

Report on the operation of the *Climate Change and Greenhouse Emissions Reduction Act 2007*

November 2009



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Attachment A: *Potential for Renewable Energy in South Australia*, 2009 Report by McLennan Magasanik Associates

Attachment B: *The future prospects for renewable energy in South Australia*, 2009 Report by the National Institute of Economic and Industry Research

Attachment C: *Climate change under enhanced greenhouse conditions in South Australia*, Executive Summary of the 2006 CSIRO Report

Attachment D: *Review of Progress to Achieving Targets under Section 7 of the Climate Change and Greenhouse Emissions Reduction Act 2007*, 2009 Report by the CSIRO

INTRODUCTION

The *Climate Change and Greenhouse Emissions Reduction Act 2007* provides for a number of reporting requirements for the South Australian Government. This report provides information that fulfils the requirements in Section 7 of the Act including information regarding:

- the assessment of the effectiveness of the climate change initiatives, targets and determinations
- progress to renewable energy targets
- sector agreements
- the State's greenhouse gas emissions
- climate change mitigation technologies
- intergovernmental agreements
- national and international commitments
- climate change impacts-related information.

As required in the Act, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) assessed the progress against the renewable and greenhouse gas emissions reduction target and concluded that:

- South Australia is expected to achieve its 2014 and 2020 targets
- The methodology currently used by the South Australian Government to set the 1990 baseline and measure progress towards meeting the legislated greenhouse gas emissions is 'valid and robust'. The CSIRO was not able to assess the extent to which the 2050 is being achieved due to a considerable estimation risk, but noted progress towards the renewable energy targets would 'significantly enhance the probability of achieving the target'.
- The CSIRO did not propose amending the legislated greenhouse gas target.

Section 1. Effectiveness of South Australia’s climate change initiatives

This section fulfils the requirement of Section 7(2)(a) of the Act. It provides information on South Australian Government climate change initiatives adopted under the Act. It includes an assessment of the effectiveness of these actions.

The activities are reported under the sectors in the Greenhouse Strategy: Leadership, Community, Industry, Energy, Transport and Planning, Buildings, Adaptation and Natural Resources. The activities have been categorised as follows:

Section	Actions
LEADERSHIP	<ul style="list-style-type: none"> • Legislation – Targets and Sector Agreements • Government Operations • National and International Processes
COMMUNITY	<ul style="list-style-type: none"> • Behaviour Change • Schools
INDUSTRY	<ul style="list-style-type: none"> • Industry Information and Training Programs • Research, Development, Commercialisation and Investment Attraction
ENERGY	<ul style="list-style-type: none"> • South Australian Strategic Plan Target 3.14 Residential Energy Efficiency Target • Renewable Energy
TRANSPORT AND PLANNING	<ul style="list-style-type: none"> • Planning for Climate Change – a New Urban Form • Infrastructure • Public Transport • Transport Programs
BUILDINGS	<ul style="list-style-type: none"> • Planning for Buildings • Building Sustainability
NATURAL RESOURCES	<ul style="list-style-type: none"> • Sequestering Carbon
ADAPTATION	<ul style="list-style-type: none"> • Research • Risk and Vulnerability Assessments • Reforming Policy Instruments • Adaptation Strategies • Water • Hazard Management

Much has changed since the passage of the *Climate Change and Greenhouse Emissions Reduction Act 2007* through Parliament and since the 2007 release of *Tackling Climate Change: South Australia’s Greenhouse Strategy*.

The awareness of climate change amongst the general public, the private sector and the media has increased. The Australian Government has signed the Kyoto Protocol

and legislated for a mandatory 20% renewable energy target (RET) to be reached by 2020.

A number of climate change policy development processes, which are currently underway, continue to affect the roles and responsibilities of regional Australian governments. These processes include the passage of the legislation to enable the implementation of Australia's emissions trading scheme known as the Carbon Pollution Reduction Scheme (CPRS); the associated development of a streamlined national set of complementary climate change policies to this scheme, such as the National Strategy on Energy Efficiency (NSEE); and implementation of the National Adaptation Framework.

The final report of the Garnaut Climate Change Review released in October 2008 also provides an important commentary and economic analysis on the role of a market mechanism like the CPRS and appropriate supporting interventions by Governments in transitioning Australia's economy to a low carbon future.

LEADERSHIP

Legislation - Targets and Sector Agreements

The *Climate Change and Greenhouse Emissions Reduction Act 2007* came into force on 3 July 2007. The Act set targets for the reduction of greenhouse emissions by 2050 and for renewable energy production and consumption by 2014. The Act also established the Premier's Climate Change Council (PCCC) and provided the framework for voluntary sector agreements.

Progress:

- In 2007, the State Government committed to a target of renewable electricity so it comprises at least 20% of electricity generated and consumed in the State by the end of 2014. In June 2009, the State Government announced an increase in its renewable energy generation target to 33% by 2020.
- The proportion of renewable energy was 14% for generation and 14% for consumption in July 2009. It is anticipated that the 20% renewable energy targets are on track to be met within their respective deadlines.
- Membership of the PCCC was officially announced by the Premier in February 2008

Work of the PCCC to date includes:

- "Adapting to Climate Change – Meeting Scientific and Technological Challenges for South Australia" forum with the SA Division of the Australian Academy of Technological Sciences and Engineering
- Engagement with stakeholders through events with the Council's Stakeholder Engagement Group
- Commencement of a review of *Tackling Climate Change: South Australia's Greenhouse Strategy*
- Input to the *Draft Planning the Adelaide we all want – Progressing the 30 year Plan for Greater Adelaide*
- Establishment of an expert science group to provide information about the latest science
- Review and provision of advice in relation to the complementary measures review as part of the Collection of Australian Governments (COAG) process
- Stock-take and analysis of adaptation activities in South Australia
- In conjunction with the Natural Resources Management (NRM) Council, the PCCC commenced work on the development of a South Australian Adaptation Framework to provide a more strategic approach to adaptation and improve coordination between the three levels of government
- Work with the National Climate Change Adaptation Research Facility on ways to involve South Australian researchers in the national initiative.

