

Tackling Climate Change

SOUTH AUSTRALIA'S GREENHOUSE STRATEGY



› 2007–2020



reducing

our personal impact by considering the emissions implications of our every action, switching to accredited Green Power, drying clothes on the line, getting on a bike, installing a gas-boosted solar hot-water system and claiming the rebate, working from home, purchasing local fresh foods, using the broom to sweep and not a blower, setting thermostats as close to room temperature as possible, composting food scraps and garden waste, turning off appliances at the power point rather than using stand-by, using post-consumer recycled paper in the office and the toilet, teleconferencing instead of meeting, turning lights off, using safe alternatives to hazardous chemicals, fully loading clothes washers before running a cycle, buying only as much food as we use, replacing burnt-out incandescent and halogen lights with long-life fluorescent lamps, car pooling, using natural light as much as possible, buying secondhand or recycled, using the lowest fuel-use car as possible, printing out only when necessary and using both sides of the paper, choosing products in minimal packaging, purchasing the right-sized high energy star rating appliances, taking the train or bus

adapting

insulating walls and ceilings and shading all windows in summer, the garden by planting local natives, employing a 'green' architect to design our new house, developing new crops and products and diversifying my farm's income stream, getting together with friends and neighbours to make a community garden and share equipment and tools, joining the slow food movement, reviewing my business's vulnerability in infrastructure and markets in the face of climate change, being prepared for bushfires and having an escape plan, joining a community group that helps inform others about behaviour change, demanding that companies we invest in perform sustainably, protecting our homes and businesses from extreme weather events, introducing efficiencies that protect my company's triple bottom line, demanding that suppliers follow 'green' practices, installing water recycling facilities, eating healthy food and staying fit to prepare for the health challenges of a warmer world

innovating

joining a collaborating group of similar businesses with common challenges in response to climate change, asking our children what they are learning at school about ways to tackle climate change, supporting sustainability focused organisations and spreading the word, sending our brightest young managers to development programs for gaining sustainability skills, calculating my family's ecological footprint and innovating to reduce it, becoming a TravelSmart household, making recycled materials a feature of our new office, buying carbon offsets every time I take a plane, making downsizing the new 'bigger and better', moving my superannuation to a sustainable fund, introducing 'closed loop' production at my factory, collaborating with experts to give our business a genuine triple bottom line, exploring funding opportunities for our business greenhouse reduction measures, finding a renewable energy source that's right for our business, volunteering for trials of new technology, employing an environmental management system and eco-efficiency measures

Foreword

I am delighted to release *Tackling Climate Change: South Australia's Greenhouse Strategy 2007–2020*.

This comprehensive and detailed plan is designed to address the single biggest threat facing our planet.

It outlines the case for immediate action and the wider, international context in which we must work.

It is based on three imperatives: the need to reduce our greenhouse gas emissions; the need to adapt to climate change; and the need to innovate.

Most importantly, *Tackling Climate Change* sets out specific goals and targets for our state—along with the means to reach them.

South Australia has achieved a great deal in the field of climate change, and we are seen by many environmental experts as being an international exemplar.

For instance, we lead Australia in the development of renewable energy, and we have introduced climate change legislation that is the first of its kind in Australia.

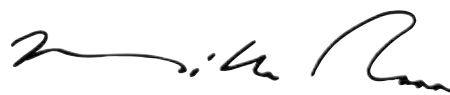
As the nation's first Minister for Sustainability and Climate Change, I am determined to maintain this momentum and to bring about profound, long-term change.

Tackling Climate Change will help us do that, and I thank the broad range of people and groups involved in its conception and development.

This strategy is not the solution to climate change.

But it is a call to arms—to government, industry, business and the people of the state—for bold, practical and concerted action.

I commend *Tackling Climate Change* to all those concerned about the future of our state, our country and our planet.



Mike Rann

Premier of South Australia

Minister for Sustainability and Climate Change





Contents



i Executive Summary

1 Case for Action

- 2 South Australia's emissions
- 3 The international picture
- 5 Policy responses to climate change

8 1. Leadership

- 10 Setting targets
- 11 Leading by example
- 13 Foundations for action

14 2. Adaptation

- 15 Science and research
- 16 Community resilience
- 17 Hazards

20 3. Community

- 21 Behaviour change
- 22 Resource efficiency
- 23 Community development

24 4. Industry

- 25 Business risk
- 26 Driving competitiveness
- 27 Opportunity in a new economy

28 5. Energy

- 30 Energy use
- 31 Cleaner energy sources
- 33 Transition pathway for energy

34 6. Transport and Planning

- 36 Integrated land use and transport planning
- 37 Travel behaviour change
- 38 Vehicle performance
- 39 Mode shifting

40 7. Buildings

- 42 Performance standards
- 43 Energy efficiency
- 44 Improved building performance
- 45 Urban development

46 8. Natural Resources

- 47 Resilient natural resource-based industries
- 48 Vulnerability of water resources
- 49 Biodiversity conservation
- 51 Reducing emissions, sequestering carbon

52 Government Action Plan to 2012

- 52 1. Leadership
- 54 2. Adaptation
- 56 3. Community
- 58 4. Industry
- 60 5. Energy
- 62 6. Transport and Planning
- 64 7. Buildings
- 66 8. Natural Resources

- 69 Appendix 1
- 71 Glossary
- 76 List of abbreviations
- 78 References and notes



**A pathway for combined
and concerted action to
tackle our greatest
single challenge**

Executive Summary

South Australia's Greenhouse Strategy, *Tackling Climate Change*, is a framework for all of South Australia's greenhouse targets and commitments to be met in a comprehensive and coordinated way. It is South Australia's planned response to climate change.

The strategy takes three avenues to the future:

- › reducing greenhouse emissions
- › adapting to climate change
- › innovating in markets, technologies, institutions and the way we live.

It frames those avenues into objectives and strategies in six sectors, each with a common set of challenges in adapting to climate change and common opportunities to reduce greenhouse gas emissions, although issues will and do overlap sectors. The sectors are:

- › Community—from individual households through to whole community, including services (e.g. health, education and emergency)
- › Industry—from the largest consumers, manufacturing, mining (other than petroleum industries), through to all businesses
- › Energy—the production and distribution of energy for consumption including energy conversion technologies
- › Transport and Planning—transport, transport infrastructure and influences, urban planning and its influence on emissions and resilience to new climates

- › Buildings—built environment generally (acknowledging the overlap with urban planning) including commercial and residential buildings, and influence of the building industry
- › Natural Resources—terrestrial, coastal and marine environments and the natural resource-based uses and the industries they support.

In addition, *Tackling Climate Change* has sections dealing with two cross-cutting themes—Leadership and Adaptation.

Each section contains a goal, a series of strategies, objectives and actions that outline the means to achieve the goal. Taken together these provide a coherent framework for the state as a whole to respond to climate change, and for different sectors to inform and guide their climate change policy and actions. The strategy also contains a Government Action Plan which is a framework to guide the activities of government agencies in meeting the Kyoto emissions reduction target in South Australia within the first commitment period of 2008–12. The action plan nominates priorities for action to 2012, but this does not represent a final commitment by government. Some of the proposals are currently unfunded and will require separate budgetary consideration.

Broadly, the framework sets 8 goals (see following page).

<p>1. Leadership</p> <p>The Leadership goal is for South Australia to lead the nation in tackling climate change. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › encourage early action in reducing greenhouse gas emissions › demonstrate best practice in reducing emissions › build capacity to tackle climate change. 	<p>2. Adaptation</p> <p>The Adaptation goal is for South Australia to be equipped to the best of its ability to adapt to climate change and capture opportunities. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › increase our understanding of risks, vulnerabilities and opportunities › build resilient and healthy communities › improve hazard management and minimise risk.
<p>3. Community</p> <p>The goal for the Community sector is for the South Australian community to be leaders in reducing greenhouse gas emissions and adapting to climate change in a way that promotes social equity and health. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › promote individual, household and community behaviour change › improve the efficient use of resources by households and communities › build greenhouse friendly communities. 	<p>4. Industry</p> <p>The goal for the Industry sector is for South Australia's industry to be a leader in managing greenhouse emissions and tackling climate change. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › manage business risks associated with greenhouse and climate change › reduce greenhouse gas emissions while driving and enhancing business competitiveness › target commercial opportunities and develop products and services of the future.
<p>5. Energy</p> <p>The goal for the Energy sector is for South Australia's energy systems to significantly reduce greenhouse emissions while continuing to support productivity and prosperity. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › improve the efficiency of energy use › increase take-up of renewable and low emission technologies › ensure energy investment and markets follow a transition pathway to low greenhouse emissions. 	<p>6. Transport and Planning</p> <p>The goal for the Transport and Planning sector is for South Australia to substantially reduce transport-related greenhouse emissions while maintaining accessibility and economic development. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › reduce trip lengths and the need for motorised travel through integrated land use and transport planning › achieve more sustainable travel behaviour › improve the emissions performance of vehicles and fuels › shift transport towards low greenhouse emission modes.
<p>7. Buildings</p> <p>The goal for the Buildings sector is for South Australia's building sector to anticipate and respond to climate change and become a world leader in the creation of a carbon neutral built environment. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › develop high performance green standards for building design, construction and operation › optimise the energy performance and subsequent cost-effectiveness of buildings › increase market and community awareness of the benefits of improved building performance › develop sustainable built environments that are responsive to climate change. 	<p>8. Natural Resources</p> <p>The goal for the Natural Resources sector is for South Australia's natural resources sector and ecosystems to be managed sustainably with optimum resilience and capacity to adapt to climate change. To achieve it, strategies and actions have been developed to:</p> <ul style="list-style-type: none"> › strengthen the resilience of industries reliant on natural resources in the face of potential impacts of climate change › incorporate climate change in the sustainable management of water resources and water supply › increase the capacity of ecosystems to adapt to climate change › reduce greenhouse gas emissions from the natural resources sector and increase carbon sinks.

The effectiveness and currency of *Tackling Climate Change* and progress with implementation will be monitored and its content reviewed and updated as necessary. Monitoring and reporting on progress will be an integral part of the reporting regimes for *South Australia's Strategic Plan* and South Australia's climate change legislation.

A progress report on *Tackling Climate Change* will be tabled annually in Parliament as part of the Department of the Premier and Cabinet's Annual Report. However, progress on *Tackling Climate Change* will be thoroughly assessed in 2009, when the first report on the implementation of the climate change legislation is likely. *Tackling Climate Change* may be reviewed earlier if necessitated by substantial change in state, national or international policy settings. The Premier's Climate Change Council will provide advice to government on the monitoring and review of *Tackling Climate Change*.

Both opportunity and challenge face the people of South Australia with climate change. The state has received international recognition in its response thus far, particularly for setting exacting targets and for leading policy interventions in support of those targets. While the government has already taken large steps, it will take the entire South Australian community to join forces to provide a liveable future.

This strategy provides a pathway for combined and concerted action aimed at South Australia willingly doing more than its fair share to tackle our greatest single challenge—climate change.



**Our actions as
individuals can have
a real impact on
climate change**

Case for Action

South Australia is becoming warmer. Southern coastal areas are now drier and rainfall is increasing in the state's northern half. While the global surface temperature has increased by 0.7°C in the last century, the change has been more marked here: a 0.89°C increase for Australia and 0.96°C for South Australia. Increases have become more rapid since 1950.

The CSIRO has reported on climate conditions and outlined climate projections for 2030 and 2070¹ for South Australia. We can expect:

- › higher temperatures including more extreme hot days with spring and summer warming more than winter and autumn
- › associated health and mortality impacts on an ageing population, and increasing energy demand for air-conditioning
- › decreased rainfall in agricultural regions (especially in winter and spring)
- › greater frequency and severity of drought
- › decreased flows in water supply catchments including the Murray-Darling
- › increased flood risk (despite drier average conditions)
- › shifts in conditions affecting viability of crops and biodiversity
- › increased incidence or severity of bushfires
- › coastal hazards related to the effect of ocean warming on sea levels combined with storms of possibly increased intensity
- › damage to infrastructure, for example from coastal erosion, flooding and extreme heat.

South Australia is particularly vulnerable to these impacts of climate change. Key industries, such as wine, grains and seafood, will be challenged. It will put more pressure on our already fragmented wildlife and fragile ecosystems. Our ageing population will be exposed to health risks from extreme temperatures. Water supplies could be threatened.

Even if global greenhouse emissions are reduced today, some changes in global climate are inevitable. At the regional and local scale, South Australians must adapt and the time to plan for that is now.

There are also economic benefits from tackling climate change. The cost savings in simple changes to energy efficient products are high; the markets for new products are vast; and those first to those markets have the competitive advantage.

Our state has already stepped to the head of the queue, with more wind power than all other Australian states and the highest level of grid-connected solar power in Australia. We make solar cells and solar hot-water heaters and have vast 'hot rock' geothermal resources, with over \$100 million invested in geothermal work programs.

Our actions as individuals can have a real impact on climate change. Walking to the local shop, installing compact fluorescent light bulbs or buying the product with minimal packaging may seem inconsequential but it is the sum of each person's emissions that makes a total far too large at present. Each of us is a potential leader on climate change.

Carbon dioxide (CO₂) turns over slowly in the atmosphere. The natural variability of Australia's climate has been factored into some areas of decision making, such as in water management and agriculture. The challenge is to be ready for a shift in climate that is beyond our current experience and will, in many instances, reinforce existing environmental stresses.

But while adapting to change, we must also focus on minimising emissions.

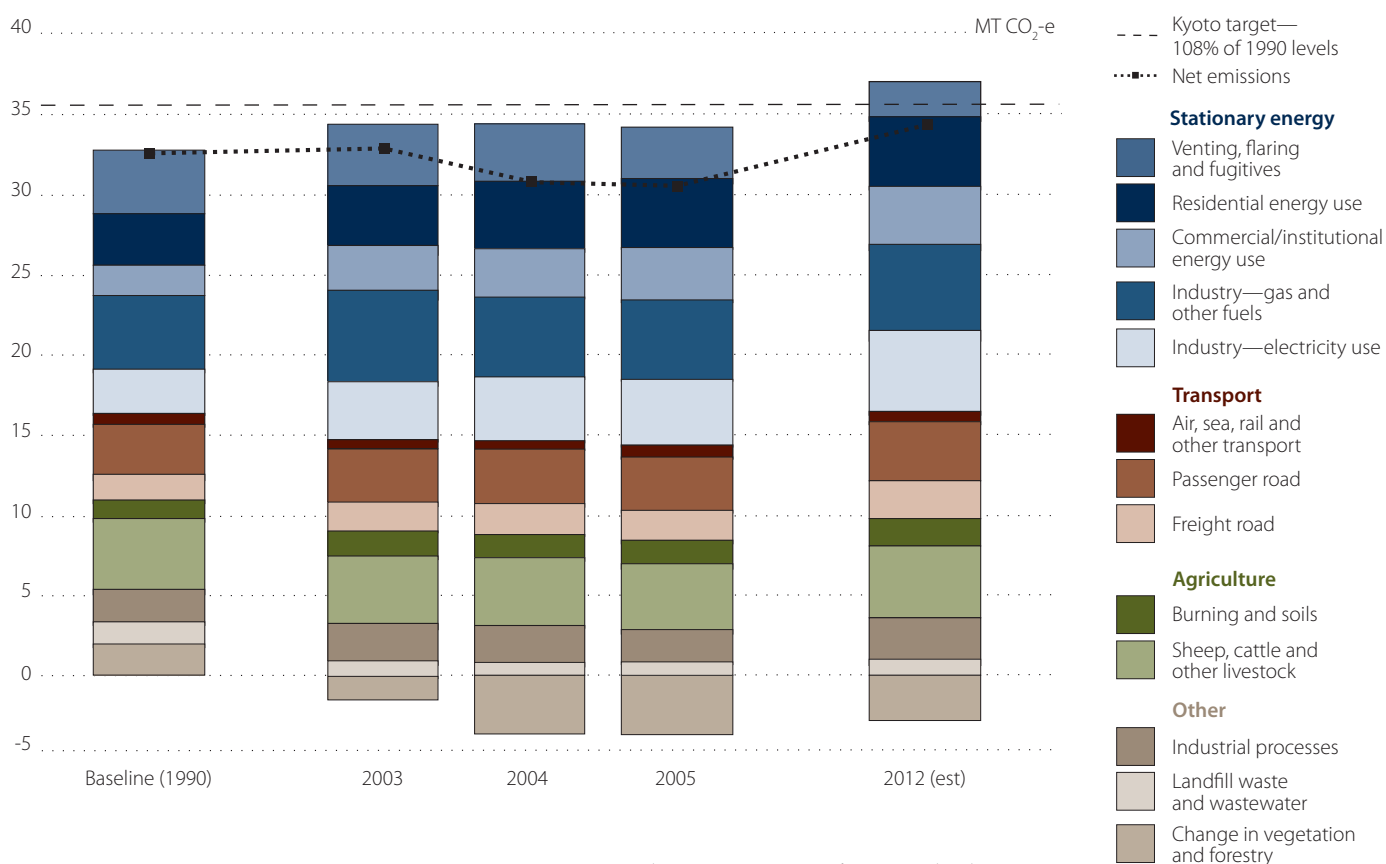
South Australia's emissions

South Australia's emissions², at about 20 tonnes per person of CO₂ equivalent (CO₂-e), are 30% lower than the national average but about four times the world average. That gives us plenty of room for improvement and a greater obligation to reduce our own emissions. If we are to encourage other countries to reduce emissions, we must continue to take action ourselves and play our part.

Analysis indicates that South Australia's emissions dropped from 33 megatonnes (MT) in 1990 (or 32.4 MT excluding imported energy) to 31 MT (net) in 2005. Almost all of the decrease is attributable to land use change and forestry. Reductions of over 5 MT of emissions have been achieved in moving from net vegetation clearance in 1990 to revegetation and new forestry plantings by 2004.

Emissions from most other sectors have continued to grow. Some reductions in emissions have come from the increase in renewable energy production and the closure of the Port Stanvac oil refinery. It is estimated that the increase in wind energy to 2012, in particular, could reduce future emissions by somewhere in the region of 1.2 MT, with a resultant overall smaller increase in emissions.

Between 2005 and 2012 the state's greenhouse emissions are projected to rise to 34 MT in line with many of the underlying growth trends. Meeting the Kyoto target is one of South Australia's key targets as articulated in *South Australia's Strategic Plan*. The Kyoto target for Australia aims for stabilisation of emissions between 2008 and 2012 at 108% of 1990 levels and while the state is projected to meet the target of 36 MT, trends indicate that emissions will fail to stabilise at this level without further policy intervention.



The international picture

Since it was established in 1988, the Intergovernmental Panel on Climate Change (IPCC) has harnessed the work of thousands of scientists to give a collective picture of a warming world and other changes in the climate system. The IPCC has concluded that climate change is definitely occurring and there is consistent evidence that human activities—especially burning of fossil fuels, clearing of forests and land-use change—are the main drivers of global warming and climate change in recent decades.

Increased concentrations of CO₂ and other greenhouse gases in the atmosphere and their enhancement of the greenhouse effect have been measured and are not in dispute. The atmospheric concentration of CO₂ has risen to 379 parts per million (ppm) in March 2004 from 280 ppm in pre-industrial times (1750). Globally, surface temperatures have increased over the last 140 years and the rate of the rise continues to increase.

South Australia's greenhouse gas emissions²

Source: Department of the Premier and Cabinet (2007) based on National Greenhouse Gas Inventory (NGGI) and Electricity Supply Industry Planning Council (ESIPC) data³

South Australia's greenhouse gas emissions by sector (2005)

The table outlines the contribution of each sector to the total South Australian emissions. Sectoral breakdowns, however, add up to more than the total emissions as some elements are repeated in more than one sector. For example, residential emissions from electricity and gas use in homes appear in three sectors: community, buildings and energy.

