessibility (mainly in rural South Australia), and improving safety of roads and road use to achieve a 40% reduction in fatalities and serious injuries by the end of 2010.

South Australia is working with other jurisdictions to establish a new long-term national multimodal planning framework to ensure Australian Government funding is targeted at projects on the AusLink network that deliver high levels of national benefit. The key component of this is a series of corridor strategies that are being prepared for each of the 24 corridors on the AusLink network.

AusLink corridor strategies will identify and establish priorities for the development and maintenance of five South Australian corridors: Adelaide Urban; Perth to Adelaide; Melbourne to Adelaide; Adelaide to Darwin; and Sydney to Adelaide. All strategies are due to be completed by June 2007. At this preliminary stage the broad directions emerging are:

- improving the operation and efficiency of the road network with targeted infrastructure improvements particularly focusing on key bottlenecks in Adelaide such as South Road;
- improving the road safety performance of all AusLink network links in South Australia;
- addressing the condition of road pavements to cater for the growth in road freight; and
- preserving and enhancing urban and regional town amenity.

South Australia considers that the defined AusLink national network should be expanded to include the following key freight links:

- metropolitan Adelaide: South Road – from Sir Donald Bradman Drive to Cross Road;
- metropolitan Adelaide: Cross Road – from South Road to Portrush Road;
- south east of South Australia – the Riddoch Highway and adjacent rail line and the Princes Highway from Mount Gambier east to the Victorian border.

South Australia has made a significant contribution to the development of national guidelines for transport system management in Australia. They form a cooperative and consistent framework to assist and guide transport planning and decision making across Australia. In February 2006 the Council of Australian Governments (COAG) agreed that the guidelines should be used for the assessment of all new road and rail initiatives. South Australia is applying the guidelines, which will bring more rigour consistency and transparency in developing and assessing project proposals.

The South Australian Government has also assisted the six regional Local Government Associations to prepare regional transport plans for local road networks by providing a framework for individual councils to integrate their local road networks with State Government transport planning strategies for the arterial road system.

Plans take into account goals such as economic development, access and the environment, and form the foundation for the development of each region's investment programme for priority projects. They are submitted for funding assistance to the South Australian Local Government Grants Commission.

Freight transport for the Limestone Coast region

The *Strategic Infrastructure Plan for South Australia - Regional Overview* identified the need to develop plans to manage growth in freight in the Limestone Coast region, in the south east of South Australia, and to work with the Victorian Government to facilitate the use of rail to transport freight between South Australia and Victoria.

A South East Freight Logistics Task Force was established to develop a plan for an efficient freight transport network including road and rail access to appropriate export ports to service the needs of industry and the community in the region.

*A Plan for Freight Transport for the South East/Limestone Coast Region of South Australia*³ was produced to guide the future development of the transport network in the Limestone Coast region aimed at enhancing freight efficiency to the export ports and meeting the future needs of industry and the local community.

This freight plan was developed using a collaborative approach involving state and local government representatives and the Regional Development Board, with submissions invited from industry. The final result is a plan that is strongly supported by all the local groups in the region.

The plan gives priority to investment in infrastructure works that will lower the cost of doing business and increase the competitiveness of trade-exposed industries in the Limestone Coast.

The benefits of the plan were recently demonstrated when in December 2006 the Northern Bypass of Mount Gambier was allocated \$2 million by the Australian Government as part of the AusLink Strategic Regional programme. This bypass was a priority project in the plan.

*Heavy Vehicle Access Framework*⁴

Heavy vehicle transport plays an important role in supporting South Australia's economy. The South Australian Government has developed a Heavy Vehicle Access Framework to provide guidelines for sustainable long-term planning of transport operations and road network access. It defines the policy, processes and accountabilities for managing heavy vehicle access in South Australia.

Developed in consultation with local government and the transport industry, the framework guides an on-going road assessment and upgrading investment programme for the heavy vehicle road network in South Australia aligned with the national transport reform agenda being pursued by COAG.

Road safety

The road safety target in *South Australia's Strategic Plan* is based on the *National Road Safety Strategy 2001-2010* which aims to reduce the annual number of road deaths per 100 000 population by 40% to no more than 5.6 by December 2010.

South Australia is implementing the Australia-wide safe systems strategy (endorsed by all jurisdictions) which focuses on:

- encouraging safer vehicles with a particular focus on the government fleet, through a new vehicle purchase policy that demands four star crash ratings, and safety features such as electronic stability control;
- targeting infrastructure improvements to areas of identified crash risk;
- reducing speed limits, supported by new enforcement technology and education programmes;
- introducing specific actions to curtail high-risk driver behaviour such as 'driving under the influence', non-use of restraints, fatigue and inattention; and

³ A Plan for Freight Transport for the South East / Limestone Coast Region of South Australia, July 2006.

⁴ Heavy Vehicle Access Framework, Version 1, July 2006. Department for Transport, Energy and Infrastructure.

- encouraging enhanced community and business engagement, especially in regional areas.

Legislation

The legislative arrangements currently in place for roads include the:

- *Highways Act 1926* provides the legislative underpinning for care and control of the state road network and associated facilities;
- *Road Traffic Act 1961* provides the regulatory framework for the operation of motor vehicles on the road network and associated facilities;
- *Motor Vehicle Act 1959* provides the regulatory framework governing motor vehicles;
- *Metropolitan Adelaide Road Widening Plan Act 1972* provides for the reservation of road easements for the development of the road network in metropolitan Adelaide.

RAIL

Supply

There are approximately 5000 kilometres of rail line in South Australia, including 245 track kilometres for the metropolitan train and tram system. The Australian Government's Australian Rail Track Corporation manages 40% of the network, with private companies owning or leasing half of the system.

The South Australian Government manages the remainder of the network, which includes the metropolitan, south east and heritage lines. The network is a diverse mix of narrow, standard and broad-gauge track. In decreasing order by network size the seven key rail systems are:

- Australian Rail Track Corporation (ARTC) (interstate network);
- Genesee and Wyoming Australia (GWA) (regional network);
- FreightLink (Tarcoola to Darwin);
- Babcock and Brown (Port Augusta to Leigh Creek coal haulage);
- TransAdelaide (urban broad gauge rail network);
- OneSteel (iron ore rail haulage line at Whyalla);
- South Australian Government-owned dormant rail lines.

The Australian Government five yearly infrastructure report to COAG presents information on the ARTC and FreightLink networks.

The location of the rail lines in South Australia and their ownership is shown on the following map.

Railway lines in South Australia – Track ownership or controlling body



Source: South Australian Government, 2005

Genesee and Wyoming Australia regional network

GWA owns 1500 kilometres of rail tracks in South Australia on State Government owned land. These rail lines are made up of seven different systems, four connected to the ARTC network, two to the TransAdelaide network and one as a stand alone network on the Eyre Peninsula.

Babcock & Brown Port Augusta to Leigh Creek

Babcock & Brown lease the 250 kilometre Port Augusta to Leigh Creek rail line from the South Australian Government. This rail line primarily is for the hauling of coal to the Port Augusta power station.

TransAdelaide urban broad gauge rail network

TransAdelaide owns 223 track kilometres of broad gauge train tracks in Adelaide and operates the urban train and tram passenger system.

OneSteel iron ore rail haulage line at Whyalla

OneSteel is the owner of the Whyalla steelworks and an 80 kilometre rail line to the mine site. As part of the \$355 million Project Magnet, OneSteel completed an upgrade of its rail system in 2006.

Non-operational rail lines

The rail lines in the south east of the state, which connect the interstate rail network at Wolseley (near Bordertown) and Penola, Mount Gambier and Millicent, do not carry any freight as they are broad gauge and require gauge standardisation and track upgrade to make them operational. The private sector is considering options to operate a commercial rail freight service over these lines. The South Australian Government has \$10 million budgeted in 2007-08 towards the upgrading of this rail line if there is a commercially viable freight proposal. In the mid north of the state a broad gauge rail line, 45 kilometres of which is non-operational, links the port at Wallaroo and the interstate rail network near Snowtown.

Intermodals

The following intermodal facilities currently operate in the Adelaide metropolitan area.

Location of facility	Owner/Manager	Task and Strategic Role
Islington	Pacific National	Intercapital intermodal containers, cars and reconfiguration of trains between 1500 metres single stacked and 1800 metres double stacked.
Islington	SCT	Palletised goods in van type wagons and containers connecting SCT facilities in Melbourne and Perth.
Dry Creek South	GWA	Small intermodal facility handling local Adelaide to Melbourne freight traffic. It is being investigated as the site of the Queensland Rail national intermodal facility.
Gillman/Port Flat	Kerry Logistics	International containers, land bridged to and from Melbourne.
Outer Harbor	DP World	International containers from Bowmans regional intermodal and BHP Billiton Port Adelaide.
Port Adelaide	ABB Grain	Bulk grain
Birkenhead	Penrice Soda Products	Bulk limestone from Barossa Valley for processing into soda ash.

Balco formed a joint venture with Patrick Corporation in 2003 called Patrick Portlink (South Australia). Operating South Australia's first inland container terminal at Bowmans, Patrick arranges container supply and transportation using its own train to and from Bowmans as well as handling all related compliance matters.

Demand

Demand for rail freight services is expected to be driven by expansion in the mining and agri-business industries. Specific examples are copper and uranium from Olympic Dam, mineral sands from the Murray Mallee and Eyre Peninsula, the proposed development of a pulp mill near Penola in the south east and development of iron ore deposits on the Eyre Peninsula.

These projects are expected to trigger the need for investment in rail infrastructure and drive the development of intermodal terminals.

The total estimated freight task in 2003-04 was 9.4 billion net tonne kilometres and in 2004-05, 10.1 billion net tonne kilometres.

The ARTC reported that in the first quarter of 2006-07 the net freight task on the east west corridor passing through South Australia had risen 9.4%⁵.

It is expected that rail freight will continue to grow to 2014. Assuming that the ARTC tonnage continues to grow at 4% per annum, then the rail freight task in South Australia could grow to between 13 and 14 billion net tonne-kilometres per annum by 2014. Mining expansion will add to this task. If the Olympic Dam expansion occurs and rail is used for transport this will add another one billion net tonne-kilometres per annum to the rail freight task.

Performance

In its 2005-06 annual report the ARTC indicated that the total gross tonne kilometres (GTK) moved on the east-west corridors in 2005-06 was 35.43 billion compared to 34.59 billion in 2004-05, representing an increase of 2.4% for the year. Intermodal volumes grew by 4.4% in 2005-06, but this was partially offset by modest decreases in the volumes of steel, grain and other bulk traffic moved on east-west corridors. Growth in rail freight over the key rail corridors managed by the Australian Rail Track Corporation is shown in the following graph.



Source: COAG Five Yearly Infrastructure Report, Australian Government, 2006

The Adelaide to Melbourne (Dynon) and the Adelaide to Kalgoorlie corridors are the second and third busiest of the interstate corridors, and have both shown strong growth in recent years.

⁵ ARTC media release 12 October 2006

The Adelaide to Melbourne corridor, however, is facing capacity constraints due to insufficient and short crossing loops with approximately 20% of weekly freight trains experiencing excessive delays (of as much as three hours). This is compounded by inefficiencies caused by steep grades and tight curves through the Adelaide hills.

Freight on the Adelaide to Kalgoorlie rail line is expected to grow significantly due to mining development which could cause train congestion unless additional infrastructure capacity, for example additional crossing loops, is added.

Investment

As discussed in the road section of this report, the AusLink investment programme is aimed at nationally important land transport infrastructure. Funding under the programme is limited to projects on the defined AusLink network deemed by the Australian Government to be nationally important road and rail infrastructure links, including intermodal transfer facilities.

South Australia believes that the Australian Government should give priority to funding an upgrade of the Adelaide to Melbourne rail corridor to remove current constraints on capacity and efficiency.

Key investments in rail have been identified in the *Strategic Infrastructure Plan for South Australia* and include the completion of the rail upgrades on the Le Fevre Peninsula.

Works underway on the \$24 million Le Fevre Peninsula Transport Corridor project involve upgrading the existing seven kilometre freight route on the Le Fevre Peninsula and linking South Australia's major port and rail terminals at Outer Harbor directly with the interstate rail network to Perth, Sydney and Melbourne. The upgrade will improve safety, increase transport efficiency, provide amenity benefits and reduce travel times. It will provide supporting road and rail infrastructure from the Port River Expressway to ensure safe and efficient transport links from the Port River bridges to Outer Harbor.

Work has also commenced on a \$43 million project to upgrade road and rail networks and grain handling facilities on Eyre Peninsula to enable more efficient movement of grain to export ports.

Eyre Peninsula grain logistics

The grain transport logistics network on Eyre Peninsula is isolated from other regions by distance and lack of rail connectivity. The region's rail network and its interfaces with associated bulk handling facilities and road infrastructure have deteriorated.

Grain production on Eyre Peninsula now averages 2.1 million tonnes per year, but is conservatively expected to continue growing at between 0.5% and 1.0% annually. By the year 2030, average production is expected to be 2.6 million tonnes, with occasional peak harvest levels reaching 4 million tonnes. Export volumes account for an average 97% of Eyre Peninsula production.

Growers, transport operators, grain handlers and the State Government have developed a Grain Logistics Plan to upgrade the grain logistics network, including improvements to roads, grain loading and storage, and significant improvements to rail.

This will establish a fit-for-purpose grain logistics system on Eyre Peninsula that meets the transport needs of the grains industry to enable the rail operator to maintain a viable grain rail network and higher percentages of grain to be carted by rail. The work is being funded jointly by Australian, state and local governments, and the transport and grains industries.

In December 2006 the Australian Government announced funding of \$1.3 million towards sealing the road linking the Buckleboo silos with the grain terminal at Kimba. This project was identified as a priority in the Grain Logistics Plan.

The Australian Government has contributed \$2 million towards the \$4 million expansion of the Bowman intermodal facility under the AusLink Strategic Regional Programme.

Other private sector initiated South Australian intermodal proposals are:

- expansion of the DP World Outer Harbor container terminal;
- development of an intermodal at McKenzies Intermodal facility at Outer Harbor;
- development of an intermodal facility at Port Flat as a joint project between Flinders Ports and Patrick Corporation;
- development of a new intermodal in the Barossa Valley as a joint project between DP World and GWA.

Other locations for intermodal projects of potential interest to the private sector include northern Adelaide, Port Augusta, the Riverland and Port Stanvac.

The south east region of South Australia has no operating rail freight system. Existing track infrastructure is broad gauge compared to the standard gauge interstate railway. Rail freight services on these tracks ceased in 1994. The government has allocated \$10 million in the 2007-08 financial year to assist with the standardisation and rehabilitation of rail lines in the Limestone Coast region and is actively encouraging the private sector to present a viable business proposition for consideration by governments.

The proposed expansion of the Olympic Dam mine by BHP will require investment in new transport infrastructure. If rail is the preferred option it is likely that a new rail line will be built to access the ARTC network at Pimba. Other upgrades may be required on the ARTC network to support expected growth in the mining industry.

Planning and regulation

A strategic priority in the *Strategic Infrastructure Plan for South Australia* is to encourage the shift from road to rail transport for passenger and freight movements where justified by environmental, economic or social imperatives.

The long-term strategic aim for rail is to develop a connected metropolitan, regional and interstate standard-gauge network, capable of supporting the axle weights and lengths of modern freight trains. The network should be serviced by intermodal terminals that facilitate rapid trans-shipment between road and rail.

Key priorities for South Australia are to ensure that:

- country rail networks are capable of supporting expected regional industry and export development;
- the urban rail network is able to support efficient movement of freight in a way that minimises impacts on urban congestion.

The South Australian Government will work with the Australian Government, ARTC and private rail companies to ensure that the rail network is upgraded to meet the needs of ongoing growth in rail freight.

The regulatory arrangements in place for rail include the South Australian rail access regime which applies to railway services, as defined under the *Railways (Operations and Access) Act 1997*. This covers the TransAdelaide broad gauge network within metropolitan Adelaide, the Genesee and Wyoming lines in the Murray-Mallee, mid north and Eyre Peninsula, and the Great Southern Railway passenger terminal at Keswick.

In terms of safety regulation, the *Rail Safety Act 1996* establishes a safety regulatory regime for all rail owners and operators in South Australia.

PUBLIC TRANSPORT

Supply

The Adelaide Metropolitan public transport system is made up of over 1316 kilometres of bus routes, 223 track kilometres of train line, 22 kilometres of tramline and 24 kilometres of O-Bahn. There are 244 bus routes (with 7500 bus stops), six train routes (with 85 stations) and one tram route (with 20 stops). Bus, train and tram services deliver over 2.8 million scheduled services and 43.6 million kilometres of scheduled route services each year. The public transport fleet in Adelaide comprises 808 buses, 93 trains and the tram fleet which is progressively being replaced with 11 new trams.

The South Australian Government supports passengers in regional South Australia by funding regular services in the six provincial cities and through planning, coordinating and funding community passenger networks across regional South Australia. Integrated passenger services have been established in partnership with local organisations in many regional areas including the Murray Mallee, Riverland and the Coorong. Benefits available from the South Australian Transport Subsidy Scheme, which provides subsidised taxi travel for people with disabilities, have just been expanded and now include the capacity for regional travellers to use multiple vouchers for long distance trips.

Demand

On average 170 000 trips (measured as initial boardings) are made on Adelaide metropolitan services each weekday⁶. In 2005-06 48.45 million initial boardings and 63.9 million total boardings were recorded. Passenger journeys on train services are much longer than on bus services.

Weekday travel on public transport accounted for less than 5% of all weekday trips in the late 1990s. Ticketing data suggests that the use of public transport is on the increase after a period of decline.

More recent modelling of public transport patronage indicates that public transport accounted for an estimated 6.9% of metropolitan weekday motorised passenger vehicle kilometres travelled. The government aims to increase this figure to 10% by 2018.

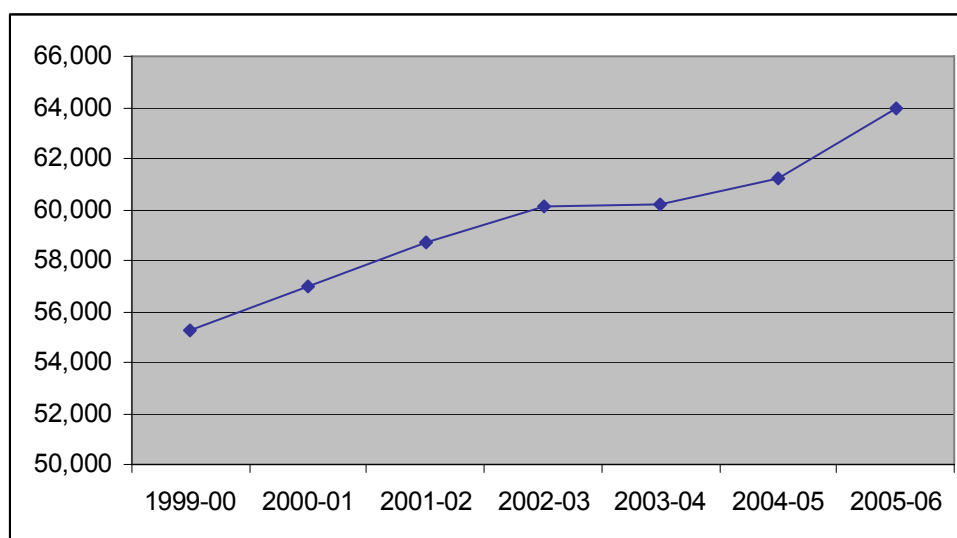
Performance

There has been steady growth in boardings since 1999-2000, which can be attributed mainly to service improvements on bus routes and better marketing of the Adelaide Metro system.

⁶ Public transport patronage can be measured in three ways using current information:

- initial boardings (also called 'trips' and 'passenger journeys') which records the first use by a passenger of the two hour metro ticket
- total boardings, which records all use of a metro ticket (which may be more than once within a two hour period)
- passenger kilometres, which is an estimate of the total kilometres that passengers have travelled by public transport, based on average trip lengths.

Public transport total boardings ('000)



Source: South Australian Government

Investment

The South Australian Government plans, develops, upgrades and maintains the public transport system in South Australia.

To increase the use of public transport the Government has:

- completed the replacement of the Glenelg trams and upgraded the Glenelg to Adelaide city centre light rail line;
- announced the extension of the Glenelg light rail system to the Adelaide Railway Station and along North Terrace to the University of South Australia's City West campus;
- introduced public transport service changes and allocated additional funding to help meet peak hour demand;
- implemented a number of measures to improve safety and security on public transport, including closed circuit television (CCTV), high visibility emergency help phones at all major interchanges, and CCTV surveillance on the bus fleet;
- invested in an annual bus replacement programme to buy forty-three new buses in 2005/06 and spend \$120 million to buy an additional 160 new buses over the next five years;
- constructed the Mawson Interchange;
- committed to funding the construction of a new train / bus interchange at Marion; and
- provided new and improved park-and-ride facilities to encourage people to use public transport for part of their journey to work. During 2005-06 an additional 200 car parking spaces were provided at interchanges and stations.

Planning and regulation

South Australia's Strategic Plan includes a target to increase the use of public transport to 10% of metropolitan weekday passenger vehicle kilometres travelled by 2018.

The government is considering a multi-faceted strategy to meet this target that is likely to include investment in infrastructure and services, the redesign of the public transport network, facilitation of transit oriented development, bus priority measures, targeted marketing and behaviour change programmes, and travel demand management measures.