- Under Section 16 of the *Climate Change and Greenhouse Emissions Reduction Act 2007*, the following sector agreements were progressed by the South Australian Government:
 - The Local Government Association
 - The South Australian Wine Industry Association
 - The Property Council of Australia (SA Division)
 - The Synod of the Diocese of Adelaide of the Anglican Church of Australia
 - The South Australian University Sector
 - Adelaide Brighton Limited
 - Electronics and ICT Industry Association
 - Royal Automotive Association
 - Jeffries Group
 - Urban Development Institute of Australia (SA Division)

Further details regarding these agreements can be found in Section 5 of this report.
- A Memorandum of Understanding has been signed with South Australia's peak industry organisation, Business SA, in which the parties commit to work together to facilitate the development of three additional sector agreements.

Government Operations

There is a range of activities undertaken by the State Government to reduce emissions from its operations. These include initiatives to reduce emissions from stationary energy and transport use. The Government's Energy Efficiency Action Plan underpins State Government activities. Reducing public transport emissions is covered in the TRANSPORT AND PLANNING section.

Progress:

- The State Government is purchasing carbon offsets to balance the travel and energy consumption by Cabinet Ministers in the course of their duties
- 20% of the State Government's total electricity has come from renewable sources from 1 January 2008
- In 2007-08, the State Government progressed towards the SASP T3.13 target: *Improve the energy efficiency of government buildings by 25% from 2000-01 levels by 2014* with a reported 10.8% cumulative improvement since 2000-01
- As of 1 July 2009, 48% of the State Government vehicles were using more friendly fuels, meeting the 'lower emission fuels' criteria
- It is South Australian Government policy to achieve a 5 star Green Star rating for all new government office buildings. The Green Star tool favours building locations with accessible public transport for occupants, restricted car parking spaces, bicycle racks and cyclist facilities.
- 53% of the Government's leased accommodation portfolio in Adelaide has either been rated, or there is an obligation on the building owner to target a particular National Australian Built Environment Rating System (NABERS) Energy base

building rating. Almost 25% of leased accommodation is rated at 4 stars or above.

- Procurement reforms are being implemented for building construction industry projects that preserve high levels of probity but allow the State to capture the benefits of innovation by the private sector. This occurs through Government policy frameworks such as the Construction Procurement Policy Project Implementation Process, contractor prequalification and the across-government Facilities Management Arrangements.
- The TravelSmart Workplace Program within South Australian Government has a number of departments involved with travel plans in various stages of development
- An internal Ecologically Sustainable Development guide for planning, design & delivery of new & major building refurbishment projects over \$4m is in place. Green Building Council of Australia green star design tools for the health and education sectors have been completed.
- The across-government facilities management arrangements include provisions to improve environmental performance & focus on energy, water & waste
- Representations from State Government agencies have significantly contributed to the Australian Procurement and Construction Council's (APCC) work to develop a standard National Green Lease Policy for government office accommodation
- SA Water is a Greenhouse Challenge member and is experienced in monitoring and reporting its emissions
- Renewable energy will be supplied to meet 100% of the electricity consumed by the Adelaide Desalination Plant over the 20-year contract period
- SA Water has developed training packages for its planners, designers and engineers to quantify the greenhouse impact of new infrastructure, and to assess cost effective solutions for efficiency, use of renewable energy and carbon offset credits
- The new Department for Families and Communities Connected Service Centre in Mount Gambier, which will be operational in late 2009 or early 2010, will be a 5 Star Green facility. The building will have many green innovations attached to the project and is expected to be a prototype for others to follow when building green star buildings.
- The Department of Treasury and Finance is leading the implementation of the Australian and New Zealand Government Framework for Sustainable Procurement, developed by the Australian Procurement and Construction Council
- Other initiatives aimed at reducing the Government's energy use include:
 - Using cost-effective combinations of low-emission fuels in public transport, including biodiesel blends and natural gas (see TRANSPORT AND PLANNING section)
 - Ongoing replacement of Cathode Ray Tube screens with flat screens for all desk top computers
 - Implementing actions in the Energy Efficiency Action Plan
 - Developing minimum energy rating requirements for fitouts and refurbished accommodation

- Agency commitment to give preference to office accommodation that meets at least a 5 star rating
- Agencies committed to regularly update Building Energy Efficiency Implementation Plans.
- Energy saving initiatives are being implemented at two regional TAFE Campuses (Mt Barker and Mt Gambier). These include upgrading of lights to more efficient T5 lamps and installing automated lighting control systems. These initiatives could realise a 20% increase in energy efficiency.
- Construction of the new Victor Harbor TAFE Campus commences this year and will include energy efficient lighting and solar hot water services. Six water tanks totalling over 200,000 litres of water, will be installed to service toilets and garden water needs.

National and International Processes

South Australia initially placed climate change on the COAG agenda and it has now become a critical national policy priority.

The Australian Government has created significant momentum for jurisdictional collaboration on climate change action with commitments to introduce a Carbon Pollution Reduction Scheme (CPRS) and its recently legislated expanded Australian Renewable Energy Target (RET). States and territories are working with the Commonwealth Government on this through COAG and Ministerial Council processes.