Source: Department of the Premier and Cabinet (2007) based on NGGI and ESIPC data³.

Sectors	Greenhouse gas emission	Activity	See also
Community	8.5MT	<ul style="list-style-type: none"> › Residential energy use › Passenger road › Landfill, waste and wastewater 	Page 20
Industry	11 MT	<ul style="list-style-type: none"> › Industry—gas and other fuels › Industry—electricity use › Industrial processes 	Page 24
Energy	20 MT	<ul style="list-style-type: none"> › Venting, flaring and fugitives › Residential energy use › Commercial/institutional energy use › Industry—gas and other fuels › Industry—electricity use 	Page 28
Transport and Planning	5.9MT	<ul style="list-style-type: none"> › Air, sea, rail and other transport › Passenger road › Freight road 	Page 34
Buildings	7.6MT	<ul style="list-style-type: none"> › Residential energy use › Commercial/institutional energy use 	Page 40
Natural Resources	2.8MT	<ul style="list-style-type: none"> › Burning and soils › Sheep, cattle and other livestock › Landfill, waste and wastewater › Change in vegetation and forestry 	Page 46

Added to that, there is increased scientific evidence that the models can project future climate change.

The IPCC's fourth assessment (2007) projects a warming of the Earth's average surface temperatures of 1.1–6.4°C by 2100. To put this into perspective, our present climate is only 5°C warmer than the climate of the last Ice Age. Even the minimum projected temperature rise of 1.1°C over one century is, to the best of our knowledge, unprecedented in the period of human civilisation.

Beyond a 2°C increase in global temperature, the risks to human societies grow significantly—agricultural losses, water scarcity and widespread health impacts and irreversible damage to terrestrial ecosystems are possible. Climatic tipping points could be precipitated—loss of the West Antarctic and Greenland ice sheets (which between them could raise sea levels by more than 10 metres over a few centuries), shutdown of the thermohaline ocean circulation (and with it the Gulf Stream that moderates Europe's climate), and transformation of forests and soils from a net sink of carbon to a net source.

This has prompted calls for emissions reductions that would limit the global average temperature rise to 2°C. Current knowledge suggests that we should limit CO₂ levels to no more than 450 ppm if we are to do that. The threat posed will become more severe over coming decades from both the greenhouse gases we have already emitted and from those we continue to emit.

Policy responses to climate change

The primary international agreement on how the world should deal with climate change is the UN Framework Convention on Climate Change. Australia has ratified the framework and committed to the goal of preventing dangerous human interference with the climate system. The Kyoto Protocol is an international treaty within this framework. It requires nations to commit to emissions targets in the period 2008–12. Australia has been the subject of considerable international attention for its failure to ratify the protocol.

Countries that ratified Kyoto are currently discussing targets beyond 2012. Despite the lack of an international requirement for longer-term targets, a growing number of jurisdictions have adopted them including the United Kingdom (60% by 2050), France (75% by 2050), Germany (40% by 2020) and California, USA (80% by 2050). South Australia also has a target of 60% reduction in emissions by 2050. These targets are a public statement of the extent of the emission cuts that jurisdictions

believe are required to avoid dangerous climate change. They also aim to provide policy certainty for those reducing emissions and encourage other jurisdictions to follow suit.

Future discussions are likely to address action beyond the first commitment period for the Kyoto Protocol of 2008–12. The European Union's introduction of emissions trading in 2005 has started a significant market-based stimulus to reducing emissions. The international business community is increasingly acknowledging climate change as an urgent issue. Further impetus has been added by the release of the Stern Review, *The Economics of Climate Change*⁴, from respected former World Bank economist Sir Nicholas Stern in 2006. The report states that costs of the impact of global poverty, conflict and mass migration due to climate change far outweigh the costs of taking urgent action to counter global warming. It concludes that early action would be far cheaper than waiting until the full effects of climate change are felt and warns of a window of opportunity of only 10 to 15 years for nations and the international community to act. The release of this report has increased the sense of urgency for action.

It may be that changes could be enforced internationally, such as new targets and trade barriers; South Australia is already positioning itself to benefit.



The state government has already taken an international leadership role by signing the Declaration of the Federated States and Regional Governments on Climate Change in Montreal in December 2005. For some time Adelaide has been part of the PLUS Network (Partners for Long-term Urban Sustainability) and South Australia has led from the front at forums of Australian governments. Most importantly, South Australia will be one of a few jurisdictions in the world to set its targets into legislation. South Australia's climate change legislation will join Alberta's *Climate Change and Emissions Management Act 2003* and the *California Global Warming Solutions Act of 2006* as pathfinding legislation internationally. Canada has also introduced climate change legislation into parliament and the United Kingdom has released a draft climate change bill for consultation.

Although South Australia is responsible for only 6% of Australia's emissions, the Government of South Australia has realised the importance of taking action on a national basis. In 2005, it convinced the Council of Australian Governments (COAG) to address climate change at the highest level of government in Australia. As a result, a detailed work plan is being pursued by all 9 jurisdictions focusing on more relevant science, supporting uptake of cleaner technologies, and taking a comprehensive approach to adaptation.

South Australia is also working with other jurisdictions to establish a national emissions trading scheme. Emissions trading systems are considered a cost-effective mechanism for reducing emissions, and a national system would be more effective and simpler for business than several state-based systems.

South Australia has also sought the advice of international experts to develop its policy response to climate change. Professor Stephen Schneider, one of the world's leading experts in climate change, was one of Adelaide's *Thinkers in Residence* in 2006. In his report, *Climate Change: Risks and Opportunities*⁵, Professor Schneider makes ten recommendations to assist South Australia to develop successful responses to climate change. These include measures to both reduce emissions and to increase our capacity to deal with the inevitable changes that will occur. Professor Schneider's recommendations are addressed by a range of objectives, strategies and actions in this document.

South Australia's Strategic Plan commits South Australia to a range of greenhouse and energy efficiency targets. A comprehensive statewide consultation process has set a series of ambitious greenhouse and energy related targets. In particular it commits the state to achieving the Kyoto target as a first step towards reducing emissions by 60% (to 40% of 1990 levels) by 2050. Other commitments are listed in the table on the right.

South Australia’s climate change legislation sets down ambitious targets to:

- › reduce the state’s emissions by 60% (to 40% of 1990 levels) by 2050
- › increase the proportion of renewable electricity consumed so that it comprises at least 20% of total electricity consumed by 2014
- › increase the proportion of renewable electricity generated so that it comprises at least 20% of total electricity generated by 2014.

This strategy provides the means of implementing the government’s commitment in the legislation, including the targets.

The Government of South Australia is also looking at reducing greenhouse gas emissions from its own operations with targets to:

- › reduce total greenhouse gas emissions from state government operations by 60% by 30 June 2020
- › purchase a minimum of 20% accredited Green Power for state government operations by 1 January 2008
- › convert 50% of state government cars to more environmentally friendly fuels by 2010.

This strategy provides a framework for all of the Government of South Australia’s targets and commitments relating to greenhouse gas emissions to be effectively dealt with in a comprehensive and coordinated way.

T3.5	Achieve the Kyoto target by limiting the state’s greenhouse gas emissions to 108% of 1990 levels during 2008–12, as a first step towards reducing emissions by 60% (to 40% of 1990 levels) by 2050
T3.6	Increase the use of public transport to 10% of metropolitan weekday passenger vehicle kilometres travelled by 2018
T3.7	Reduce South Australia’s ecological footprint by 30% by 2050
T3.12	Support the development of renewable energy so that it comprises 20% of the state’s energy production and consumption by 2014
T3.13	Improve the energy efficiency of government buildings by 25% from 2000–01 levels by 2014
T3.14	Increase the energy efficiency of dwellings by 10% by 2014



➤ 1. Leadership

Goal: South Australia will lead the nation in tackling climate change

We are all responsible for tackling climate change.

It is up to government, industry, the community and individuals to take action.

Being at the forefront of efforts to tackle climate change will create opportunities, for example in innovative technologies and services that we can export. Being an early mover provides us with more time to adapt and position ourselves to benefit from future technological and commercial breakthroughs.

The Government of South Australia accepts that it has a responsibility to lead in responding to climate change.

Internationally, South Australia is recognised for its pioneering role in responding to climate change generally and, in particular, for being one of only a few governments in the world to legislate its greenhouse targets.

At the national level, South Australia has been the first jurisdiction in Australia to:

- › set targets in legislation
- › roll out solar panels for schools
- › commit to feed-in laws to reward owners of solar panels
- › trial micro wind turbines.

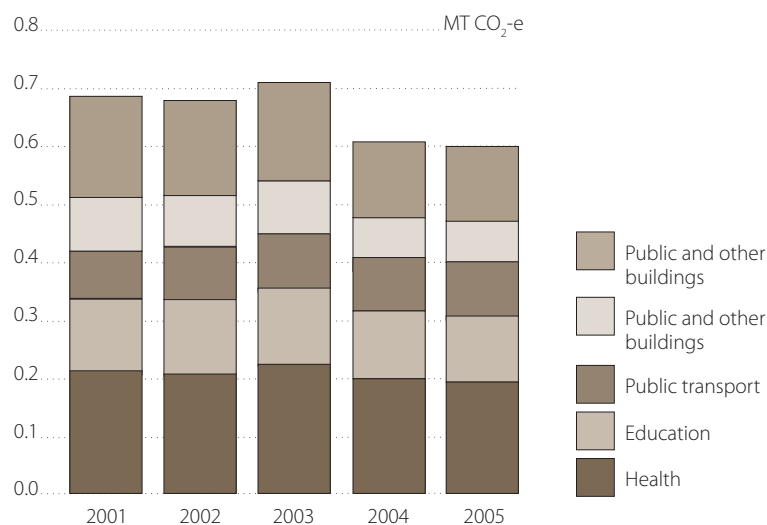
The Premier's appointment as Australia's first Minister for Sustainability and Climate Change and the government's credentials in this area have been applied to securing a national leadership standing for South Australia.

With the drive from South Australia, a national work program is being pursued by the Council of Australian Governments (COAG), the forum for First Ministers from all 9 Australian governments. This program is focusing on removing impediments to the uptake of cleaner power generation technologies, closing gaps in the development of these technologies, strengthening the flow of scientific information capable of being used by decision makers, and putting in place a national and streamlined system for mandatory reporting by organisations that produce large quantities of emissions.

The last of these is an essential prerequisite for development of a national emissions trading system, without which Australia cannot engage internationally. The absence of such a system, together with the failure of the Australian Government to ratify the Kyoto Protocol, has isolated Australia from the international movement to address climate change.

South Australia also has strong involvement in the national agenda through the Council of the Australian Federation, which is comprised of Premiers and Chief Ministers of the states and territories. It is a strategic body that helps shape and set the national policy agenda, and a forum for joint state and territory action. The Federation has endorsed a series of principles as the basis for a national approach to the challenges of climate change. It also committed to the immediate pursuit of a number of actions relating to emissions trading, carbon offsets, energy efficiency, decentralised renewables, adaptation and new technologies to remove or reduce emissions from the burning of fossil fuels.

By 1 January 2008, the Government of South Australia will source 20% of its electricity requirements from renewable electricity sources, more than any other government in Australia. Three million trees will be planted by the government by 2014. Targets are in place for improving the energy efficiency of government buildings by 25% from 2000–01



levels by 2014. All new government buildings have to be constructed to achieve a 5-star ‘Green Star’ rating as a minimum. A program is in place to improve the energy efficiency of existing government buildings by 25% by 2014. Preference is given to government office accommodation that meets at least a 5-star energy rating for all new leases and lease renewals.

Solar panels have been installed on North Terrace cultural institutions and on Parliament House. Government buildings are being used to trial the operation of micro wind turbines.

There is a firm base of international, national and local action. The task now is to use that as a platform for South Australia to take an even greater leadership role by setting targets, leading by example and building capacity.

Greenhouse gas emissions from Government of South Australia operations

The state government has been successful in reducing its energy use by 1.6% since 2000–01. The substantial drop in emissions between 2003 and 2004 is mostly due to the drop in emissions intensity of the electricity used in government buildings.⁶

Source: Department of the Premier and Cabinet, based on *Government Energy Efficiency Action Plan* data, 2005–06.

› Setting targets

Objective 1.1

To encourage early action in reducing greenhouse gas emissions

As global emissions continue to rise, so too will pressure to control them. Leadership from all governments is needed to set equivalent targets for their jurisdictions and to set in place the appropriate measures to achieve the targets.

Carefully selected targets for emissions reduction will help foster decisive and early action and help provide certainty and flexibility for long-term investment. South Australia has already set a range of ambitious and far-reaching targets which are having an impact on greenhouse gas emissions.

South Australia's strategies

South Australia's future strategies will be to set further targets, develop cost effective strategies to achieve them, and monitor progress. Other strategies include the integration of climate change considerations into the assessment of significant longer-term projects that may be vulnerable to climate change impacts.

Government actions

Priorities for government in encouraging early action in reducing greenhouse gas emissions targets will be to:

- › introduce climate change legislation that includes the state's target to reduce

greenhouse emissions by 60% (to 40% of 1990 levels) by 2050

- › increase the proportion of renewable electricity generated so that it comprises 20% of electricity generated in South Australia by 2014
- › increase the proportion of renewable electricity consumed so that it comprises at least 20% of electricity consumed in South Australia by 2014
- › determine a target to reduce total greenhouse gas emissions from state government operations within an agreed timeframe
- › purchase a minimum of 20% accredited Green Power for state government operations by 1 January 2008
- › establish the Premier's Climate Change Council to advise government on climate change policy development and implementation
- › investigate a climate change impact assessment process for major projects
- › set interim and sectorally based targets in consultation with industry and the community
- › in conjunction with other states and territories, implement a national emissions trading scheme.

Support can be provided for these actions by modelling to identify cost effective strategies to achieve the targets and publicly reporting on progress against these targets.

➤ Leading by example

Objective 1.2

To demonstrate best practice in reducing emissions

The Government of South Australia has a clear role to play in leading by example, setting the agenda, and driving change across the state. It can set standards through its own operations and purchasing, while providing certainty for others by committing to action, setting clear, consistent policies, and monitoring progress towards stated goals.

Local government has a pivotal role in providing leadership in greenhouse action and engaging local businesses and residents in driving change in the community. South Australian councils, through their involvement in the International Council for Local Environmental Initiatives (ICLEI) Cities for Climate Change program, have been national leaders in taking action to reduce greenhouse emissions in their own activities and in their local communities.

Industry and community leaders who demonstrate the possibilities and opportunities that climate change brings will encourage our whole society to tackle the issue.

South Australia's strategies

Strategies for government to adopt best practice in reducing emissions will be to accelerate efforts to reduce greenhouse emissions and to promote leadership on climate change action.

Government actions

Priorities for government in demonstrating best practice in reducing emissions will be to:

- › reduce emissions from the government vehicle fleet by converting 50% of state government cars to lower emission fuels by 2010; and reduce emissions generated by government travel by applying greenhouse friendly corporate travel policies for the location of government workplaces, commuting, aircraft and taxi use, and vehicle salary packaging
- › develop a green procurement strategy for government to purchase 'green' energy
- › implement the Government Energy Efficiency Action Plan, which supports *South Australia's Strategic Plan* target to improve the energy efficiency of government buildings by 25% from 2000-01 levels by 2014
- › reduce emissions from the public transport fleet through the most cost effective combination of low emission fuels, biodiesel, natural gas, biosequestration and the purchase of more efficient vehicles



- › increase the use of high efficiency lighting in all government accommodation
- › establish sectoral agreements with local government that put in place measures to achieve agreed goals and targets to reduce emissions and adapt to climate change. Key priorities include joint action to reduce emissions from public lighting sources and procurement practices.

Support can be provided for these actions by using sustainable practices during all stages of the building procurement process as well as developing specific strategies for significant public sector organisations.

➤ Foundations for action

Objective 1.3

To build capacity to tackle climate change

We need to stimulate and support activities that enhance our ability to reduce emissions, adapt to climate change and innovate. Important foundations for longer-term greenhouse action across a range of sectors will come from these activities.

South Australia's ability to adapt to climate change and to meet its emissions reduction targets is contingent upon it building partnerships between sectors and between spheres of government, as well as being an active participant in national and international climate change policy activities. The state must have regard for identifying and participating in collaborative solutions to climate change across jurisdictions and the Asia-Pacific region, within the private and public sectors. South Australia cannot 'go-it-alone' to meet emissions reduction targets from local activities only. South Australia can demonstrate leadership and encourage national and international governments to create further emissions reduction opportunities.

South Australia's strategies

South Australia's strategies to build capacity to tackle climate change will be to take a lead role in national climate change policy development

and action, to form collaborative partnerships within and across sectors and jurisdictions, and to position the state to drive and benefit from technological research and development.

Government actions

Priorities for government in building capacity to tackle climate change are to:

- › lead policy development in COAG and the Council for the Australian Federation, embracing the deployment of renewable and low emission technology, the generation of relevant scientific information, effective adaptation, and efficient and comprehensive reporting of greenhouse emissions
- › review government policies and strategies to ensure that climate change and greenhouse emissions reduction issues are considered
- › continue to pursue collaborative international partnerships to develop agreed policy responses to climate change.

Support can be provided for these actions by collaborating with other sub-national jurisdictions to implement the Montreal Declaration, which commits signatories to set achievable short and long-term targets.



➤ 2. Adaptation

Goal: South Australia will be equipped to the best of its ability to adapt to climate change and capture opportunities

Some climate change is inevitable regardless of how fast global greenhouse gas emissions can be reduced. Therefore we need to adapt to climate change as well as reduce emissions, and prepare for climate change impacts such as higher temperatures, lower rainfall, more extreme weather events, constrained water supply and increased vulnerability of coastal areas.

Starting adaptation⁷ early, including efforts to reduce knowledge gaps and uncertainties, has significant benefits. The body of knowledge in these and other areas has expanded fast, but more needs to be done for the state to keep up with the adaptation challenge.

South Australia's approach to adaptation has been to make full use of its advantages in its scientific knowledge base and in its unique natural environment. Skills in forestry, dryland farming and spatial mapping have been applied to factoring climate change into evaluating options for cropping and forestry.

Land, available in strategic locations, has been used for extensive tree plantings to provide salinity and biodiversity benefits in addition to carbon sequestration. This work is continuing with the Cooperative Research Centre for Plant-Based Management of Dryland Salinity.

Over many years, South Australia has developed an expertise in dealing with water scarcity. This expertise has been applied to responding to the impact of climate change on water supplies with particular focus on plant-based management of dryland salinity and research into tree species capable of producing economic returns in constrained rainfall conditions.

To more comprehensively meet the adaptation challenge and further build on these existing skills and expertise, future strategies will focus on science and research, community resilience and hazards.

Some adaptation opportunities are the more efficient use of resources, development of new crops and diversified income streams for rural communities.

➤ Science and research

Objective 2.1

To increase our understanding of risks, vulnerabilities and opportunities

Effective adaptation strategies require sound climate change monitoring, analysis and modelling. It is critical that research is tailored to meet practical needs and that stakeholders are engaged to build awareness and ownership effectively.

The CSIRO report, *Climate Change Under Enhanced Greenhouse Conditions in South Australia*⁸, completed in 2006, gives the Government of South Australia, local government, the community and industry a scientific basis for assessing the implications of climate change. Priority topics for scientific climate research identified by CSIRO include investigating the:

- › effects of extreme events on coastal ecosystems and sustainable development of planned infrastructure
- › management of the effect of drought and fire on biodiversity, agriculture and forestry
- › effect of climate change on functional capacity of ecosystems.