PORTS

Supply

Overview

South Australia's commercial export ports are all privately leased and operated and are essential to the state's overseas trade, economy and community. In 2001, the government leased to the private sector the state's commercial ports at Port Adelaide, Port Lincoln, Thevenard, Port Giles, Port Pirie, Wallaroo and Klein Point to Flinders Ports. Ardrossan was leased to ABB Ltd. Other privately operated ports include Whyalla (OneSteel), Port Bonython (Santos) and Port Stanvac (Mobil).

The private sector is now principally responsible for port and shipping infrastructure. The government has a role in guiding and facilitating strategically significant high priority developments of net benefit to the state.

The state's major ports are shown in the map below.

Location of South Australian ports



Source: Department for Transport, Energy and Infrastructure,
Sea Freight Export Report 2004-05

In addition to commercial export ports, there are a number of smaller ports and jetties around the coast serving the fishing and aquaculture industry and local recreation. In general local government is responsible for this infrastructure other than the ports of Kingscote, Cape Jervis and Penneshaw, which are operated by the State Government.

South Australia's commercial export ports and the principal commodities exported are outlined below.

Port Adelaide

The Port of Adelaide consists of an inner and outer harbour, complete with over twenty wharves including the DP World Adelaide container terminal. The inner harbour caters for roll-on roll-off and bulk cargoes.

There are six berths at Outer Harbor and each one is equipped to handle specialised cargo. The motor vehicle terminal manages roll-on roll-off trade and other facilities cater for livestock, general cargo and containers. A new deep-sea grain berth has recently been built and a handling facility is under construction.

The Adelaide container terminal, located at Outer Harbor, provides customers with state-of-the-art facilities and services ensuring efficient movement of goods. Intermodal facilities integrate the container terminal with the national rail and road system, enabling the efficient transfer of cargo.

A number of regular liner services call at the Port of Adelaide, offering direct access to a number of key international markets, and access to the world via relay services through Singapore and Malaysia. Port Adelaide provides flexibility for infrastructure development, as well as facilitating cost-effective cargo movements with few delays. The port is recognised for its excellent track record of container terminal efficiency and maintains good working relationships with port service providers.

Port Lincoln

A natural deepwater harbour makes Port Lincoln attractive to large bulk grain carriers for topping up loads from shallower ports in South Australia and Victoria. Grains and seeds are the principal exports and fertiliser and petroleum products are the major imports. The other high value product exported direct from this port is tuna.

Wallaroo

Principal commodities handled through the port are fertiliser imports and grain and seed exports.

Port Pirie

Zinifex Limited operates one of the largest smelters in the world in Port Pirie, exporting large quantities of zinc concentrates and lead. Other exports from the port include grain and seeds, with principal imports comprising minerals, coal and ores.

Whyalla

Exports from Whyalla have shown significant growth, recently led by large increases in the value and volume of iron products. Various iron products are exported from the port, with the largest being ores and fines.

Port Bonython

The Port Bonython processing facility accepts liquid hydrocarbons in a mixed stream of products sent from Moomba via a 659 kilometre pipeline. Petrochemical products exported through the port include propane, butane, crude oil and naphtha.

Port Giles⁷

Port Giles was established in 1970 to export grain and seeds from the southern Yorke Peninsula.

Ardrossan

Statistics for grain exports through Ardrossan are not available through ABS or the port operator ABB Grain. However, ABB Grain recorded a 14% increase in exports of dolomite and salt from Ardrossan in 2004-05.

⁷ Port Giles is not included as such in the Maritrade database, but is incorrectly identified as Klein Point. Klein Point and Port Giles are close together on the Yorke Peninsula. Klein Point is a single purpose port (limestone) used for domestic shipments.

Thevenard

Exports from Thevenard are largely gypsum and wheat.

Further details about each of the above mentioned ports, including location, ship limitations, equipment and facilities, are available at:

<http://www.flindersports.com.au/pdf/PtUserGuideFacilities.pdf>

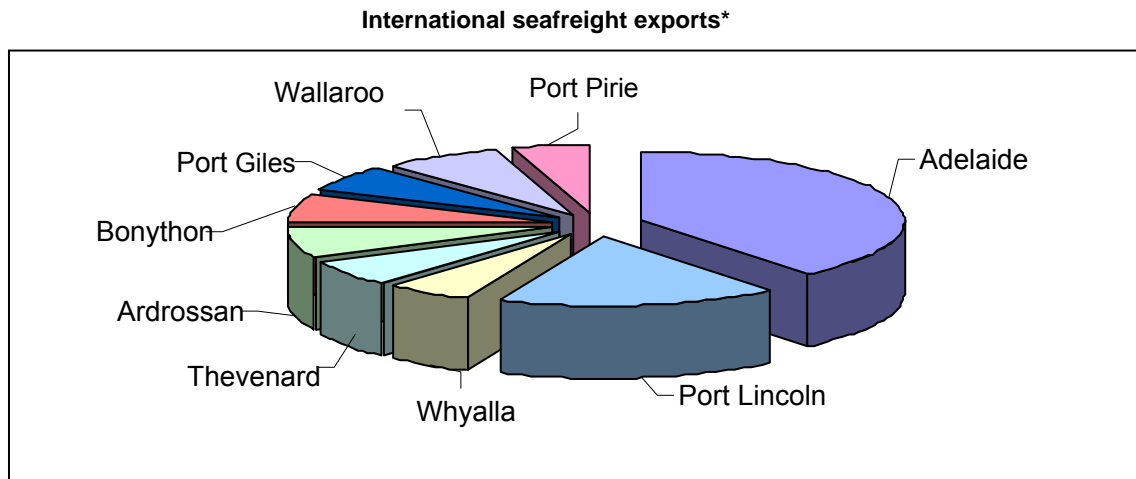
Demand

Over the six years to 2004-05, South Australia's sea freight exports from all ports have risen 17.2% by value and 13.0% by volume. Growth in volume has been led by Port Adelaide and Whyalla.

Export volumes and values for a number of South Australia's regional ports handling grain vary according to seasonal and market factors.

Port Stanvac ceased active operation altogether during this period, with the closure of the Mobil oil refinery.

The following figure presents the distribution of export activity across the state's major ports.



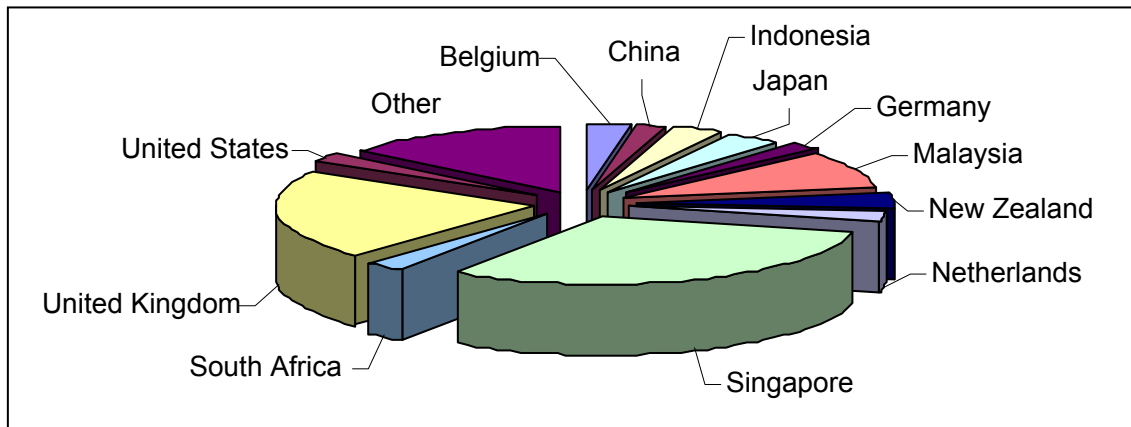
*Shares of total export volume based on annual average for 2000-01 to 2004-05.

Source: ABS Maritrade Database

Over the six years to 2004-05, exports through the Port of Adelaide have grown by about 30% to 3.5 million tonnes per annum valued at \$3.6 billion. This growth has been led by a number of South Australia's key export products including copper, wine, lead and meat.

Container traffic through the Port of Adelaide has also shown steady growth. The figure below indicates a diverse range of export destinations for container traffic, dominated by the United Kingdom and Singapore.

Container exports through Port Adelaide*



*Share of export containers based on annual average for 2001-02 to 2004-05.

Source: Flinders Ports Annual Summary, <http://www.flindersports.com.au>

In the future, infrastructure improvements may be required to keep pace with shifts in international markets and shipping trends. One such trend is increasing ship sizes which led to the channel deepening and may require berth, cargo handling and storage infrastructure improvements. The increase in ship size is likely to impact on liner shipping, and bulk and break bulk shipping services as well as land side services.

The other major driver of port infrastructure investment is the growth in demand for port facilities generated by the state's export growth. Increased demand for shipping is expected for manufacturing, mining, metals processing, forestry, food and grain, wine, beverages and defence.

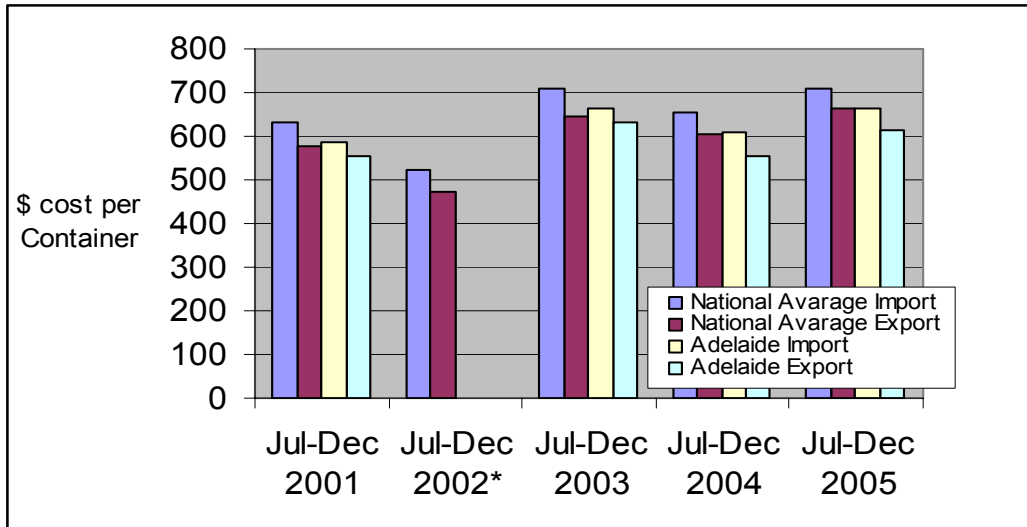
Shipping demand in South Australia is likely to increase significantly as a result of the proposed BHP Billiton Olympic Dam mine and processing plant expansion and further significant mining developments across the state particularly in the north and north west.

Performance

BTRE performance indicators which compare Australia's top five container ports highlight Port Adelaide's efficiency, excellent industrial relations record, and lack of congestion.

The indicators presented below cover the key areas of port performance including port operations, stevedoring and waterside operations.

Port interface cost index (\$ per container)

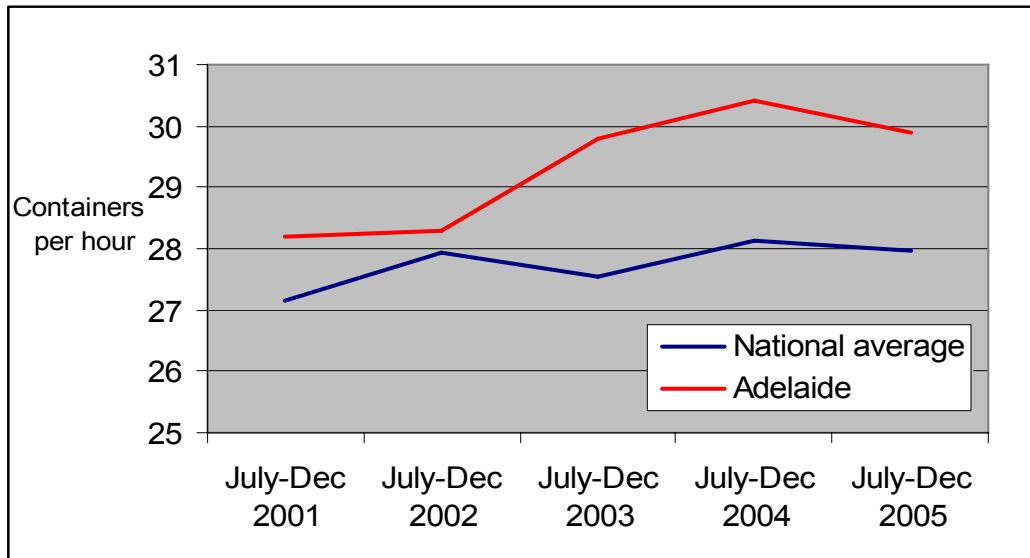


*Note: no data exists for Adelaide in the 2002 period

Source: BTRE, Waterline, May 2006

The port interface cost index provides a measure of shore-based shipping costs (charges) for each container moved through Australian mainland capital city ports. The port interface cost index is based on those costs charged by service providers in most instances. Data are presented for ships in the 35 000 to 40 000 gross tonne (GT) range. The Port of Adelaide has consistently recorded port interface costs below the national average for both imports and exports.

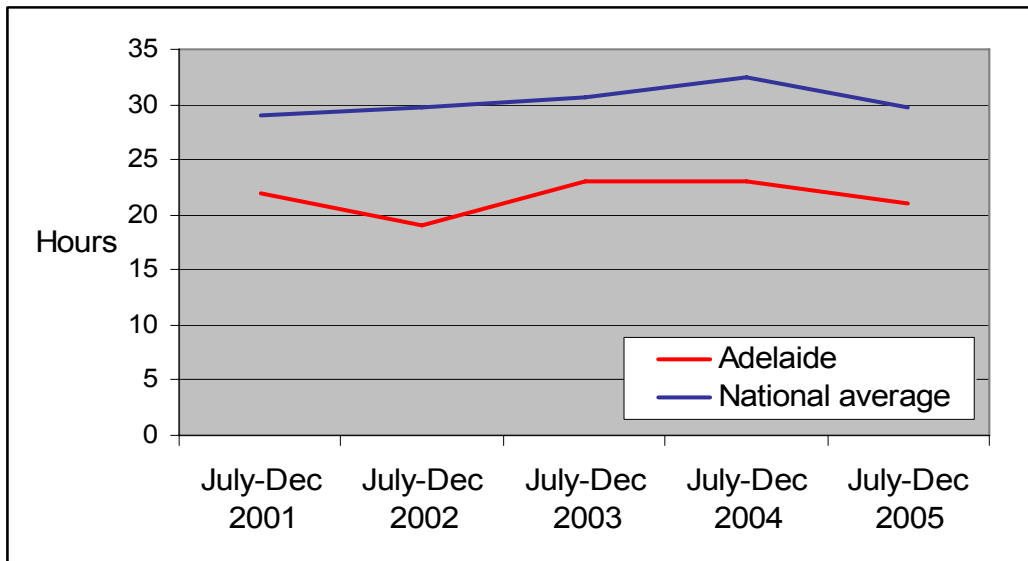
Crane rate (containers per hour)



Source: BTRE, Waterline, May 2006

The crane rate is the number of containers (or TEUs) moved per allocated crane hour less operational and non-operational delays. Higher values indicate higher productivity. Crane rates in Adelaide have improved significantly over the last five years and have consistently exceeded the national average.

Port turnaround time (hours per ship)



Source: BTRE Waterline, May 2006

Turnaround time is the length of time between a ship arriving at a port and being ready to depart. Shorter turnaround times are beneficial for shipping lines and port operators. Adelaide has consistently recorded shorter turnaround times than the national average.

The BTRE is also currently developing other indicators to assist monitoring and analysis of port performance.

Investment

Port Adelaide's export competitiveness has been enhanced as a result of the \$45 million deepening of the main shipping channel at Outer Harbor, undertaken in response to the international shipping trend towards larger ships. The port can now accommodate vessels that require a deeper draft.

Outer Harbor channel deepening

The State Government and the private port operator, Flinders Ports, worked closely together to complete economic and environmental investigations, consult key stakeholders and obtain a development approval (as a Crown Development). The government and Flinders Ports jointly funded dredging works which included deepening the Outer Harbor shipping channel from 12.2 to 14.2 metres, lengthening the channel by approximately three kilometres into the gulf and widening parts of it. Work was completed in August 2006 and fully laden Panamax size vessels are now able to use the port.

The channel deepening is an important element of an integrated infrastructure plan for the port at Outer Harbor, aimed at underpinning its viability and development as the state's key export and import port. It complements and optimises the value of other infrastructure initiatives and the transport network linking to the port.

Flinders Ports is also extending the container berth by 125 metres, at an additional cost of \$13 million, in order to handle the larger container ships expected to schedule Adelaide on their itinerary following the deepening of the channel.

A \$31 million new deep sea grain wharf at Outer Harbor has recently been completed. Work on the \$100 million new ABB grain terminal is underway. The new terminal will include a storage site, conveyor linking the storage site and the wharf and a two kilometre rail loop.

Flinders Ports refurbished the Port Adelaide passenger terminal in 2002. The refurbishment work included improvements to the gangway access from cruise ships to the terminal, upgraded fire sprinklers and firewalls, installation of new windows in the terminal area and escalator improvements.

At Wallaroo, works were undertaken to allow Panamax grain vessels to safely berth for part loading in Wallaroo. Works totalling \$6 million were completed in December 2003, with the first Panamax vessel visiting the port in January 2004.

In 2005, Flinders Ports completed a \$9 million upgrade of Port Giles. These works enable Panamax-sized vessels up to 250 metres long and 80 000 dead weight tonnes (DWT) to use the port and depart fully loaded.

There is potential for further development of Port Bonython as a facility for bulk commodities associated with growth in mineral exports.

Flinders Ports is considering further developments at its ports to accommodate the expected growth in mineral and other exports.

Planning and regulation

The South Australian Government monitors port activity and consults private port operators and users on the steps needed to augment or upgrade port facilities and land-based access to key ports to meet growth in demand for port services.

Strategic priorities for port development, as reflected in the *Strategic Infrastructure Plan for South Australia* are to:

- facilitate redevelopment of the state's export and import harbours to ensure efficient access to international markets and support for regional industries;
- ensure that changes in land use on or near ports and harbours do not preclude current or future transport and harbour activities.

The South Australian Government is working with the private sector to identify infrastructure needs likely to arise from the expected substantial growth in mining activity in the north and west of the state. In particular, the need for a significant new deep water port facility in the Upper Spencer Gulf has been identified. Australian Government support for an infrastructure development of this magnitude will be important in facilitating significant growth in export income.

The legislative arrangements currently in place for ports include:

- the *South Australian Ports (Disposal of Maritime Assets) Act 2000* provides for the disposal of assets of the South Australian Ports Corporation; assignment of employees of the South Australian Ports Corporation; and makes provision for recreational access to ports;
- the *Maritime Services (Access) Act 2000* provides for access to South Australian ports and maritime services on fair commercial terms and for price regulation and monitoring by the Essential Services Commission of South Australia;
- the *Harbours and Navigation (Control of Harbours) Amendment Act 2000* amended the *Harbours and Navigation Act 1993* and established the Port Operating Agreement as the mechanism for the control and management of the state's privatised ports.

AIRPORTS

Supply

Adelaide Airport is South Australia's only international aviation gateway and the hub of the state's interstate and regional air services. Parafield Airport is the state's primary centre of general aviation activity and flight training.

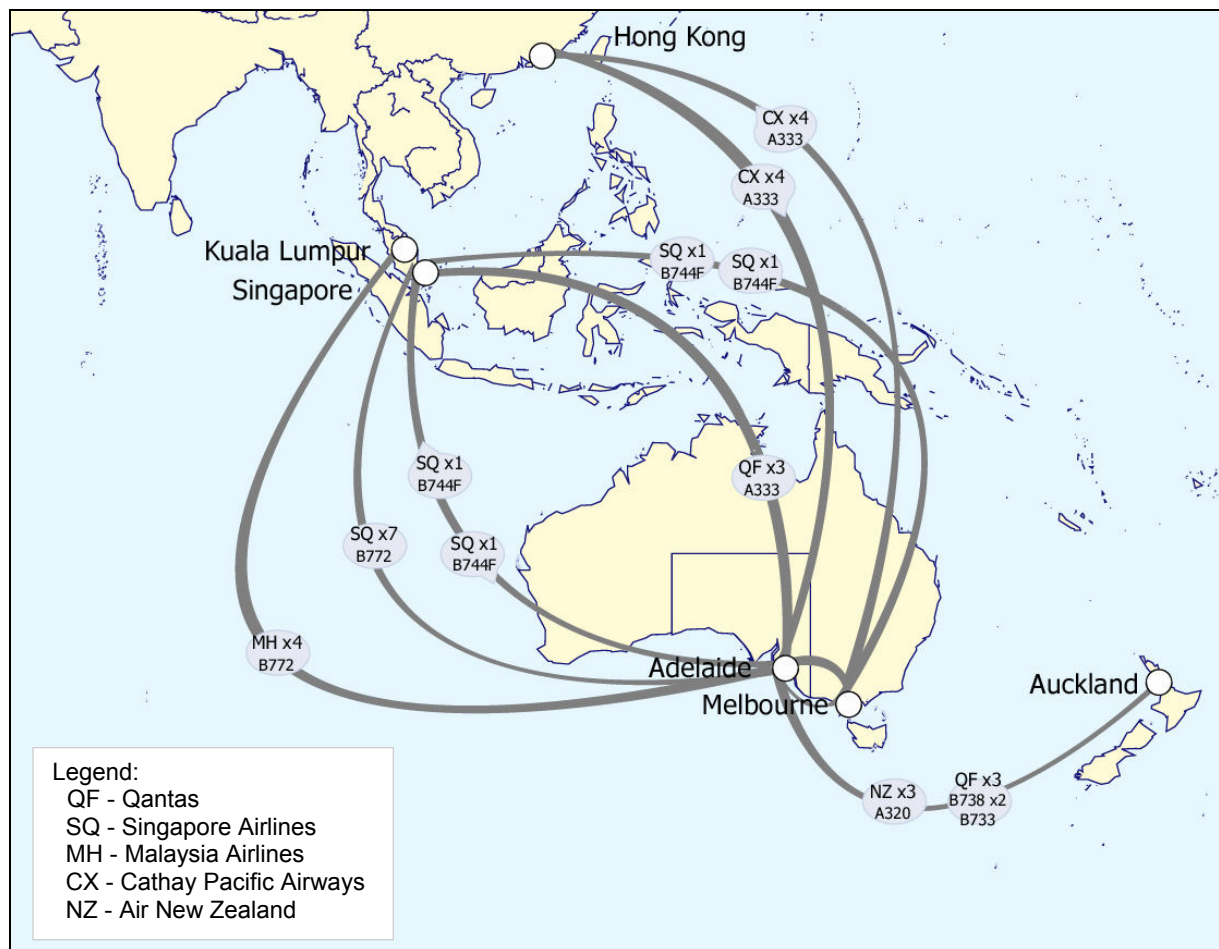
Both are owned by the Australian Government and have been leased since 1998 to a private company, Adelaide Airport Ltd, under long term arrangements involving an initial 50 year lease with the possibility of an extension for a further 49 years.