South Australian Leadership

The South Australian Government has made particular contributions in the following areas:

- At South Australia's instigation, the Commonwealth introduced a single national reporting system for industry. The National Greenhouse and Energy Reporting Act 2007 set reporting obligations for corporations and commenced on 1 July 2008.
- Commenced the development of a South Australian Adaptation Framework to develop a more strategic approach to adaptation, improve communication and enhance coordination across the different levels of government and across sectors
- Under the *Climate Change and Greenhouse Emissions Reduction Act 2007*, the South Australian Government was the first in Australia to set a greenhouse gas reduction target in legislation
- The first state to legislate a premium feed-in tariff for small solar photovoltaic systems and has worked with other states to provide information about the legislation required to implement the scheme
- Contributed to a national study of the measurement and reporting issues associated with agriculture, forestry and fisheries being included in the CPRS
- Successfully negotiated a commitment at the COAG meeting of 2 July to introduce a 10% improvement to minimum energy performance standards (MEPS) for air conditioners by October 2011

National Progress

South Australia has made an important contribution to the following national initiatives:

- The final Garnaut Climate Change Review report, commissioned by the States, Territories and Commonwealth Government, which was released in October 2008
- The development of the Carbon Pollution Reduction Scheme which is currently before the Federal Parliament. The South Australian Government has strongly advocated at a national level for the inclusion of voluntary action in the Scheme.
- The developments of the expanded national RET to ensure that 20% of electricity generated in Australia comes from renewable sources by 2020
- The National Framework for Energy Efficiency (NFEE) which has been in operation since 2004. Achievements in this time include Minimum Energy Performance Standards (MEPS) for a range of appliances and equipment; the introduction of minimum energy efficiency standards for new buildings; the implementation of the Energy Efficiency Opportunities (EEO) program; and training courses and accreditation systems for key industry sectors.
- In July 2009, the COAG endorsed a 10-year strategy to accelerate energy efficiency improvements for householders and businesses across all sectors of the economy. The National Strategy on Energy Efficiency (NSEE) will complement the Carbon Pollution Reduction Scheme by addressing the barriers that are preventing the efficient uptake of energy efficient opportunities, such as split incentives and information failures.
- The NSEE incorporates the ongoing work of the NFEE and includes implementation of the following key buildings measures:
 - Improvements to the energy efficiency requirements of residential and commercial buildings in the 2010 Building Code of Australia
 - Mandatory disclosure of the energy efficiency performance of residential and commercial buildings at the time of sale or lease.
- The joint Environment Protection Heritage Council and Australian Transport Council (EPHC/ATC) Vehicle Fuel Efficiency Working Group released its Final Report on encouraging the uptake of low carbon emission vehicles. Recommendations contained in this report were agreed by COAG in May 2009 and implementation is now underway through the ATC's Environment Standing Sub-Committee (SA is a member of this Committee) and the NSEE.
- The South Australian Government is a member of the national Emissions Intensity Benchmarking Working Group that aims to reduce greenhouse gas emissions while maintaining agricultural productivity
- The South Australian Tourism Commission is represented on the National Tourism and Climate Change Taskforce, established by the Tourism Ministers Council, and provides input into the National Tourism Action Plan on Climate Change, endorsed in July 2008.

International Collaboration

- In 2006 the South Australian Government signed an Memorandum of Understanding (MoU) with the Manitoba Provincial Government in Canada, including the commitment to share information regarding climate change
- The Third World Solar Cities Congress, a major international event, was held in Adelaide in February 2008
- The Council for the Australian Federation met with a delegation from Canada in February 2008 to discuss climate change partnerships and issues
- The Premier, as Chair of the Climate Leaders Summit in Poznan, Poland, made a commitment to the Federated States and Regional Governments Statement of Action. Commitments included:
 - Establishment of renewable energy targets
 - Improvements to the greenhouse performance of government operations
 - Exchange of information about best practice policy and research
 - Provision of assistance to at least one region in a developing country
 - Exchanges of leaders, practitioners and experts between sub-regional governments
 - Making information available regarding common systems of measurement for greenhouse gas emissions for regional governments.

Work has been undertaken to achieve these commitments.

- In August 2009, the Premier of South Australia met with the Governor of California, Mr Arnold Schwarzenegger, to further progress sub-national governments' commitments to leading the way in reducing carbon pollution and embracing green energy.

Assessment

South Australia currently enjoys a national leadership position in climate change. Ambitious targets have been set, the climate change agenda has been championed at a national level and iconic projects supported. The challenge will be to retain this leadership role in the new policy environment and ensure that these activities are complementary to the Carbon Pollution Reduction Scheme.

The *Climate Change and Greenhouse Emissions Reduction Act 2007* appears to be a successful instrument in encouraging early action. The Act has attracted the attention of the private sector. The voluntary sector agreements provided for in the climate change legislation are being used to form leadership commitments throughout the state. A separate report assessing the effectiveness of the legislation is being prepared for Parliament.

Government's own operations should be a demonstration of best practice in reducing emissions. A number of long running programs and systemic changes across Government supports this aim, including the Government Energy Efficiency Action Plan. However, it is possible to identify areas where best practice is not being achieved. Programs to achieve best practice are often constrained by lack of resources and lack of high level priority.

COMMUNITY

Overview Greenhouse Gas Emissions from Community

Greenhouse Gas (GHG) emissions from the Community sector increased by 13% from 7,500 kilotonnes (kt) CO₂-e (1990) to 8,500 kt CO₂-e (2007).

Contribution of the community sector to total South Australian GHG emissions increased from 23% (1990) to 27% (2007). Emissions intensity in the community sector increased by 2%, from 5.2 tonnes CO₂-e per person (1990) to 5.3 tonnes per person (2009).