South Australia's strategies

Strategies to increase our understanding of climate change in South Australia will be to further build capacity in scientific climate change research, and evaluate the impacts of climate change and effectiveness of adaptation actions.

Government actions

Priorities for government in science and research will be to:

- › work with all levels of government and industry to assess the state's regional and sectoral vulnerabilities starting with areas of known or expected vulnerability and building on national work on climate change adaptation
- › participate in the implementation of the National Climate Change Adaptation Framework, including developing national tools to assist decision makers and researchers
- › continue to support the Climate Change Chair at the University of Adelaide, established by the government in early 2007, and develop its research capability in adaptation to climate change in natural and productive ecosystems
- › consider further research on extreme event projections
- › form partnerships with universities, CSIRO, Australian Centre for Ancient DNA and Australian Centre for Plant Functional Genomics to examine climate change mitigation and adaptation.

Support can be provided for these actions by lobbying for and supporting national research on key issues, establishing baseline data, updating current projections and impact assessments, identifying new areas for research, and supporting collaborative research to build local expertise.

› Community resilience

Objective 2.2

To build resilient and healthy communities

As the climate changes, communities will need to make adjustments to cope with global warming and its impacts on local conditions.

For example, agricultural industries are used to adapting to climate variability, but the communities that are most directly dependent on primary industry for income and employment may face considerable challenges as projected drying and warming trends unfold. Effective adaptation measures such as increasing the efficiency of resources, greater use of drought-tolerant crops and diversifying income opportunities for rural communities can help to reduce the extent of impacts.

Climate change is also expected to increase the risk of adverse health effects, from heat stress and the spread of disease. As well as extreme climate events (see 2.3 'Hazards'), South Australia faces the potential for:

- › changes in the incidence of diseases due to climate change
- › health risks from infectious diseases and food, water and vector borne diseases
- › mortality and morbidity from extreme temperature events and air pollution.

Community resilience will rely on a range of community and sectoral strategies. Different approaches may be required for different regions and local communities, but the successful strategies will be those that the regional or local community has helped to shape.

It is critical that communities are aware of the potential impacts and how they can prepare to adapt to these changes.

South Australia's strategies

Strategies to further build community resilience will be to facilitate community access to information and resources, increase focus on communities in areas of high vulnerability and promote effective climate change adaptation through relevant policy and planning instruments.

Government actions

Priorities for government in building community resilience will be to:

- › review the vulnerability of critical state infrastructure
- › identify and address the adaptation needs of those communities where early adaptation is needed.

Support can be provided for these actions by developing education programs for community and business, and producing regional climate change profiles.

➤ Hazards

Objective 2.3

To improve hazard management and minimise risks

Climate change is expected to increase the vulnerability of some communities, industries and natural systems to a range of environmental hazards. In South Australia the most likely hazards are temperature change effects, such as heatwave and sea level rise. There is less certainty about hazards associated with wind and rain. CSIRO assessments highlight:

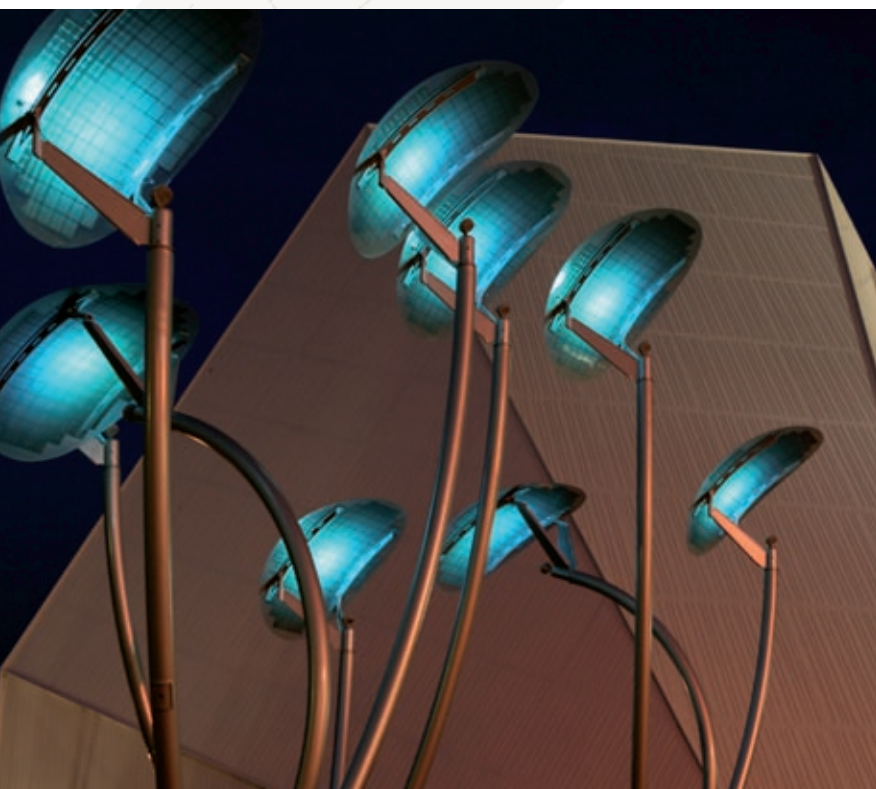
- › potential for increased rainfall intensities and flood risk
- › higher temperatures and lower rainfall possibly leading to an increase in drought and fire
- › coastal hazards relating to sea level rise combined with storms of possibly increased intensity
- › potential adverse effects on the functional capacity of ecosystems
- › heatwave impacts including health and mortality impacts on an ageing population.

South Australia's arrangements for emergency management cover the coordination of emergency preparedness, prevention, response and recovery. The planning and development system is also a key mechanism for incorporating sound risk management that seeks to build resilience.



South Australia's strategies

South Australia's strategies to improve hazard management and minimise risk will be to implement measures that reduce the vulnerability of communities, development and infrastructure to climate change related hazards, incorporation of climate change impacts and risks in planning and decision-making frameworks, and to address the impacts of climate change in emergency planning.



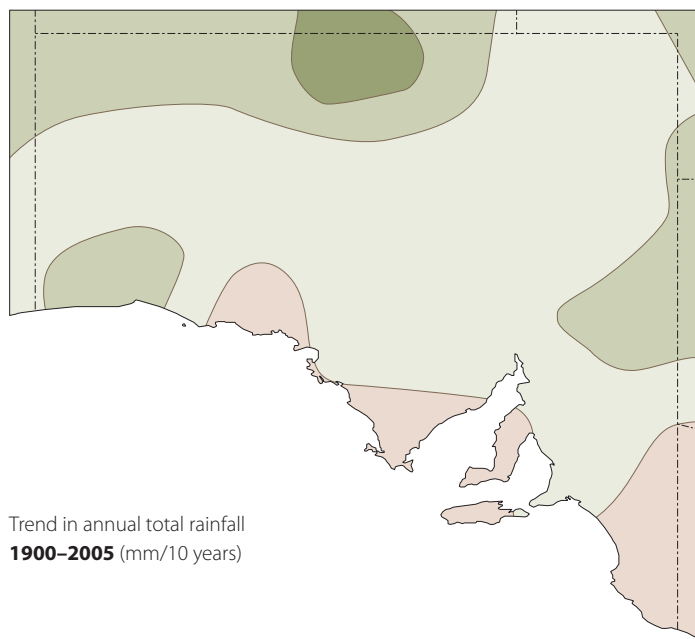
Government actions

Priorities for government in managing hazards will be to:

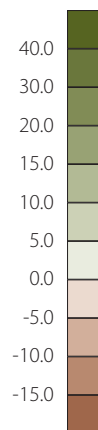
- › review the status of hazards and adequacy of arrangements for emergency planning, preparedness, response and recovery for those hazards potentially affected by climate change in view of recent information on climate change

- › incorporate climate change projections into catchment hydrology models and flood risk assessments, including investigating the magnitude of climate change impacts on urban stormwater systems
- › produce fine-scale topographic mapping and more detailed assessments of coastal vulnerability starting with areas (including settlements and habitats) of expected greatest vulnerability to sea level variation
- › build nationally agreed plans into the work programs of agencies
- › build on the well-established surveillance programs for infectious diseases by adapting their systems to incorporate specific climate change issues
- › implement the new stormwater agreement with local government to refocus available funds towards the highest priority stormwater management works determined on the basis of a total catchment stormwater management plan.

Support can be provided for these actions by modelling potential climate change impacts, monitoring of infectious diseases and increasing the amount of information available for the planning process.



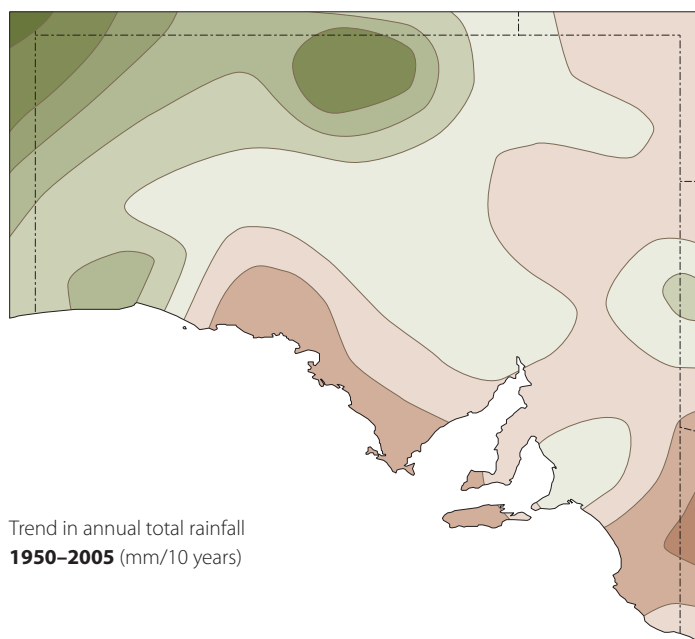
Trend in annual total rainfall
1900–2005 (mm/10 years)



Trend in annual total rainfall

The CSIRO report, *Climate Change Under Enhanced Greenhouse Conditions In South Australia* (2006), looks at historical and possible future trends for South Australia and the potential impacts of climate change. The rainfall trend, particularly over the past 50 years, shows a marked drying effect throughout many of the state's agricultural districts.

Source: CSIRO, *Climate Change Under Enhanced Greenhouse Conditions in South Australia*⁹ (2006)



Trend in annual total rainfall
1950–2005 (mm/10 years)



➤ 3. Community

Goal: The South Australian community will be leaders in reducing greenhouse gas emissions and adapting to climate change in a way that promotes social equity and health

Climate change is an issue for our whole society—we all contribute to it and collectively experience its impacts but some sections of the community are more vulnerable than others.

As individuals we have a responsibility to reduce our contribution to climate change by recognising the impacts of our everyday actions, and taking the necessary steps to minimise those impacts. It is also essential that governments, industry and the community work together to put in place systems and structures to make it easy for all sections of the community to make greenhouse friendly choices. To ensure widespread behaviour change, these choices must be accessible and affordable for all.

International experience has shown that the most progress is made in those communities where there is strong support for purposeful action. Building that support requires increasing awareness and supporting actions by individuals.

Awareness has been bolstered by the public advertising campaign of 2005–06 aimed at informing households about strategies for reducing emissions. School curriculum has been augmented with information on sustainable energy. Other education programs have addressed youth, energy efficiency and the development of Adelaide as a green city.

Actions at the individual level have also been supported.

Feed-in laws will be introduced to reward owners of solar panels for the power they return to the grid. The solar hot water system rebate has encouraged significant increase in use of these systems from the time it was introduced in 2001.

The decisions to require all new households to have plumbed rainwater tanks and to set standards which effectively eliminate the use of electrical hot water systems have fostered a new level of awareness of the importance of changed behaviours. To further build on these achievements, there will be a focus on behaviour change, resource efficiency and community development.

➤ Behaviour change

Objective 3.1

To promote individual, household and community behaviour change

Behaviour change programs are crucial tools in empowering the community to act to reduce greenhouse gas emissions and adapt to climate change. They encourage individual, household and community action through a combination of research, information provision, education and marketing strategies. Recognising that behaviour change requires more than information provision alone, programs need institutional and infrastructure support and must accommodate the needs of different communities. For example, the differences between regional and metropolitan communities and the specific needs of communities such as low-income households, indigenous and ethnic communities, must all be catered for.

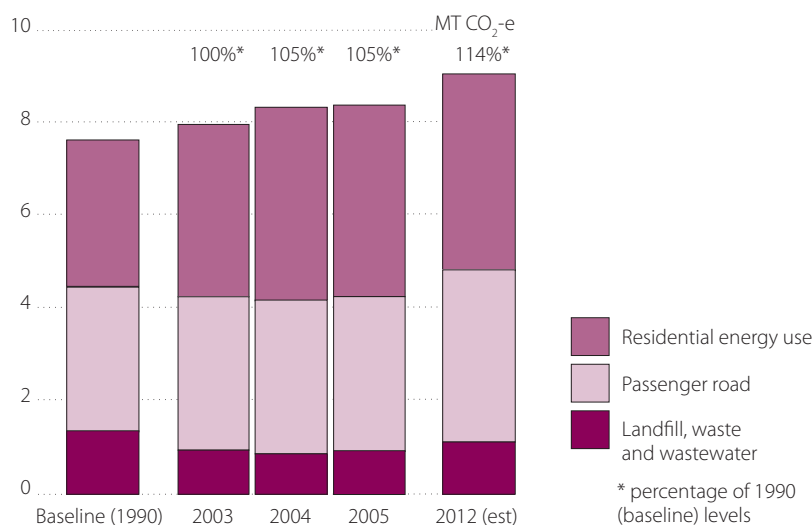
South Australia's strategies

South Australia's strategies to further promote behaviour change will be to raise awareness of climate change, implement behaviour change initiatives, develop tools to measure greenhouse emissions and support educational institutions to develop appropriate programs.

Government actions

Priorities for government in promoting behaviour change will be to:

- develop and implement a statewide climate change awareness raising and behaviour change program that incorporates:



- working with non-government and community groups on behaviour change initiatives
 - market-based research to design, monitor and evaluate community behaviour change programs
 - development of a community emissions reduction target that households can readily adopt and that is aligned with the state's emissions reduction targets
 - establishment of partnerships with community groups and local government to deliver awareness raising and education programs
- monitor and publicly report on the community's performance in reducing their greenhouse emissions and ecological footprint at a household and community level.

Community sector greenhouse gas emissions

The community sector accounts for 8.5 MT of the state's emissions, primarily from energy use in the home and in travel. Emissions are projected to rise more slowly to 2012, mostly due to the increased proportion of electricity from renewable sources. Population growth, however, continues to stimulate emissions growth.

Source: Department of the Premier and Cabinet (2007), based on NGGI and ESIPC data³.

› Resource efficiency

Objective 3.2

To improve the efficient use of resources by households and communities

While the direct link between our energy use and the greenhouse gases we emit is perhaps our most widely understood impact on climate change, our real impact extends far beyond. Everyday resources such as food, water, manufactured items, and other goods and services, all have a greenhouse cost in their embodied energy, that is greenhouse gases have been created in pumping the water, or growing and transporting the food. Processing the wastes we generate also has a greenhouse impact.

The energy intensive nature of our lifestyles means that well over half of our total ecological footprint is attributed to the emission of greenhouse gases in the production and use of energy. Improvements in the efficiency of household fittings and appliances have the potential to make a significant difference to energy demand, consequently reducing greenhouse gas emissions and saving money for consumers.

Many energy-efficient appliances are already on the market. The challenge lies in making these options both feasible and cost-effective for every household. A coordinated program

of promotion and support, along with an increase in minimum performance standards, has the potential to showcase our communities as world leaders in energy efficiency.

South Australia's strategies

South Australia's strategies to further improve the efficient use of resources by the community will be to increase understanding of the greenhouse impacts of household consumption, encourage the minimisation of waste and promote the use of renewable energy and greenhouse friendly products.

Government actions

Priorities for government in improving resource efficiency will be to:

- › work with other Australian governments through the National Framework for Energy Efficiency to establish more demanding mandatory greenhouse performance standards for energy-using fittings and appliances
- › investigate the potential for demand management strategies, such as for demand-load management equipment, 'smart' electricity meters and increased awareness to improve energy efficiency.

Support can be provided for these actions by developing information and awareness-raising initiatives that focus on sustainable consumption and the links with greenhouse emissions.

› Community development

Objective 3.3

To build greenhouse friendly communities

Local government, non-government organisations and community peak bodies play a critical role in working with communities, creating low emission and well-adapted greenhouse communities, and providing for the needs of different communities, including rural and indigenous communities and low-income households.

By incorporating good design, resource efficiency and low-waste practices into their operations, community providers and hubs such as councils, schools and community centres can also exemplify a range of best practice greenhouse solutions that are accessible and affordable for all sections of the community.

South Australia's strategies

South Australia's strategies to build greenhouse friendly communities will be to invest in community initiatives to reduce emissions, promote greenhouse friendly showcases and ensure that initiatives also address the needs of disadvantaged and low-income communities.

Government actions

Priorities for government in community development will be to:

- › continue to provide assistance for the Australian Sustainable Schools Initiative

– South Australia to integrate educational programs that have a climate change and greenhouse learning focus

- › trial a climate change program in a six school cluster
- › continue the Solar Schools initiative so that at least 250 schools have solar power by 2014
- › incorporate the energy efficiency requirements of the 'Green Star' rating tool into Department of Education and Children's Services (DECS) capital works and into DECS Environmentally Sustainable Development (ESD) policy guidelines
- › introduce climate change and greenhouse content into school curricula and practical school based actions
- › continue and expand the annual ESD grants program that assists sustainable projects by schools.

Support can be provided for these actions by forming partnerships, including relevant performance criteria in major funding agreements with non-government organisations, providing information to the community, and promoting youth leadership on climate change.





➤ 4. Industry

Goal: South Australia's industry will be a leader in managing greenhouse emissions and tackling climate change

Industry is a significant emitter of greenhouse gases. Little progress can be made in improving the state's performance and achieving the 2050 target without the participation of industry. The government aims to secure industry commitment in the first instance through collaboration and voluntary participation, and has put programs in place that advise on opportunities for improved energy efficiency in large operations, commercial buildings and 30 small businesses. The government is in discussion with the electronics, wine and cement industries about entering into agreements that could see material reductions in emissions achieved in all three. A voluntary carbon offsets register will be established under the umbrella of the climate change legislation.

At the national level, South Australia is leading the development of strategies to remove impediments to the take-up of renewable and low emission technologies as well as the introduction of an efficient and streamlined mandatory reporting system for those organisations with the largest emissions.

Consultation with a range of South Australian businesses suggests that key drivers for addressing climate change issues in industry include:

- › the requirement for more company information on environmental and social performance to manage investment risks
- › natural resources impacts from climate change, which will flow through to sectors such as food and wine
- › extreme weather events and insurance shaping as a risk factor for some sectors
- › efficiency improvements supporting business competitiveness
- › pressure from retailers and consumers becoming a risk for big business, which in turn influences the performance of its key suppliers
- › company branding and positioning in response to consumer interest in sustainability issues.

Addressing these drivers will require approaches tailored to the needs and capacities of small to medium sized enterprises and of large industries. Leadership, collaboration, innovation and changing behaviour are key success factors as our economy faces the greenhouse challenge.

Business risk

Objective 4.1

To manage business risk associated with greenhouse and climate change

No business can expect to be immune to changes associated with adapting to climate change and reducing greenhouse emissions. The risks that need to be managed will vary widely across different industries. To improve certainty, businesses need to be well informed about direct and indirect greenhouse and climate change impacts on their activities and decisions.