Adelaide Airport Ltd has been proactive in working with the South Australian Government to develop aeronautical services that increase the state's access to its export and tourism markets, and has developed the necessary infrastructure to cater to the growth in services achieved.

Air service growth has been significant in all market sectors.

International services have grown from 15 return flights per week in 2001 to 24 in 2006, providing an increase in seats from about 3260 each way each week to 5700. In addition to the export freight capacity offered on these flights, Singapore Airlines now operates two dedicated freighter flights each week.

Adelaide weekly international airline services – December 2006



Source: South Australian Government

Interstate services have grown from 430 flights per week offering 56 400 seats over seven routes prior to Ansett's collapse in 2001 to 870 flights offering 139 220 seats over 12 routes in 2006.

South Australian interstate airline services – December 2006



Source: South Australian Government

Further information on Adelaide Airport can be found in the Australian Government's five-yearly infrastructure report to COAG.

The eight regional airports in South Australia that have scheduled air services to and from Adelaide are owned and managed by local government except for Olympic Dam, which is privately owned.

Regional airport infrastructure contributes to Australian exports by providing business access for export industries in regional centres, such as the aquaculture industry in Port Lincoln. Regional airports also play a role in tourism by providing access for international tourists to Kangaroo Island, Port Lincoln, Mount Gambier, Ceduna and Coober Pedy. They are required for the delivery of government services including education, judicial, health and other social services. These services in turn are essential to the social viability of regional centres that underpins their export and tourism industries.

Air freight is crucial for the transport of time-critical high-value products. Adelaide Airport is South Australia's only international export airport. The local government operators of Port Lincoln and Whyalla airports are assessing the demand and funding sources available to extend their facilities to allow direct export to international markets.

South Australian regional airline services – December 2006



Source: South Australian Government

Regional services in South Australia, in common with other states, have suffered attrition in both carriers and routes. However, the replacement of small with larger aircraft has resulted in an overall increase in capacity across the network. In 2001, four airlines provided 556 flights and 10 820 seats per week over 11 routes, which by 2006 had fallen to 508 flights, but this has increased to 14 490 seats over ten routes provided by two airlines only.

Demand

The Australian Government's five yearly infrastructure report to COAG provides information on passenger and freight traffic through Adelaide Airport. Both passenger numbers and freight volumes have shown steady growth with an increase of 7.4% in 2005-06 compared to the previous year.

The key driver for demand at airports is economic growth leading to greater passenger and freight traffic. Some of this economic growth is export related. Airlines respond to increased passenger traffic with more flights or the use of larger aircraft. This may lead to the need for airport infrastructure investment on longer or strengthened runways, taxiways, aircraft parking aprons and increased terminal space.

Performance

The air service growth described earlier has been driven by passenger and freight growth in all sectors. Those traffic statistics are detailed in the Adelaide Airport section of the Australian Government's report to COAG.

While the growth in international services and traffic growth, most important in the export and tourism contexts, has been strong, it should be noted that Adelaide Airport still lags very significantly behind the gateways serving cities closest in size to Adelaide. For instance, in comparison to Adelaide's 24 weekly return flights Perth Airport has about 106 and Brisbane 211. Because of this 61% of the state's air freighted exports and 54% of overseas passengers from South Australia use interstate gateways for international flights. This results in increased transport costs which reduce the competitiveness of the state's export, business and tourism sectors.

Investment

Adelaide Airport Ltd is responsible for investment in aeronautical infrastructure at Adelaide and Parafield airports. Its investment totals \$270 million since 1998 and includes the development of a new integrated passenger terminal accommodating international, interstate and regional flights. The company plans to spend an additional \$85 million over the next five years.

All seven local government owned airports receiving scheduled air services and a number of others in charter and community use were previously owned, operated and funded by the Australian Government. They were transferred to local government ownership by 1991, accompanied, in some cases, by capitalised grants and upgrade works.

Since then it has become clear that other than three or four higher-volume airports, none generate enough revenue for their maintenance or development. In some cases the operating councils provide for these requirements from their rate base or borrowings, but the smaller councils lack these resources and a backlog of essential airports works is accumulating.

The South Australian Government supports the recommendations of the House of Representatives Standing Committee on Transport and Regional Services 2003 report that the Australian Government should resume funding regional airports.

Planning and regulation

Strategic priorities in the *Strategic Infrastructure Plan for South Australia* (subject to availability of funding) include:

- ensuring that any change in land use on or adjacent to key airports does not preclude future transport development;
- providing for the orderly expansion of facilities at regional airports to meet growing passenger and freight activities.

Adelaide and Parafield airports are subject to the Australian *Airports Act 1996*, which regulates their commercial as well as aeronautical development. This has the potential to conflict with the South Australian Government's *Planning Strategy for Metropolitan Adelaide*, particularly about the types of non-aeronautical commercial developments approved. So far, however, the South Australian Government has been able to work closely with Adelaide Airport Ltd to achieve compromise in commercial land uses, with benefits to both the company and the community.

Adelaide and Parafield airports are protected from urban encroachment by a combination of Australian Government airports regulations and the state's *Planning Strategy for Metropolitan Adelaide* as articulated in the Development Regulations and the surrounding councils' Development Plans.

Local government airport owners are responsible for planning their airports and for protecting them from encroachment by incompatible land uses. Some have developed airport master plans to guide development and most have protections in their council Development Plans. The South Australian Government provides guidance to councils on airport planning issues during the development and review of these plans.

The Australian Government is responsible for airport safety and security regulation.

Conclusion

Major improvements have been made to the state's transport infrastructure in recent years. The Adelaide-Darwin rail link was completed late in 2003. The new Adelaide airport is fully operational and the deepening of the Outer Harbor channel at the Port of Adelaide has been completed and large vessels can now be accommodated. New trams have been purchased, the Glenelg tram line upgraded and the new interchange and connector at Mawson Lakes completed.

Notwithstanding these achievements the state faces a number of challenges. Passenger and freight transport loads will continue to grow. Growth in the road freight task over the next 15 years is expected to exceed the national average.

Increasing traffic, particularly freight, will create an extensive maintenance requirement for both state and local governments.

Congestion is likely to cause increased delays on Adelaide roads. There will be a need to manage congestion on major transport routes through a range of capital works projects and transport system improvements and greater use of public transport for peak-hour travel.

The State Government aims to double the use of public transport for metropolitan weekday travel by 2018.

While road safety performance in South Australia has improved recently there is still more to be done to reach the national target of a reduction in road fatalities by 40% by 2010.

The level of international air services to Adelaide Airport and the condition of regional airport facilities is cause for concern as a constraint on the state's export, business and tourism growth.

Some regional sea ports will require investment in new infrastructure to accommodate the expected growth in mineral and other commodity exports. Efficient land-based freight links to these regional ports will also be critical.

An overarching priority is to ensure the transport system in South Australia is sustainable. Motorised transport has a significant impact on air quality, noise and stormwater pollution. Road transport is a significant contributor to air pollution in Australia. South Australia has released its draft greenhouse strategy, *Tackling Climate Change*, which contains strategies to reduce transport-related greenhouse emissions while maintaining accessibility and supporting economic development.

To meet these challenges the South Australian Government has developed the *Strategic Infrastructure Plan for South Australia* which presents priorities for developing the state's transport infrastructure in the next five and ten years.

Specific infrastructure projects currently underway include:

- construction of road and rail bridges at Port Adelaide as part of the State-Australian Government funded Port River Expressway;
- commencement of the upgrade to the Le Fevre Peninsula freight transport corridor improving the freight link to Outer Harbor;
- a new grain wharf has been constructed at Outer Harbor and construction of new grain terminal is underway;
- detailed design work is in progress for the Northern Expressway, a \$550 million new link connecting the Sturt Highway to Port Adelaide;
- Sturt Highway upgrade is under construction;
- Commencement of work on the Eyre Peninsula grain logistics upgrade;

- removal of significant bottlenecks on South Road including intersections at Anzac Highway, (design and acquisition in progress) Port Road/Grange Road and Sturt Road (concept investigations underway);
- start of construction of the Bakewell Underpass;
- commitment to extend the Glenelg light rail line to the Adelaide Railway Station and along North Terrace;
- new Marion Oakland's transport interchange design underway;
- ongoing road safety programs focussing on black spots, shoulder sealing and overtaking lanes;
- improvements to suburban public transport services; and
- targeted improvements to key rural arterial roads.

The State Government is working collaboratively with the Australian Government to develop corridor strategies for the AusLink network. It will work to ensure that state investment priorities are adequately reflected in these strategies and are considered in the next round of AusLink funding. South Australia considers that the defined AusLink network should be expanded to include additional key freight links in Adelaide (portions of South Road and Cross Road) and the south east of the state.

The State Government is also working closely with local government on regional transport plans. In particular, a plan addressing the freight demands in the Limestone Coast region of South Australia was released in July 2006.

Private sector transport infrastructure providers also have an important role to play in meeting the state's transport challenges. The South Australian Government recognises the importance of maintaining regulatory arrangements which promote efficient investment in and use of transport infrastructure. Work is underway to establish a simpler and consistent national approach to regulating significant infrastructure. The government will also continue its one-stop-shop approach to facilitate major new infrastructure investment of strategic significance to the state.

Further information:

www.dtei.sa.gov.au/ – South Australian Government, Department for Transport Energy and Infrastructure

www.auslink.gov.au – Australian Government, AusLink

www.btre.gov.au – Australian Government, Department of Transport and Regional Services

www.btre.gov.au/waterline/wline.aspx – Australian Government, Bureau of Transport and Regional Economics, Waterline Journal

www.flindersports.com.au/ – Flinders Ports SA

www.atcouncil.gov.au – Australian Transport Council

Energy

Supply

Electricity

Overview

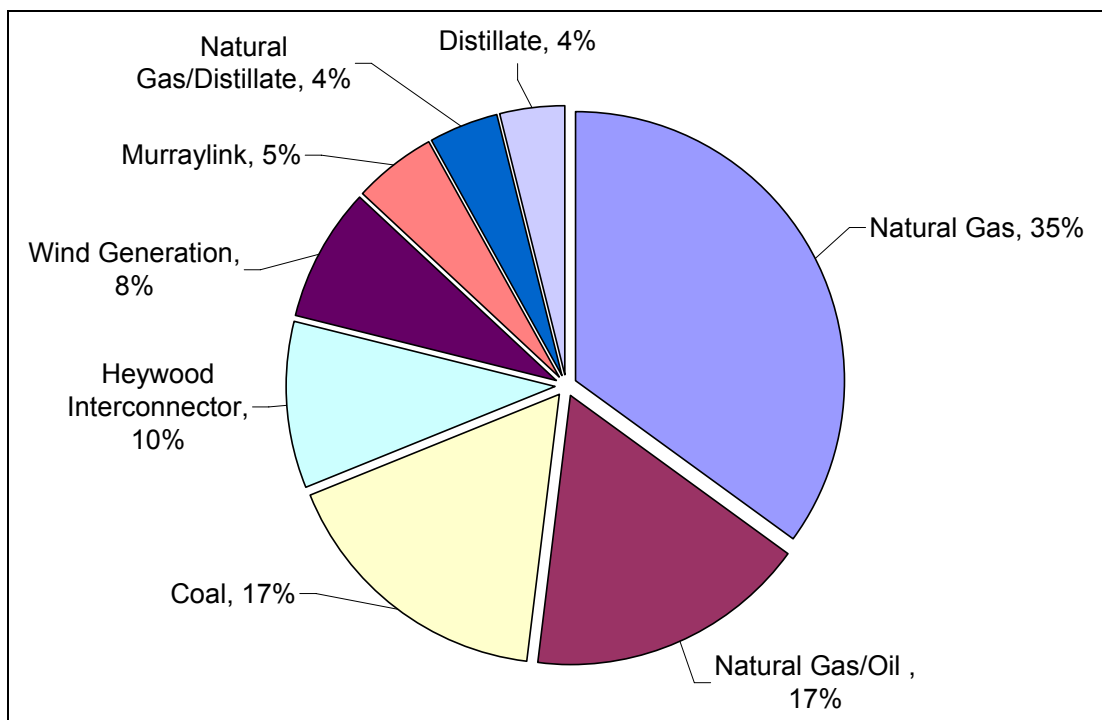
The former government's privatisation of the South Australian electricity supply industry has seen fundamental changes in both the industry and the role of the State Government in South Australia.

Responsibility for funding electricity infrastructure investments now rests with the private owners of the assets who expect to recoup investment costs over shorter time periods with returns to shareholders a key criterion for investment decisions.

The State Government has a role in ensuring that regulatory and institutional arrangements protect consumer interests and promote timely investment in new capacity, as well as securing efficient and reliable energy supplies. The generation and retail sectors of the electricity industry now comprise a number of competing suppliers. The monopoly transmission and distribution network businesses are subject to controls by independent economic regulators.

Generation

Electricity supply to South Australia comes from a diverse range of generators using a fairly balanced mix of fuel types.



Conventional generation

Scheduled generation in South Australia currently consists of two sub-bituminous coal, three distillate, seven natural gas and two stations with dual-fuel firing capability. The total installed name-plate capacity of the generating units in South Australia is currently 3505 megawatts (MW).

Details of the existing conventional generating capacity in South Australia are contained in the following table.

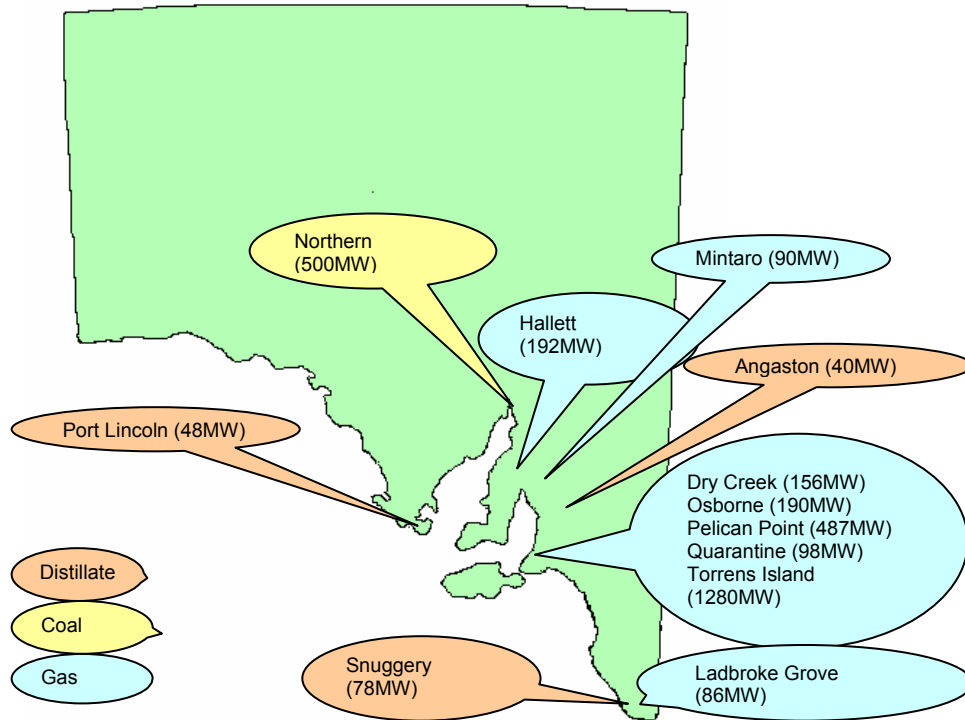
Existing conventional generating capacity

Power station	Station capacity (MW)	Plant type	Fuel	Registered NEM participant
Angaston	40	Reciprocating diesel	Distillate	Infratil
Dry Creek	156	Gas turbine	Natural gas	International Power
Hallett	192	Gas turbine	Natural gas/distillate	AGL
Ladbroke Grove	86	Gas turbine	Natural gas	Origin Energy
Mintaro	90	Gas turbine	Natural gas	International Power
Northern	520	Steam	Coal	NRG Flinders
Osborne	190	Cogeneration	Natural gas	NRG Flinders
Pelican Point	487	Combined cycle	Natural gas	International Power
Playford	240	Steam	Coal	NRG Flinders
Port Lincoln	48	Gas turbine	Distillate	International Power
Quarantine	98	Gas turbine	Natural gas	Origin Energy
Snuggery	78	Gas turbine	Distillate	International Power
Torrens Island A	480	Steam	Natural gas	TRUenergy
Torrens Island B	800	Steam	Natural gas/oil	TRUenergy

Source: Electricity Supply Industry Planning Council *Annual Planning Report* – June 2006

The following map shows where the existing conventional generators in South Australia are located:

Conventional generator locations around South Australia



Source: Electricity Supply Industry Planning Council *Annual Planning Report* – June 2006

Wind generation

The State Government aims to increase the proportion of renewable electricity generated so that it comprises 20% of the electricity consumed in South Australia by 2014. The government has actively encouraged investment in wind generation and South Australia now leads the nation in terms of installed wind generation capacity.

Recent construction of wind farms at Cathedral Rocks and Mount Millar has increased total wind generating capacity to 387.5 MW.

The following table provides details on current wind generation in South Australia.

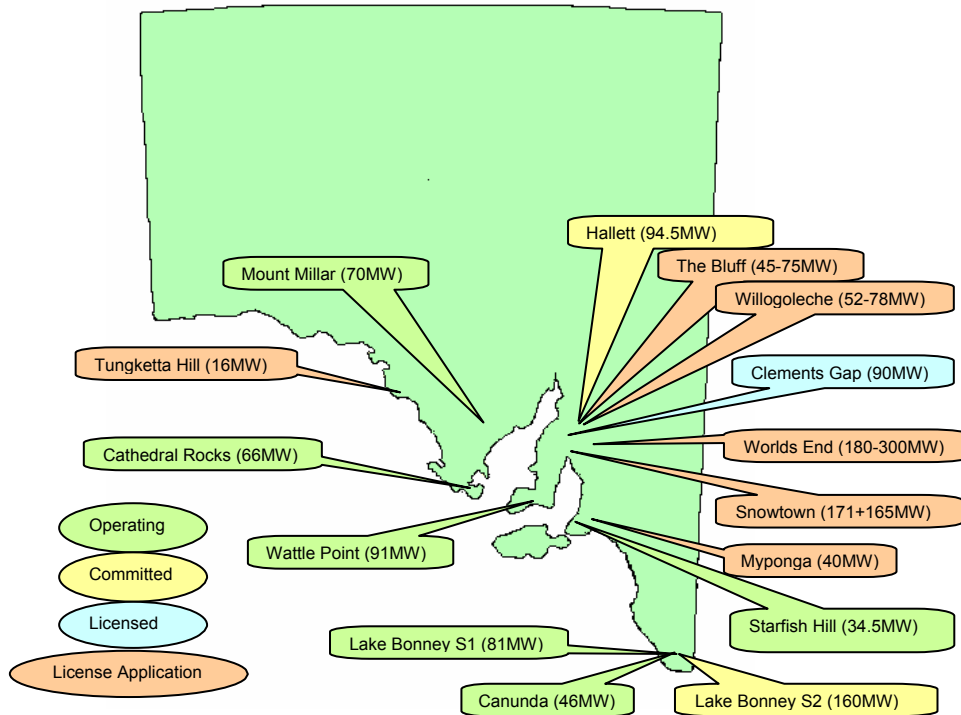
Existing non scheduled wind generation capacity

Registered NEM participant	Power station	Station capacity (MW)
Babcock & Brown	Lake Bonney Stage 1	80.5
HydroTasmania/EHN	Cathedral Rocks	66.0
International Power	Canunda	46.0
AGL Hydro	Wattle Point	90.5
Tarong Energy	Mt Millar	70.0
Tarong Energy	Starfish Hill	34.5
Total		387.5

Source: Electricity Supply Industry Planning Council *Annual Planning Report* – June 2006

The locations of current and proposed wind farms in South Australia are shown in the following map:

Wind farm locations around South Australia



Source: Electricity Supply Industry Planning Council *Annual Planning Report* – June 2006

Wind generation

South Australia has 51% of the nation's installed wind-power capacity.