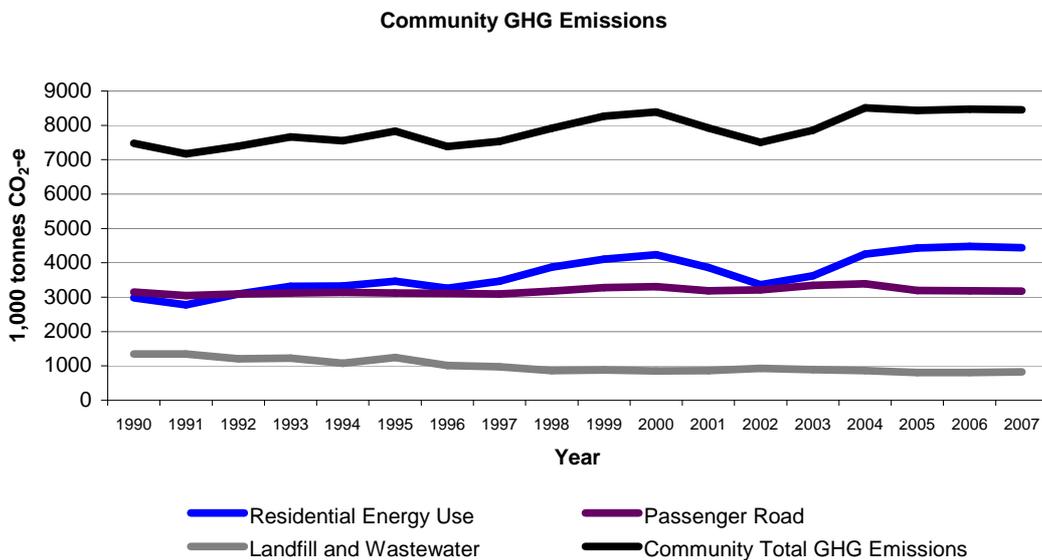
Analysis of subsectors

Between 1990 and 2007, GHG emissions from residential energy use increased by 49%, corresponding to a per capita increase by 35%, from 2.1 tonnes CO₂-e per person (1990) to 2.8 tonnes per person (2007).

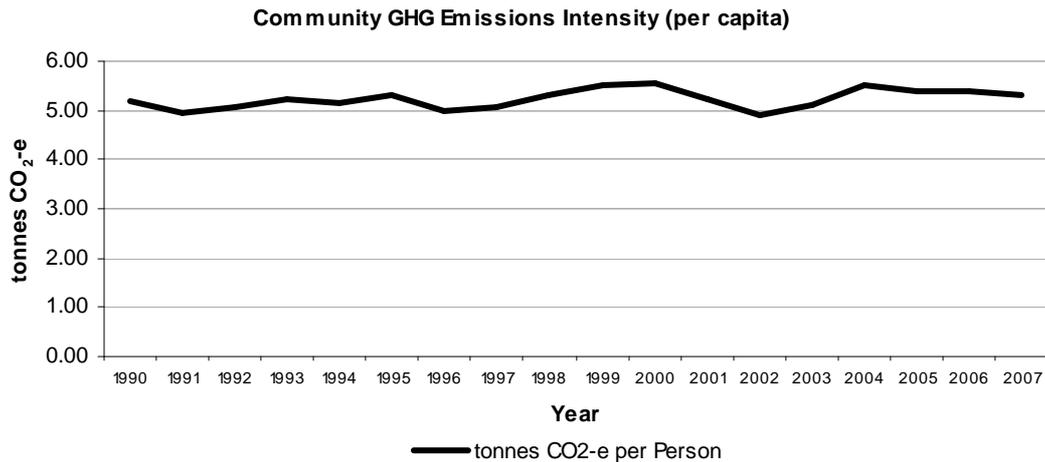
GHG emissions from passenger road increased by 1% between 1990 and 2007. Emissions from cars increased by 0.5%, emissions from buses by 17%, indicating a potential switch to public transport.

GHG emissions intensity from passenger road decreased by 9%, from 2.2 tonnes CO₂-e per person (1990) to 2.0 tonnes (2007).

Between 1990 and 2009, South Australia's GHG emissions from solid waste disposal on land and wastewater treatment decreased by 38%, from 1,300 kt CO₂-e (1990) to 830 kt CO₂-e (2007), corresponding to a per capita decrease by 44%, from 0.92 tonnes CO₂-e to 0.54 tonnes CO₂-e.



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI)



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI) and Australian Bureau of Statistics data

Behaviour Change

The Australian Bureau of Statistics (ABS) Survey "Environmental Views and Behaviour, 2007-08 (2nd issue)" found that South Australians are the second most concerned with the environment after the Australian Capital Territory. Around 89 % of South Australians take steps to reduce electricity use, and more than 90% have access to recycling services. Around 65% decreased water use in 2007-08, which is the second largest reduction after Victoria.

The behaviour change and community awareness program has been led by the 'black balloons' media campaign and supported by a variety of home energy information products and the TravelSmart program. These are reported in more detail in the sections on the Energy Efficiency Target under ENERGY and Transport Programs under TRANSPORT AND PLANNING respectively. Low income households are a priority sector and program design needs to be cognisant that the CPRS includes compensation for low income households. Activities to reduce waste, such as the revised container deposit levy and ban on light weight plastic shopping bags, support the reduction of greenhouse emissions and improve community sustainability.

Progress:

- The energy use and climate change 'black balloons' media campaign was rolled out across the state. Evaluation of the program demonstrated that it has made a substantial contribution to raising awareness of climate change and ways in which the community can reduce its carbon footprint.
- The Residential Energy Efficiency Scheme (REES) commenced on 1 January 2009. This program requires South Australian gas and electricity retailers, as a condition of their licence, to install energy saving measures such as ceiling insulation, draught proofing, and more efficient appliances in households to achieve a pre-determined greenhouse target. The scheme is available to all South Australian households and has a particular focus on providing energy audits and energy efficiency activities to low income households.
- Developing and delivering information and advice to households and communities through the Energy Advisory Service and through implementation of programs to

encourage voluntary behaviour change. This includes provision of a home energy audit toolkit to householders through over 100 public libraries; and delivery of Energy Friends training to community volunteers to undertake assisted household energy audits.