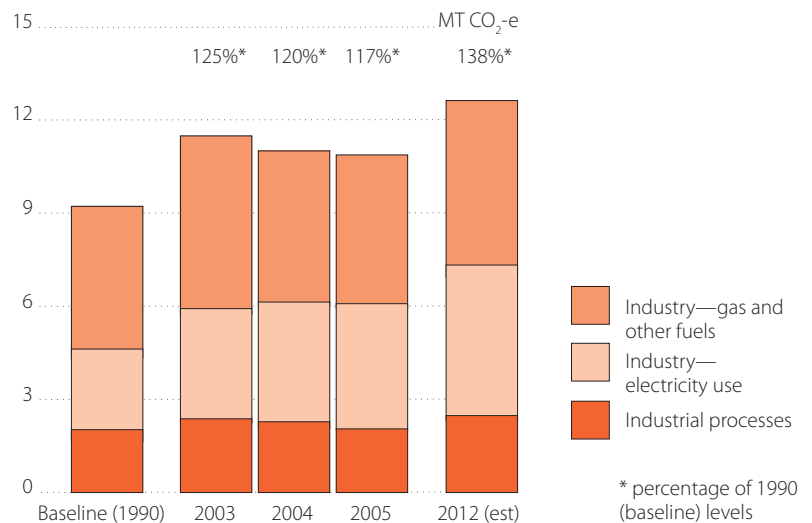
South Australia's strategies

South Australia's strategies to manage business risk will be to improve industry's knowledge, skills and communication linkages, consider the effect of economic planning and business investment in climate change policies, and increase the capacity of business to respond to consumer demands relating to climate change.

Government actions

Priorities for government in managing business risk will be to:

- › establish a 'sustainable skills development' program that provides training for trades and professionals in energy management (e.g. electricians, builders, engineers, architects), building on national work being undertaken as part of the National Framework for Energy Efficiency



- › lead national coordination and streamlining of greenhouse reporting across all levels of government and industry
- › collaborate with the Australian Greenhouse Office and business to foster membership of the Australian Greenhouse Challenge Plus Program, and to assist South Australian Greenhouse Challenge Plus members to attain 'leader' or 'champion' status.

Support can be provided for these actions by working with the Australian Government to ensure greenhouse issues are considered in market analysis, and lobbying for greenhouse issues to be included in business training courses.

Industry sector greenhouse gas emissions

Industrial activity accounts for a significant amount of the state's emissions and economic growth is a key driver of emissions growth. This sector is expected to grow from 11 MT in 2005 to 13 MT by 2012⁹ but the full impact of the Olympic Dam expansion will not be felt until 2015.

Source: Department of the Premier and Cabinet (2007), based on NGGI and ESIPC data⁹.

› Driving competitiveness

Objective 4.2

To reduce greenhouse gas emissions while driving and enhancing business competitiveness

Improvements in efficiency and reduced greenhouse gas emissions have commercial benefits for business and can reduce exposure to greenhouse pressure in the future. These opportunities exist within a business and in logistics efficiencies, in working with suppliers, and through purchasing practices based on whole-of-life costs rather than just up-front capital. Further greenhouse reductions can be achieved with renewable energy, advances in technology, offsets from carbon sequestration, recycling and reuse.

To exploit these efficiencies, business needs to have access to tools, information and examples of greenhouse reductions, opportunities to change processing methods, relevant expertise and skills and corporate management systems.

South Australia's strategies

South Australia's strategies will be to build business capacity to reduce their greenhouse emissions, use supply chains to increase greenhouse gas abatement measures and promote the achievements of South Australian businesses.

Government actions

Priorities for government in facilitating competitiveness will be to:

- › establish an inter-agency business sustainability program which improves industry productivity, and environmental and social outcomes, by providing a suite of integrated services in lean processes, eco-efficiency (EMS, energy-efficiency, water conservation, waste management and product stewardship) and market access. The government will review the effectiveness of the program after three years
- › work with the states and territories in the development of a national energy efficiency system for industry
- › establish a sustainable business program, specifically focusing on small and medium enterprises that provides cost effective solutions to improve their performance in climate change and sustainability
- › establish sectoral agreements with major industry sectors (e.g. electronics, wine and cement) that put in place measures to achieve agreed goals and targets
- › provide a sustainable business technology advisory service that has:
 - a website facility
 - R&D and technology advice
 - referrals.

Support can be provided for these actions by helping businesses calculate their ecological footprint and working with financial institutions for recognition of the lower risk of energy efficiency investments.



› Opportunity in a new economy

Objective 4.3

To target commercial opportunities and develop products and services of the future

Changes across global markets will present many business opportunities. Sustainable industries of the future will be well positioned to export their solutions to the world. Our economy could be transformed to produce and use greenhouse friendly products and services. Research, development and implementation of innovative solutions will help South Australians respond to climate change. This will entail collaboration between industry, government and research institutions to focus on technologies, processes and services that have greenhouse reduction benefits.

South Australia's strategies

South Australia's strategies to target opportunities in a new economy will be to improve links between the research sector and industry, attract support for business greenhouse reduction measures and expand the ability of industry to produce greenhouse friendly products.

Government actions

Priorities for government in targeting opportunities in a new economy will be to:

- › establish an industry and investment program to attract key businesses and work with local industry to develop and deliver products and services that reduce greenhouse gas emissions (e.g. renewable energy)
- › facilitate trials of new technologies and processes to accelerate commercialisation opportunities
- › become Australia's centre for micro wind turbines by supporting research and development and securing local manufacture, assembly and distribution
- › foster the commercialisation of geothermal energy resources through:
 - targeted research
 - a supportive investment framework
 - proactive participation in the development of a COAG roadmap for geothermal energy development
 - taking national leadership roles that facilitate investment in geothermal exploration, proof-of-concept, demonstration and development projects.

Support can be provided for these actions by working with various sectors to produce and market low greenhouse emission technology and working with research institutions to develop R&D and commercialisation plans for greenhouse technologies.





› 5. Energy

Goal: South Australia's energy systems will significantly reduce greenhouse emissions while continuing to support productivity and prosperity

Energy supply and use underpins modern society. At present South Australia sources its energy needs predominantly from fossil fuel supplies. In burning these fossil fuels we gain essential energy services such as heat and electricity but we also generate over 64% of South Australia's greenhouse gas emissions. South Australia is leading the way in the provision of renewable energy. We have a natural advantage in wind generation and are becoming world leaders with significantly more wind generation than any other state.

Demand for renewable energy is also being supported by:

- › the Government of South Australia's commitment to source 20% of its own electricity requirements from certified Green Power
- › a commitment to rewarding owners of solar panels through a feed-in law, for the power they return to the grid
- › trialling micro wind turbines.

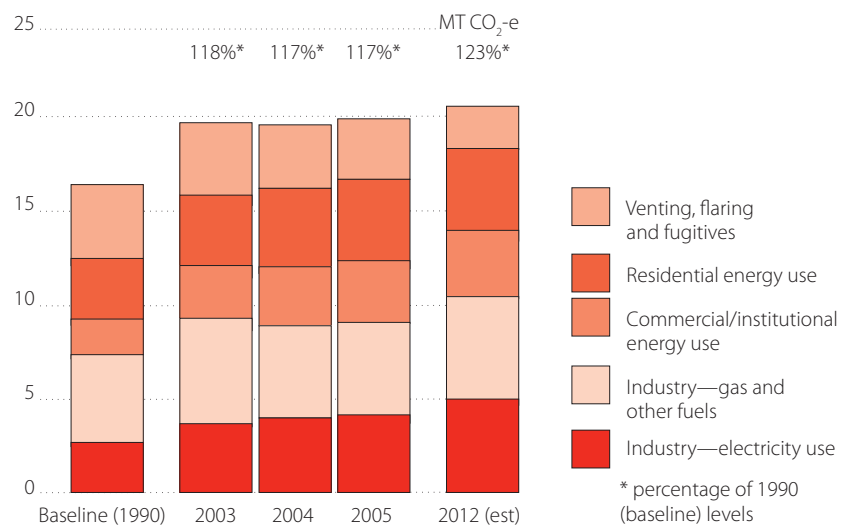
On the supply side, the state has put in place Australia's best practice land use planning rules for the construction of wind farms, developed a unique and supportive regulatory regime for geothermal energy, and led national development of a policy framework for removing impediments to the take-up of renewable and low emission technologies.

To build on these achievements, there will be a focus on improving energy efficiency, switching to cleaner energy sources and developing a transition pathway for energy.

The energy sector operates with long lead times and high capital investment. Early planning and action is setting up a transition pathway to significantly lower emissions. The decisions made this decade will shape the energy sector of the future. Facilitating access to and encouraging the uptake of renewable and low emission sources of energy, will be an important part of the process.

Tackling Climate Change strategies for energy must also recognise that the state's future well-being and prosperity require an energy sector that is competitive and reliable, delivers essential infrastructure in a timely manner and remains accessible and affordable. The aim is to uncouple energy-related greenhouse emissions from economic development.

Market-driven responses are usually the most cost-effective and speedy way to facilitate change. For example, establishing an emissions trading scheme, preferably broad-based and part of an international scheme, will internalise the cost of carbon in energy production, promote least cost emissions reduction and enable investors to manage risks, as well as fostering energy efficiency and innovation.



Stationary energy greenhouse gas emissions

The generation of electricity, direct combustion and transport together emit three-quarters of the state's greenhouse gases. The energy sector section in this strategy deals with stationary energy, which accounts for approximately 20 MT of greenhouse gas emissions or 64% of the state's total CO₂-e emissions per annum^{9, 10}.

Source: Department of the Premier and Cabinet (2007), based on NGGI and ESIPC data⁹.

› Energy use

Objective 5.1

To improve the efficiency of energy use

Energy use continues to grow in South Australia driven by growth in our economy, population and the energy dependence of our lifestyles. Implementing energy efficiency is a ‘no regrets’ measure that can reduce consumer costs and make immediate progress in reducing emissions. It needs to be the first step toward any transition and will ensure that greenhouse costs and pressures are less of a burden in the future. A commitment to energy efficiency can also bring down costs and create a strong market for associated products and services.

Reducing peak demand will also reduce risks to the electricity system caused by stronger hot spells anticipated under climate change scenarios. Improving energy efficiencies is critical in achieving the following two targets in *South Australia’s Strategic Plan*:

- › T3.13 Improve the energy efficiency of government buildings by 25% from 2000–01 levels by 2014
- › T3.14 Increase the energy efficiency of dwellings by 10% by 2014.



South Australia’s strategies

South Australia’s strategies to improve the efficiency of energy use will be to develop and implement solutions to barriers for energy efficiency initiatives, develop information provision and capacity building programs, and support measures to reduce peak demand and energy use.

Government actions

Priorities for government in improving energy use will be to:

- › implement a feed-in incentive that allows solar photovoltaic (PV) owners to receive premium tariffs for electricity generated by their solar PV systems and fed back into the grid
- › help drive the Ministerial Council on Energy's National Framework for Energy Efficiency Stages 1 and 2, to develop measures to overcome barriers to greater energy efficiency on a national basis
- › develop and implement policy measures to attain *South Australia's Strategic Plan* target to improve the energy efficiency of dwellings by 10% by 2014.

› Cleaner energy sources

Objective 5.2

To increase take-up of renewable and low emission technologies

South Australia relies heavily on fossil fuels—gas and coal for electricity, gas for direct use, and petrol and diesel for transport. A transition to cleaner energy sources needs to make the most of our comparative advantages, in local energy sources and low emission technologies.

Locally based clean energy enterprises are an economic growth and export opportunity for South Australia. The state already leads the nation in using wind and solar power. Maintaining diversity of supply and local sources also reduces energy security risks. Progressively reducing the greenhouse intensity of energy supply reduces the exposure of our state to carbon prices and limits—pressures that are expected to increase over the medium term.



The switch to cleaner energies will be critical in achieving the targets in *South Australia's Strategic Plan* to increase the proportion of renewable electricity.

South Australia's strategies

South Australia's strategies to switch to cleaner energy sources will be to introduce a carbon price signal to the market that includes the true cost of energy production, facilitates entry of renewable and low emission technologies into the energy market, and encourages the use of low carbon transition fuels.

Government actions

Priorities for government in increasing the take-up of renewable and low emission technologies will be to:

- › contribute to the development and implementation of a national cap and trade emissions trading scheme covering the stationary energy sector, including support for a national summit
- › in conjunction with the states and territories, strengthen the standards and ensure consistent accreditation for Green Power and emission offsets, including a possible national registry of carbon offsets
- › in conjunction with the states and territories, promote the adoption of new technologies that can remove, or substantially reduce, emissions from the burning of fossil fuels.

Support can be provided for these actions by providing an appropriate framework at the state and national levels, working at a national level on support and incentive measures for renewable and low emission technologies, and promoting efficiencies to reduce the emissions intensities of generation stock.

› Transition pathway for energy

Objective 5.3

To ensure energy investment and markets follow a transition pathway to low greenhouse emissions

Energy investment decisions, for example those for power stations and pipelines, represent a commitment to asset use for over 20 years and therefore define the greenhouse impact our energy supply will have in the medium term. Tackling climate change will mean attracting ongoing investment in the type of energy infrastructure that will remain physically, financially and environmentally suitable throughout its lifetime in the face of climate change.

Those responsible for early investments and innovations will expect not to be disadvantaged by subsequent market or policy changes. At the same time we cannot afford our considerable investment in existing assets to be stranded by new directions. The challenge in developing a pathway forward is to provide certainty for investment while still retaining flexibility to respond to opportunities such as technological breakthroughs.

South Australia's strategies

South Australia's strategies will be to establish clear policy frameworks to facilitate the transition toward a low carbon future, to facilitate energy technology research and to develop and establish appropriate reporting processes.

Government actions

Priorities for government in developing a transition pathway for energy will be to:

- › facilitate access to Australian Government funding and support (e.g. Solar Cities, Renewable Energy Development initiative, Low Emissions Technology Development Fund, Pre-Seed Funding Program) for interested parties in South Australia that are developing and piloting low emission technologies.

Support can be provided for this action through assistance for technology research and development and participation in the development of national frameworks.



➤ 6. Transport and Planning

Goal: South Australia will substantially reduce transport-related greenhouse emissions while maintaining accessibility and economic development

Our reliance on fossil fuels for transport contributes to increased greenhouse gas emissions, with emissions from transport comprising nearly 20% of the state's total. Our challenge is to maintain economic development while reducing transport induced greenhouse emissions.

Reducing greenhouse emissions will see the community taking less motorised travel and using more fuel-efficient vehicles. It will see policies that reduce the need for, and length of, motorised trips through integrated land use planning. The emission performance of the government vehicle fleet will need to improve and there will need to be a shift to lower emission passenger and freight modes

of transport. Growth in emissions from air travel must also be countered. The use of currently available lower carbon emission fuels needs to be expanded and the low carbon emission fuel options for the medium and long term explored.

South Australia has recognised the importance that the transport sector plays in greenhouse gas abatement strategies. Public transport is a particular focus of government attention.

The current tram system has been modernised and will be extended to the University of South Australia City West campus. South Australia has one of the cleanest, if not the cleanest, public transport fleets in Australia with 26% of buses running on compressed natural gas. Metropolitan diesel buses and trains run on 5% biodiesel with potential to increase the biodiesel fuel content.



Support has also been given to encouraging the community to take up zero emission forms of transport such as walking and cycling. A statewide comprehensive cycling strategy, *Safety in Numbers, A Cycling Strategy for SA 2006–2010*, is being implemented. Ongoing improvements are being made to bicycle infrastructure.

To build on these achievements there will be a focus on integrated transport and land use planning, travel behaviour change, vehicle performance and mode shifting.

› Integrated land use and transport planning

Objective 6.1

To reduce trip lengths and the need for motorised travel through integrated land use and transport planning

Planning the built environment to reduce the movement of people and goods through motorised vehicle travel is a key long-term strategy to reduce greenhouse gas emissions. More compact settlements can reduce journey lengths, co-location of complementary industries can reduce freight transport, and the expansion of services at the local level can reduce the need for motorised travel. More intensive development along transport corridors will support more journeys by sustainable modes of travel.

The South Australian planning system, including the *Planning Strategy for South Australia*, is the primary state government policy tool for developing these strategies. The following strategies focus on land use planning as it relates to transport networks. Urban development and design issues that affect emissions from buildings are addressed in the 'Buildings' section.

South Australia's strategies

South Australia's strategies to reduce trip lengths and dependence on motorised travel will be to use the land use planning system to reduce greenhouse emissions from transport, locate industries close to road and rail corridors and terminals, and encourage the co-location of complementary industries.

Government actions

Priorities for government in integrating transport and land use planning will be to:

- › plan for sustainable urban development that optimises previous investment in social and physical infrastructure, including existing public transport to accommodate the state government's population target of 2 million by 2050
- › identify transit oriented development (TOD) opportunities, prepare planning policy and utilise government-owned land to facilitate specific opportunities.

Support can be provided for these actions by maintaining an urban growth boundary, promoting transit-focused neighbourhoods, encouraging employment in activity centres and facilitating the development of intermodal terminals where commercially viable.

➤ Travel behaviour change

Objective 6.2

To achieve more sustainable travel behaviour

Low emission technology and alternatives to high emission travel modes exist and will become increasingly more available as we move towards a carbon constrained future. The challenge is to provide an environment where these choices or alternatives are more acceptable.

Voluntary behaviour change programs have a significant role to play, as do education and consumer information programs. Behaviour change needs to be complemented by appropriate infrastructure, pricing signals and incentives.

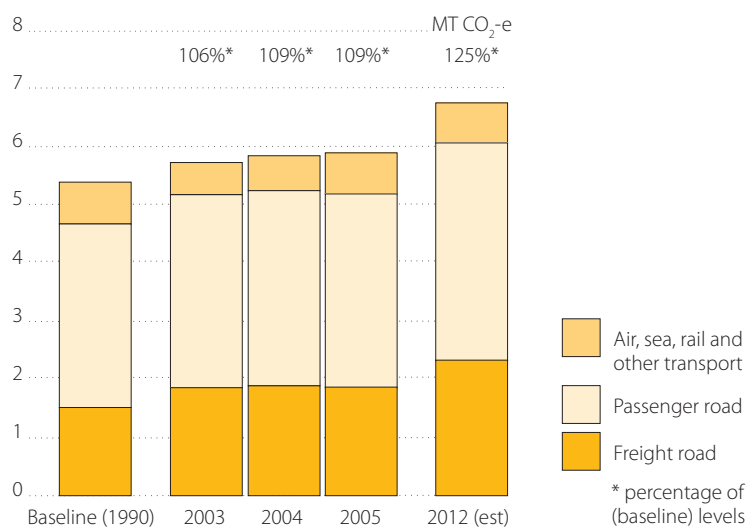
South Australia's strategies

South Australia's strategies to achieve more sustainable travel behaviour will be to promote voluntary behaviour change and education programs, maximise the emissions efficiency of the transport network, and promote legislation and pricing that encourages emissions-reducing travel behaviour.

Government actions

Priorities for government in encouraging travel behaviour change will be to:

- › expand the TravelSmart households, workplaces and schools voluntary behaviour change programs and link them with other



initiatives such as TODs, cycling programs, public transport service upgrades and urban corridors initiatives

- › review state government incentives to encourage purchase of, or conversion to, lower emission vehicles and fuels
- › together with affected councils, develop a metropolitan parking policy that targets the reduction of long-term parking in activity centres across metropolitan Adelaide.

Support can be provided for these actions by participating in national travel demand management initiatives, giving greater priority to emission-efficient modes across the network and providing better information on sustainable transport behaviour.

Transport sector greenhouse gas emissions

Emissions from transport have steadied over the past three years to just under 6 MT. Before 2002, freight and air travel were the fastest growing transport sectors. Emissions in 2012 are projected to grow but at a slower rate than the trends observed before 2002.