There are six operating wind farms in South Australia which are all currently non-scheduled. These farms have a combined capacity of 387.5 MW. New wind farms in the state will be required to comply with the Essential Services Commission of South Australia's (ESCOSA) new licence conditions that will, among other things, require the wind farms to be scheduled generators. These conditions aim to preserve the security of the South Australian power system while still enabling wind farms to be constructed in the state.

Wind generation in South Australia currently produces approximately 1300 gigawatt hours (GWh) per annum in an average year, which represents nearly 10% of the total customer sales in South Australia.

Renewable and distributed energy generation

South Australia is a national leader in the field of renewable energy and in tackling climate change, with 51% of the nation's installed wind-power capacity and more than 45 % of the nation's grid-connected solar power.

The most promising renewables of interest to South Australia, based on regional comparative advantages, are wind, solar and geothermal energy. A number of geothermal electricity generation projects are at various stages of development which, if they prove to be commercial, could contribute significantly to future energy needs.

The state's biomass resources, particularly in the south east, can also be exploited. Biofuels have the potential to reduce greenhouse and other emissions if used for transport. Of the 734 contracted buses in the government-owned fleet, 514 run on 5% biodiesel, and six buses are operating on 20% biodiesel on a trial basis, with the remainder of the fleet running on compressed natural gas.

Geothermal energy

South Australia has attracted significant interest and investment in development of geothermal energy. Geothermal energy, produced by pumping fluid through wells drilled into naturally occurring hot rocks has the potential to provide a major Australian and regionally significant sustainable energy supply source. While enhanced geothermal systems (hot rock) technologies are commercially unproven, significant progress and investment in hot rock geothermal energy exploration has been achieved.

To late November 2006, 98 geothermal exploration licences (GELs) have either been granted or are in the process of being granted to 12 companies, leading to a forecast \$515 million expenditure over the period 2002 to 2012. This figure excludes costs for the deployment of demonstration power plants. South Australia holds about 90% of all GELs and GEL applications in Australia and about 90% of total investment in the geothermal sector. Several companies have demonstrated high geothermal gradients with one company, Geodynamics Limited, proving that a significant geothermal resource capable of producing water in excess of 210°C to surface at flow rates of 25 litres a second occurs at its Habanero Project near Innamincka in the state's far north. These are the hottest rocks anywhere in the world outside active volcanic areas.

Future generating options

A further 342 MW of wind generation plant will soon be constructed and is expected to come on stream in 2008:

- Lake Bonney stage 2 wind farm (159.5 MW);
- Hallett (Brown Hill) wind farm (94.5 MW); and
- Snowtown (Barunga Ranges) wind farm (88 MW).

These and other potential future generating options in South Australia are outlined in the table below.

Future generating options in South Australia

Developer	Power Station	Capacity (MW)	Fuel/Plant type	Classification
AGL	The Bluff (Hallett)	94.5	Wind turbines	Publicly announced
AGL	Hallett	250.0	Natural gas/gas turbine	Advanced ⁸
AGL	Brown Hill (Hallett)	94.5	Wind turbines	Committed ⁹ licence granted, complete Q2/2008
ATCO	Osborne 2	180.0	Natural gas/combined cycle	Publicly announced, no firm time frame
Babcock & Brown	Millicent	30.0	Wood waste/steam	Publicly announced, no firm time frame
Babcock & Brown	Lake Bonney Stage 2	159.5	Wind turbines	Committed, licence granted, complete Q1/2008

⁸ A development application has been lodged with the Regional Council of Goyder to increase the generation capacity of Hallett from 180MW to 430 MW.

⁹ For a project to be considered to be 'committed' it must satisfy certain criteria including purchasing of land and signing of contracts for the supply and construction of major components of plant or equipment.

Centrex	Lock	500.0	Coal-fired/steam	Publicly announced, no firm time frame
Geodynamics ¹⁰	Innamincka	40 MW in 2009 420 MW in 2016	Geothermal	Publicly announced
Greenrock ¹¹ Energy	Olympic Dam	NA	Geothermal	Publicly announced, no firm time frame
International Power	Dry Creek	40.0	Natural gas/gas turbine	Publicly announced, no firm time frame
International Power	Mintaro	40.0	Natural gas/gas turbine	Publicly announced, no firm time frame
International Power	Pelican Point 2	240.0	Natural gas/combined cycle	Publicly announced, no firm time frame
International Power	Snuggery	25.0	Distillate/gas turbine	Publicly announced,, no firm time frame
Origin Energy	Quarantine	75.0	Natural gas/combined cycle	Publicly announced, no firm time frame
Origin Energy	Quarantine	2 x 40	Gas	Publicly announced, no firm time frame
Pacific Hydro	Clements Gap	57.8	Wind turbines	Licence granted, no start date set
Pacific Hydro	Far north South Australia	NA	Geothermal/steam	Publicly announced, no firm time frame
Petratherm	Paralana	7.5	Geothermal	Publicly announced, MoU with Heathgate Resources - no firm time frame
Scopenenergy	Millicent	50.0	Geothermal	Publicly announced, no firm time frame
Snowtown Wind Farm Pty Ltd	Barunga Ranges (Snowtown)	88.0	Wind turbines	Licence granted, construction to begin in 2007

Source: Electricity Supply Industry Planning Council *Annual Planning Report* – June 2006

¹⁰ The information contained in this table on Geodynamics has been updated from the information in the Planning Council's June 2006 *Annual Planning Report*.

¹¹ The information contained in this table on Greenrock Energy has been updated from the information in the Planning Council's June 2006 *Annual Planning Report*.

Interconnectors

South Australia is connected to the NEM via interconnectors linking to Victoria.

Local generation supplies 85% of South Australia's electricity consumption, with the Heywood and Murraylink interconnectors contributing the remainder. The Heywood interconnector, which has been in operation since 1990, is located in the south east of the state and has regulated status.

When originally conceived and built by TransÉnergie, Murraylink was an entrepreneurial interconnector between Monash in South Australia and Red Cliffs in northern Victoria. Following its completion, TransÉnergie applied to the Australian Competition and Consumer Commission (ACCC) to have the status of the interconnector changed to a regulated asset. Murraylink has been in commercial operation since 4 October 2002 and operating as a regulated interconnector since 8 October 2003.

The recent completion of Basslink, a 360 kilometre interconnector between Tasmania and Victoria, enables supply of 600 MW of capacity into the combined South Australian–Victorian region.

Transmission

ElectraNet Pty Ltd is the sole electricity transmission company in South Australia. ElectraNet, which is privately owned, owns and operates a network of almost 6000 circuit kilometres of transmission lines and 76 substations or switchyards.

The following map shows ElectraNet's South Australian transmission network.

ElectraNet's transmission network



Source: Electricity Supply Industry Planning Council Annual Planning Report – June 2006

Distribution

ETSA Utilities is the major electricity distribution company in South Australia. The privately owned company, owns and operates a network of 393 zone substations and 80103 kilometres of powerlines. Other minor distributors operate in some regional and remote areas.

Retail

At present, the electricity retailers licensed to operate in South Australia are: AGL South Australia Pty Ltd, Aurora Energy Pty Ltd, Country Energy, EnergyAustralia, Energy Australia Pty Ltd and IPower Pty Ltd, Ergon Energy Pty Ltd, International Power (Retail) Pty Ltd, Jackgreen (international) Pty Ltd, Momentum Energy Pty Ltd, NRG Flinders, Origin Energy Electricity Ltd, Powerdirect Pty Ltd, Red Energy Pty Ltd, South Australia Electricity Pty Ltd, Sun Retail Pty Ltd TRUenergy Pty Ltd, and TRUenergy Yallourn.

The South Australian retail electricity market is one of the most competitive in the world, with latest statistics showing that over 60% of customers in South Australia have switched to market contracts.

Gas

Overview

The natural gas industry in South Australia comprises four sectors: exploration and production, transmission, distribution, and retail. These sectors take natural gas from the point of extraction to the point of consumption.

In South Australia, responsibility for gas infrastructure investments rests with the private owners of the assets. There is competition in the production and retail sectors of the industry. The monopoly gas distribution network business is controlled by an independent economic regulator. One of the gas transmission network businesses is controlled by an independent economic regulator, while the other gas transmission business is unregulated.

Exploration and production

South Australia's natural gas is predominantly sourced from the Cooper-Eromanga basin (which straddles north east South Australia and southern Queensland) and, more recently, the Otway basin (which lies offshore from Victoria). Prior to 2004, South Australian gas supplies were entirely supplied from the Cooper Basin and the onshore Otway Basin. Completion of the SEA Gas pipeline in 2004 has allowed gas from offshore fields adjacent to Victoria to be delivered to Adelaide.

Without new discoveries, gas supplies from existing basins (Cooper, Otway, Gippsland, Bass) are sufficient to meet the needs of south eastern Australia (including South Australia) until the middle of the next decade. With moderate exploration success in these basins, the period of full supply is extended to around 2018. In addition, significant coal seam gas reserves are being developed in Queensland and NSW. When combined with gas reserves located to the north of Australia (Papua New Guinea, Carnarvon, Browse, Bonaparte and Timor Sea Basins), these reserves are expected to be sufficient for eastern Australian demand well into the period 2025-2030.

Gas processing

Gas processing is required to convert raw gas streams to sales products (sales gas, ethane, LPG and condensate).

The Moomba gas plant has operated since 1969 and will continue to make a major contribution to sales gas delivery to South Australian markets in years to come. There is potential for the Moomba plant to provide processing from other sources. The Moomba facility includes gas storage reservoirs which are used primarily to manage peak market demand, but also to augment emergency supplies if short to medium-term supply interruptions occur.

A second gas processing plant is also located at Katnook, near Penola in the south east of South Australia. The long-term significance of this facility has lessened with the decline of local gas fields and construction of a connection from the SEA Gas pipeline to Katnook. There is potential for depleted reservoirs to be used for gas storage, which could extend the life of the Katnook plant.

Transmission

The transmission pipeline systems supplying the South Australian market include:

- the Moomba to Adelaide pipeline system, a 1115 kilometre system of transmission pipelines which services Moomba, Adelaide and regional centres throughout South Australia. This system is owned by Epic Energy South Australia Pty Ltd (Epic) and is made up of the main Moomba to Adelaide trunk line and laterals;
- the SEA Gas pipeline, a 690 kilometre pipeline jointly owned by International Power Australia, Origin Energy and TRUenergy – between Port Campbell (in Victoria) and Pelican Point (in Adelaide);
- the SESA pipeline, owned by Origin Energy, which connects the SEA Gas pipeline to the south east pipeline system;
- the south east pipeline system, owned by Epic, which supplies gas from the Katnook Gas Plant near Penola to domestic and industrial customers at Mount Gambier and other customers in the south east of South Australia; and
- the Riverland pipeline system, owned by Envestra, which supplies gas to Murray Bridge and the Riverland markets in South Australia and Mildura (Victoria).

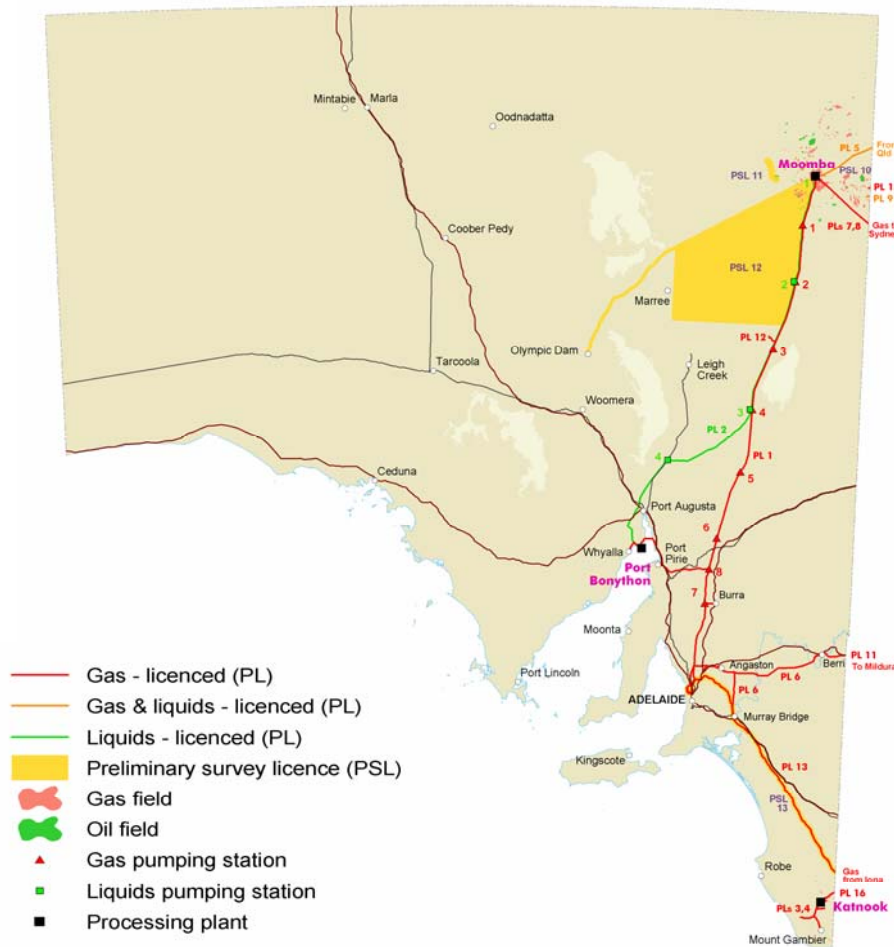
Transmission pipeline projects currently under active consideration include:

- BHP Billiton's Olympic Dam pipeline proposal to deliver gas from the Moomba to Adelaide Pipeline to the Olympic Dam mine site;
- Epic Energy's/Australian Pipeline Trust's North Gas Link project to deliver sales gas from Ballera in Queensland to Moomba providing a direct physical link from Queensland's coal seam gas reserves to the south eastern Australian markets.

The development of a more complete gas network between fields and states is promoting gas competition and more robust security of supply.

The following map shows the locations of gas pipelines in South Australia.

Gas pipelines in South Australia



Source: Primary Industries and Resources SA

Distribution

The South Australian natural gas distribution system is owned by Envestra and operated under a service contract by Origin Energy Asset Management (OEAM). OEAM is a wholly owned subsidiary of Origin Energy Ltd.

The Envestra gas network consists of around 7000 kilometres of pipelines and is comprised of six natural gas operating regions. These are: Adelaide, the south east, Whyalla, Port Pirie, the Riverland and Peterborough.

Retail

At present, gas retailers licensed to operate in South Australia are: AGL South Australia Pty Ltd, the EA-IPR Retail Partnership, Jackgreen (International) Pty Ltd, Origin Energy Retail Limited, Santos Direct Pty Ltd, South Australia Electricity Pty Ltd and TRUenergy Pty Ltd.

Demand

Electricity

The South Australian Electricity Supply Industry Planning Council (ESIPC) projects peak demand to rise by an average of 1.7% annually from 2005-06 to 2015-16 and overall customer sales to also grow at an average of 1.7% per annum over the forecast period.

South Australia's electricity demand is highly dependent on ambient temperatures across the greater metropolitan area of Adelaide. Cold conditions give rise to high levels of demand during winter, while extreme hot days produce demand spikes during summer. Heating and cooling appliances such as space heaters and air-conditioners give rise to temperature sensitive load, with the actual peak in any season reflecting prevailing weather conditions and the consequent use of these appliances.

In South Australia, peak electricity demand is much higher than average demand. This results in a low load factor and a large portion of generation capacity required to meet peak demand having low utilisation. Demand side measures to enable more efficient use of electricity assets are being investigated, including a direct load control scheme currently being trialled by ETSA Utilities.

Growth of the daytime base load averaged around 19 MW annually over the past four years. This period was associated with the loss of two medium sized industrial loads (the Mitsubishi Motors engine plant and the Mobil refinery) and coincided with a period of higher retail prices, especially within the residential sector. In comparison, the Planning Council forecasts average growth of around 26 MW annually over the next decade. This includes a small increase in the load at Olympic Dam (which is not related to the proposed major mine expansion) and spot load increases in the north of the state, as advised by ElectraNet.

Electricity sales forecasts for South Australia are shaped by a number of factors, which include:

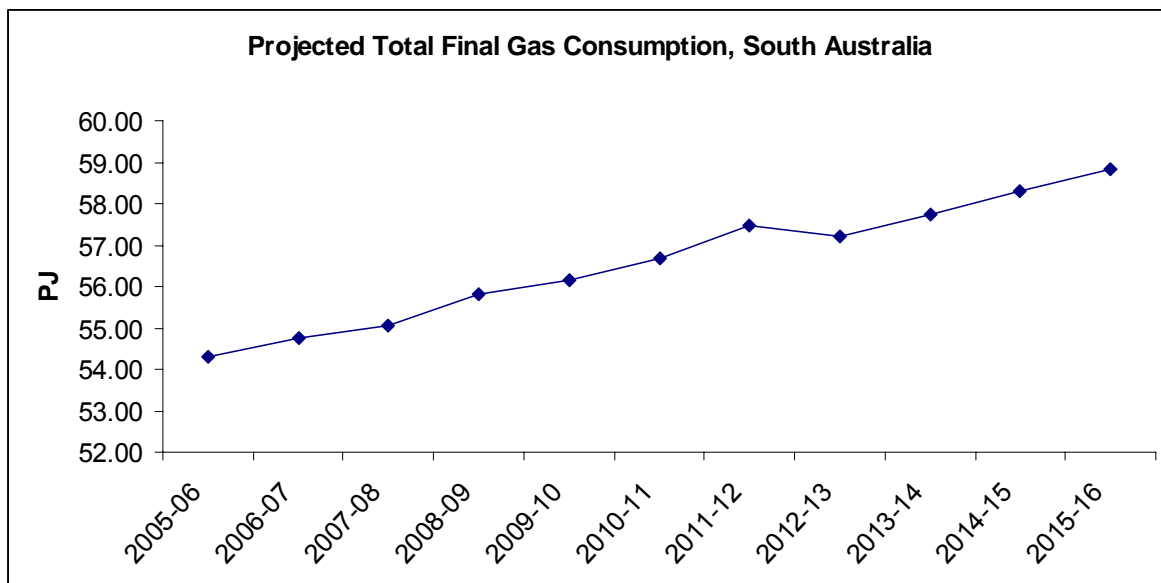
- the economic outlook for the South Australian economy;
- the outlook for major load. There is a very large expansion proposed at the Olympic Dam site by BHP Billiton which is currently in the pre-feasibility study stage. A decision is expected on the project by the end of 2007;
- the impact of changes in building standards on electricity usage. The South Australian Government introduced a five Star energy rating for new residential dwellings built from May 2006. Commercial building standards are also being reviewed periodically by the Australian Building Codes Board; and
- Australian Government policies such as changes to the Mandatory Renewable Energy Target relating to solar hot water, and new Minimum Energy Performance Standards for air-conditioning equipment and other electrical appliances.

Gas

According to the Essential Services Commission of South Australia (ESCOSA) 2006 Annual Performance Report for the South Australian Energy Retail Market, in 2005-06 total final retail gas sales were 38370 terajoules (TJ), of which large businesses consumed 75.9%, small businesses 3.3% and residential customers 20.8%.

According to ABARE data, overall retail customer sales are forecast to grow at an average of 0.8% per annum over the period 2005-06 to 2015-16 as shown in the graph below.

The Planning Council's June 2006 Annual Planning Report shows that a further 54000 TJ of gas were used for electricity generation in 2005-06. Gas fired generation supplied approximately 41% of the state's electricity needs in that year.



Source: ABARE, 2007

Performance

The state's independent economic regulator, ESCOSA, is proactive in monitoring the performance of the electricity and gas distribution and retail sectors in South Australia.

Electricity

ETSA Utilities has, over the period 2000-01 to 2004-05, largely been able to meet the reliability targets set by ESCOSA.

Despite significant year-to-year variability over the five years, no apparent trend emerged in either the State-wide System Average Interruption Duration Index (SAIDI)¹² or State-wide System Average Interruption Duration Index (SAIFI)¹³ performance.

According to ESCOSA¹⁴, around 499 000 small¹⁵ customers have transferred to electricity market contracts since commencement of electricity full retail contestability (FRC) on 1 January 2003, equivalent to 66% of the small electricity customer base of 755 000.

The State Government has taken an active interest in ensuring that the retail electricity market is competitive. For example, it provided an electricity transfer rebate to concession holders transferring from the standing contract to a market contract. The rebate, which was phased out in August 2004, was received by over 92 000 customers.

Gas

There are fewer service standards imposed on Envestra (for example, in relation to reliability of the distribution network) than on ETSA Utilities. This reflects the more reliable nature of gas, particularly in relation to supply interruptions and variations in quality of supply, in comparison with electricity. It also reflects the fact that in South Australia the distributor does not have a direct contractual relationship with customers, in contrast to the electricity industry. The incidence of

¹² SAIDI is measure of how long each customer is without supply for the year when averaged over all customers in the network (or specified part of the network).

¹³ SAIFI is a measure of the number of supply interruptions each customer experiences for the year when averaged over all customers on the network (or specified part of the network). In SA, interruptions of less than 30 seconds duration are not included in this measure, consistent with practices in most other states. Both planned and unplanned interruptions are included in the measure.

¹⁴ Completed small customer electricity and gas transfers to market contracts, October 2006.

¹⁵ A small electricity customer refers to all residential customers and those business customers with an annual consumption of less than 160 MWh.

unplanned interruptions in gas distribution is very low and the quality of distribution supply is generally good. According to ESCOSA Envestra has a high level of compliance with promptness of connection requirements.