- Various initiatives have been undertaken to reduce waste and emissions from landfill. This includes: updating of research into the life cycle impacts of waste through the national Life Cycle Analysis (LCA) Data project; the ban on light weight plastic shopping bags ban from 4 May 2009; and the increase in the deposit amount on beverage containers to 10 cents.
- Active support has been provided to farmers' markets under the SA Food Plan to develop the local food industry
- Funding of \$800,000 has been provided for the construction of a new first-class 'green' educational facility for the Adelaide Zoo. The installation has a strong climate change component.
- Savings in running costs to the occupants in government assisted housing in Port Augusta include reduced hot water and heating costs. Trials in Housing SA homes in the Port Augusta area over a five year period where solar hot water heating was installed showed a reduction in the total household electricity use by almost 30%, carbon dioxide emissions were reduced by two tonnes per year and water heater running costs showed annual savings of \$147.
- A leaflet providing 'tips for renters' that highlights energy issues for renters and identifies practical ways of saving energy has been developed. The aim of the leaflet is to assist renters to significantly reduce energy bills and greenhouse gas emissions. The leaflet will be distributed through various Low Income Support Program networks.

Schools

The schools program involves climate change education through each school's educational programs and applied learning in the way schools tackle climate change directly, in day to day operations and in the way schools are designed and built.

The Department of Education and Children's Services (DECS) has the goal of "a sustainable system" at the heart of its statement of directions and works with the Commonwealth Government to support the Australian Sustainable Schools Initiative in South Australian schools (AuSSI-SA).

Progress:

- Over 150 schools and preschools were registered with AuSSI-SA in 2008
- The Climate Change Education Resource, *Sustainable and Attainable: Tackling Climate Change* is being delivered to teachers across South Australia. The resource supports learning and action to address climate change in schools and preschools. The resource includes auditing tools for energy water and waste.
- Eco-mapping for schools is being trialled at Richmond Primary School
- Energy management within schools is promoted through DECS Education News, 'Sustainable and Attainable' for schools and online "energy smart" fact sheets
- Since 2008, all new major building works at schools now incorporate green measures, including the fitting of solar panels. The State Government's SA Solar

Schools Program set a goal to provide solar power to 250 schools and preschools by 2014, which is well on target. As of July 2009, 111 South Australian schools and preschools are generating solar power through this program, with a further 20 under other funding arrangements.

- Funding of \$1 million is provided on an annual basis to fund the Green School Grants sub-program. This program has provided funding to schools and preschools to develop initiatives in areas such as water conservation, energy efficiency, land care and waste management. The 2008/09 program supported 112 schools and 400 preschools for 520 projects.
- Over 140 schools have each planted an average of approximately 500 local native plants to create bush gardens on their grounds as part of the *Million Trees Program: Grow a Great School* initiative. In addition to providing habitat, these living outdoor classrooms also contribute to shading and carbon biosequestration.
- DECS has developed and endorsed a policy on ecological sustainable development in schools and early childhood centre facilities, requiring all capital projects to incorporate environmental initiatives including energy efficiency through passive design.

Assessment

The behaviour change agenda is underpinned by significant investment in the black balloons communication campaign, but such a campaign really only signifies the beginning of creating a shift in people's behaviour. The range of government programs that support personal greenhouse emissions reduction are not linked - with agencies focussing on their own areas of expertise. However, full integration would also be unrealistic and ultimately unsuccessful. The challenge in this area is to increase the ability of government to influence behaviours without duplicating resources that are rapidly being produced by other sectors such as the media, Non-Government Organisation's and private sector marketing.

The issue to address is also the concern that compensation proposed under the CPRS to flow to the community sector may alter the appropriate policy response.

The long running schools program has become more formalised within DECS with some dedicated resources and influence on the mainstream agenda. This is happening in preschools and children's centres as well as in schools. One opportunity might be more collaboration with the private school sector.

Initiatives reaching the community through the Department for Families and Communities (DFC) funded community services, for people on low incomes and local government services, which are identified in the Greenhouse Strategy to broaden the government's impact on the community sector regarding greenhouse emissions reduction, aim to be progressed further with the development of a DFC financial hardship response plan proposed for 2010.

INDUSTRY

The policy instruments adopted by Government in tackling climate change within the industry sector include regulation, economic instruments and information provision. The question of which policy tools are to be selected to achieve the desired outcome is a challenge for industry, government and the community. Part of the challenge for the South Australian Government is to formulate policy initiatives which complement Commonwealth Government initiatives without adding costs for industry.

The approach of the South Australian Government has been to secure industry commitment through collaboration and voluntary participation.

Overview Greenhouse Gas Emissions from Industry

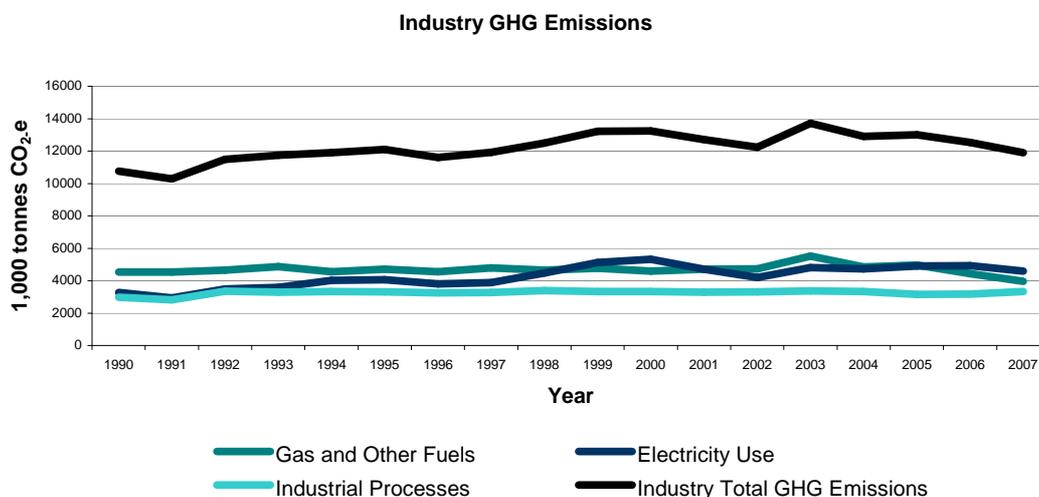
GHG emissions in the Industry sector increased by 11%, from 11,000 kt CO₂-e (1990) to 12,000 kt CO₂-e (2007). Contribution of the Industry sector to Total SA GHG emissions increased from 33% (1990) to 39% (2007). Emissions intensity in the Industry sector decreased by 24%, from 230 tonnes CO₂-e / m\$ GSP (1990) to 170 tonnes CO₂-e / m\$ GSP (2009).