Source: Department of the Premier and Cabinet (2007), based on NGGI and ESIPC data¹.

› Vehicle performance

Objective 6.3

To improve the emissions performance of vehicles and fuels

Improved motor vehicle and fuel standards (coupled with improved maintenance), the increased use of low greenhouse emission technologies (including hybrid petrol-electric vehicles and lighter vehicles) and the uptake of low emission fuels will help us reduce emissions in the short term. This is an important step on the transition pathway to breaking our reliance on fossil fuel energy for transport in the longer term.

South Australia's strategies

South Australia's strategies will be to improve the emissions performance of vehicles, support research and development, and facilitate the transition towards low emission fuels.

Government actions

Priorities for government in improving emissions performance will be to:

- › continue to support the development of a local biofuels industry and promote compatibility of biofuels with new vehicle technology through consultation with automotive manufacturers and importers



- › seek the early and comprehensive adoption of new, tighter national fuel efficiency and emissions requirements for new vehicles
- › establish in-service vehicle emissions standards and legislation enforced through an on-road detection testing and correction program.

Support can be provided for these actions by initiating research on the wider use of compressed natural gas, working with the heavy and light road freight industry to improve vehicle emissions performance and encouraging more efficient industry practices that will reduce freight emissions.

› Mode shifting

Objective 6.4

To shift transport towards low greenhouse emission modes

Reducing greenhouse gas emissions in the transport sector requires improving low emission choices in private and public transport.

Improved infrastructure is also needed to encourage more people to take up cycling and walking. Planning for these modes also means addressing issues such as safety, end-of-trip facilities (e.g. showers and secure parking) and connectivity with public transport.

South Australia's strategies

South Australia's strategies are to improve public transport services, provide infrastructure to facilitate more cycling and walking, and encourage freight to shift to lower emission modes.

Government actions

Priorities for government in encouraging mode shifts will be to:

- › increase peak hour public transport services to meet high demand
- › improve the frequency, speed and connectivity of public transport services
- › consider investment in fixed rail infrastructure
- › support zero emission modes by:
 - implementing *Safety in Numbers, A Cycling Strategy for SA 2006–2010*, with a particular emphasis on actions that encourage replacement of motorised trips with cycling, such as comprehensive cycling networks and workplace end-of-trip facilities
 - developing a walking strategy.

Support can be provided for these actions by increasing public transport capacity, facilitating improvements to key rail freight lines, seeking to assess opportunities and obstacles to increasing the role of shipping in the domestic freight task and facilitating interconnectivity of the state's rail network.

➤ 7. Buildings

Goal: South Australia's building sector will anticipate and respond to climate change and become a world leader in the creation of a carbon neutral built environment

Buildings consume around one-third of electricity in South Australia and generate around one-quarter of greenhouse gas emissions.

The government is using its leverage as the occupier of around 25% of the commercial building space in Adelaide's CBD to achieve better emissions performance.

All new government buildings are being constructed to at least a 5-star level. The government is giving preference to 4–5 star buildings in its office leasing.

The government has provided funding to the Green Building Council of Australia towards the development of 'green star' building rating tools. As a result, pilot rating tools have been developed to assess the environmental attributes of new and refurbished educational and health care facilities. The tools will enable assessments to determine the environmental impacts of developments, and to capitalise on and receive recognition for the environmental benefits of their design initiatives.

Through the Capital City Committee, the Government of South Australia and Adelaide City Council are working to improve the environmental performance of existing commercial office buildings. The Building Tune-Up project, completed in 2006, has improved the energy, water and greenhouse performance of 10 office buildings in the CBD. This is assisting the government to achieve its 25% greenhouse gas reduction target for government buildings. The Capital City Committee has also endorsed a strategy to improve environmental performance and reduce greenhouse emissions in existing buildings through green retrofits.

At the residential buildings level, emissions performance is being improved by rebates for solar hot water systems, new standards for these systems, and better water efficiency. The government's commitment to reward owners of solar panels for surplus power returned to the grid and to trial micro wind turbines for deployment in residential areas will also improve the environmental performance of this sector.

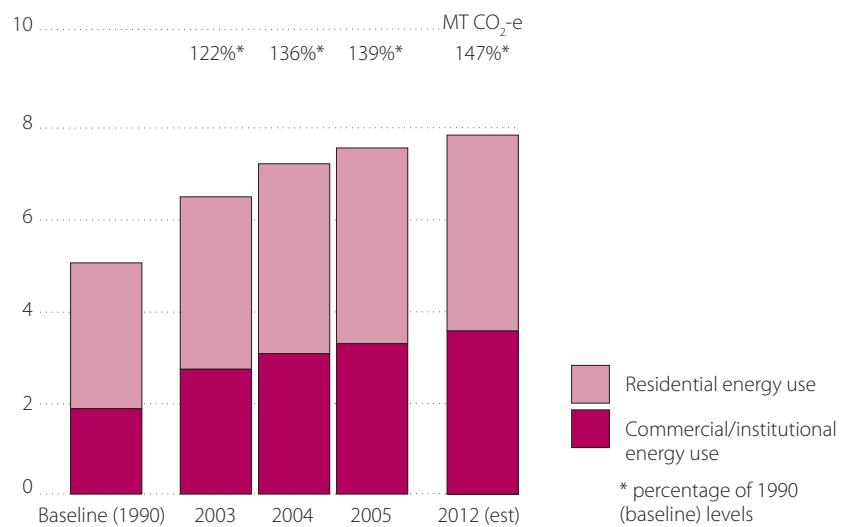
The state government has also been at the forefront in establishing demonstration projects to further sustainable development. These projects, including Lochiel Park, Mawson Lakes, Northgate Stage 3 and Playford North, have set new benchmarks for communities in water conservation, energy efficiency and urban planning.

The buildings sector will benefit from collaborative ventures to demonstrate and educate both the market and the community on the benefits of adopting a green building culture.

The sector needs to invest in research that helps develop innovative technologies and practices that can be transferred beyond the local market.

Performance of the building sector will also be improved by a number of national initiatives, including:

- › the Ministerial Council on Energy’s National Framework for Energy Efficiency
- › the Local Government and Planning Ministers’ Council’s land-use planning and building practices work, as requested by COAG
- › the inclusion of sustainability as a major goal for the Building Code of Australia.



Buildings sector greenhouse gas emissions

The buildings sector accounts for between 7 MT and 8 MT of the state’s emissions. Energy use in commercial buildings, mostly in the form of electricity, is growing at a faster rate than in the residential sector.

Source: Department of the Premier and Cabinet (2007), based on NGGI and ESIPC data³.

› Performance standards

Objective 7.1

To develop high performance green standards for building design, construction and operation

Establishing high performance green building standards (in the context of whole-of-lifecycle costs and benefits) can increase the prevalence of climate friendly, cost effective, and low emission measures in the buildings sector.

Mandatory performance criteria for new buildings can be progressively strengthened in step with the sector's capacity to adjust, but the cumulative effects of this progression will be slow because of the slow turnover of existing building stock.

Opportunities exist to lead the world in the development and use of green building rating tools that respond to climate change impacts and reduce greenhouse gas emissions. These tools will need to be supplemented by other strategies and standards for building operation and the retrofit of existing stock for high performance green outcomes.

South Australia's strategies

South Australia's strategies to improve performance standards will be to assume a leadership role in the use of voluntary green building rating tools, the periodical review of building standards to ensure they promote high performance green standards and the promotion of passive solar design measures to achieve indoor air comfort.

Government actions

Priorities for government in developing high performance standards will be to:

- › develop further performance standards at national and state levels to improve the energy efficiency of air-conditioners
- › investigate amendment to the regulations to the *Development Act 1993*, so that it is clear that development approval is not required for the installation of PV panels
- › establish greenhouse performance standards for water heaters installed in new and existing dwellings.

Support can be provided for these actions by reviewing and strengthening climate change requirements in national building, infrastructure and planning standards.

› Energy efficiency

Objective 7.2

To optimise the energy performance and subsequent cost effectiveness of buildings

Many opportunities for reducing the energy use and greenhouse emissions of South Australia's building stock are hindered by the disincentive of higher up-front investment. Some measures are already attractive to building owners and occupants because they yield net savings by lowering energy bills and enhancing occupant comfort. This process needs to be accelerated with better information for building owners and tenants. The most effective educational mechanism is the development of robust, transparent building ratings tools.

Investment in energy efficiency and performance in buildings makes good business sense.

Market signals that reward innovation and promote high performance green building must be encouraged.

South Australia's strategies

South Australia's strategies to optimise the energy efficiency of buildings are to use market based instruments to increase investment in energy efficient buildings, encourage environmentally sustainable procurement

practices for the building construction sector and promote the benefits of a greenhouse emissions reduction approach to buildings.

Government actions

Priorities for government in improving energy efficiency will be to:

- › determine an appropriate system for rating the sustainability of residential buildings
- › resolve the use of appropriate systems for rating the sustainability of commercial buildings
- › provide certainty and support for green development in planning policy and building standards to facilitate efficient and effective approval processes
- › investigate a suite of financial incentives that complement other building environmental measures and reward responsible behaviour to improve the efficiency of existing building stock.

Support can be provided for these actions by increasing the use of recycled materials in the built environment and promoting exemplary projects.



› Improved building performance

Objective 7.3

To increase market and community awareness of the benefits of improved building performance

Useful and timely information on energy consumption and costs can overcome a number of barriers to investment in energy efficiency measures in the buildings sector. Access to timely information on energy performance and costs of buildings will help increase voluntary uptake of energy efficiency measures that bring in net savings to building owners, house owners or occupants.

Information on the energy efficiency of buildings at point of sale or lease will help educate the market and the community on the benefits of improving building performance.

South Australia's strategies

South Australia's strategies to increase awareness of the benefits of improved building performance will be to develop tools and guidelines, establish consistent information about energy consumption performance, increase the capacity of the building sector and encourage research.



Government actions

Priorities for government in raising awareness will be to:

- › investigate, select and, where appropriate, develop guidelines to assist with the application of sustainability planning and development of buildings and the urban environment
- › consider sustainability ratings for residential areas.

Support can be provided for these actions by encouraging branding and eco-labelling, establishing an advisory service for the building sector and consumers, and supporting collaborative research.

› Urban development

Objective 7.4

To develop sustainable built environments that are responsive to climate change

Climate change needs to be tackled at all levels of urban planning and design not just in individual buildings or infrastructure. Integrated approaches and solutions will be necessary for both emissions reduction and adaptation. Energy efficient subdivision layouts and urban form with integrated transport strategies will be complemented by stormwater reuse in water-sensitive urban design and living belts of habitat throughout urban spaces. There is a need to continue to develop best practice while mainstreaming and maximising the use of proven solutions. The *Planning Strategy for South Australia* is a key policy tool for integrating sustainability with other objectives for urban development.

South Australia's strategies

South Australia's strategies to develop sustainable built environments will be to establish best-practice principles for design and construction and to implement innovative practices for land management planning and development.

Government actions

Priorities for government in urban development will be to:

- › integrate greenhouse mitigation and climate change adaptation strategies into urban land development policy and processes by:
 - demonstrating leadership with sustainable outcomes in government land development projects
 - reviewing residential and industry land release policies and incorporating both greenhouse mitigation and climate change adaptation strategies where appropriate
- › identify land parcels critical to the sustainable future growth and consolidation of metropolitan Adelaide and, where appropriate, purchase, amalgamate, and/or assemble these parcels to facilitate their intended use and incorporate both greenhouse mitigation and climate change adaptation strategies.

Support can be provided for these actions by promoting sustainable, whole-of-life outcomes when planning for the use, location and form of land development.



➤ 8. Natural Resources

Goal: South Australia's natural resources sector and ecosystems will be managed sustainably with optimum resilience and capacity to adapt to climate change

The natural resources sector is made up of South Australia's natural resource assets including water (both marine and fresh), soils, native plants, native animals, ecosystems and also the industries that depend on one or more of these natural resources. Those industries include agriculture, horticulture, pastoralism, aquaculture, forestry, water services and biodiversity-related industries such as fisheries, and nature-based tourism. Rural and urban communities depend on these industries and on the health of the natural systems that support them.

The following key principles underpin the proposed strategies for the natural resources sector:

- › biodiversity and ecosystem health are of fundamental importance in underpinning the natural resources sector and the socio-economic well-being of South Australia
- › climate change is incorporated as a risk factor in natural resources management and planning
- › management will take place in the face of uncertainty and will be adaptive to changing conditions
- › impacts are managed in the most appropriate temporal and spatial scales

- › natural systems' responses to climate change are monitored and evaluated to inform adaptation measures
- › natural resources management and water allocation will stay within sustainable limits to ensure that the state's natural resources and ecosystems have optimum resilience and capacity to adapt to climate variability and climate change
- › climate change actions provide multiple benefits as part of integrated natural resources management.

The South Australian Research and Development Institute (SARDI) is pioneering research into new technologies for biodiesel, including algae whose growth is particularly suited to the climatic conditions of the state. The NatureLinks program provides a philosophical and practical approach to enabling South Australia's species and ecosystems to survive, evolve and adapt to climate change and other environmental changes.

To build on the state's achievements there will be a focus on resilient natural resource-based industries, vulnerability of water resources, biodiversity conservation and carbon sequestration.

➤ Resilient natural resource-based industries

Objective 8.1

To strengthen the resilience of industries reliant on natural resources in the face of potential impacts of climate change

Historically, many of South Australia's natural resource-based industries have adopted highly adaptive management practices in response to variable climate and market conditions. Some of these will need additional levels of adaptation to new climatic regimes, and an increased capacity for innovation and development.

Industries that manage the resource base in a precautionary way, within sustainable limits and that are responsive to natural climate variability are likely to be better positioned to adapt to climate change. The conservation of biodiversity and natural systems will make natural resource-based industries more resilient. Continued development of science capability and further assessment of climate change risks and impacts on these industries will help build their capacity to adapt.

South Australia's strategies

South Australia's strategies to strengthen the resilience of natural resource-based industries will be to use climate change projections in risk assessments for industry and industry planning, exploration of the opportunities for using biofuels and the protection of the state's most productive agricultural land.

Government actions

Priorities for government in strengthening industries will be to:

- › establish pilot programs in critical regions to demonstrate adaptation techniques (e.g. environmental management systems), trial emission controls, new techniques, technologies, crop and livestock varieties and other opportunities, and continue research on field crop varieties for low rainfall regions
- › incorporate areas of primary production significance into development plans and apply stricter controls to forms of development not directly related to primary production and related value-adding activities
- › identify and prioritise regions and industries that are vulnerable to climate change
- › develop innovative support tools and farm management systems to increase industry adaptation to climate change impacts and continue existing work with the wine and grains industries.

Support can be provided for these actions by collaborating with industry, contributing to national programs, contributing to research programs and addressing regulatory issues.

› Vulnerability of water resources

Objective 8.2

To incorporate climate change in the sustainable management of water resources and water supply

Water supply in South Australia is particularly vulnerable to the influence of changes in climate. As evidenced in recent times, rainfall and associated run-off in catchments, in the Mount Lofty Ranges, Murray-Darling Basin and the South East of South Australia, can be highly variable, affecting water availability and security for key industries, populations and ecosystems. As well as the direct implications for water supply and rural industries, the prospect of a drier and warmer climate over southern parts of the state increases the need for water sensitive urban design.

Hazards relating to increased flood risk are addressed in the ‘Adaptation’ section.

South Australia’s strategies

South Australia’s strategies to protect the vulnerability of water resources will be to ensure that water-related plans include climate change projections, explore options for diversified water supply, investigate low emission options that increase water security, and participate in key national water and climate change initiatives.

Government actions

Priorities for government in the management of water resources and supply will be to:

- › work with the Australian Government and other jurisdictions under the proposed new governance arrangements to identify the extent of the climate change risk for the Murray-Darling system and to increase flows in the River Murray
- › progressively review water allocation plans to ensure long-term sustainability of the state’s water resources
- › achieve *Water Proofing Adelaide* objectives and develop the *Water Proofing South Australia* strategy
- › work collaboratively with other jurisdictions to gain a shared understanding of water availability, to examine contingency planning to secure water supply during both emergency drought situations and in the longer term.

Support can be provided for these actions by working towards implementing major water resource programs in a carbon neutral way and investigating efficient desalination plants.



➤ Biodiversity conservation

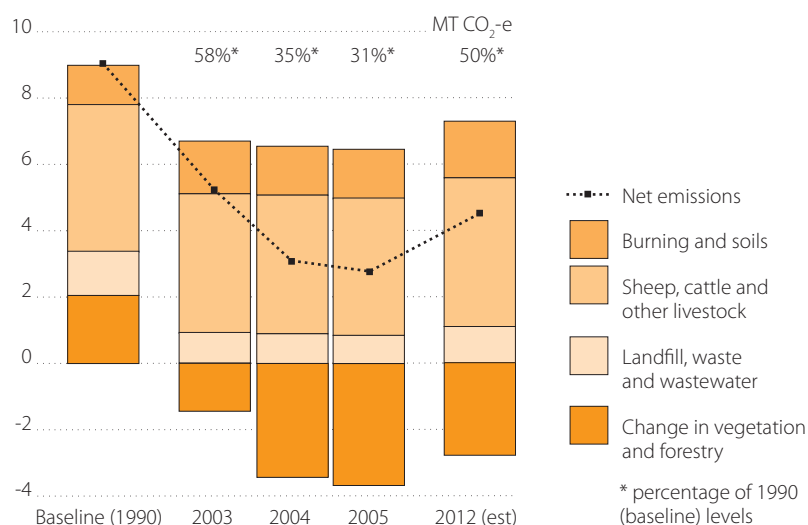
Objective 8.3

To increase the capacity of ecosystems to adapt to climate change

Healthy, biologically diverse ecosystems are of intrinsic value and underpin South Australia’s environmental, social, cultural, spiritual and economic well-being. They provide many of the ecosystem services necessary to support resource use and maintain productivity. Climate change is very likely to interact with and exacerbate existing stresses on biodiversity, such as habitat loss, fragmentation and desertification. Extinction of many species is one of the likely outcomes, but considerable uncertainty surrounds specific impacts and their timing.

South Australia’s strategies

South Australia’s strategies for increasing the capacity of ecosystems to adapt to climate change will be to determine priorities for biodiversity conservation, identify opportunities to build resilience in ecosystems and improve ecological function and connectivity.



Natural Resources sector greenhouse gas emissions

Although agricultural activity is projected to grow with a corresponding increase in emissions, this sector benefits from the impact of changing land use and the reduction in emissions from revegetation and forestry. In 2005, net emissions from the natural resources sector had dropped to 2.8MT.

Source: Department of the Premier and Cabinet (2007), based on NGGI and ESIPC data³.



Government actions

Priorities for government in biodiversity conservation will be to:

- › develop models and predictive tools that use climate change scenarios (including sea level rise) and biological data to identify terrestrial, marine, estuarine and freshwater species, ecological communities and ecosystem processes that will be most:
 - vulnerable to climate change
 - resilient to climate change
 - advantaged by climate change
- › assess the risk of threatening processes and the impact of climate change on these processes to predict impacts on species status and ecosystem function
- › determine the vulnerability of coastal habitats to sea level rise and wave surge, incorporating the results into land use and marine planning
- › implement the River Murray Forest policy and NatureLinks plans, incorporating opportunities for biosequestration, in partnership with key stakeholders, including private landholders and organisations that can contribute key habitat management outcomes.

Support can be provided for these actions by participating and brokering research, monitoring trends and undertaking risk assessments.

➤ Reducing emissions, sequestering carbon

Objective 8.4

To reduce greenhouse gas emissions from the natural resources sector and increase carbon sinks

Currently, about 21% of South Australia's greenhouse emissions come from the natural resources sector. However, the sector also absorbs greenhouse gases, reducing its net contribution to 10% of the state's total.