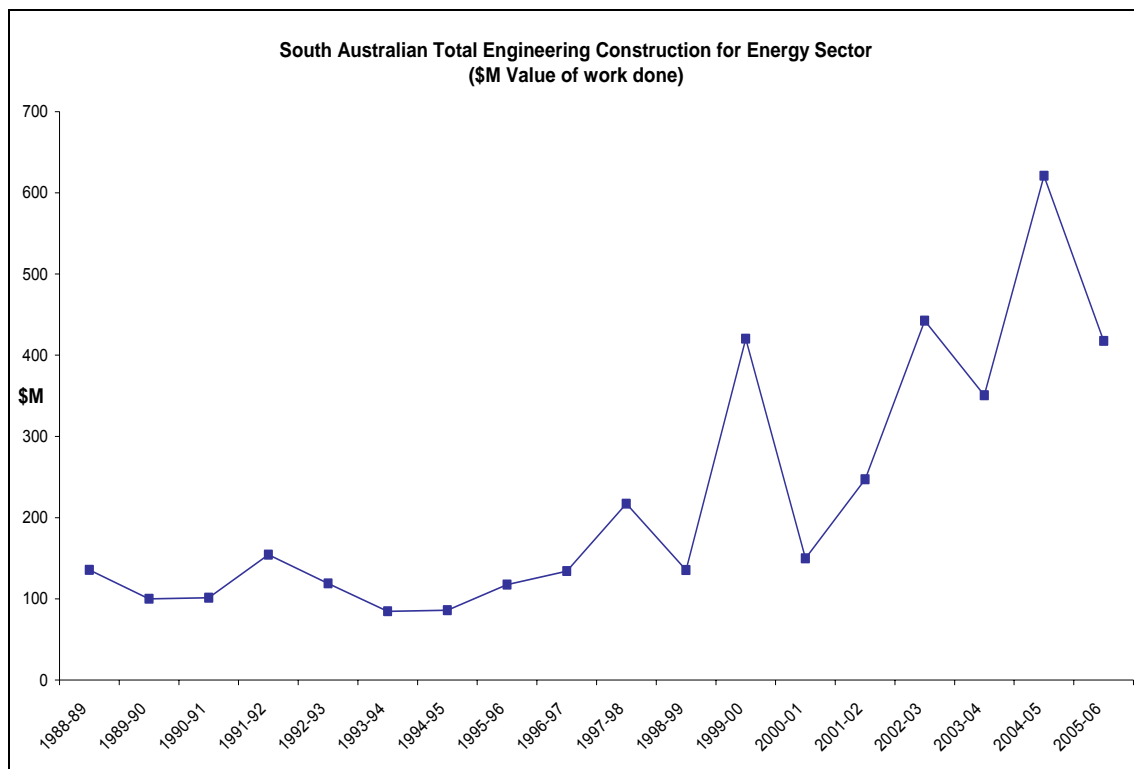
According to ESCOSA¹⁶, around 229 000 small¹⁷ customers have transferred to gas market contracts since commencement of gas FRC on 28 July 2004, equivalent to 62% of the small gas customer base of 370 000.

Investment

Overview

South Australia's electricity and gas markets are fully privatised and investment is the responsibility of the private sector. The following graph shows the growth in annual infrastructure investment in the energy sector in South Australia since 1988-89. The main drivers of investment are demand growth, asset replacement and refurbishment requirements and the need to meet regulated service standards.

The South Australian Government works closely with the electricity and gas industries to facilitate necessary government approvals for new investment using a one-stop-shop approach. This includes sponsorship and support by the government's Office of Major Projects and Infrastructure for applications for development consent for infrastructure proposals under the Crown development provisions of the *Development Act 1993*. This approach has been very successful in achieving timely augmentation to capacity in recent years, particularly in the case of electricity generation and transmission and gas transmission infrastructure.



Source: ABS catalogue no. 8762.0 Engineering Construction Activity, Australia Table 22

¹⁶ Completed small customer electricity and gas transfers to market contracts, October 2006.

¹⁷ A small gas customer refers to all residential customers and those business customers with an annual consumption of less than 1TJ.

Electricity investment

Generation

The investment response to the hot summer of 2000-2001 in South Australia (which included the Quarantine, Hallett and Lonsdale power stations in South Australia, and the Somerton and Valley Power investments in Victoria) suggests that the National Electricity Market (NEM) is capable of bringing forward investment, although private investment timing tends to be cyclical with large infrequent increments of capacity being added only when market signals emerge and economies of scale can be achieved.

AGL, Babcock & Brown and Trustpower have committed to the construction of separate wind turbine projects with a combined capacity of 342 MW. Construction is due to be completed in 2008.

Most of the incumbent generation companies in the state and a number of potential new entrant organisations have well advanced expansion or new development projects planned and are actively monitoring market conditions to proceed.

Based on ESIPC advice on the supply-demand balance, investment in new generating capacity is likely to be required to meet increasing demand while maintaining appropriate levels of reliability in the combined South Australian-Victorian market. As previously discussed, there are number of generating options which could meet this need.

A number of geothermal electricity generation projects are at various stages of development in South Australia. Should this energy source prove to be fully deliverable, it offers the potential to supply a significant portion of Australia's energy needs and to lower national greenhouse gas emissions. The Government believes that ongoing support from the Australian Government will be critical in facilitating development of commercial generation projects.

Transmission

ElectraNet has a regulated asset base valued at around \$824 million and at the beginning of the last reset¹⁸ the regulator allowed \$296 million in capital expenditure over the five and a half year regulatory period to July 2008.

The next twelve months will see ElectraNet finalise its estimated capital expenditure requirements for electricity transmission projects out to 2013. Growing demand and ageing assets are likely to result in an increase in the level of capital spending over the 2008–2013 period. Several key projects supplying the greater Adelaide area and the central business district are expected to be a core part of the proposed capital program.

Current network plans do not include any projects to increase the interconnection capacity into South Australia. Analysis of options to increase the capacity of interstate transfers of energy will continue through the national planning processes and, in particular, the Annual National Transmission Statement, which is contained in the National Electricity Market Management Company's (NEMMCO) publication, the Statement of Opportunities.

Distribution

ETSA Utilities has a regulated asset base valued at around \$2466 million and at the last reset the regulator allowed \$753 million in capital expenditure over the five year regulatory period. In addition, ETSA Utilities was allocated \$20 million by ESCOSA over the five year regulatory period to 2010 for a series of trial programs on demand management initiatives.

¹⁸ The term 'reset' refers to the evaluation process undertaken and ultimately the decision made by the relevant economic regulator (in this case the ACCC) prior to the commencement of a regulatory control period, which is typically of five years' duration. Under a regime of economic regulation, the regulator typically sets the maximum revenue the regulated entity may earn over the coming regulatory period. This involves, amongst other things, setting forward-looking benchmarks for capital expenditure.

ETSA Utilities also seeks out commercial construction and maintenance opportunities. Late in 2006 the company announced a \$50 million project to construct a 170 kilometre 132 kilovolts (kV) line from Olympic Dam to the new Prominent Hill copper-gold mine, 650 kilometres north west of Adelaide.

ETSA Utilities' \$20 million demand side management (DSM) initiatives pilot

In its last Electricity Distribution Price Determination, ESCOSA provided a maximum of \$20 million funding to ETSA Utilities over five years for pilot programmes in an attempt to address this state's peakiness of electricity demand.

These pilot programmes include improving power factors at customer installations, investigating standby generation as a means of network support, aggregating demand management resources within the NEM, and a trial of direct load control (DLC) of residential customers' air-conditioners. In this, small remote-controlled devices are used to manage the use of air conditioner compressors (but not their fans) for a few minutes over a few hours on the state's small number of peak demand days. The first publicly available data on the DLC trial is expected to be released by ESCOSA in April 2007.

Gas investment

Transmission

Epic has a regulated asset base valued at about \$345 million and Envestra has a regulated asset base valued at around \$15 million. The \$500 million SEA Gas pipeline began transporting gas to Adelaide in January 2004. This investment was facilitated by the South Australian Government in recognition of its significant contribution to gas supply security in the state.

In the longer term, as gas reserves supplying the south east Australian market are depleted, investment in major new gas pipelines to access gas from northern (offshore) Australia and Papua New Guinea will be required. To ensure the long-term security of gas supply joint facilitation by State and Australian Governments will be critical to ensuring timely investment in a major new trans-Australian pipeline.

South Australia, as lead legislator, played a significant role in the passage of the *Gas Pipelines Amendment Act* in 2006, which includes provisions for 'greenfields' pipelines that provide certainty for investors and will encourage such pipelines to be built.

Distribution

Envestra Ltd has a regulated asset base valued at around \$771 million, and at the last reset the regulator allowed \$195 million in capital expenditure over the five year regulatory period to 2011.

Planning and Regulation

Provision of a reliable and affordable supply of energy through timely investment in new electricity generation capacity, alternative energy sources and augmentation of supply networks (gas and electricity), combined with measures to manage growth in peak demand, will contribute toward the achievement of South Australia's Strategic Plan targets aimed at growing prosperity and attaining sustainability.

Specific targets in *South Australia's Strategic Plan* related to energy are:

- increase the proportion of renewable electricity generated so that it comprises 20% of electricity generated and consumed by 2014. This includes leading Australia in wind and solar generation connected to the national grid on a per capita basis and leading Australia in geothermal resource investment;
- improve the energy efficiency of government buildings by 25%, and dwellings by 10%, by 2014.

Strategic Infrastructure Plan for South Australia

The *Strategic Infrastructure Plan for South Australia* contains strategic priorities for energy, aimed at, amongst other things:

- encouraging competition and providing regulatory certainty to businesses to encourage investment;
- ensuring the market provides reliable and affordable sources of energy by, for example, facilitating greater inter-connectivity of state gas transmission pipelines to ensure that South Australia has access to multiple gas supplies at competitive prices;
- promoting the adoption of demand-side measures;
- promoting the development of market and regulatory arrangements that encourage energy industry developments that minimise growth in greenhouse gas emissions; and
- supporting research and development in renewable energy technologies.

Electricity planning

The South Australian Electricity Supply Industry Planning Council (ESPIC) plays an important role in providing information to markets to ensure appropriate investment. ESPIC independently develops and reports on electricity load forecasts (over a ten year period), the performance of the state's power system and matters relating to future capacity and reliability. It also publishes an Annual Planning Report which is an annual review of the performance, capability and reliability of the South Australian electricity supply system.

The National Electricity Market Management Company (NEMMCO) also makes ten year forecasts, from the information provided by the ESIPC, in its Statement of Opportunities which incorporates its Annual National Transmission Statement (ANTS). The ANTS provides important national information to improve transmission planning for each transmission network.

Regulation

ESCOSA is responsible for the economic regulation of ETSA Utilities, the major electricity distribution business in South Australia, and Envestra, the major gas distribution business.

ESCOSA is also responsible for gas and electricity retail price regulation, that is setting standing contract prices for small electricity customers (those customers who consume less than 160 MW/hour of electricity per annum), and small gas customers (those customers who consume less than 1 TJ of gas per annum).

AGL South Australia is the electricity standing contract retailer and Origin Energy Ltd is the gas standing contract retailer.

Responsibility for economic regulation of electricity and gas distribution is expected to transfer from ESCOSA to a national body, the Australian Energy Regulator (AER), by July 2007 and responsibility for non-economic regulation of electricity and gas retail and distribution is expected to transfer to the AER by January 2008.

Conclusion

The South Australian and national energy markets have undergone significant changes in recent years. In South Australia, the energy supply industry has been fully privatised and, in accordance with the Ministerial Council on Energy's reform agenda, there is a shift underway from state-based to national institutional and regulatory arrangements governing the industry.

The State Government, as the lead legislator, is working with other jurisdictions and the industry to develop new policy and regulatory frameworks for the national energy market which are designed to promote efficient investment in and use of energy infrastructure.

In the short term, managing peak demand is likely to be a key issue for the NEM should the current extreme drought conditions persist. Balancing the needs of water consumers and the environment with the commercial interests of hydro generators by releasing water from storage, is likely to impact on hydro generators' capacity, particularly Snowy Hydro, to generate electricity at times of peak demand in the NEM.

In the longer term, the issue of sourcing fuel to meet south eastern Australia's growing demand for energy will need to be considered within the context of a carbon constrained future. Possible options include sourcing gas from the north and bringing a potential sustainable solution of geothermal energy to market.

A key issue to be addressed in the future development of the electricity and gas industries is climate change and the way governments, industry and the community will respond and adapt to this change. South Australia has received international recognition for its response so far.

The lack of a coherent national policy on greenhouse emissions and renewable energy is creating uncertainty for energy industry investors and needs to be addressed by the Australian Government.

The State Government has set a target for cutting greenhouse gas emissions by 60% of 1990 levels by 2050 and increasing the use of renewable electricity to 20% of total electricity consumption by 2014. The Climate Change and Greenhouse Emissions Reduction Bill 2006 was introduced into Parliament late in 2006. The legislation is the first of its kind in Australia and will give legal effect to these ambitious targets and provide for the introduction of measures to achieve them. The overall intent of the legislation is to focus on voluntary measures and collaboration to achieve change.

The government will continue to promote increased consumption of renewable energy with a focus on:

- leveraging investor interest in wind farms, geothermal energy and biomass plants;
- increasing the penetration rates of solar hot water heaters and photovoltaics (PV);
- active programs of research and development, particularly in solar PV and geothermal energy; and
- addressing the complexities of managing significant quantities of intermittent wind generation in conventional electricity networks.

In 2005, South Australia convinced the Council of Australian Governments to address climate change at the highest level. As a result, a detailed national action plan is now being developed by all jurisdictions to tackle this issue.

South Australia is also working with other State and Territory Governments to establish a national emissions trading scheme. Emissions trading systems are considered a cost-effective mechanism for reducing emissions. The establishment of a national scheme, initially in the stationary energy sector, would also put an end to the policy uncertainty that has faced investors and, by costing the environmental impacts of electricity supply, will promote development of the electricity industry in a more sustainable way.

Further information:

<http://www.esipc.sa.gov.au> – Electricity Supply Industry Planning Council
<http://www.escosa.sa.gov.au> – Essential Services Commission of South Australia
<http://www.accc.gov.au> – Australian Competitive and Consumer Commission
<http://www.aer.gov.au> – Australian Energy Regulator
<http://www.aemc.gov.au> – Australian Energy Market Commission
<http://www.mce.gov.au> – Ministerial Council on Energy
<http://www.nemmco.com.au> – National Electricity Market Management Company
<http://www.electranet.com.au> – ElectraNet Pty Ltd
<http://www.etsa.com.au> – ETSA Utilities

Water

Supply

Surface water resources are distributed unevenly throughout the state and are highly variable. The most reliable surface water resources are those from the River Murray, the Mount Lofty Ranges near Adelaide, and the south east region of the state. Under the Murray-Darling Basin Agreement 1992, South Australia's minimum River Murray entitlement flow is 1850 gigalitres (GL) per year. Historically the actual flow has been greater than this with a median annual flow of 4800 GL. Most of the state depends on water supply from the Mount Lofty Ranges and the River Murray.

Groundwater resources are more evenly distributed, generally less variable and are a vital resource in many areas of the state. Groundwater is an important source of drinking water in the south east and Eyre Peninsula and supports irrigation development in the south east, Eyre Peninsula, mid north, and Adelaide and Mount Lofty Ranges regions. The Great Artesian Basin located in the north east of the state has been a critical water source for pastoral development and is of growing significance for mining. The northern towns of Coober Pedy and Roxby Downs both draw from the Great Artesian Basin and use desalination technology for their water supplies.

The Mount Lofty Ranges water catchment is not able to supply all of Adelaide's urban water requirements on its own. The ten reservoirs around Adelaide have a combined capacity that can meet slightly less than one year's annual demand. The sustainable yield from local catchments does not allow an increase, which limits the opportunity to build any more major dams.

South Australia has built large pipelines from the River Murray to supplement its other water supplies and the reliability of the river is critical for ensuring its water supply. While South Australia takes only 7% of the water extracted from the entire Murray Darling system annually, it is still a vital resource. For example, the River Murray provides on average 40% of Adelaide's water needs and in dry years can provide more than 90% of requirements.

There are 26 townships supplied directly from the River Murray, which also augments local water supplies in the mid north, Upper Spencer Gulf, south east and Eyre Peninsula. The Clare Valley water supply scheme was completed in 2004-05, allowing many townships and irrigators in this region access to reticulated water supply for the first time. Construction of a new pipeline on Eyre Peninsula is underway to augment that region's limited water supply.

Kangaroo Island's water supply comes from a combination of surface storage and a desalination plant at Penneshaw.

The state-owned South Australian Water Corporation (SA Water) supplies most urban communities in South Australia with drinking quality water. The SA Water supply system consists of more than 25 000 kilometres of mains and pipelines linking reliable water sources with centres of demand. Licences issued under the *Natural Resources Management Act 2004* specify arrangements under which SA Water can take water for the public water supply.

Irrigation from surface water and groundwater plays a significant role in South Australia's economy. Nearly 40% of the water taken for irrigation comes from the River Murray, approximately 50% from south east groundwater and the remaining 10% from the Mount Lofty Ranges, areas in the mid north and groundwater basins in the Eyre Peninsula and around Adelaide. Recently, recycled wastewater has been used for irrigation and almost 20% of Adelaide's wastewater is reused, mainly for horticulture and viticulture. In addition a small quantity of River Murray irrigation water is imported into the Barossa and Clare Valley using existing infrastructure.

In the South Australian Murray-Darling Basin, privately owned and managed irrigation infrastructure schemes supply agricultural areas with water from the River Murray. This infrastructure is almost fully rehabilitated, that is, automated and piped, and is highly efficient compared to many other irrigation schemes in the Murray-Darling Basin.

South Australian Murray-Darling irrigators produce relatively high economic returns for the amount of water used. A CSIRO¹⁹ report notes that in a full water supply year the NSW Murray region uses more than 2000 GL to irrigate 321 000 ha and produces irrigated revenue of about \$310 million. In comparison, the Riverland in South Australia uses 311 GL to irrigate 36 000 ha and produce irrigated revenue of \$555 million. The report attributes the difference in cropping and production systems to fundamental differences in geology, soils, and viability of surface irrigation methods.

In planning for the future, South Australia has focused on ways of better managing its available water resources, including increasing the efficiency of its water use and increasing the use of alternative water sources such as stormwater and recycling wastewater for non-drinking purposes. As a result, South Australia is a national leader in water reuse with more than 22 GL of stormwater and wastewater being recycled each year. Under its *Water Proofing Adelaide 2005–25* strategy, the government aims to reuse an additional 33 GL each year by 2025.

Being at the lower end of the River Murray has obvious risks, which have influenced the strategies of successive state governments. Normal consumption demands from the River Murray in South Australia are 649 GL per annum of which about 80% is used for irrigation. To this figure must be added a maintenance flow to provide for evaporation, groundwater recharge and minimum river health needs of 900 to 1350 GL per annum. South Australia has therefore reached a point where its entitlement flow of 1850 GL per year barely meets its needs for industrial, rural, urban and irrigation consumption.

Under especially dry conditions, as defined in the Murray-Darling Basin Agreement, New South Wales and Victoria no longer need to jointly provide a guaranteed minimum of 1850 GL to South Australia. The special accounting provisions of the agreement come into play and the available water resources are shared among the three states. South Australia could receive considerably less than its entitlement of 1850 GL of water across the border in 2006-07, and the worst case scenario is a much lower flow in 2007-08.

The sustainability of current water diversion practices across the Murray-Darling Basin is an ongoing issue. Increased extraction of water for irrigation in the basin upstream of South Australia, particularly over the last 20 years, has reduced the capacity for diluting natural salt loads and compromised the integrity of ecological systems. During the late 1960s while other states were significantly increasing their extractions from the River Murray, South Australia licensed its irrigators and introduced a cap on extractions. This self-imposed cap was reduced twice before the Murray-Darling Basin Commission (MDBC) introduced a basin-wide cap in 1994.

South Australia is also a signatory to the 2004 Intergovernmental Agreement for Addressing Water Over-allocation and Achieving Environmental Objectives in the Murray-Darling Basin, which provides \$500 million to return 500 GL of environmental flow annually to the River Murray by 2009. South Australia's share of this commitment is 35 GL by 2009 and it sees the securing of 500 GL as the first step towards achieving a target of 1500 GL per annum for environmental flows by 2018. South Australia put a package of water recovery measures before the Murray-Darling Basin Ministerial Council in May 2006 and was the first state to make 13 GL available for environmental use under the Living Murray Initiative.

Another key issue is maintenance of water quality in the River Murray. South Australia is committed to the MDBC Salinity Management Strategy and its target of less than 800 electrical conductivity (EC) units at Morgan 95% of the time. This means that further irrigation development that impacts on the River Murray must work in conjunction with salt interception schemes to generate the required salt credits.

The quality of other surface water and groundwater resources varies considerably across South Australia. Some surface resources with primarily pristine vegetated catchments have good water quality for the protection of aquatic ecosystems. Other more developed catchments, such as the Mount Lofty Ranges, are characterised by moderate or poor water quality. Groundwater quality throughout the state is also highly variable, depending on its use. Rising salinity, often associated with land clearance and local overuse, is an issue in some areas. A range of programmes to improve water quality is being implemented, including ongoing monitoring, water allocation planning, pollution prevention and water quality management.

¹⁹ <http://www.csiro.au/files/files/p3we.pdf>

Potentially, climate change will have significant implications for water infrastructure planning. Projections of climate change suggest that average temperatures and evaporation rates will rise and average rainfall will fall, with an increase in the frequency of droughts and severe rainfall events. Water supplies are expected to decline in the long term as a result of climate change. Water infrastructure planning in South Australia is taking into account resulting predicted changes in supply and demand. The current extreme drought situation has prompted a reconsideration of previous assumptions about the reliability of the state's water supplies, particularly the River Murray.