Analysis of Industry Subsectors

GHG Emissions from Industry gas and other fuels decreased by 12% between 1990 and 2007, from 4,500 kt CO₂-e to 4,000 kt CO₂-e. The former Port Stanvac petroleum refinery, accounting for approximately 600 kt CO₂-e per annum, closed in 2003. Within this sub-sector, GHG emissions from the manufacture of solid fuels and other energy industries decreased, whereas GHG emissions from manufacturing industries and construction and agriculture, forestry and fishing increased.

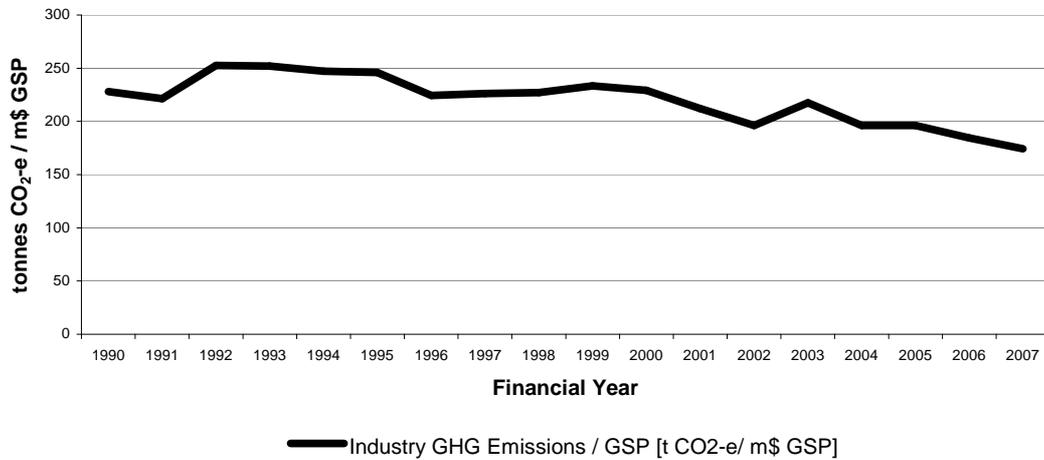
Scope 2 (indirect) GHG emissions from electricity use in the Industry sector increased by 40%, from 3,300 kt CO₂-e (1990) to 4,600 kt CO₂-e (2007), with all Australian and New Zealand Standard Industrial Classification (ANZSIC) Divisions in this sub-sector contributing to the increase.

GHG Emissions from Industrial Processes increased by 12% from 3,000 kt CO₂-e in 1990 to 3,300 kt CO₂-e in 2007, with increases both in Iron and Steel Production as well as Other Industrial Processes.



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI)

Industry GHG Emissions Intensity
Industry GHG Emissions per Gross State Product



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI) and Australian Bureau of Statistics data

Industry Information and Training Programs

To assist business with adapting to a new carbon-constrained economy and encourage business to utilise new opportunities arising, the South Australian Government puts policies and programs in place which improve industry’s knowledge and skills, attract support for business greenhouse reduction measures and enhance the ability of industry to produce climate change friendly products.

Progress:

- The Business Sustainability Alliance (BSA) was formally established through the signing of an MoU between key partner agencies including the Department of Trade and Economic Development (DTED), Zero Waste SA, Environmental Protection Authority (EPA) and SA Water. Outcomes of this initiative include a BSA website to assist companies improve their environmental performance as well as a number of courses on resource efficiency, carbon economy, sustainability, eco-mapping and clean technology delivered to 530 business and industry attendees.
- The State Government has worked with the University of Sydney in up-skilling local industry service providers with life cycle assessments. A course on a Life Cycle Analysis/Carbon Footprint Tool was facilitated to assist service providers’ support local industry.
- A referral service database has been established which contains a list of local service providers and an informal technical advisory service is being provided on an ad-hoc basis
- State and Local Government, the University of South Australia and business partners have collaborated in the development of the Sustainable 1000 program. The focus of the program is on small and medium enterprises and is designed to produce environmental savings and cost reduction through waste output, energy consumption, water usage, and transport usage. A Pilot Program involved about

80 small businesses in the Salisbury and Playford Council areas and 10 businesses in the Barossa Valley was completed on 16th October 2008. An expanded pilot program is currently being rolled out across councils that encompasses Northern, Central and Southern Adelaide.

- The State Government has worked with the University of Sydney to develop a course on a Carbon Footprint Tool for South Australian participants
- The South Australian Tourism Commission, together with the Great Barrier Reef Marine Protection Authority, provided funds for the development of a new Climate Action Certification program for tourist operators. The program will allow the travelling public to identify operators who are committed to reducing their carbon emissions. It was trialled with a number of operators in 2008 and is now available in South Australia, being administered by the South Australian Tourism Industry Council.
- The EasyData website has been developed which provides a regional breakdown of economic key performance indicators and greenhouse gas emissions
- The State Government is implementing an audit program for up to 30 commercial businesses within the communities serviced by the Remote Areas Energy Supplies (RAES) scheme
- Training and development in environmental sustainability and renewable energy is available through the TAFE system in SA, including:
 - the delivery of an Eco Electrician course in conjunction with the National Electrical Communications Association (NECA)
 - the launch of a Renewable Energy Centre at the Regency Campus in August 2007, providing vocational education and training in renewable energy studies; the design and installation of wind generation, solar panel and grid-connected systems; and the conducting of energy audits
 - the delivery of a Diploma of Sustainability as either a stand alone qualification or as part of dual diploma which is delivered concurrently with a diploma in the student's chosen field
 - a website which provides information and tools to assist industry and the public with up to date and current information regarding environmental sustainability skills.