There are potential benefits to the sector from measures that reduce emissions, particularly in livestock and soil management, although closer examination of costs and benefits may be required.

Growing plants extract carbon from the atmosphere and store it. This uptake can be enhanced through long-term vegetation management and revegetation in a manner that also produces co-benefits for natural resource management (e.g. in salinity and biodiversity), while avoiding potential adverse impacts (e.g. on water resources).

South Australia's strategies

South Australia's strategies to reduce emissions from the natural resources sector will be to work collaboratively with primary industries, make greenhouse improvements in the provision of water supply and waste treatment, promote carbon sequestration and develop market outcomes that value carbon, biodiversity and salinity outcomes.

Government actions

Priorities for government in reducing emissions and sequestering carbon will be to:

- › establish a voluntary offset scheme as part of the climate change legislation
- › develop and implement a series of pilot projects for adopting commercial and non-commercial perennial vegetation options in the NRM regions of South Australia to promote and achieve biosequestration and deliver multiple NRM benefits.

Support can be provided for these actions by investigating perennial vegetation options for biosequestration.

Government Action Plan to 2012

➤ 1. Leadership **Goal: South Australia will lead the nation in tackling climate change**



Setting targets

Objective 1.1

To encourage early action in reducing greenhouse gas emissions

Strategies

- 1 Set targets for reducing greenhouse emissions consistent with scientific evidence and develop cost effective strategies to achieve them
- 2 Monitor, review and report trends in greenhouse emissions and on progress towards the targets

Priority actions	Type of measure	Lead agencies
Introduce climate change legislation that includes the state's target to reduce greenhouse emission levels by 60% (to 40% of 1990 levels) by 2050	Policy development	DPC
Increase the proportion of renewable electricity generated so that it comprises at least 20% of electricity generated in South Australia by 2014	Policy development	DTEI
Increase the proportion of renewable electricity consumed so that it comprises at least 20% of electricity consumed in South Australia by 2014	Policy development	DTEI
Determine a target to reduce total greenhouse gas emissions from state government operations within an agreed timeframe	Policy development	DPC, DH
Purchase a minimum of 20% accredited Green Power for state government operations by 1 January 2008	Policy development	DPC
Establish the Premier's Climate Change Council to advise government on climate change policy development and implementation	Policy development	DPC
Investigate a climate change impact assessment process for major projects*	Impact assessment	DPC, PIRSA
Set interim and sectorally based targets in consultation with industry and the community	Policy development	DPC
In conjunction with other states and territories, implement a national emissions trading scheme	Policy development	DTEI

Supporting actions

Supporting actions	Type of measure	Lead agencies
Undertake modelling to identify cost effective strategies that will meet the 2050 targets	Policy development	DPC, DTEI, PIRSA, DTED
Model baseline data to measure progress	Evaluation and review	DPC

Leading by example

Objective 1.2

To demonstrate best practice in reducing emissions

Strategies

- 1 Accelerate efforts to reduce energy use and greenhouse gas emissions from government activities and operations
- 2 Support and promote leadership on climate change action

Priority actions	Type of measure	Lead agencies
Reduce emissions from the government vehicle fleet by converting 50% of state government cars to lower emission fuels by 2010; and reduce emissions generated by government travel by applying greenhouse friendly corporate travel policies for the location of government workplaces, commuting, aircraft and taxi use, and vehicle salary packaging	Policy development	DTF, DPC, DTEI

Priority actions (continued)		Type of measure	Lead agencies
Develop a green procurement strategy for government to purchase 'green' energy		Policy development	DTF, DTEI, DPC
Implement the Government Energy Efficiency Action Plan, which supports <i>South Australia's Strategic Plan</i> target to improve energy efficiency of government buildings by 25% from 2000–01 levels by 2014		Policy development and delivery	DTEI, DPC
Reduce emissions from the public transport fleet through the most cost effective combination of low emission fuels, biodiesel, natural gas, biosequestration and the purchase of more efficient vehicles		Service delivery	DTEI, TransAdelaide
Increase the use of high efficiency lighting in all government accommodation		Policy development and delivery	DPC, DTEI
Establish sectoral agreements with local government that put in place measures to achieve agreed goals and targets to reduce emissions and adapt to climate change. Key priorities include joint action to reduce emissions from public lighting sources and procurement practices		Policy development	DPC, PIRSA
Supporting actions			
Use sustainable practices (including energy efficiency) during all stages (e.g. planning, acquisition, management and disposal) of the government building procurement process		Development	DTEI
Work with the tourism industry to implement the South Australian Tourism Commission's climate change policy statement that seeks to minimise greenhouse gas emissions from tourism activities, including development of green tourism packages [†]		Policy development	SATC
Foundations for action			
Objective 1.3 To build capacity to tackle climate change	Strategies 1 Take a leadership role in national climate change policy development and action 2 Build partnerships within and across sectors and jurisdictions to identify collaborative solutions, share resources and maximise outcomes 3 Position the state to drive and benefit from technological research and development		
Priority actions		Type of measure	Lead agencies
Lead policy development in COAG and the Council for the Australian Federation embracing the deployment of renewable and low emission technology, the generation of relevant scientific information, effective adaptation, and efficient and comprehensive reporting of greenhouse emissions		Policy development	DPC, DTEI
Review government policies and strategies to ensure that climate change and greenhouse emissions reduction issues are considered [‡]		Policy development	DPC
Continue to pursue international collaborative partnerships to develop agreed policy responses to climate change [§]		Policy development	DPC
Supporting actions		Type of measure	Lead agencies
Collaborate with other sub-national jurisdictions to implement the <i>Declaration of the Federated States and Regional Governments on Climate Change 2005</i> which commits signatories to set achievable short and long-term targets for emissions reduction by, for example, market mechanisms, research and clean energy		Policy development	DPC

* Consistent with recommendation 3b of Professor Stephen Schneider's report, *Climate Change: Risks and Opportunities* (2007)

[†] *ibid.*, recommendations 7a and 7b

[‡] *ibid.*, recommendations 10a and 10b

[§] *ibid.*, recommendation 1

2. Adaptation **Goal: South Australia will be equipped to the best of its ability to adapt to climate change and capture opportunities**

Science and research

Objective 2.1

To increase our understanding of risks, vulnerabilities and opportunities

Strategies

- 1 **Build capacity in climate change science and research**
- 2 **Monitor and evaluate impacts of climate change and the effectiveness of adaptation actions**

Priority actions	Type of measure	Lead agencies
Work with all levels of government and industry to assess the state's regional and sectoral vulnerabilities, starting with areas of known or expected vulnerability and building on national work on climate change adaptation	Research	DPC, DTEI, DEH, PIRSA, DWLBC, DTED, DH
Participate in the implementation of the National Climate Change Adaptation Framework, including developing national tools to assist decision makers and researchers	Policy development	DPC
Continue to support the Climate Change Chair at the University of Adelaide, established by the government in early 2007, and develop its research capability in adaptation to climate change in natural and productive ecosystems	Research	DPC
Consider further research on extreme event projections	Research	DPC
Form partnerships with universities, the CSIRO, the Australian Centre for Ancient DNA and the Australian Centre for Plant Functional Genomics to examine climate change mitigation and adaptation*	Research	DPC
Supporting actions	Type of measure	Lead agencies
Seek national research on key issues such as fisheries, forestry, tourism and health	Research	DPC
Work with relevant service providers to ensure baseline climate and weather information is available	Research	DPC, DEH, DWLBC, PIRSA
Support the establishment of a national dedicated climate change research facility	Research	DPC
Identify science and adaptation research priorities for South Australia's sectors, regions and natural systems, including identifying critical thresholds	Research	DPC
Regularly update the CSIRO climate change projections and impact assessments for the state	Research	DEH, DPC, DWLBC, PIRSA
Support collaborative research within and between universities and research institutions to build local expertise	Research	DPC, DFEEST, DH
Invest in research needed to manage health risks associated with climate change	Research	DH
Incorporate climate change into current environmental monitoring and reporting systems	Research	DEH, EPA, DWLBC

Community resilience

Objective 2.2

To build resilient and healthy communities

Strategies

- 1 **Ensure that communities have the appropriate information and resources to respond to the risks, impacts and opportunities arising from climate change**
- 2 **Establish measures to increase the resilience of communities in areas of high vulnerability including disadvantaged, rural and remote communities**
- 3 **Ensure that relevant policy and planning instruments (e.g. natural resources management plans, land-use planning, and building and infrastructure standards) promote effective climate change adaptation**

Priority actions	Type of measure	Lead agencies
Review the vulnerability of critical state infrastructure	Evaluation	DTEI, DPC

Priority actions (continued)		Type of measure	Lead agencies
Identify and address the adaptation needs of those communities where early adaptation is needed [†]		Research and policy development	DPC, DFC, DEH
Supporting actions		Type of measure	Lead agencies
Develop a community and business information and education program on climate change impacts and risks		Information	DPC
Produce regional profiles explaining the implications of projections and other climate information for policy makers, planners and managers		Research	DPC, DFC
Hazards			
Objective 2.3 To improve hazard management and minimise risks	Strategies 1 Implement measures that reduce the vulnerability of communities, development and infrastructure to hazards related to climate change 2 Incorporate climate change impacts and risks in frameworks for risk management, planning and decision making by governments, industries and community groups 3 Address the impacts of climate change in emergency planning, preparedness, response and recovery		
Priority actions		Type of measure	Lead agencies
Review the status of hazards and adequacy of arrangements for emergency planning, preparedness, response, and recovery for those hazards potentially affected by climate change in view of recent information on climate change		Evaluation and planning	DPC, hazard leaders
Incorporate climate change projections into catchment hydrology models and flood risk assessments, including investigating the magnitude of climate change impacts on urban stormwater systems		Research	DWLBC
Produce fine-scale topographic mapping and more detailed assessments of coastal vulnerability starting with areas (including settlements and habitats) of expected greatest vulnerability to sea level variation		Research	DEH
Build nationally agreed plans into the work programs of agencies		Policy development	DPC
Build on the well-established surveillance programs for infectious diseases by adapting their systems to incorporate specific climate change issues		Health service provision	DH
Implement the new stormwater agreement with local government to refocus available funds towards highest priority stormwater management works determined on the basis of a total catchment stormwater management plan		Infrastructure	DTEI
Supporting actions		Type of measure	Lead agencies
Using case studies, model impacts of increased frequency and intensity of extreme events (e.g. storm surges, heatwaves, droughts, bushfires, storms, rainfall and flood events) on areas of known or expected vulnerability		Research	DPC, DEH, PIRSA, relevant hazard leaders, DH
Work with the South Australian Murray-Darling Basin NRM Board on managing climate change risk		Policy development	DWLBC
As GIS data become available from various sources, develop an online (spatial) information service that informs the development planning process of known potential natural hazards taking into account climate change projections		Information	PIRSA

* Consistent with recommendation 6 of Professor Stephen Schneider's report, *Climate Change: Risks and Opportunities* (2007)

[†] *ibid.*, recommendations 9b and 9c

3. Community

Goal: The South Australian community will be leaders in reducing greenhouse gas emissions and adapting to climate change in a way that promotes social equity and health

Behaviour change

Objective 3.1

To promote individual, household and community behaviour change

Strategies

- 1 Develop and implement a range of climate change awareness raising and behaviour change initiatives that address the needs of different communities
- 2 Support educational institutions to develop and implement creative curricula and learning approaches to climate change
- 3 Develop tools to help households and communities to measure and monitor their greenhouse emissions

Priority actions

Develop and implement a statewide climate change awareness raising and behaviour change program that incorporates:

- › working with non-government and community groups on behaviour change initiatives
- › market-based research to design, monitor and evaluate community behaviour change programs
- › development of a community emissions reduction target that households can readily adopt and that is aligned with the state's emission reduction targets
- › establishment of partnerships with community groups and local government to deliver awareness raising and education programs

Type of measure

Information provision, education, incentives, evaluation

Lead agencies

DPC, DTEI

Monitor and publicly report on the community's performance in reducing their greenhouse emissions and ecological footprint at a household and community level

Evaluation by monitoring and reporting

DPC

Resource efficiency

Objective 3.2

To improve the efficient use of resources by households and communities

Strategies

- 1 Encourage households and communities to minimise waste
- 2 Promote the use of Green Power and on-site renewable energy supplies by households and communities
- 3 Promote the sustainable consumption of greenhouse friendly products and services by households and the community
- 4 Improve community understanding of the greenhouse impacts of food production and consumption

Priority actions

Work with other Australian governments through the National Framework for Energy Efficiency to establish more demanding mandatory greenhouse performance standards for energy-using fittings and appliances

Type of measure

Policy development and delivery—with information provision, standards and regulation

Lead agencies

DTEI

Investigate the potential for demand management strategies such as demand-load management equipment, 'smart' electricity meters and increased awareness to improve energy efficiency

Policy development and delivery—information provision, performance standards and incentives

DTEI, DPC

Supporting actions		Type of measure	Lead agencies
Develop a fund for supporting community initiatives that encourage the production and consumption of local food, including community gardens and farmers markets		Education	PIRSA, DH, DFC,
Develop information and awareness initiatives focusing on waste avoidance and reduction, and the relationship between consumption, waste and greenhouse emissions		Education	ZWSA, DPC
Community development			
Objective 3.3 To build greenhouse friendly communities	Strategies 1 Invest in community initiatives that reduce emissions and help communities to adapt 2 Promote schools and community facilities as greenhouse friendly showcases 3 Ensure that climate change initiatives address the needs of disadvantaged and low income communities		
Priority actions		Type of measure	Lead agencies
Continue to provide assistance for the Australian Sustainable Schools Initiative – South Australia to integrate educational programs that have a climate change and greenhouse learning focus*		Education	DECS, DEH
Trial a climate change program in a six-school cluster		Education	DECS
Continue the Solar Schools initiative so that at least 250 schools have solar power by 2014		Incentives	DECS
Incorporate the energy efficiency requirements of the 'Green Star' rating tool into DECS capital works and into DECS Environmentally Sustainable Development (ESD) policy guidelines		Policy	DECS
Introduce climate change and greenhouse content into school curricula and practical school based actions		Education	DECS
Continue and expand the annual ESD grants program that assists sustainable projects by schools [†]		Education	DECS
Supporting actions		Type of measure	Lead agencies
Partner with local government, media and business to establish an innovation fund and climate change champions initiative to support and recognise community-led greenhouse projects		Information education, incentives	DPC, DFC, DH, EPA
Include greenhouse reduction and climate change performance criteria in major funding agreements with non-government organisations		Incentives	DPC, DFC, DH, DEH, DWLBC, EPA, ZWSA
Include information about affordable greenhouse emission reduction technologies and techniques in services that assist people on low incomes		Information	DFC, DPC, DTEI
Assess the potential of the state government concession scheme to include energy and water efficiency incentives		Incentives	DFC, DPC, DTEI, DWLBC
Continue to invest in the energy saving kit for schools, a joint venture between DECS, DTEI and AGL that has been used by 400 schools since 1996		Education	DECS, DTEI
Investigate the financial and other impacts associated with the incorporation of sustainable building principles into government assisted housing [‡]		Policy	DFC, DPC, DTEI
Support and promote youth leadership initiatives that help communities respond to climate change		Community development	PIRSA

* Consistent with recommendation 8b of Professor Stephen Schneider's report, *Climate Change: Risks and Opportunities* (2007)

[†] *ibid.*, recommendation 8a

[‡] *ibid.*, recommendation 9a

4. Industry

Goal: South Australia's industry will be a leader in managing greenhouse emissions and tackling climate change

Business risk

Objective 4.1

To manage business risk associated with greenhouse and climate change

Strategies

- 1 Improve industry's knowledge, skills and communication linkages to manage the business risks from climate change and greenhouse emissions
- 2 Work with business to develop climate change policy to provide more certainty for future economic planning and business investment
- 3 Build the capacity of business to proactively respond to markets, community and government demands

Priority actions

Establish a 'sustainable skills development' program that provides training for trades and professionals in energy management (e.g. electricians, builders, engineers, architects) building on national work being undertaken as part of the National Framework for Energy Efficiency*

Type of measure

Education

Lead agencies

DFEEST, DTED

Lead national coordination and streamlining of greenhouse reporting across all levels of government and industry

Collaboration

DPC, DTEI, DTED, EPA

Collaborate with the Australian Greenhouse Office and business to:

- › foster membership of the Australian Greenhouse Challenge Plus Program
- › assist South Australian Greenhouse Challenge Plus members to attain 'leader' or 'champion' status

Collaboration

DTED, DPC

Supporting actions

Work with the Australian Government to integrate greenhouse and sustainability issues into international trade and market analysis

Type of measure

Research and information provision

Lead agencies

DTED

Integrate industry sustainability and greenhouse issues into the curriculum of existing business training courses at universities, TAFE and other registered training organisations (including professional societies)

Education

DFEEST, DTED

Driving competitiveness

Objective 4.2

To reduce greenhouse gas emissions while driving and enhancing business competitiveness

Strategies

- 1 Through voluntary and collaborative programs, build business capacity to cost effectively reduce their greenhouse emissions
- 2 Use supply chains to promulgate greenhouse gas abatement measures and reduce the embodied greenhouse emissions and performance of products and services
- 3 Demonstrably measure and monitor greenhouse gas emissions and promote the greenhouse emissions reduction achievements of South Australian businesses

Priority actions

Establish an inter-agency business sustainability program which improves industry productivity and environmental and social outcomes, by providing a suite of integrated services in lean processes, eco-efficiency (EMS, energy efficiency, water conservation, waste management and product stewardship) and market access; government will review the effectiveness of the program after three years

Type of measure

Service and education provision

Lead agencies

DTED, EPA, ZWSA, DPC, DTEI, NRM Boards, SA Water

Work with the states and territories in the development of a national energy efficiency system for industry¹

Policy development

DPC, EPA, DTED

Establish a sustainable business program specifically focusing on small and medium enterprises, that provides cost effective solutions to improve their performance in climate change and sustainability

Service provision

DPC, NRM Boards, DTED, DTEI, DWLBC, ZWSA, EPA

Priority actions (continued)		Type of measure	Lead agencies
Establish sectoral agreements with major industry sectors (e.g. electronics, wine and cement) that put in place measures to achieve agreed goals and targets		Policy development and delivery	DPC
Provide a sustainable business technology advisory service that has: <ul style="list-style-type: none"> › a website facility › R&D and technology advice › referrals 		Service provision	DTED, DTEI, EPA, ZWSA, DPC, NRM Boards, SA Water
Supporting actions		Type of measure	Lead agencies
Develop tools to help businesses calculate the greenhouse emissions footprint of their products and services		Service provision	DTED, DPC, DTEI, PIRSA, EPA
Work with financial institutions to increase recognition of the lower risk of energy efficiency investments		Service provision	DTED, DPC
Opportunity in a new economy			
Objective 4.3 To target commercial opportunities and develop products and services of the future	Strategies <ol style="list-style-type: none"> 1 Improve linkages between the research sector and industry 2 Attract industry, investment and targeted research to support greenhouse reduction measures by business 3 Expand South Australia's industry capability to produce greenhouse friendly products and services 		
Priority actions		Type of measure	Lead agencies
Establish an industry and investment program to attract key businesses and work with local industry to develop and deliver products and services that reduce greenhouse gas emissions (e.g. renewable energy)		Information provision	DTED
Facilitate trials of new technologies and processes to accelerate commercialisation opportunities		Research	DTED, DFEEST, DTEI
Become Australia's centre for micro wind turbines by supporting research and development and securing local manufacturing, assembly and distribution		Research and development	DTED
Foster the commercialisation of geothermal energy resources through: <ul style="list-style-type: none"> › targeted research › a supportive investment framework › proactive participation in the development of a COAG roadmap for geothermal energy development › taking national leadership roles that facilitate investment in geothermal exploration, proof-of-concept, demonstration and development projects 		Research	PIRSA, DPC, DTEI, DTED
Supporting actions		Type of measure	Lead agencies
Work with the automotive sector to explore the feasibility of manufacturing low-emission vehicles in South Australia		Collaboration	DTED, DTEI
Collaborate with industry-focused R&D corporations, cooperative research centres and other research institutions to develop R&D and commercialisation plans focusing on priority greenhouse reduction and adaptation goals for industry		Collaboration	DTED, DFEEST, PIRSA
Investigate ways of producing and marketing South Australian products and services that have a low or neutral greenhouse footprint		Research	DTED, DPC, EPA