Demand

Current demand

South Australian water use by sector is summarised in the table below. Agriculture uses approximately 75% of all water in the state. While this is mostly for irrigation, water is also used for other agricultural purposes such as stock water, machinery wash-down, chemical application and rural domestic purposes.

Household water use accounts for approximately 11% of all water use in South Australia. The vast majority of household water use is within the Adelaide metropolitan area. Average household consumption is around 234 kilolitres per year. About 40% of this is used on gardens and for other outside uses. Nearly all water used inside the house ends up as sewage. The potential for re-using some of this water has been developed in particular locations and promotion of large-scale recycled water projects is a strategy under *Water Proofing Adelaide*.

Manufacturing and other industries account for about 8% of total state water use. Water consumption for the water supply industry accounts for around 5% and includes supply system losses, unaccounted for water and water used directly by both urban and rural water suppliers.

The mining and petroleum industries account for about 1% of total state water use, generally sourced from groundwater. For example, the Olympic Dam mine and Roxby Downs township pipe Great Artesian Basin groundwater from 100 to 200 kilometres away. A desalination plant reduces the salinity of water for domestic supplies and critical industrial processes.

South Australia water consumption by sector in 2004-05 (%)

Agriculture	75
Mining	1
Manufacturing	4
Water supply	5
Other industries	4
Household	11
TOTAL	100%

Source: Adapted from ABS 2004-05 Water Accounts, November 2006

Future demand

Large-scale demand for water for irrigated agriculture can be expected to continue. There will be future demand growth for new mining developments, particularly in the north of the state. Other major users (rural, domestic and industrial) are likely to have comparatively smaller growth in consumption.

Population growth in the next 20 years will increase demand and may place pressure on particular localities. For example, there has been increasing pressure for extending or upgrading the supply of reticulated water to coastal communities in recent years due to increased development.

SA Water undertakes strategic planning for future use patterns for drinking water, considering influences on future demand growth such as demographic change, changes in industry structure and climate change. The existing reticulated supply system has sufficient capacity for current uses in most areas. System upgrades to serve new development occur where commercially justified.

Water supply and demand projections indicated that, through implementation of *Water Proofing Adelaide* and other initiatives, future demand for drinkable water supply can be met in a typical (median runoff) year. Demand is also expected to be met in most dry years, with the exception of extreme droughts, until at least 2010. Ongoing review of water supplies and demands will be used to develop strategies from then on. Responses to the current drought are discussed later in this section.

Infrastructure and Performance

Drinking water supply and wastewater infrastructure (SA Water)

SA Water is responsible for providing the majority of drinking water (potable) supply and wastewater services to the South Australian population. Key infrastructure assets include 20 water treatment plants and 23 wastewater treatment plants and more than 25 000 kilometres of water mains and 8000 kilometres of sewer mains across South Australia.

Overview and location of SA Water infrastructure



Source: SA Water Annual Report, 2004-05

Private companies manage parts of the system at SA Water's direction, including United Water (management of the operations and maintenance of metropolitan Adelaide water and wastewater systems), United Utilities Victor Harbor (management and operation of the Victor Harbor Wastewater Treatment Plant) and Riverland Water (provision of treated water to areas of the Adelaide Hills, Barossa Valley, mid north, Riverland, and areas of the Yorke Peninsula). The following tables provide information about SA Water's domestic water supply and wastewater drainage infrastructure and its performance.

Drinking water and wastewater assets owned and operated by/for SA Water

Asset	Length or number	Population served
Water mains and distribution pipelines	25 693 km	1 102 000 (city) 421 000 (country)
Major supply pipelines from Murray (five)	1061 km capacity 1211ML/day	As above
Major dams	17	As above
Water treatment plants	20	As above
Sewers	8383 km	1 069 000 (city) 146 000 (country)
Wastewater treatment plants	23	1 069 000 (city) 146 000 (country)

Source: SA Water, Annual Report 2005-06

SA Water infrastructure performance – water supply

Metropolitan Adelaide	2004-05	2005-06
Number of priority calls, bursts leaks per 1000 customers	2.5	2.2
Water quality complaints per 1000 customers	1.2	0.9
Service interruptions restored in 5 hours (target 80%)	96%	95%
Water samples free of e-coli	100%	100%
Country	2004-05	2005-06
Mainbreaks per 100 km of water main	9.3	8.8
Water samples free of e-coli	99.9%	99.97%

Source: SA Water, Annual Report 2005-06

SA Water infrastructure performance – wastewater

Metropolitan Adelaide	2004-05	2005-06
Sewer main chokes per 1000 customers	8	7.9
Chokes in property connections per 1000 customers	38.6	38.5
Average treated wastewater biochemical oxygen demand (BOD)(target <20)	3mg/L	4.3mg/L
Treated wastewater compliance with EPA licences	100%	100%
Country	2004-05	2005-06
Sewer main chokes per 100 km of sewer	28.7	30.2
Chokes in connections per 1000 customers	19.2	18.3

Source: SA Water, Annual Report 2005-06

Overall, the infrastructure used by SA Water in providing water and wastewater services to its customers is appropriately managed in accordance with the asset management processes described later in this chapter. Furthermore, comparisons with other water utilities indicate that SA Water's infrastructure performance rates above average in many areas.

The South Australian Government is committed to managing the risks to drinking water supplies to safeguard public health. SA Water's *Annual Report* for 2005-06 shows that water quality treatment performance for both country and metropolitan consumers was very high. Microbiological performance for water samples at customer taps showed that 100% of metropolitan Adelaide water samples were free of the faecal bacteria e-coli and 99.97% of country supplies were free of faecal bacteria. SA Water is well advanced in implementing the Australian Drinking Water Guidelines Framework through its Australian Water Quality Centre. The centre is nationally and internationally recognised for excellence in water research, testing and developing innovative treatment technology. SA Water also monitors reservoirs and the River Murray for blue green algae blooms with strategies to manage them as they arise.

Community wastewater management systems

Local government is responsible for over 100 community wastewater management systems (CWMS) in country towns. CWMS, started in 1972, provide approximately 10% of all public wastewater services in South Australia. Around 130 000 South Australian residents have their wastewater treated and their local environment and public health improved and protected by CWMS. A further 68 000 people currently meet the criteria for connection to similar communal wastewater services. Public health, environmental, economic and community benefits from CWMS include less pollution of groundwater and surface water, and protection of the local environment from septic tank overflows and leakages. A reform program initiated in 2004 aims to improve the management and operation of existing CWMS and to work towards ensuring the long-term sustainability of each facility.

Each day CWMS in South Australia treat over 18 million litres of effluent of which more than 50% is reused in agriculture and for irrigating sports fields, town commons and wood lots. This proportion is increasing as all new schemes developed under the CWMS programme include dedicated reuse facilities wherever this is feasible and for environmental reasons investment in upgrading existing CWMS often includes reuse facilities.

Urban stormwater infrastructure

The State Government provides infrastructure for water supply, sewerage and some major urban and rural drainage systems. Urban stormwater systems are managed by local councils in partnership with the State Government, sometimes through specific purpose drainage authorities. There is increasing emphasis on catchment-based management and reuse.

Water conservation and reuse and recycling infrastructure

Currently South Australia uses approximately 20% of recycled water from its metropolitan and country wastewater treatment plants for non-drinking purposes. The Adelaide region currently captures and uses between 3000 and 5000 megalitres of stormwater each year. Recycled water is used for non-drinking purposes, for example, for horticulture and viticulture north and south of the city. Local government has taken on an increasing role in recycling and stormwater reuse projects, often in partnership with State Government, Natural Resources Management Boards or the private sector. A number of significant new schemes are proposed or underway, including stormwater harvesting at three metropolitan golf clubs and large scale stormwater and wastewater recycling for non-drinking purposes for the northern and southern suburbs of Adelaide.

Recycling and reuse schemes

The Mawson Lakes recycled water system delivers stormwater and recycled wastewater to this entire suburb in the north of Adelaide. This was the result of a partnership between SA Water, the State Government's Land Management Corporation, the City of Salisbury and Delfin Lend Lease. The water is used for non-drinking purposes such as toilet flushing and garden watering. The project is estimated to save about 800 megalitres (ML) of water being drawn from the River Murray each year.

Urban stormwater reuse schemes, which capture, treat and store stormwater for irrigation and industry use can be found across Adelaide, for example Port Adelaide Enfield Council area (Oakden, Northfield), Munno Para Council area (Andrews Farm), Scotch College (Mitcham), Brompton, Bowden, St Elizabeth's Church, Warradale, and Morphettville racecourse. Larger, off-site stormwater use is also occurring. For example, the Parafield Partnerships Project, operated by the City of Salisbury and located at the Parafield Airport, captures in excess of one GL of stormwater a year for reuse.

Many of these stormwater reuse schemes store water in aquifers and there are currently 22 operational aquifer storage and recovery schemes (ASR) injecting about 2000 ML/year of rural and urban stormwater runoff. Salisbury Council's aquifer storage and recovery scheme, for example, treats and stores stormwater in an aquifer before it is used by industry. At Morphettville, the local racecourse stores stormwater in the underlying aquifer and uses it for irrigation.

Desalination plants

A small volume of water for domestic consumption is treated by desalination technology. Existing desalination plants are located at Coober Pedy, Roxby Downs and Penneshaw.

South Australian Murray-Darling infrastructure

Locks, weirs and barrages

The South Australian Government, through SA Water, with joint funding through the Murray-Darling Basin Commission (MDBC), operates and maintains the five barrages at the mouth of the Murray, nine locks and weirs along the River Murray and the Lake Victoria storage in south-western New South Wales. These structures are used for supplying water to South Australia, providing stable water levels for consumptive use, navigation and recreation, and preventing seawater incursions into Lake Alexandrina and Lake Albert. The structures were built between 1913 and the mid-1940s and have generally been maintained in very good condition. The replacement value of these structures along the entire River Murray system is \$590 million.

Environmental management

Environmental management infrastructure allows the existing flow in the Murray to be managed better to provide environmental benefits, including managing environmental flows in and out of wetlands. The River Murray Environmental Manager, located in the South Australian Murray-Darling Basin Natural Resources Management Board, is currently developing a South Australian River Murray Strategic Watering Plan to prioritise floodplain-watering actions, including long-term wetland management.

Infrastructure (that is, wetland regulators) at 28 wetland sites along the River Murray in South Australia has resulted in significant ecological improvement in the health of these wetlands, in conjunction with the development of wetland management plans. Following accreditation of the wetland plans, water licences have been provided to wetland managers.

The South Australian River Murray Strategic Watering Plan also incorporates actions under the Living Murray Initiative at the River Murray Channel, Chowilla and the Lower Lakes-Coorong-Murray Mouth Icon Sites. A package of works has been developed at Chowilla, including upgrades to the Staney and Pipeclay weirs, Bank E and the construction of an environmental regulator at Chowilla Creek to enable enhanced flooding of the floodplain.

The Hume to the Sea fishway project focuses on environmental outcomes in the River Murray channel and involves the construction of fish passages at all the main barriers on the River Murray. Fishways have been built at Locks 7, 8 and 9 and at the barrages, with structures to be completed at the remaining locks and weirs over the next four years.

Salinity management

Drainage disposal and salt interception schemes (SIS) are the backbone of salinity management in the River Murray in South Australia. They are a joint South Australian Government and MDBC initiative. South Australia is committed to the MDBC Salinity Management Strategy and the target of less than 800 EC units measured at Morgan 95% of the time.

The schemes reduce the inflow of saline groundwater into the River Murray, protecting water quality and assisting in the control of water table levels on the floodplain. This protection provides environmental benefits and underpins sustainable irrigation development by preventing both irrigation-induced and natural saline groundwater discharge from impacting on the river and its floodplain.

Saline and drainage water disposal basins are part of the SIS process. Two disposal basins currently operate in the Murraylands at Stockyard Plain and Noora. The South Australian Government also invests in basins in other states. Investigations are underway into a Regional Saline Water Disposal Strategy, which should be completed in 2007. The capacity of existing basins will be sufficient until about 2030.

Salt interception schemes

There are currently four salt interception schemes (SIS) operating in South Australia, at Rufus River, Bookpurnong, Woolpunda and Waikerie. A further scheme is being constructed at Loxton. This will lower the water level in basins on the floodplain and reduce saline inflows to the river there.

The Woolpunda and Waikerie SIS continue to perform well by preventing 350 tonnes of salt per day entering the river. Under low flow conditions, the salinity level at Morgan is reduced by 25% through use of these schemes. In 2003-04, the \$3.4 million Waikerie Stage 2A scheme was commissioned and intercepts a further 30 tonnes of salt per day.

The \$11.4 million Bookpurnong SIS will initially intercept 60 tonnes of salt per day. By 2032, it will have the capacity to intercept a predicted 110 tonnes per day. Construction of the adjacent Loxton SIS is well advanced, with floodplain well fields installed and highland areas under advanced investigation. The Loxton SIS is designed to intercept about 70 tonnes per day when operational and has an approved budget of \$21.4 million.

Further investigations are continuing into additional schemes at Pike River, Murtho, Chowilla and downstream of Waikerie. If approved, the SIS at Murtho could commence staged construction in 2007. Schemes in all these areas will intercept at least 300 more tonnes of salt per day to help keep River Murray salinity within acceptable limits and provide environmental benefits to large areas of flood plain. Present indications are that to construct these proposed schemes could cost more than \$100 million.

Irrigation infrastructure

The main irrigation districts are in the Riverland, Lower Murray, Clare, Barossa, Adelaide Hills, Northern Adelaide Plains, Southern Vales, the Mallee, upper south east and the lower south east. In addition to individual irrigator infrastructure development, areas of the River Murray in South Australia are managed by a number of irrigation trusts, established under the *Irrigation Act 1994*. They range from the Central Irrigation Trust (1600 individual irrigators) and Renmark Irrigation Trust (700 irrigators), to very small trusts of a handful of irrigators. The Central Irrigation Trust manages nine individual irrigation trusts and operates fully automated and piped irrigation schemes. It delivers water through underground pipelines from main pumping stations on the River Murray and a number of re-lift pumping stations.

South Australia is a leader in the Murray-Darling Basin in its management of Murray region irrigation districts. Many of the irrigation areas were established at the beginning of the 20th century and relied on gravity irrigation distribution and drainage systems that were both wasteful and damaging to soil and water resources. Since the late 1970s, these have been rehabilitated to improve water use efficiency, reduce the impacts of salinity and reduce the return of polluted water

to the river. This rehabilitation has assisted South Australian Murray-Darling irrigators to produce relatively high economic returns for the amount of water used.

All highland irrigation infrastructure along the River Murray that was previously government- owned has been rehabilitated, with channels replaced by pipes and transferred to self management by the growers. This has resulted in water savings of around 9 GL per annum.

Great Artesian Basin Bore rehabilitation and piped drainage systems

Significant amounts of groundwater from the Great Artesian Basin have been wasted through seepage and evaporation from open bore drains fed from uncontrolled bores. The Great Artesian Basin Sustainability Initiative (GABSI) is a joint project of the South Australian and Australian Governments, working with landholders to rehabilitate uncontrolled bores and replace bore drains with polyethylene pipes, tanks and troughs.

To date, the initiative has replaced more than 324 kilometres of open bore drains with closed pipe systems. Two hundred and thirty-nine bores have been rehabilitated in South Australia since 1977 and about 29 still need attention under GABSI. The project has meant water savings of around 59 million litres a day, helping to protect the water supply for communities, pastoralists and mining operations in outback South Australia.

South east drainage infrastructure

An estimated 250 000 hectares or 40% of land in the upper south east of South Australia comprising productive farmland, native vegetation and wetlands, has been degraded by salinisation caused by high groundwater levels and flooding (National Land and Water Resources Audit). The Upper South East Dryland Salinity and Flood Management Programme (USE Programme) was developed in the early 1990s to address community concerns about dryland salinity, waterlogging and ecosystem fragmentation and degradation. Measures adopted to address these concerns include drainage, saltland agronomy, revegetation and wetland management.

Under the initial phase of the programme, 255 kilometres of open cut drains were constructed, 6560 hectares of native remnant vegetation fenced, 2650 hectares of wetland protected under the Wetlands Waterlink project and 1250 hectares of native vegetation planted. In addition, salt tolerant pasture has been established in 80% of the salt affected area and perennial pasture such as lucerne has been established on about 30% of rising land cleared for agriculture. Work is currently underway to construct another 410 kilometres of drainage works and on wetlands management and restoration.

In the lower south east, the South Eastern Water Conservation and Drainage Board is responsible for 1780 kilometres of drains and 1160 associated structures (bridges, weirs, inlets, control gates, sea outlets) and for licensing private drainage works. The objective is to manage salinity and waterlogging so that the land can be used for primary production.

Water monitoring network

The South Australian water monitoring network is extensive, covering large areas of the state. Network infrastructure (river gauging stations, rain gauges, evaporation pans and water quality instrumentation) provides information that is used for: flood warnings; monitoring surface water and groundwater quantity and quality; long-term planning of water supply infrastructure requirements; monitoring ecological health; and ensuring the correct operation of infrastructure.

This infrastructure helps ensure sustainable water allocation and pollution mitigation to support economic development as well as ensuring that environmental needs are addressed. It also helps support more cost-effective flood disaster management.

Investment

All three spheres of government and the private sector currently invest in infrastructure and related initiatives to supply and manage the state's water resources.

Drinking water supply and wastewater infrastructure (SA Water)

SA Water undertakes major annual capital investment to ensure that its drinking water supply systems and wastewater collection and treatment arrangements meet community and legislative requirements. The table below gives the scale of recent investments.

SA Water capital expenditure (\$ million)

	2002-03	2003-04	2004-05	2005-06
Environmental improvement	47	72	25	9
Water quality	6	7	6	6
Customer growth	38	43	32	32
Maintain business	17	35	36	63
Safety	8	15	7	9
Improve business	15	15	16	8
TOTAL	131	187	122	127

Source: SA Water, 2006

Recent investments have included major upgrades to metropolitan Adelaide wastewater treatment plants to achieve better environmental discharge outcomes, implementation of national dam safety standards; significant growth-related projects to support developer activity and a gradual increase in asset renewal.

Annual expenditure on water main replacements by SA Water is expected to rise gradually over the next 25 years from the current \$6 million to about \$20 million a year.

In most densely populated areas of the state, SA Water is responsible for sewage collection (linked to treatment of the waste stream), licensed by the Environment Protection Authority (EPA). In recent years SA Water has undertaken a \$240 million programme to upgrade the major wastewater treatment plants in order to reduce the environmental impact from discharges of treated effluent to the marine environment. Further investment is planned over the next four years to complete this work, make other environmental improvements to the plants and to commence a programme to reduce wastewater overflows.

Proposed capital expenditure by SA Water in 2006-07 totals \$165 million, including works to upgrade wastewater treatment plants, work on augmenting water supplies on Eyre Peninsula and replacement or rehabilitation of some existing infrastructure.

Community wastewater management schemes (CWMS)

For many years the provision of CWMS based on septic tanks in South Australia has been a partnership between state and local governments. Grant funding, combined with financing by councils, has resulted in investment in CWMS assets with a total replacement value of \$326 million. Future investment will be necessary to satisfy demand for new CWMS, and for replacing and upgrading existing schemes.

Stormwater infrastructure

In 2006, the State Government and the Local Government Association (LGA) entered into a stormwater management agreement setting up new governance arrangements for the joint management of stormwater systems throughout the state. The agreement gives priority to funding stormwater works determined on the basis of whole-of-catchment stormwater plans.

The South Australian Government has committed \$4 million per annum (CPI adjusted) for the next 30 years towards priority stormwater works. This will be supplemented by matching funding from the local government sector. The new governance arrangements are designed to enable funding for priority works to be brought forward against the security of future allocations.

Water conservation, reuse and recycling infrastructure

State and local governments and the private sector have previously invested and continue to invest in a variety of water conservation and alternative supply projects, including stormwater reuse and wastewater recycling projects. More than \$200 million of water management, reuse and recycling projects are so far planned or underway for *Water Proofing Adelaide*, with funding from all spheres of government and the private sector.

A number of other water projects involving reuse, recycled water and other innovative water treatment and supply options have been submitted by the State Government, local governments and community groups to the National Water Commission for funding support. A number of these projects seek to sustain supplies to remote communities. Support from the Australian Government under the National Water Initiative's Water Smart Australia Fund is vital in bringing these projects to fruition.

South Australian Murray-Darling infrastructure

The construction of Murray-Darling infrastructure, its operation and maintenance are in accordance with the Murray-Darling Basin Agreement. This agreement between the Murray-Darling Basin jurisdictions of South Australia, Victoria, New South Wales, Queensland, the Australian Capital Territory and the Australian Government is coordinated through the Murray-Darling Basin Commission.

A three-year construction, operation and maintenance programme is agreed by all jurisdictions for all MDBC assets on the Murray-Darling system and each jurisdiction and the Australian Government contribute to the total cost on an agreed cost sharing formula. This means that any state may see expenditure in any year greater or less than its annual contribution, depending on the prioritisation of the workload.

Expenditure in South Australia on Murray-Darling infrastructure assets (that is, salt interception works, environmental management infrastructure and locks and weirs) for the last five years is outlined in the table below. Other environmental management infrastructure proposals are being developed and ongoing infrastructure investment is required at wetland sites to ensure continued improvement in ecological health. In addition, investigations are continuing into additional SIS schemes which could cost more than \$100 million.