Research, Development, Commercialisation and Investment Attraction

Recognising that climate change presents many business opportunities, South Australia has put measures in place to position the State as a leader in research, development and implementation of new climate change friendly products and services.

Progress:

- To support ongoing investment in renewable energy in the State the South Australian Government has announced a \$20m Renewable Energy Fund to be overseen by the newly created RenewablesSA Board to accelerate and foster investment in this sector. The Board is supported by the Commissioner for Renewable Energy who will advise the Government on policy and planning and ensure that the State's leadership position in renewable energy translates into benefits for the economy.

- In 2007-08 the Premier's Science and Research Fund (PSRF) awarded \$0.6m over three years to support the establishment of the Regional Sustainability Centre in Whyalla, based at the University of South Australia's campus. The Centre is utilising the University of South Australia's expertise in sustainable systems and technologies and other relevant capabilities to develop and demonstrate systems and technologies appropriate for the region and its specific resource development operations.
- Following from the State's MoU with the Canadian province of Manitoba, the State Government has provided seed funding to support a joint South Australian/Manitoba project to optimise lipid yields in microalgae for next generation biofuels. This project seeks to gain a better understanding of lipid synthesis in microalgae in order to further investigate new sources of biofuel.
- In 2008-09 the Premier's Science and Research Fund (PSRF) awarded around \$1.2m over three years to further support a 'Biorefinery approach' with the aim of developing a proof-of-concept facility to enable commercially competitive and sustainable production of biofuel from microalgae, a second generation feedstock. The project concept – integrating bio and chemical processing to produce high-value bioproducts and chemicals concurrently with biofuel production – will diversify the revenue stream to provide a sustainable business model. This technology addresses climate change by biofixation of carbon, and nutrient remediation of waste water. Commercialisation will result in significant infrastructure development, job creation, CO₂ reduction of 10 Megatonnes by 2018, and an annual income for South Australia of at least \$32 billion by 2050. As a result of this funding, the Algal Fuels Consortium was formed, led by the South Australian Research and Development Institute (SARDI) and Flinders University, and was successful in leveraging \$2.7m from the Commonwealth's Second Generation Biofuels program, to establish a pilot biorefinery in South Australia.
- Other activities contributing to the development of a local biofuels industry include:
 - a business plan is being developed by the State Government to support the emergence of a long-term and commercially sustainable microalgae biofuels industry in the state
 - \$5m funding was provided to SARDI to develop the National Photobioreactor Facility through the National Collaborative Research Infrastructure Strategy.
- The PSRF has also provided funding to enable the development of a business plan for a low-cost, high-efficiency, small-scale wind turbine system for stand-alone and grid-connected applications and a path to market
- The Sustainable Energy Research grants program provides \$220,000 per year for sustainable energy research projects in South Australia. The program supplements the \$4m Premier's Science and Research Fund.
- Exploration and infrastructure requirements of the geothermal industry in South Australia have been supported. Optimum actions to support the growth of the geothermal industry are being explored. To date, the State Government has provided:

- \$650,000 in tied grants for high priority geothermal research that has attracted more than matching inputs from non SA Government sources
 - \$959,000 in tied grants from the Plan to ACelerate Exploration (PACE) program
 - \$630,000 from the SA Regional Development Infrastructure Fund for half the cost of developing the transmission infrastructure for Australia's first 1 Mega Watt (MW) 'hot fractured rock' geothermal power plant. It is expected to be the first pilot plant of its kind in Australia.
 - \$1.6m from the RenewablesSA program over two years to create the South Australian Centre of Excellence for Geothermal Research at the University of Adelaide and other institutions to make Adelaide a hub for geothermal research.
- The design of a Duoleta light-weight vehicle has been completed. This involved close collaboration with the automobile industry, the Cooperative Research Centre (CRC) for Advanced Automobile Technology and South Australian research institutions.
 - Development of a South Australian CleanTech Industry Directory in partnership with Flinders University and the Australian CleanTech Network
 - Industries that will increase the establishment of forests and revegetation in cleared agricultural land are being supported. This includes contributions to the Joint Venture Agroforestry Program (JVAP). A current JVAP research project focused on greenhouse reduction and adaptation is 'Bioenergy, Bioproducts and Energy'.
 - The South Australian Government provides assistance to parties interested in accessing the Commonwealth Government's funding for low emissions technologies:
 - South Australia's Centre of Innovation conducted a seminar for business, which provided information on State and the Commonwealth Government support funding available to industry, including low emissions technology funding
 - An outline of support programs for relevant low emissions technologies was integrated in the Business Sustainability Alliance's Resource Efficiency Seminars
 - Part of the State's Innovation Development Grant scheme provides funding to applicants to engage a consultant to develop funding submissions to the Commonwealth Government
 - The Renewable Remote Power Generation program, administered in South Australia on behalf of the Commonwealth Government, provided rebates of up to 50% of the initial capital costs of renewable energy installations in remote areas of South Australia. The Renewable Remote Power Generation Program is now closed to new applications.

Assessment

The goals of managing business risks and reducing greenhouse emissions in this sector are progressed by a range of information programs and providing opportunities to build the state's skills and capacities in tackling climate change.

Sector agreements have an important impact in servicing the industry sector and identifying the needs of business in the lead up to the implementation of the CPRS.

Commercial opportunities in technologies and services that will assist in tackling climate change are being promoted by a variety of grants and support programs across the research, development and demonstration, commercialisation and investment attraction spectrum.

The Renewable Energy Industry Plan, provided for under the *Climate Change and Emissions Reduction Act 2007*, is expected to provide strategic oversight to many of these investments.

These programs are currently expanding with little funding commitment to date. It will be critical that the \$20m Renewable Energy Fund is effectively committed and complements Commonwealth Government programs and the CPRS. Analysis and prioritisation at this stage has been limited, hence the relatively ad-hoc nature of progress to date. Nonetheless some important progress has been made.