* Consistent with recommendation 8c of Professor Stephen Schneider's report, *Climate Change: Risks and Opportunities* (2007)

† *ibid.*, recommendation 2b

5. Energy

Goal: South Australia's energy systems will significantly reduce greenhouse emissions while continuing to support productivity and prosperity

Energy use

Objective 5.1

To improve the efficiency of energy use

Strategies

- 1 Develop and implement proactive regulatory and incentive-based solutions to overcome barriers and market failures for energy efficiency initiatives to deliver low cost greenhouse gas abatement
- 2 Develop and implement information provision and capacity building programs for end-users and energy service providers
- 3 Support measures that reduce both peak demand and energy use, such as improving the performance of air-conditioners and buildings to suit summer conditions

Priority actions

Implement a feed-in incentive that allows solar PV owners to receive premium tariffs for electricity generated by their solar PV systems and fed back into the grid

Type of measure

Regulation, incentives

Lead agencies

DPC

Help drive the Ministerial Council on Energy's National Framework for Energy Efficiency Stages 1 and 2, to develop measures to overcome barriers to greater energy efficiency on a national basis*

Regulation, information and incentives

DTEI

Develop and implement policy measures to attain *South Australia's Strategic Plan* target to improve the energy efficiency of dwellings by 10% by 2014

Regulation, information, incentives

DTEI

Cleaner energy sources

Objective 5.2

To increase take-up of renewable and low emission technologies

Strategies

- 1 Introduce a carbon price signal to the energy market to include the true costs of energy production, for example through a national emissions trading scheme
- 2 Facilitate greater entry of renewable and low emission technologies into the energy market, including removing market and regulatory barriers
- 3 Encourage the use of gas and other alternatives as low carbon transition fuels

Priority actions

Contribute to the development and implementation of a national cap and trade emissions trading scheme covering the stationary energy sector, including support for a national summit

Type of measure

Policy development and delivery

Lead agencies

DTEI, DPC

In conjunction with the states and territories, strengthen the standards and ensure consistent accreditation for Green Power and emission offsets, including a possible national registry of carbon offsets

Policy development and delivery

DPC

In conjunction with the states and territories, promote the adoption of new technologies that can remove or substantially reduce emissions from the burning of fossil fuels

Policy development

DPC

Supporting actions

Promote best efficiencies in generator class (according to the size and type of generator) to reduce the emissions intensities of electricity generation stock

Policy development

DTEI, DPC

Provide Australia's most supportive policy framework for developing renewable and low emission technologies, including facilitating clustering of these technologies†

Policy development

PIRSA

Transition pathway for energy		
<p>Objective 5.3 To ensure energy investment and markets follow a transition pathway to low greenhouse emissions</p>	<p>Strategies</p> <ol style="list-style-type: none"> 1 Establish clear energy policy frameworks to facilitate the transition to a low carbon future 2 Facilitate energy technology research and development that builds on the state's comparative advantage 3 Establish appropriate information and reporting on greenhouse gas emissions and energy production and consumption 	
Priority actions	Type of measure	Lead agencies
Facilitate access to Australian Government funding and support (e.g. Solar Cities, Renewable Energy Development Initiative, Low Emissions Technology Development Fund, Pre-Seed Funding program) for interested parties in South Australia that are developing and piloting low emission technologies	Information provision	DTED , PIRSA, DTEI
Supporting actions	Type of measure	Lead agencies
Provide support for renewable energy through seed funding for technology research and development, from the Premier's Science and Research Council fund and the Sustainable Energy Research Advisory Council's funding initiative	Information provision, funding	PIRSA , DFEEST, DTED, DTEI
Support the energy-related aspects of the COAG climate change working group's development of a National Adaptation Framework	Research and information provision	DPC

* Consistent with recommendation 2a of Professor Stephen Schneider's report, *Climate Change: Risks and Opportunities* (2007)

† *ibid.*, recommendation 3a

➤ 6. Transport and Planning

Goal: South Australia will substantially reduce transport-related greenhouse emissions while maintaining accessibility and economic development

Integrated land use and transport planning

Objective 6.1

To reduce trip lengths and the need for motorised travel through integrated land use and transport planning

Strategies

- 1 Use the land use planning system to reduce greenhouse emissions from transport
- 2 Encourage more compact metropolitan and regional town development, and expand neighbourhood-level activities and services
- 3 Encourage higher density development around interchanges and stations
- 4 Plan for and maintain strategic transport corridors, infrastructure and freight inter-modal sites
- 5 Locate industries to maximise the proximity to road and rail corridors and markets, and encourage the co-location of complementary industries

Priority actions

Plan for sustainable urban development that optimises previous investment in social and physical infrastructure, including existing public transport to accommodate the state government's population target of 2 million by 2050

Type of measure

Research and policy

Lead agencies

PIRSA, DTEI

Identify transit orientated development (TOD) opportunities, prepare planning policy and utilise government-owned land to facilitate specific opportunities

Policy

PIRSA, DTEI, LMC

Supporting actions

Maintain a metropolitan Adelaide urban boundary and establish urban boundaries for select towns in the outer metropolitan Adelaide region to foster efficiencies in urban development and support public transport usage

Type of measure

Policy

Lead agencies

PIRSA

Facilitate opportunities for higher density housing in targeted locations and transit-focused neighbourhoods

Research and policy

PIRSA, DTEI

Encourage businesses with large numbers of employees to locate in employment or business clusters and activity centres with accessibility to public transport

Research and policy

PIRSA, DTEI

Facilitate the development of and access to commercially viable inter-modal terminals that encourage greater use of lower emission marine and rail modes, and protect terminals and key rail/road networks from incompatible development

Policy

DTEI, PIRSA

Travel behaviour change

Objective 6.2

To achieve more sustainable travel behaviour

Strategies

- 1 Promote voluntary behaviour change programs to encourage more sustainable travel choices
- 2 Promote federal and state transport legislation, pricing and taxation that supports emission-reducing travel behaviour
- 3 Develop education and information programs that support more sustainable travel choices
- 4 Maximise the emissions efficiency of the transport network

Priority actions

Expand the TravelSmart households, workplaces and schools voluntary behaviour change programs and link with other initiatives such as TODs, cycling programs, public transport service upgrades and urban corridors initiatives

Type of measure

Travel behaviour change

Lead agencies

DTEI

Review state government incentives to encourage purchase of, or conversion to, lower emission vehicles and fuels*

Policy development

DTEI

Together with affected councils, develop a metropolitan parking policy that targets the reduction of long-term parking in activity centres across metropolitan Adelaide

Policy development

DTEI

Supporting actions

Seek changes to policies that are barriers to emissions reductions such as road pricing, excise regimes for alternative fuels and fringe benefits tax; contribute to Australian Government processes to achieve these outcomes

Type of measure

Policy development

Lead agencies

DTEI

Design new and existing road space to give greater priority to emission-efficient modes and use intelligent transport systems to improve fuel efficiency

Service and technology improvement

DTEI

Supporting actions (continued)		Type of measure	Lead agencies
Evaluate the benefits of 'eco-driving' programs, and if their worth is proven, expand within government and incorporate in driver training and testing		Research, regulation and behaviour change	DTEI
Support the introduction of car sharing in Adelaide		Policy	DTEI
Provide information on the full personal cost of transport and the role of vehicle maintenance in fuel efficiency		Information provision	DTEI
Vehicle performance			
Objective 6.3 To improve the emissions performance of vehicles and fuels	Strategies 1 Improve the tailpipe emissions performance of new and in-service vehicles 2 Support the research, development and introduction of emissions-reducing technology and fuels 3 Facilitate the transition towards low emission fuels		
Priority actions		Type of measure	Lead agencies
Continue to support the development of a local biofuels industry and promote compatibility of biofuels with new vehicle technology through consultation with automotive manufacturers and importers [†]		Research	PIRSA, DTEI, DTED
Seek the early and comprehensive adoption of new, tighter national fuel efficiency and emissions requirements for new vehicles		Policy	DTEI, EPA
Establish in-service vehicle emissions standards and legislation enforced through an on-road detection testing and correction program		Regulation	DTEI
Supporting actions		Type of measure	Lead agencies
Facilitate research into the potential of compressed natural gas as a medium-term, more widely used, vehicle fuel		Research	DTEI
Encourage the heavy and light commercial road freight industry to adopt lower emission fuels and industry in general to develop more efficient practices that lower emissions from freight		Education, information provision	DTEI, EPA
Mode shifting			
Objective 6.4 To shift transport towards low greenhouse emission modes	Strategies 1 Improve public transport services 2 Improve infrastructure, safety and facilities for pedestrians and cyclists to encourage these zero emissions modes 3 Encourage freight to shift to lower greenhouse emission modes		
Priority actions		Type of measure	Lead agencies
Increase peak hour public transport services to meet high demand		Infrastructure	DTEI
Improve the frequency, speed and connectivity of public transport services		Service improvement	DTEI, TransAdelaide
Consider investment in fixed rail infrastructure		Infrastructure	DTEI, TransAdelaide
Support zero emissions modes by: <ul style="list-style-type: none"> › implementing <i>Safety in Numbers, A Cycling Strategy for SA, 2006–2010</i>, with a particular emphasis on actions that encourage replacement of motorised trips with cycling, such as comprehensive cycling networks and workplace end of trip facilities › developing a walking strategy 		Policy development, policy implementation	DTEI
Supporting actions		Type of measure	Lead agencies
Expand bus, train and tram fleet capacity		Infrastructure	DTEI, TransAdelaide
Investigate measures to improve and support public transport services in activity centres, including in regional areas		Service provision	DTEI, TransAdelaide
Facilitate the improvement and/or re-opening of key rail freight lines		Infrastructure	DTEI
Assess opportunities and obstacles to increase the role of shipping in the domestic freight task		Evaluation	DTEI
Consider increased interconnectivity of the state's rail network with gauge standardisation and associated network improvements		Infrastructure	DTEI

* Consistent with recommendation 4a of Professor Stephen Schneider's report, *Climate Change: Risks and Opportunities* (2007)

† *ibid.*, recommendation 9d

7. Buildings

Goal: South Australia's building sector will anticipate and respond to climate change and become a world leader in the creation of a carbon neutral built environment

Performance standards

Objective 7.1

To develop high performance green standards for building design, construction and operation

Strategies

- 1 Periodically review building standards to ensure that they incorporate requirements that encourage the implementation of innovative measures for reducing emissions and adapting to climate change
- 2 Provide leadership in adopting and using voluntary green building rating tools
- 3 Promote passive solar design measures and minimise reliance on artificial means of achieving indoor air comfort

Priority actions

Develop further performance standards at national and state levels to improve the energy efficiency of air-conditioners

Type of measure

Performance standards

Lead agencies

DTEI, PIRSA

Investigate amendment to the regulations to the *Development Act 1993* so that it is clear that development approval is not required for the installation of PV panels

Policy development

PIRSA

Establish greenhouse performance standards for water heaters installed in new and existing dwellings

Performance standards

DTEI

Supporting actions

Review and strengthen climate change requirements in national building, infrastructure and planning standards

Performance standards

PIRSA, DTEI, DPC

Energy efficiency

Objective 7.2

To optimise the energy performance and subsequent cost effectiveness of buildings

Strategies

- 1 Consider the use of market-based instruments to increase investment in energy efficient building design and refurbishment
- 2 Encourage leadership to drive environmentally sustainable procurement practices for the building construction sector
- 3 Encourage and recognise industry-wide collaboration and innovative strategies that demonstrate high performance building outcomes
- 4 Promote a greenhouse emissions reduction approach in buildings that recognises whole-of-life energy costs and benefits

Priority actions

Determine an appropriate system for rating the sustainability of residential buildings

Performance standards

Performance standards

Lead agencies

PIRSA, DTEI

Resolve the use of appropriate systems for rating the sustainability of commercial buildings

Performance standards

DPC, PIRSA

Provide certainty and support for green development in planning policy and building standards to facilitate efficient and effective approval processes

Policy development

PIRSA

Investigate a suite of financial incentives that complement other building environmental measures and reward responsible behaviour to improve the efficiency of existing building stock

Market-based instruments

DTED, DPC, DTEI

Supporting actions

Increase use of recycled materials in construction of buildings and other elements of the built environment

Policy performance standards and specifications, education

Policy performance standards and specifications, education

Lead agencies

ZWSA, PIRSA

Reward responsible environmental behaviour and outcomes by identifying and promoting exemplar projects

Education

DPC, DTEI, DFC

Improved building performance		
<p>Objective 7.3 To increase market and community awareness of the benefits of improved building performance</p>	<p>Strategies</p> <ol style="list-style-type: none"> 1 Develop and promote building performance guidelines, tools and techniques 2 Establish a consistent approach to mandatory measuring, monitoring and disclosure of building energy consumption performance and the impact of occupant behaviour 3 Improve the capacity of the building sector through education, training and development 4 Encourage research that provides opportunities 	
Priority actions	Type of measure	Lead agencies
Investigate, select and where appropriate develop guidelines to assist with the application of sustainability planning and development of buildings and the urban environment	Education	PIRSA, LMC
Consider sustainability ratings for residential areas	Policy development	DPC, PIRSA
Supporting actions	Type of measure	Lead agencies
Encourage appropriate branding/eco-labelling by manufacturers of building materials and products including equipment and appliances	Education	DTED, DTEI
Develop a multi-stakeholder training and advisory service for consumers and the buildings sector	Education	DFEEST, DPC
Support collaborative (e.g. industry, government, education institutions) research into innovative systems and technologies for adapting buildings and urban planning to the impacts of climate change and reducing greenhouse gas emissions	Research	DTED, DFEEST, DTEI
Urban development		
<p>Objective 7.4 To develop sustainable built environments that are responsive to climate change</p>	<p>Strategies</p> <ol style="list-style-type: none"> 1 Establish best-practice principles for the design and construction of a climate-responsive urban environment, consistent with longer-term targets such as a carbon neutral built environment 2 Implement and promote innovative principles and practices for land management planning and development of a sustainable, climate-responsive urban environment 	
Priority actions	Type of measure	Lead agencies
Integrate greenhouse mitigation and climate change adaptation strategies into urban land development policy and processes by: <ul style="list-style-type: none"> › demonstrating leadership with sustainable outcomes in government land development projects › reviewing residential and industry land release policies and incorporating both greenhouse mitigation and climate change adaptation strategies where appropriate 	Urban development	LMC
Identify land parcels critical to the sustainable future growth and consolidation of metropolitan Adelaide and where appropriate, purchase, amalgamate and/or assemble these parcels to facilitate their intended use and incorporate both greenhouse mitigation and climate change adaptation strategies	Urban development	LMC
Supporting actions	Type of measure	Lead agencies
Promote sustainable, whole-of-life outcomes when planning for the use, location and form of land development by: <ul style="list-style-type: none"> › providing clear strategic directions for urban development › preparing and promoting sustainable land development principles and guidelines that focus on minimising greenhouse gas emissions and adapting to climate change 	Urban development	PIRSA, LMC, DFC

8. Natural Resources

Goal: South Australia's natural resources sector and ecosystems will be managed sustainably with optimum resilience and capacity to adapt to climate change

Resilient natural resource-based industries

Objective 8.1

To strengthen the resilience of industries reliant on natural resources in the face of potential impacts of climate change

Strategies

- 1 Take climate change projections into account in assessing risks to natural resource-based industries, including risks posed by invasive species such as weeds, pest animals and pathogens
- 2 Build climate change into primary industry planning with provision for industry readjustment where required and support sustainable new industries
- 3 Explore opportunities for renewable energy generation and fuels from biosources
- 4 Protect the state's most productive agricultural land from alienation and retain for primary production

Priority actions	Type of measure	Lead agencies
Establish pilot programs in critical regions to demonstrate adaptation techniques (e.g. environmental management systems), trial emission controls, new techniques, technologies, crop and livestock varieties and other opportunities, and continue research on field crop varieties for low rainfall regions	Education and research	PIRSA, DWLBC
Incorporate areas of primary production significance into development plans and apply stricter controls to forms of development not directly related to primary production and related value-adding activities	Policy development	PIRSA, DWLBC
Identify and prioritise regions and industries that are vulnerable to climate change*	Research	PIRSA, SARDI, DWLBC
Develop innovative support tools and farm management systems to increase industry adaptation to climate change impacts and continue existing work with the wine and grains industries	Information and support systems	PIRSA, DWLBC
Supporting actions	Type of measure	Lead agencies
Establish a communication and engagement program between government and industry, producers and the community, and continue to: <ul style="list-style-type: none"> › engage with grain growers on climate change › work with the wine grape industry on managing heat stress in vines 	Information provision	PIRSA, DWLBC
Address regulatory issues and revise rural adjustment policy for industries in areas vulnerable to climate change and with potential for exceptional rates of business failure	Regulation, policy development	PIRSA, DWLBC
Continue to develop and trial market-based instruments that create incentives for private investment in activities that increase resilience of natural resource-based industries, support biosequestration and/or improve ecological function and connectivity [†]	Policy development	PIRSA, DWLBC
Continue to collaborate with industry to investigate the feasibility of developing a plant-based and waste-based bioenergy industry in South Australia [‡]	Industry development	PIRSA, DWLBC
Contribute to national programs to identify and quantify agricultural greenhouse gas emissions	Policy development	PIRSA, DWLBC
Contribute to national programs to establish benchmarks and targets for emissions and energy use by the agricultural industry sector	Policy development	PIRSA, DWLBC, DPC
Include a climate change perspective in agricultural research programs and establish new adaptable and flexible management and production systems [§]	Research	PIRSA, DWLBC
Contribute to national research programs into more efficient soil fertilisation, livestock digestion, and other technologies to reduce agricultural greenhouse gas emissions	Research	PIRSA, DWLBC
Contribute to research into projections of climate change and likely impacts on NRM industry sectors and continue work currently underway in the South Australian Murray-Darling Basin	Research	PIRSA, SARDI, DWLBC, DEH
Support research programs to develop new industries and approaches in regions where substantial land use changes are expected as a result of climate change	Research	PIRSA, DWLBC
Contribute to research and development of models that predict epidemiology of pests, diseases and weeds with expected changes of climate	Research	PIRSA, DWLBC