Expenditure on Murray-Darling infrastructure (\$ million)

Year	Locks and weirs		Salt interception works		Environmental management
	Operations and maintenance	Construction	Operations and maintenance	Construction	Construction
2002-03	5.65	4.22	1.85	2.31	2.56
2003-04	6.05	4.88	1.97	5.50	6.31
2004-05	7.35	4.41	2.52	7.22	6.62
2005-06	7.75	1.65	2.45	6.69	6.47
2006-07*	8.16	3.92	3.53	3.02	3.05

*Estimated expenditure

Source: South Australian Government, 2006

River Murray irrigation infrastructure

There has been significant investment over the last 30 years in rehabilitating infrastructure that was built to serve the needs of irrigation areas formerly operated by the government. Government investment has led to corresponding investment by landholders in upgrading farm irrigation and drainage infrastructure.

More recently the South Australian and Australian Governments and irrigators have invested a total of \$35 million in the Loxton Irrigation District Rehabilitation scheme, completed in 2006. Works included upgrading the existing pumping station and replacing open channels and low-pressure pipelines to provide a high-pressure water delivery system. Overall, 73 kilometres of pipelines now distribute water to 3200 hectares of irrigated horticulture, using a pump station which can deliver water at high pressure to all irrigators on demand during the irrigation season. The infrastructure has an economic life of 40 years.

A \$24.5 million programme of restructuring and rehabilitating flood-irrigated farms is underway on 5200 hectares of former River Murray flood plains between Mannum and Wellington known as the Lower Murray reclaimed irrigation areas (LMRIA). Infrastructure improvements include construction of new water delivery channels, installation of water meters and run off reuse systems to prevent the return of pollutants to the river. The project will result in the rehabilitation of 4000 hectares and retirement of the remaining 1200 hectares from irrigation.

Great Artesian Basin bore rehabilitation and piped drainage systems

Since 1997-98, the State and Australian Governments and private investors have invested approximately \$6.2 million in bore rehabilitation and piped drainage systems.

South east drainage infrastructure

The South Australian and Australian Governments have contributed approximately \$56 million to the Upper South East Dryland Salinity and Flood Management programme with around \$17 million contributed by local landholders. In the lower south east region, the current value of major assets is \$33.8 million. A plan for future management of this infrastructure will need to be considered.

Planning and Regulation

Planning and strategies to meet future needs

Strategic framework

The state strategic framework for water supply and infrastructure planning is provided by *South Australia's Strategic Plan* and the *Strategic Infrastructure Plan for South Australia*. These are complemented by the *State Natural Resources Management Plan 2006-2011* which sets the State Government's policy direction for an integrated approach to sustainable management of natural resources, including water allocation and management guidelines.

South Australia's *Strategic Plan* contains the following critical targets for water and particularly for the River Murray:

- increase environmental flows by 500 GL by 2009, as a first step towards improving sustainability in the Murray-Darling Basin, with a longer term target of 1500 GL by 2018;
- South Australia to maintain a positive balance on the Murray-Darling Basin salinity register;
- South Australia's water resources are managed within sustainable limits by 2018.

Strategic priorities identified in the *Strategic Infrastructure Plan for South Australia* reinforce these targets and also include:

- implementation of water education and efficiency programmes for users;
- removal of barriers to water trade;
- implementation of the *Water Proofing Adelaide* strategy.

South Australia's draft greenhouse strategy, *Tackling Climate Change*, highlights the vulnerability of water resources. It includes strategies for incorporating climate change into the sustainable management of water resources and explores options for diversifying water supply and more robust management systems to cope with this change. The need to account for climate change impacts is also recognised in natural resources management and water allocation planning.

The Climate Change and Greenhouse Emissions Reduction Bill 2006, introduced into South Australian Parliament in December 2006, proposes legislation to commit the government to work with business and the community to put in place strategies for early action to reduce greenhouse emissions and adapt to climate change. South Australia will also continue to lead inter-jurisdictional work to develop and implement a Plan of Collaborative Action on Climate Change, as agreed by COAG.

The state's Thinker in Residence programme included a residency from renowned water authority, Professor Peter Cullen, whose report, *Water Challenges for South Australia in the 21st Century*, has provided important input to water policy and future directions which is reflected in the government's water plans and strategies. The government is also fostering links with major water-focused research groups based in Adelaide, including the Cooperative Research Centre for Water Quality and Treatment, CSIRO Land and Water and the International Centre of Excellence in Water Resources Management.

Water proofing strategies

The South Australian Government is committed to securing a long-term sustainable water supply for Adelaide and a blueprint for this is provided in *Water Proofing Adelaide: a Thirst for Change: 2005–25*. This 20 year strategy outlines 63 priority actions in key areas for managing existing resources, responsible water use, fostering innovation and developing additional water supplies.

The strategy aims to increase rainwater, stormwater and recycled water use by 33 GL per year and to make water savings of 37 GL per year by 2025. The gains to be made in water availability from Water Proofing Adelaide are shown in the table below. The strategy is currently being implemented with the involvement of State and Local Governments, community and industry.

As well as addressing water needs through infrastructure development, South Australia has implemented initiatives to encourage efficient water use. Permanent water conservation measures to encourage responsible water use have been in place since 2003. On 1 July 2006, for new developments it became mandatory to install a rainwater tank and have it plumbed into the house. This initiative is complemented by a rainwater tank plumbing rebate scheme for existing homes. A range of rebates is also available to encourage households to install water saving devices. Examples of other initiatives include the implementation of water efficiency labelling and standards, education programs and voluntary water audit services.

**Gains in water availability from the *Water Proofing Adelaide* strategy
(GL per annum)**

Responsible water use	
Permanent water conservation measures	12
Reduce indoor household use	12
Reduce outdoor household use additional to permanent water conservation measures	7
Reduce community purposes water use additional to permanent water conservation measures	3
Reduce commercial and industrial water use	2
Reduce losses from mains water system	1
Sub-total	37

Additional water supplies and fostering innovation	
Large scale stormwater use projects	11
Rainwater tanks in new houses	4
Water sensitive urban development in new land developments	2
Recycled water	16
Sub-total	33
TOTAL	70

Source: Water Proofing Adelaide, 2005

The government has also committed to develop a *Water Proofing South Australia* strategy for regional and rural South Australia, along the lines of *Water Proofing Adelaide*. Similarly, this would be a long-term strategy aimed at securing sustainable, long-term water resources management, through wise water use and in managing existing resources and additional supplies.

Desalination

Desalination is supported when it is economically feasible and represents an appropriate augmentation option. The South Australian Government with BHP Billiton is investigating the feasibility of a large-scale seawater desalination project in the Upper Spencer Gulf to provide the additional water needed for proposed expanded operations at the Olympic Dam mine. This would reduce the need for BHP Billiton to draw additional water from the Great Artesian Basin and may also provide an opportunity to reduce the use of River Murray water in the Upper Spencer Gulf and Eyre Peninsula regions.

Water trading for public benefit

In addition to the water conservation initiatives in the *Water Proofing Adelaide* strategy, the government has been purchasing River Murray water allocations from willing sellers. Purchasing additional allocations is one option for ensuring that the current level of security for the public water supply is maintained. Current SA Water licences for Adelaide are fully used and additional allocations will provide extra security of supply and allow for timing differences between supply and demand strategies. Allocations will also provide water for new economic development initiatives in Adelaide and country areas as well as providing for environmental water requirements, such as the Murray-Darling Basin's Living Murray initiative.

Drought response

The impact of six years of drought in the Murray-Darling Basin and the lowest inflows on record in 2006 into the River Murray have resulted in record low allocations to South Australia, with the prospect of lower flows in 2007-08. As a result a lack of water is a clear risk to South Australia in 2007-08.

While the *Water Proofing Adelaide* strategy takes into account future reductions to existing water allocations from the River Murray due to the impact of climate change, groundwater changes and bushfires, it was assumed that even in the worst case scenario South Australia would receive sufficient water across the border to meet its minimum urban requirements. It was also assumed that during periods of drought in the Murray Darling basin the only action necessary in South Australia would be moderate restrictions on water allocations from the River Murray.

The current extreme drought situation has shown that previous assumptions about the reliability of the River Murray can no longer be used. As a consequence, the reliability of the water supply to Adelaide is being reconsidered, and options are being developed for further improving reliability over the longer term.

In the short term, water restrictions have been applied and water allocated for River Murray irrigators reduced. A range of other demand and supply-side response options is being implemented and contingency planning for various River Murray water scenarios is underway.

South Australia's work on River Murray water security is being conducted in collaboration with actions across the entire Murray-Darling Basin. Priorities for the South Australian Government include:

- access to Australian Government funding towards the cost of significant drought mitigation and related measures;
- rapid facilitation and approvals for infrastructure works associated with drought mitigation;
- cooperation from other basin states and the Australian Government in temporarily putting aside certain clauses in the Murray-Darling Basin Agreement.

Sustainable management of existing resources

Most water resources in key irrigation or water supply areas across the state are prescribed and managed under water allocation plans that detail policies and administrative arrangements to manage water use within sustainable limits, including providing for environmental water needs. Natural Resources Management Boards develop water allocation plans in consultation with the community. These plans aim to achieve a balance between economic, social and environmental needs and to ensure a more secure allocated supply. Taking of water in these areas, other than for some stock and domestic purposes, requires a licence. The water resources of the Mount Lofty Ranges were prescribed in 2005, providing greater certainty and security of access for regional landholders and the people of Adelaide. The prescription process has been commenced for groundwater in the Central Adelaide Plains.

Water quality management

The *Environment Protection (Water Quality) Policy*, *Natural Resources Management Act 2004* and the *River Murray Act 2003* provide an important regulatory framework for consistent water quality management across the state. Regional Natural Resource Management Boards provide a regional focus for water quality management and take action on the ground. In the Mount Lofty Ranges, the Watershed Protection Office also works to achieve improvements in water quality through enforcement, coordination, on-ground activities and education.

Asset management planning

In providing water and wastewater services to communities across South Australia, SA Water uses an extensive array of fixed infrastructure assets with a total replacement value of around \$10 billion, many of which are expected to have long operational lives.

SA Water has adopted an integrated asset management framework that ensures service delivery to customers is maintained while broader sustainability issues are recognised and addressed. Asset management processes ensure that:

- assets are recorded, valued and depreciated in accordance with industry-recognised standards;
- key drivers of investment and operating priorities, including customer service standards, regulatory requirements (health, environment and economic), demand growth, and performance and condition of existing assets, are considered;
- a 25 year planning horizon is used.

SA Water has also developed a range of risk-based models to cater for variability in failure rates. Together with performance and condition assessment tools, asset planners use these models to write replacement requirements into asset management plans for various classes of assets (water pipes, wastewater pipes, tanks, pumping stations). Asset plans also take account of the other key drivers mentioned previously and therefore identify the capital investment the corporation needs to undertake in planning periods of up to 25 years.

The State Government is establishing asset management agreements with external bodies for other assets in which it has strategic interests. Asset management plans (AMPs), agreements and associated documents incorporate information on the location, purpose, value, costs and performance of the assets, along with operations, maintenance, risk and capital investment plans. AMPs and agreements provide a particular focus on the first five and ten years of the planning period, but augment this with a cost analysis that extends to 30 years.

The regulatory environment

Water resources in South Australia are primarily managed under the *Natural Resources Management Act 2004*. Where increased development causes stress on water resources and a higher level of management is warranted, the associated water resources can be prescribed under the Act. This establishes a water allocation and licensing system to protect the resource from overuse and ensure water users do not adversely affect each other. It also ensures that the environment is provided with water to sustain ecological values. Where a water resource is prescribed, the Act requires that the relevant regional Natural Resources Management Board prepares a water allocation plan. This is a statutory instrument to guide the allocation, management and monitoring of prescribed water resources including the transfer of water licences and licensed allocations.

The majority of the state's significant water resources are prescribed, which means that most people who take water from that resource require a licence to do so. Only stock and domestic use can be exempted from licensing requirements. Each licence specifies how much water is allocated and how the allocated water may be taken or used.

The *Waterworks Act 1932* Act authorises the responsible minister and the SA Water Corporation to supply water to urban and regional communities and to provide safe drainage of wastewater, rating and pricing arrangements and the construction of necessary works. The *Sewerage Act 1929* empowers SA Water to construct and operate sewerage systems.

The *River Murray Act 2003* was enacted to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the River Murray, recognising its critical importance to the South Australian community and its unique value from environmental, economic and social perspectives. It has a special focus on ensuring that the use and management of the River Murray sustains the physical, economic and social wellbeing of the people of the state and facilitates its economic development.

The *Environment Protection Act 1993* is the primary pollution control and prevention legislation in South Australia. It promotes the principles of ecologically sustainable development. The Act protects water quality through the Environment Protection (Water Quality) policy and by providing for the licensing of waste discharges that may affect water quality in streams, rivers, coastal waters or groundwater. The legislation also requires that a State of the Environment Report, including information on the state of South Australia's water resources, be produced at least every five years. The *Environment Protection (Water Quality) Policy* and the *River Murray Act 2003* provide an important regulatory framework for consistent water quality management across the state.

The *Ground Water (Qualco-Sunlands) Control Act 2000* was enacted to reduce the risk of waterlogging and salinisation of land and increased levels of salinity in the River Murray caused by irrigating land in the Qualco-Sunlands irrigation area.

The *Renmark Irrigation Trust Act 1936* enables the provision of domestic water for the township of Renmark, and the supply and drainage of irrigation water for the surrounding irrigation district. The trust manages the water supply and drainage infrastructure that serves the district.

The *Irrigation Act 1994* enables the establishment of government and private irrigation districts and the irrigation of land within these districts. The Act establishes the legal framework whereby shared irrigation infrastructure can be managed. Trusts, rather than the individual irrigators who make up the trusts, hold the licence to take water from the River Murray issued under the *Natural Resources Management Act 2004*. The water licence is the mechanism whereby the impact of irrigation water use on the resource is managed and controlled.

A review of the *Irrigation Act 1994* and the *Renmark Irrigation Trust Act 1936* is currently underway to ensure compliance with National Water Initiative (NWI) requirements.

The *South East Water Conservation and Drainage Act 1992* provides for the conservation and management of water and the prevention of flooding of rural land in the south east of the state. The *Upper South East Dryland Salinity and Flood Management Act 2002* enables infrastructure, environmental management programmes and other initiatives to be undertaken to enhance water conservation, drainage or management and to protect the productive capacity of land in the upper south east.

The Metropolitan Drainage Act 1935 provides for flood mitigation works on the River Torrens, Sturt River, and the Brownhill and Keswick Creeks.

Intergovernmental agreements

South Australia is a signatory to the Intergovernmental Agreement on the NWI and is implementing a program of water policy reforms in line with the NWI objectives. The NWI sets an agenda for management and reform that aims for a nationally compatible system of water resources management to optimise economic, social and environmental outcomes and to adapt to future changes in supply and demand. Areas to be addressed include:

- expansion of permanent trade in water;
- more secure water access entitlements;
- more compatible registry arrangements;
- better monitoring, reporting and accounting of water use;
- improved public access to information;
- a commitment to managing over-allocated systems; and
- better and more efficient management of water in urban environments, through, for example, increased use of recycled water and stormwater.

The Murray-Darling Basin Agreement sets out collaborative arrangements between the Australian, Queensland, New South Wales, ACT, Victorian and South Australian Governments for regulating and sharing water within the Murray-Darling Basin. These arrangements have existed since 1914. South Australia is also party to the Intergovernmental Agreement on Addressing Water Overallocation and Achieving Environmental Objectives in the Murray-Darling Basin. This agreement, commonly referred to as the Living Murray IGA, provides the framework for investment to recover water to reach an estimated annual average of 500 GL of additional flow by 2009.

The management of other significant water resources, such as the Lake Eyre Basin, the Great Artesian Basin and groundwater shared with Victoria are also subject to intergovernmental agreements.

State and local governments approved the Urban Stormwater Management Policy for South Australia in 2005. The policy provides the basis for collaborative and forward looking stormwater management including:

- introducing a risk management framework for hazards or flooding;
- promoting productive use of stormwater;
- reducing the environmental impacts of stormwater;
- managing stormwater as part of the urban water cycle;
- recognising natural watercourse and floodplain ecosystems where feasible.

This policy has provided a framework for a binding agreement between the State Government and the Local Government Association of South Australia on stormwater management, which was signed by both parties in March 2006. Legislation to establish the Stormwater Management Authority as a statutory corporation to implement an improved framework for completing priority flood mitigation works throughout the state was introduced to the South Australian Parliament in November 2006.

Conclusion

The Government of South Australia is committed to addressing the challenges to water supply and management. The key long-term challenge for South Australia is to secure water supplies to match business, irrigation and household demands which flow from population and economic growth, while ensuring the long-term sustainability of its water resources and ecosystems. South Australia's approach to its future water infrastructure needs is underpinned by three themes: sound management of existing resources, responsible water use, and fostering innovation and developing additional water supplies.

South Australia is a signatory to the National Water Initiative and is continuing to progress towards more efficient and sustainable water management. This work builds on achievements against the 1994 COAG reform obligations in water pricing, water management, water trading, institutional reform, water quality management and infrastructure investment.

South Australia's Strategic Plan target to increase environmental flows by 500 GL in the River Murray by 2009 and 1500 GL by 2018, is being progressed through the Living Murray Initiative. Significant investment has been made towards more efficient irrigation infrastructure, salt interception infrastructure, environmental works and other measures along the river.

The current extreme drought has led to a reassessment of the reliability of supply from traditional sources, particularly the River Murray. Options for improving reliability during drought are being explored as part of the state's drought response and the lessons learnt will be taken into account in future planning.

South Australia is also putting in place strategies for early action to reduce greenhouse emissions and adapt to climate change, including incorporating climate change impacts into the sustainable management of its water resources.

Important progress is being made in water allocation planning and sustainable management of water resources in important irrigation regions across the state. There has been significant investment in managing dryland salinity and flooding in the south east and in rehabilitating artesian bores and piping open bore drains in the Great Artesian Basin.

The state is already a leader in a range of water-related practices, including: the reuse of recycled water and stormwater for non-drinking purposes; aquifer storage and recovery; water treatment; water sensitive urban design and development; efficient farm irrigation; and drainage and pipe relining. This provides a firm basis for a range of strategic initiatives to address future challenges faced by the state.

The government will continue to support the development of innovative water supply and management programs in South Australia. Key strategies for water conservation, supporting additional supplies and meeting future demand are outlined in *Water Proofing Adelaide: a Thirst for Change*. In addition, the government is developing a Water Proofing South Australia strategy to identify opportunities for sustainable water supplies for regional areas. This will investigate options for augmenting and diversifying water supplies and increasing the efficiency of water use.

Further information:

www.dwlbc.sa.gov.au – Department of Water, Land and Biodiversity Conservation

www.sawater.com.au/sawater – SA Water

www.waterproofingadelaide.sa.gov.au – Water Proofing Adelaide

www.climatechange.sa.gov.au – Tackling climate change, SA's greenhouse strategy

www.mdbc.gov.au – Murray Darling Basin Commission

www.epa.sa.gov.au/water_quality.html – EPA (SA), water quality

www.lga.sa.gov.au – Local Government Association, urban stormwater management and community wastewater management systems

Telecommunications

Supply

Overview

Telecommunications services and the underlying infrastructure are increasingly critical to industry efficiency and growth, to cost-effective delivery of government services and to community interaction and social inclusion.

Legislative and regulatory powers relating to this area rest with the Australian Government. The market has been progressively deregulated since the early 1990s and there are now over 150 licensed telecommunications carriers, although Telstra is still the dominant player in most market segments, especially in regional areas. Market forces and commercial imperatives largely determine decisions about governing the building of new infrastructure.

While the national legislative framework aims to promote infrastructure-based competition, relatively little competition has developed in the local access market (the so-called 'last mile' connection into homes and businesses).

South Australia is a small economy, far from global markets, with a great reliance on effective communications technology to connect to the rest of the world. High speed, always-on broadband technology has become essential infrastructure in sustaining and increasing the economic prosperity of the state.

South Australia is a relatively small market for telecommunications carriers. While a number of national carriers have a presence here, their networks are generally concentrated in major population centres where there is sufficient traffic to justify infrastructure investment. South Australia is often placed towards the end of national telecommunications product rollouts, at times lagging eastern states markets by several years.

As the jurisdiction responsible for regulating the telecommunications industry, the Australian Government's five yearly infrastructure report to COAG contains a detailed discussion on telecommunications. The following section of this report presents a South Australian perspective and provides an overview of the South Australian Government's strategies to promote access to and use of affordable telecommunications services.

Convergence

Until comparatively recently, the telecommunications industry has comprised two distinct elements: voice telephony and broadband data services. Telecommunications carriers around the world, including Telstra, have begun the monumental task of converting their entire networks to broadband data networks, on which voice telephony is carried as just another application.

While this 'convergence' of voice and data is not yet complete, in the long term all telecommunications networks will be broadband networks.