Vulnerability of water resources		
Objective 8.2 To incorporate climate change in the sustainable management of water resources and water supply	Strategies <ol style="list-style-type: none"> 1 Ensure relevant plans, including water allocation plans, reflect climate change projections and provide a framework to adjust water allocations if necessary 2 Explore options for diversified water supply and robust management systems able to cope with climate change 3 Investigate low emission options that increase water security 4 Participate in key national water and climate change initiatives 	
Priority actions	Type of measure	Lead agencies
Work with the Australian Government and other jurisdictions under the proposed new governance arrangements to identify the extent of the climate change risk for the Murray-Darling system and to increase flows in the river	Policy development	DWLBC
Progressively review water allocation plans to ensure long-term sustainability of the state's water resources	Evaluation	DWLBC
Achieve <i>Water Proofing Adelaide</i> objectives and develop the Water Proofing South Australia strategy	Policy development	DWLBC, SA Water, EPA
Work collaboratively with other jurisdictions to gain a shared understanding of water availability to examine contingency planning to secure water supply during both emergency drought situations and in the longer term	Policy development	DWLBC
Supporting actions	Type of measure	Lead agencies
Extend SA Water's Greenhouse Challenge actions into a longer term strategy including adaptation planning and mitigation commitments such as the use of renewable electricity, revegetation and market offsets	Policy development	SA Water
Work towards implementing major water resource programs in a carbon neutral way	Program delivery	SA Water, DWLBC
Investigate opportunities to reduce greenhouse gas emissions as part of developing future desalination plants in South Australia	Research	SA Water, DWLBC
Biodiversity conservation		
Objective 8.3 To increase the capacity of ecosystems to adapt to climate change	Strategies <ol style="list-style-type: none"> 1 Determine priorities for biodiversity conservation based on an assessment of direct and indirect climate-related risks and vulnerabilities 2 Identify opportunities to build resilience in marine, freshwater and terrestrial ecosystems to improve their capacity to respond to disturbance and stresses 3 Improve ecological function and connectivity and the capacity for individuals and communities to move and evolve 	
Priority actions	Type of measure	Lead agencies
Develop models and predictive tools that use climate change scenarios (including sea level rise) and biological data to identify terrestrial, marine, estuarine and freshwater species, ecological communities and ecosystem processes that will be most: <ul style="list-style-type: none"> › vulnerable to climate change › resilient to climate change › advantaged by climate change 	Research	DEH
Assess the risk of threatening processes and the impact of climate change on these processes to predict impacts on species status and ecosystem function	Research and evaluation	DEH
Determine the vulnerability of coastal habitats to sea level rise and wave surge, incorporating the results into land use and marine planning	Research	DEH
Implement the River Murray Forest policy and NatureLinks plans, incorporating opportunities for biosequestration, in partnership with key stakeholders, including private landholders and organisations that can contribute key habitat management outcomes	Policy implementation	DEH

Supporting actions		Type of measure	Lead agencies
Act as a broker for research that will identify properties or processes that confer resilience to climate change on species, ecological communities and ecosystems		Research	DEH, DWLBC
Participate in and broker research to provide relevant state and regional scale projections that enable impacts on the function and structure of species and ecological systems to be predicted and adaptation strategies to be identified		Research	DEH, DWLBC
Identify changes to distribution and lifecycle parameters of affected species and ecological communities and identify indicators that can be used to monitor trends in response to climate change		Research	DEH
Assess appropriate parameters for indicating changes in ecosystem function and process to act as an early warning for action		Research	DEH
Assess the risk of establishing invasive species or exacerbating current pests in the face of climate change and identify what needs to be done to manage the impacts on biodiversity and industry		Research and evaluation	DEH, PIRSA
Assess the implications of climate change for managing South Australia's reserve system and implement priority changes		Research	DEH
Reducing emissions, sequestering carbon			
Objective 8.4 To reduce greenhouse gas emissions from the natural resources sector and increase carbon sinks	Strategies <ol style="list-style-type: none"> 1 Improve understanding of the processes by which greenhouse gases are produced and recycled in the sector and work with primary industries to implement practical and cost-effective emission reduction options 2 Improve energy-efficiency and increase the use of renewable energy and biofuels for water supply and wastewater treatment 3 Promote carbon biosequestration in appropriate locations to deliver a range of natural resource management benefits 4 Develop market mechanisms that value carbon, biodiversity and salinity outcomes 		
Priority actions		Type of measure	Lead agencies
Establish a voluntary offset scheme as part of the climate change legislation		Policy implementation	DPC
Develop and implement a series of pilot projects for adopting commercial and non-commercial perennial vegetation options in the NRM regions of South Australia to promote and achieve biosequestration and deliver multiple NRM benefits		Program delivery	DWLBC, PIRSA, DEH
Supporting actions		Type of measure	Lead agencies
Investigate perennial vegetation options in South Australia's rural landscapes for biosequestration and for improving options for adapting to climate change which also have commercial and/or biodiversity benefits		Research	DWLBC, PIRSA, DEH

* Consistent with recommendation 9b of Professor Stephen Schneider's report, *Climate Change: Risks and Opportunities* (2007)

† *ibid.*, recommendation 5

‡ *ibid.*, recommendation 9d

§ *ibid.*, recommendation 5

Appendix 1


The emissions inventories used throughout this document have been calculated using the internationally recognised reporting framework known as the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (GHG Protocol). The GHG Protocol is based on existing and best practice methodologies and as such the methods and reporting tools have been designed to be consistent with the Intergovernmental Panel on Climate Change (IPCC) recommendations for preparing national inventories.

The GHG Protocol has been developed by industries and governments and claims to be used by nearly every greenhouse program and reporting standard in the world, as well as by hundreds of companies. The Australian Greenhouse Office (AGO) was involved in the development of the GHG Protocol and uses this standard in the Greenhouse Challenge Program that involves some 700 Australian companies, non-government organisations and governments.

The GHG Protocol establishes three emissions categories: Scopes One, Two and Three. The distinction between scopes allows programs to

eliminate double counting of emissions where necessary, particularly in relation to electricity production and use:

- › Scope One emissions are defined as those emissions that occur directly within the boundaries or control of a company or jurisdiction. Scope One emissions for South Australia are equivalent to the data currently provided by the AGO for South Australia in its publication: *Australia's National Greenhouse Accounts – State and Territory Greenhouse Gas Inventories (SGGI)*.
- › Scope Two emissions relate to imported secondary energy, such as electricity and steam, where the emissions associated with the energy use occur outside the boundary of the jurisdiction. South Australia's Scope Two emissions are calculated based on net imports of electricity from interstate over the two interconnectors. The GHG Protocol prescribes that reporting of Scope One and Two emissions are mandatory. The AGO have advised that they will provide Scope Two emissions data for inclusion in future releases of the National Greenhouse Gas Inventory (NGGI).

- 
- › Scope Three emissions relate to other sources of indirect emissions such as transport services or fugitive emissions from energy production that occurs interstate. The GHG Protocol encourages companies and jurisdictions to quantify and report Scope Three emissions on a voluntary basis.

Consistent with the prescription of the GHG Protocol, the Department of the Premier and Cabinet adds Scope Two emissions to the NNGI data. This provides a more comprehensive greenhouse gas emission report. This is important for South Australia as imported electricity is material in that it

typically represents over 10% of the state's greenhouse gas emissions. While the case for including Scope Two emissions is clear, there is currently no established method of converting the contributions from the imported/exported electricity into greenhouse gas equivalents. In the absence of such a method, the approach used is to convert imported/exported electricity into greenhouse gas equivalents using the overall emissions factor for the National Electricity Market as published by the National Electricity Market Management Company (NEMMCO).

Glossary

Adaptation

Action in response to, or anticipation of, climate change to reduce or avoid adverse consequences or to take advantage of beneficial changes. Adaptation is usually distinct from actions to reduce greenhouse gas emissions.

Adaptive management

A systematic process for continually improving management policies and practices by learning from the outcomes of operational programs.

Biodiversity

The variety of life forms: the different plants, animals, fungi, bacteria and other microorganisms, the genes they contain, and the ecosystems they form. It includes the ecological and evolutionary processes through which genes, species and ecosystems interact with one another and with their environment.

Biofuel(s) / bioenergy / biosources / biodiesel

Biofuel or bioenergy is any fuel that is derived from biomass—recently living organisms or their metabolic byproducts, such as manure from cows. It is a renewable energy source, unlike other natural resources such as petroleum, coal and nuclear fuels. Biosources is shorthand for energy resource sources derived from biomass. Biodiesel refers to a diesel-equivalent, processed fuel derived from biological sources.

Biosequestration

A biological process that removes greenhouse gases from the atmosphere, such as the absorption of carbon dioxide by growing trees.

Carbon dioxide (CO₂)

An atmospheric gas composed of one carbon and two oxygen atoms. It is present in the Earth's atmosphere at a low concentration and acts as a greenhouse gas.

Carbon dioxide equivalent (CO₂-e)

An internationally accepted measure that encapsulates all of the different greenhouse gases. Each of the gases has a different 'global warming potential' in terms of an equivalent amount of carbon dioxide (the major greenhouse gas). Methane, for example, has a global warming potential 21 times that of carbon dioxide—so one tonne is included in the accounts as 21 tonnes of CO₂-e.

Carbon neutral

Net greenhouse gas emissions are zero. This can be achieved by preventing or offsetting emissions (e.g. by supporting a tree planting scheme that will absorb carbon dioxide, or a combination of the two).

**Carbon offset(s)**

A carbon offset zeros out (offsets) all or part of the carbon dioxide emissions of a party, by reducing the emissions—or increasing the carbon dioxide absorption—of another party. This reduces net greenhouse gas emissions with the aim of combating global warming. Effectively offsetting the emissions of an activity makes that activity carbon neutral.

Carbon sequestration

The term describing processes that remove carbon from the atmosphere.

Carbon sink

A biological or other process that removes carbon dioxide from the atmosphere, such as the absorption of carbon dioxide by growing trees.

Climate change

Any change in climate over time, whether due to natural variability or as a result of human activity.

Climate projection

A projection of the response of the climate system to emission or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based upon simulations by climate models. Climate projections are distinguished from climate predictions by the more substantial degree of uncertainty in the underlying assumptions (e.g. regarding how future technological and economic trends may affect emissions).

Cumulative effects

The combined impacts of activities and resource uses within an area and over time.

Desertification

The degradation of land in arid, semi-arid and dry sub-humid areas resulting from various factors including climatic variations, but primarily human activities.

Ecological footprint

The ecological impact of human activities as measured in terms of the area of biologically productive land and water required to produce the goods consumed and to absorb the wastes generated.

Ecosystem

A dynamic complex of plant, animal, fungal and microorganism communities and the associated non-living environment interacting as an ecological unit.

Embodied energy

All the energy invested in bringing a material to its final product, including transportation.

Emissions trading / emissions trading scheme

Parties with emissions commitments trading their emission allowances with other parties.

Fragmentation

The division or separation of natural areas by the clearance of native vegetation for human land uses, isolating remnants and species and affecting genetic flow.

Freight inter-modal sites

See 'Inter-modal terminals or sites'.

Geothermal—'hot rock'

Energy extracted from the heat of the earth.

In South Australia, this primarily refers to hot rocks many kilometres below the surface (e.g. in Cooper Basin). Geothermal also refers to hot springs and low temperature heat exchange activities but this is not the sense in which the term is used in this document.

Greenhouse effect

The process where gases in the lower atmosphere such as carbon dioxide, methane and water vapour are warmed by radiation released by the earth's surface after it has been warmed by solar energy. These gases then radiate heat back towards the ground—adding to the heat the ground receives from the Sun. The effect of naturally occurring greenhouse gases keeps Earth 33°C warmer than it would otherwise be.

Greenhouse friendly

This term is used to define all those solutions that will remain useful in a future with climate change and limits on our ability to produce greenhouse gases. (i.e. solutions that achieve zero, low or substantially lowered greenhouse gas emissions and/or solutions that enhance our capacity to cope with the effects of climate change).

Greenhouse gas emissions

The release of greenhouse gases into the atmosphere. A greenhouse gas is an atmospheric gas that absorbs and emits infrared or heat radiation, giving rise to the greenhouse effect.

Green Power

An accredited electricity product that guarantees production from renewable energy sources.

Green Star / Green Star rating

An environmental rating system for buildings.

Hazard

A situation or condition with potential for loss or harm to the community or environment.

'Hot rock' geothermal resources

See 'Geothermal'.

Integrated natural resources management

A holistic, long-term approach to natural resources management that, while retaining the benefits and efficiencies of sectoral management and associated expertise, also brings together the considerations and expertise of all sectors.

Intelligent transport systems

Systems based on advanced communications-based information and electronics, which when integrated into the transportation system's infrastructure, and in vehicles themselves, can help relieve congestion, improve safety and reduce fuel use and emissions per distance travelled.



Inter-modal terminals or sites

Inter-modal describes a system of transport where two or more modes of transport (eg. road and rail) are used to transport the same loading unit or track in an integrated manner, without loading or unloading, in a door-to-door transport chain. Inter-modal terminals or sites are facilities that form part of that chain.

Kyoto target

The Kyoto Protocol is an agreement about climate change signed by most nations. Parties (primarily developed nations) agreed to an average roll-back of 5.2% in anthropogenic (from human sources) greenhouse gas emissions by 2008–12, compared with the base year of 1990. Australia's agreed Kyoto target was an 8% reduction from 1990 level by 2008–12. However, the Australian Government has not ratified Kyoto.

Market-based instruments

Measures that are used to influence the decisions of buyers and sellers of goods and services, or the users of resources, to achieve specific policy objectives.

Mode shifting

A change in the choice of transport mode. For the purposes of this strategy, this implies a shift to lower emission modes (e.g. walking, cycling, public transport, rail, marine).

Modelling

Use of mathematical equations to simulate and predict real events and processes.

NatureLinks

A biodiversity conservation concept and program of the Government of South Australia that promotes ecological restoration at broad landscape scales through community partnerships.

National Framework for Energy Efficiency

A program of the Australian Government that aims to improve the energy efficiency of household appliances and equipment, and commercial and industrial equipment, for example, through mandatory minimum energy performance standards and energy efficiency labelling.

'No regrets' measure

A measure that has other net benefits (or at least no net costs) besides limiting greenhouse gas emissions or conserving or enhancing greenhouse gas sinks.

Passive solar design

Urban or building design that makes best use of the sun and local climatic conditions to create comfortable, pleasant and energy-efficient human habitats.

Pathogen(s)

A disease-producing organism.

Performance standards

Standards which define how a building or appliance should perform under a range of uses and conditions (e.g. a standard for the energy consumption of the building or appliance).

Photovoltaic (PV)

Converting light into electricity.

Product stewardship

A principle that directs all those involved in the life cycle of a product to take responsibility for reducing the health and environmental impacts that result from the production, use and disposal of the product.

Resilience

Ability to withstand and recover from stresses and disturbances.

Transit oriented development(s) (TODs)

Any development undertaken within walking distance of public transport in a manner that improves the accessibility and attractiveness of the public transport. Typically, it has a higher urban density than development less accessible to public transport, and may include a mix of residential, retail, commercial and civic uses.

Vulnerability

The susceptibility and resilience of the community and environment to hazards.

Water allocation plan

A plan developed to manage prescribed water resources through providing a system for the allocation and transfer of water via water licences at a sustainable rate of use that establishes an equitable balance between environmental, social and economic needs for the water. Water allocation plans may also set up rules to regulate water-affecting activities such as the drilling of wells and construction of dams through permits.

Water sensitive urban design

The aim of water sensitive urban design is to ensure that development is designed, constructed and maintained to minimise negative effects of urban development on natural hydrological regimes and water quality while minimising water consumption and maximising opportunities for water harvesting and re-use.

Whole-of-life costs

The total cost of a building, product or material including the initial cost and the long-term maintenance costs from conception through to demolition or disposal.

List of abbreviations

AER	Australian Energy Regulator	DTED	Department of Trade and Economic Development
CBD	central business district	DTEI	Department for Transport, Energy and Infrastructure
CO₂	carbon dioxide	DTF	Department of Treasury and Finance
CO₂-e	carbon dioxide equivalent	DWLBC	Department of Water, Land Biodiversity and Conservation
COAG	Council of Australian Governments	EMS	environmental management system
CSIRO	Australia's Commonwealth Scientific and Industrial Research Organisation	EPA	Environment Protection Authority
DECS	Department of Education and Children's Services	ESCOSA	Essential Services Commission of South Australia
DEH	Department for Environment and Heritage	ESIPC	Electricity Supply Industry Planning Council
DFC	Department for Families and Communities	GIS	geographic information system
DFEEST	Department of Further Education, Employment, Science and Technology	IPCC	Intergovernmental Panel on Climate Change
DH	Department of Health	LMC	Land Management Corporation
DPC	Department of the Premier and Cabinet	MT	megatonnes
		NGGI	National Greenhouse Gas Inventory

NRM natural resources management

**NRM
Boards** Natural Resources
Management Boards

OCBA Office of Consumer and
Business Affairs

PIRSA Department of Primary Industries
and Resources, South Australia

ppm parts per million

PV photovoltaic

R&D research and development

SARDI South Australian Research and
Development Institute

SATC South Australian Tourism
Commission

TA TransAdelaide

TODs transit oriented development(s)

UN United Nations

ZWSA Zero Waste SA

References and notes

- 1 McInnes, KL, Suppiah, R, Whefton, PH, Hennessey, KJ and Jones, RN. 2003. *Climate Change in South Australia: Report on assessment of climate change impacts and possible adaptation strategies relevant to South Australia*. Climate Impacts Group, CSIRO Atmospheric Research.
- 2 All emitting activities result in gross emissions. Negative emissions occur from sequestration activities such as an increase in vegetation. Net emissions are totals that include both emitting activities and sequestration activities. Emission data in this document is specifically referred to as net emissions wherever sequestration activities are included. See also note 3 regarding data sources and updates.
- 3 The emissions data in this strategy has been calculated by the Department of the Premier and Cabinet using the National Greenhouse Gas Inventory (NGGI) which is based on the *Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks 2004*. This national methodology is consistent with the revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and is comparable with international practice. The South Australian greenhouse gas accounts are based on data from the NGGI as well as the Electricity

Supply Industry Planning Council (ESIPC). South Australia's accounts include the addition of electricity imports and the exclusion of export electricity. The net impact typically represents over 10% of the state's greenhouse gas emissions since 1990. This inclusion is consistent with the recommendations of the internationally recognised Greenhouse Gas Protocol, which sets standards for greenhouse reporting. The impact of this inclusion is demonstrated in Appendix 1.

There are important links between this strategy and the climate change legislation. In particular, this strategy provides a means of implementing the legislation. The legislation recognises that greenhouse gas accounting is still in its infancy and that revisions will continue to be made, particularly in the transport and agriculture sectors. The legislation requires the Minister to update baseline data to reflect national and international best practice for greenhouse accounting. The Minister may also change targets and determinations to take into account new or updated methodologies for the calculation, assessment, measurement or reporting of greenhouse gas emissions. The calculations in this strategy are therefore subject to any changes in the methodology used for the purposes of the legislation.

- 4 Stern, N. 2006. *The Economics of Climate Change: The Stern Review*. Cabinet Office–HM Treasury
- 5 Schneider, S. 2007. *Climate Change: Risks and Opportunities*.
- 6 Government operations refers to activities that government undertakes to deliver services by the general government sector, which excludes non financial public corporations and public financial corporations, as defined in the South Australian budget papers.
- 7 NRM adaptation issues/actions are addressed in the Natural Resources section of *Tackling Climate Change*.
- 8 Suppia, R, Preston, B, Whetton, PH, McInnes, KL, Jones, RN, Macadem, I, Bathois, J and Kirono, D. 2006. *Climate change under enhanced greenhouse conditions in South Australia*. Climate Impacts Group, CSIRO Atmospheric Research.
- 9 Current industry activity.
- 10 Stationary energy covers the generation of electricity and direct combustion of fossil fuels for the production of heat and processing. Transport is covered in the Transport and Planning section. Direct combustion includes the manufacture of solid fuels, manufacturing and construction industries, such as non-ferrous metals, iron and steel, chemicals, pulp, paper and print, food manufacturing and beverages. Small combustion such as home heating, on-site diesel generation, and on-farm machinery is also classified as a component of the stationary energy sector. Energy use is expected to continue to grow but the impact of increased wind power in the electricity sector and reduced fugitive emissions from the Moomba gas fields will contribute to an overall steadying of emissions by 2012.

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