Basic telephone services

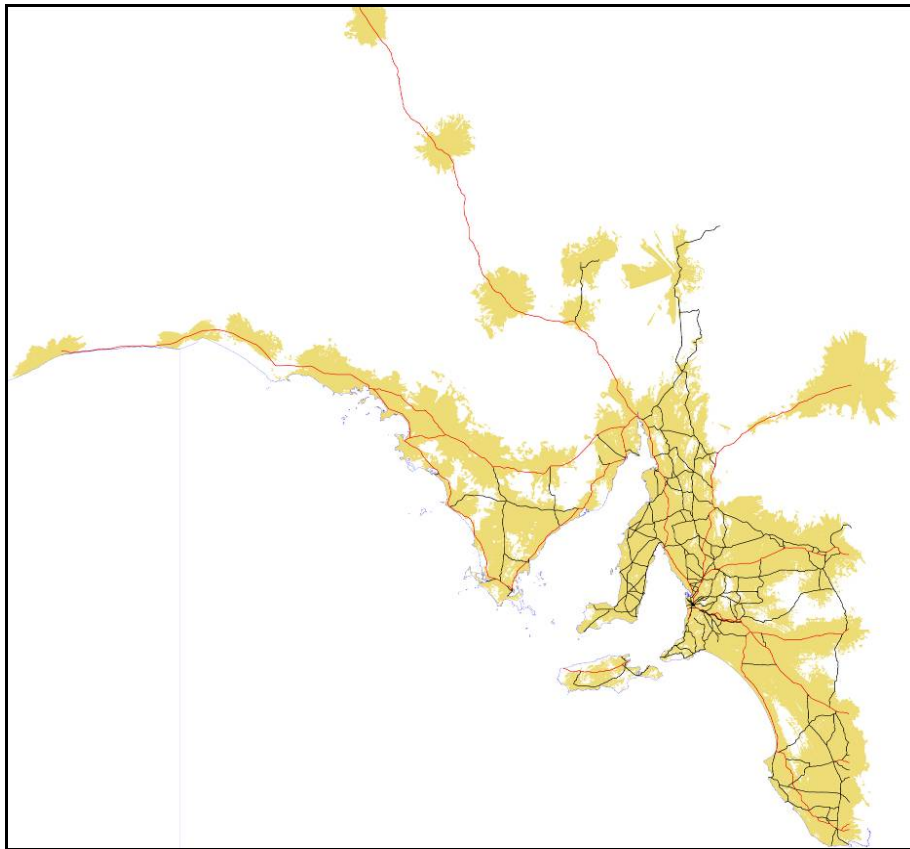
A telecommunications 'safety net' exists to ensure that all Australians have access to a basic telephone service. The universal service obligation (USO) ensures that standard telephone services, payphones and prescribed carriage services are reasonably accessible to everyone in Australia on an equitable basis. Telstra is currently the nominated universal service provider (USP). Losses resulting from supplying services in the course of fulfilling the USO are shared among carriers. The USO does not include mobile telephones, broadband internet access or other advanced services.

Mobile telephone coverage

Mobile phone coverage has improved markedly in the last few years due in part to heavily subsidised deployment of mobile phone base stations by the Australian Government. All South Australian towns of over 500 now have Code Division Multiple Access (CDMA) mobile coverage and continuous coverage now exists along most of the major highways in the state. The capacity for users to be able to afford to roam between provider networks will have the greatest impact for regional mobile services. The following map shows the extent of CDMA coverage in the state.

As with terrestrially-based broadband access, the availability of competitively priced backhaul out of any particular region is a critical factor in making mobile coverage economically viable.

Telstra CDMA mobile coverage for South Australia



Source: Telstra

Despite improved mobile coverage in the last few years the state continues to experience some coverage black spots.

The South Australian Government's priorities for future developments are:

- extending coverage to small population centres and along regional highways;
- filling gaps in existing coverage; and
- improving depth of coverage.

In November 2005, Telstra announced its intention to close its CDMA network, and replace it with a '3G' Wideband CDMA network. Telstra has given assurances that the coverage of the 3G network will meet or exceed that of the CDMA network. The Australian Government has established a group to monitor and audit the performance and coverage of this network.

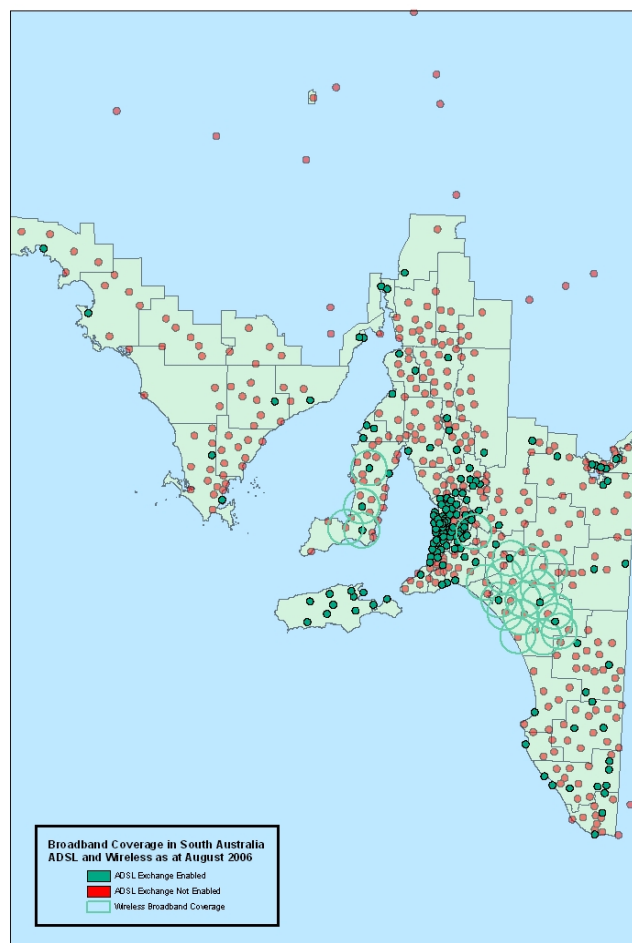
Broadband

'Broadband' is a general name for telecommunications services that transmit digital information at high speed over extended distances. Broadband infrastructure is the equipment needed to transmit signals either through the air (for example, satellite, terrestrial radio) or along a physical carriage medium (for example, optical fibre, copper wire). Licensed radio spectrum is also considered as broadband infrastructure.

There are still major cost and infrastructure barriers to the delivery of broadband services, which is limiting the take up of these services, particularly in much of regional South Australia. As of May 2006, 75% of South Australia's population outside metropolitan Adelaide has access to Asymmetric Digital Subscriber Line (ADSL) broadband services of the type available in the metropolitan area. Broadband capability is generally not available outside major regional centres. While optical fibre now connects most populated centres, access to affordable broadband services by business and residential users outside of these towns is currently inhibited by inadequate infrastructure (except for relatively costly satellite connections) and lack of a commercially viable level of demand.

Significant black spots also exist throughout metropolitan Adelaide, particularly in new housing and business developments. The State Government estimates 15% of the metropolitan population is blocked from access to a broadband service because of these black spots. The following map shows the status of ADSL coverage across South Australia. The large unfilled circles show existing wireless broadband services as an alternative to ADSL services.

Indicative broadband coverage in South Australia



Source: Government of South Australia

Wireless broadband

There are many ways of transmitting broadband through the air by means of radio waves. Collectively, these are known as 'wireless broadband', and fall into two broad categories:

- mobile broadband services, such as 3G using wideband CDMA technology;
- fixed wireless broadband (FWB) services that serve essentially the same function as a physical cable, transmitting data from one point to another ('point-to-point' or 'point-to-multipoint').

Today, mobile broadband services are slower and more expensive than either fixed wireless broadband or conventional cable-based broadband. Users pay a premium price for mobility and applications that exploit that mobility, rather than the speed and convenience of broadband alone.

Fixed wireless broadband (FWB) services, on the other hand, offer genuine alternatives to ADSL and other forms of cable-based broadband infrastructure. However, today's FWB market presents a daunting array of competing proprietary products and conflicting standards which drives up prices and adds risk to investment decisions.

CityLan

The CityLan initiative is a wireless hotspot network constructed through a partnership between the Adelaide City Council, Internode Systems, and m.Net Corporation. This network has been deployed in various areas across the central business district and shopping precinct in Adelaide and at Adelaide Airport. The CityLan network is to be expanded with the number of wireless hotspots increasing to 140 by June 2007.

Satellite

In principle, broadband and mobile telephone coverage are available everywhere in Australia using geostationary satellite technology. Satellite equipment, however, is more expensive than terrestrial equivalents, and the quality of both voice and data services is generally lower, due largely to the 'latency effects' of signals having to travel 36 000 kilometres up to a satellite and back again.

Nonetheless, satellite is often the only viable solution in the more remote parts of Australia and plays an important part in the overall telecommunications environment. While satellite services have been successfully deployed in the more populous parts of South Australia (including metropolitan Adelaide), satellite technology is not likely to play more than a niche role in this environment.

Demand

The table below shows some indicators of South Australia's progress in terms of access and use of telecommunications services, compared to Australia.

Use of telecommunication services in South Australia

Percentage indicator	South Australia			Australia
	Metro	Regional	All	
Home internet use (dial up or broadband) (%)	51	47	50	56
Household broadband (% of internet connections)	39	26	36	47
Small business internet use (dial up or broadband) (%)	83	79	80	77
Businesses with a website (%)	34	22 ²⁰	31	27

Source: ABS, 8129.0 and 8146.0; Government of South Australia

According to the Australian Bureau of Statistics (ABS), despite South Australia having a higher than national average use of internet (broadband and dialup) the business sector has the lowest uptake of broadband of any mainland state. In metropolitan Australia, 53% of household connections are broadband, compared to 39% in South Australia. For non-metropolitan areas the figure is 35% in Australia versus 26% in South Australia.

South Australian Government Activities

The most significant strategic priority for South Australia is to accelerate the uptake and use of affordable broadband services, so as to connect South Australians nationally and internationally, strengthen economic competitiveness and improve household and business access to government services.

This is reflected in *South Australia's Strategic Plan* which presents a target for South Australia to exceed the Australian average in broadband usage by 2010.

Broadband SA

In 2003, the State Government created Broadband SA, an \$8.4 million programme to develop and implement a state broadband strategy to map the telecommunications environment and track the effect of infrastructure programmes and policies.

Broadband SA aims to promote and support the development of broadband infrastructure and the development and use of broadband services.

Strategies to accelerate broadband uptake and use are:

- collaboration in programme development: sustain an integrated approach to the advancement of broadband access and use through cross-sectoral initiatives such as the South Australian Telecommunications Strategy Implementation Group;
- infrastructure development: facilitate the deployment of necessary infrastructure for broadband access across South Australia;
- demand aggregation: assist customer groups, such as local councils and businesses, to aggregate their broadband business and bring it to market;
- business case: develop and promote the business case for broadband applications across different sectors of business and the community;
- regional development: seek to develop and maintain parity in the price and availability of broadband between regional and metropolitan South Australia;

²⁰ Estimate has a relative standard error of 10% to less than 25% and should be used with caution.

- digital divide: introduce specific strategies to use the introduction of broadband technology to improve access to telecommunications services to promote social inclusion;
- national representation: ensure that South Australia's broadband needs and priorities are met by influencing national telecommunications policy and ensuring that the state receives its fair share of funding from national programmes;
- innovation: develop and encourage innovative ways to exploit the potential of broadband including, multimedia and film production, e-business, high-performance computing and online learning;
- government procurement: maximise use of the opportunities presented by the State Government's purchasing of broadband services to stimulate investment in broadband infrastructure and take-up rates across the broader community.

A cornerstone of the Broadband SA programme is the Broadband Development Fund (BDF), which provides up to \$7 million over four years in infrastructure grants to fund new broadband infrastructure in regions and metropolitan black spots, focusing on 'last mile' projects that deliver economic benefits to the state.

Coorong Broadband Network

The Coorong Council Region, the largest council region in South Australia, spans more than 8800 square kilometres and has a population of approximately 5800.

The Coorong Broadband Network is a \$1.08 million project supported by the Coorong District Council, Agile Communications, and the Australian and South Australian Governments providing affordable high speed internet services region wide and 'cheap' telephone services.

The broadband solution provided by Agile involves the establishment of eleven new radio towers providing wireless coverage across most of the council area. Many of the sites are solar powered, an innovative and cost-effective way of providing power to these remote locations.

The South Australian Government announced the first round of BDF funding in June 2004. Since then \$3.5 million, including \$218 000 for demand aggregation and assistance projects, has leveraged \$15.5 million in non-state funding (applicants, industry, community, local and Australian governments). The BDF has provided a catalyst for broadband infrastructure to be rolled out in Yorke Peninsula, Salisbury, Barossa and Light council areas, the Coorong, Port Lincoln, Kangaroo Island, Mount Gambier, with significant aggregation activities occurring in the Eyre and Fleurieu peninsulas, the Adelaide hills, the Central Local Government Region, the Murraylands and Riverland; Onkaparinga and the south east.

Connecting Salisbury

Businesses and residents in Salisbury have significantly improved access to broadband services as a result of a joint initiative between the City of Salisbury, Amcom Telecommunications and the South Australian Government. Salisbury is one of the fastest-growing metropolitan communities in South Australia, but surveys conducted by the City of Salisbury found many businesses within its community were being hampered by lack of access to high-speed broadband services. It found significant "black spots" where services were not available. The council, leveraging off its own broadband and other telecommunications needs, developed a project to deliver advanced broadband services. Amcom utilised wireless facilities and ADSL2+ DSLAMs to deliver high-bandwidth broadband services to businesses and residences across the City of Salisbury. The BDF contributed \$550 000 towards the total project cost of over \$1.1 million.

The State Demand Aggregation Programme has been a key element of Broadband SA in raising awareness and stimulating local demand for telecommunication services, particularly in regional South Australia. The programme is used to map demand for regional broadband services and put in place a development plan to provide broadband services to meet that demand in the immediate and longer term.

Port Lincoln Broadband Project

New high-speed broadband services are being established in Port Lincoln, Whyalla and Port Augusta by aggregating South Australian Government telecommunications usage in the townships. The \$4.6 million project received funding of \$2 million from the Australian Government, \$140 000 from the BDF, \$1.1 million from the State Government and the remainder from the commercial service provider.

Government agencies and the Port Lincoln Marine Research Centre will be able to access optical fibre and wireless broadband services. A new backhaul connection to Adelaide will be established by constructing a microwave link between Port Lincoln and Port Augusta and then interconnecting with the national inter-capital fibre route at Port Augusta.

Construction is expected to be completed early in 2007. The project is already providing additional community benefits with Internode, an internet service provider, announcing that it will deploy its own ADSL infrastructure and offer broadband services in the towns of Port Lincoln and Whyalla due to the availability of a competitively priced backhaul service as a result of this project.

SABRENet

The South Australian Broadband Research and Education Network (SABRENet) is a joint venture of the State Government, three South Australian universities and Defence Science and Technology Organisation (DSTO) to construct a fibre optical broadband network linking Adelaide's major research sites to the national and global education and research network. It is one of the first and largest purpose-built customer owned fibre networks linking 27 primary sites. Each fibre is capable of transmitting over 300 gigabits (Gb) per second using current equipment. It is expected that participants will commission services providing between 1 and 10 Gb per second. Establishment of a purpose-built network is being driven by the demands of new applications such as high-performance computing and bioinformatics. The network will also be available for government and educational use.

In September 2005 SABRENet Ltd was incorporated as a company limited by guarantee with the universities and the South Australian Government as members and the DSTO subsequently joining as a participant and user. The network has been funded from contributions from SABRENet members together with a significant contribution from the Australian Government. It links all the major research precincts in Adelaide, from Roseworthy in the north to Flinders University in the south and Queen Elizabeth Hospital in the west, to the Magill campus of the University of South Australia in the east. The network is expected to be operational in 2007.

Cinenet Systems

The State Government provided financial assistance toward the establishment of a privately operated broadband network, Cinenet which is used by the growing film post-production and multimedia industry and provides affordable high-end broadband connection ranging from 2 megabits (Mb) to 1 Gb per second suited to the particular requirements for this industry.

Cinenet consists of a fibre optic backbone servicing the Kent Town post-production district, the central business district and Mercury Cinema, 100 Mb per second microwave services to selected clients and a microwave radio system to support rapid deployment of services to 10 Mb per second within a five kilometre radius from the central business district.

Future ICT

The Future ICT project seeks to streamline and direct the State Government's expenditure on information technology (IT) and telecommunications services and infrastructure in the wake of the nine-year government-wide agreement with EDS, which ends in 2007.

Procurement will cover all services related to both metropolitan and regional and remote areas for fixed voice carriage services, mobile and data carriage services. Future information and communications technology (ICT) presents an opportunity for the State Government to aggregate its entire telecommunications expenditure, currently running at around \$62 million per annum, with a potentially significant impact on South Australia's telecommunications environment. The impact

of this is likely to be most pronounced in regional areas, where the State Government is generally the largest customer of telecommunications services.

The Future ICT procurement has, to the maximum extent practicable, been designed to integrate with the Australian Government's Connect Australia programme.

Conclusion

There are a number of significant challenges which must be addressed to ensure an affordable telecommunications service offering for all South Australians. The Australian Government, with lead responsibility for telecommunications policy, needs to address these issues, which are not unique to South Australia.

Competitive regional backhaul

It is now well recognised that access to affordable backhaul is a major problem for internet service providers (ISP) and other carriers seeking to provide broadband services into remote and sparsely populated areas. As an example, the Digital Subscriber Line Access Multiplexer (DSLAM) deployments in regional South Australia by Agile Communications would simply not be possible, according to that carrier, without competitively priced backhaul connections. This has necessitated Agile building its own backhaul into the upper south east region of the Coorong to provide ADSL access in Taillem Bend, Meningie and Tintinara.

The construction of competitive backhaul can be a major factor in delivering sustainable metropolitan parity pricing into non-metropolitan areas. Funding must be available to assist with backhaul links (or part thereof) that:

- directly enable a terrestrial access solution;
- provide the required 'incentive' for internet service providers (ISPs) to deliver services where they might not otherwise; and
- provide additional leverage to obtain a whole-of-region or area solution versus just the 'easy' customers.

In many regional and rural areas there is evidence of providers being willing to invest within the local region but having limited options to acquire the necessary backhaul to complete their service delivery. If competitively priced access to the incumbent's backhaul networks became more readily available, it would remove the need to overlay the continent with additional high-capacity transport networks and generate more options for regional deployment by providers.

Satellite services

Satellite-based delivery of broadband services provides an essential complement to terrestrial solutions such as DSL and wireless. However, the many drawbacks of satellite broadband (such as cost, latency and performance) will limit its usefulness, except to the more remote locations where alternative forms of broadband service are not available.

Satellite use should not be encouraged in regions where viable investment would create other solutions. There is some evidence of satellite being used to deliver 'quick fixes' in situations where it detracts from demand that could otherwise justify ADSL or wireless deployment. The marginal cost of satellite broadband for each additional customer is high, compared to the equivalent marginal cost of terrestrial services when a reasonable concentration of demand is present (perhaps in towns with more than 50 people in them).

Hence, satellite services should not be subsidised where a viable terrestrial service is available or could be made available through a strategic programme.

Demand aggregation

To date demand aggregation has proved an effective means of promoting investment in broadband infrastructure. Future demand aggregation and brokering activities need to focus more on applications and effective use of services and could include:

- working with local communities and governments to identify strategic projects and opportunities to promote applications and effective use at the regional level;
- focusing on key industries such as wine or tourism to identify aggregation opportunities within sectors and to promote best-practice use of broadband services to support and improve business processes.

Broadband threshold

The current broadband threshold should be reviewed to better meet user expectations. Two years ago, a speed of 256K/64K was considered adequate. Now, a minimum of 512K/128K is a frequent choice for metropolitan users. Many other OECD countries do not consider speeds below one megabit per second as broadband.

Technology neutrality

The assumed benefit of technology neutrality as a philosophy for rollout of infrastructure could be questioned if a longer-term view of service provision is adopted. The adoption of ADSL and wireless broadband technologies may provide sufficient bandwidth to meet current demands, but appropriate planning for future needs may require technologies with more scalable bandwidth, to encourage economic growth from the use of electronic technologies.

Connect Australia

The Australian Government's Connect Australia programme is an opportunity to generate a significant improvement in the broadband services available to regional, rural and remote communities. Connect Australia will enhance work that has already been undertaken by the Broadband SA team, commercial interests and communities.

The challenge for all parties involved is to develop the level of coordination to maximise the benefits from the entire Connect Australia programme and ensure effective integration with other initiatives, especially at a regional level. Such coordination needs to extend across usage sectors, communities, regions, agencies and jurisdictions.

Virtual Town Hall – community engagement

The Virtual Town Hall component of the *South Australia's Strategic Plan (SASP)* regional consultation was an initiative of the Department of Further Education, Employment, Science and Technology (DFEEST) and the Department of the Premier and Cabinet (DPC).

The Virtual Town Hall model allowed people in remote locations to participate in the plan's community forums via interactive real-time internet technology owned by DFEEST's Outback Connect project.

Up to nine remote locations could join in the scheduled community forums, participate in group discussions, and contribute to the forum outcomes. Participants physically present at the sessions in Port Augusta and Ceduna were joined by online participants from various remote locations.

The Australian and South Australian Governments have made significant investments in building competitive telecommunications infrastructure in South Australia. In order to realise productivity gains and enhance social and community networks, the South Australian Government has identified that availability and effective use of content and applications are the next steps in the evolution of the information economy. Effective engagement with businesses and the community (as users) to properly understand their needs and requirements will be vital.

A particular challenge for the Australian Government in delivering the Connect Australia programme will be providing competitive telecommunications services to areas of low population density.

Targeted investment in telecommunications infrastructure must continue if all South Australians are to access reliable and affordable telecommunications services.

Further information:

www.broadband.sa.gov.au – Broadband SA program

http://www.dcita.gov.au/communications_and_technology – Department for Communications, IT and the Arts

www.acma.gov.au – Australian Communications and Media Authority

http://www.oecd.org/topic/0,2686,en_2649_34225_1_1_1_1_37441,00.html – OECD
Telecommunications and Internet Policy

www.etsi.org – European Telecommunications Standards Institute

www.ofcom.org.uk – UK Office of Communications

<http://www.fcc.gov/broadband/> – USA Federal Communications Commission

www.wimaxforum.org – Worldwide Interoperability for Microwave Access (WIMAX)

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