ENERGY

Overview Greenhouse Gas Emissions from Energy

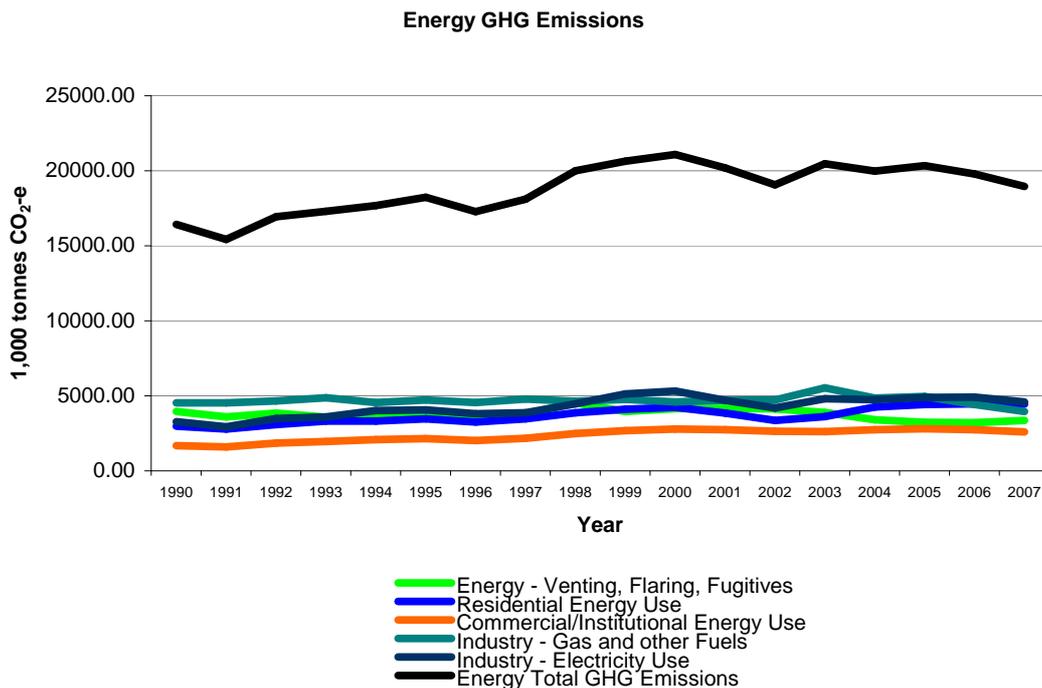
GHG emissions in the Energy sector increased by 16%, from 16,000 kt CO₂-e (1990) to 19,000 kt CO₂-e (2007). Contribution of the Energy sector to total South Australian GHG emissions increased from 50% (1990) to 61% (2007).

Analysis of Energy Subsectors

Subsector residential energy use is discussed under sector COMMUNITY; subsectors Industry – gas and other fuels, and Industry – electricity use are discussed under sector Industry.

GHG emissions from venting, flaring, fugitives decreased by 15% from 4,000 kt CO₂-e (1990) to 3,400 kt CO₂-e (2007) mainly due to a decrease in GHG emissions from venting and flaring (-20%).

Commercial/institutional GHG emissions increased by 51% from 1,700 kt CO₂-e (1990) to 2,600 kt CO₂-e (2007). Both electricity use and fuel combustion activities contributed to the increase.



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI)

T3.14: Residential Energy Efficiency Target

South Australia's Strategic Plan (SASP) outlines the State Government's commitment to improving the energy efficiency of households with a target to improve the 2003-04 energy efficiency of dwellings by 10% by 2014. To attain this target, the following initiatives are being pursued. These should be considered in conjunction with national policies development and measures discussed in the BUILDINGS section.

Progress:

- Minimum energy performance standards (MEPS) and labelling requirements for a range of household appliances and equipment are being implemented. These measures are estimated to contribute around 30% of the energy savings needed to attain the above-mentioned target.
- The Greenhouse Gas & Flow Rate Requirements for Water Heater Installations in Dwellings commenced on 1 July 2008, with full implementation occurring on 1 July 2009
- The Residential Energy Efficiency Scheme (REES) commenced on 1 January 2009. This program requires South Australian gas and electricity retailers to install energy saving measures such as ceiling insulation, draught proofing, and more efficient appliances as a condition of their license.
- 3,155 solar hot water rebates for households were administered between July 2008 and June 2009. Of these, 1,506 rebates were provided to low income households.
- At the 2 July 2009 COAG meeting, the South Australian Government successfully negotiated a commitment, subject to a regulatory impact statement, to make the national minimum energy performance standards for air-conditioners 10% more stringent than 2010 levels by 2011.
- The State Government has completed a \$9m program over the two-year period 2007-09 to replace existing housing with new housing in the Government Employee Residential Property program that includes energy and water savings initiatives, including:
 - Fifteen houses with a 5 star energy rating purchased at Roxby Downs at a cost of \$5.25m
 - Ten 5 star energy rated houses constructed in regional areas at a cost of \$2.95million.
- Energy efficiency advice, training and information have been provided to households and those servicing households (community groups, local governments and others) through the Energy Advisory Service.

Renewable Energy

South Australia aims to provide Australia's most supportive policy framework for developing renewable and low emission technologies and to date has proven itself to be a leader in promoting and developing the renewable energy sector. The State currently has around 22% of the national grid-connected solar photovoltaic capacity. Having established best practice land use planning rules for the construction of wind

farms, as at October 2009, South Australia has 47% of the nation's wind power generation capacity.

South Australia has around ten photovoltaic systems installed for every 1,000 households. This is well over double the level of any other state and more than three times the national average.

The State's natural geothermal resource endowment and supportive investment framework have attracted 28 companies to apply for 279 geothermal licences (70% of the total number of geothermal licences in Australia) covering more than 130,000 sq km in South Australia.

South Australia, through the Department of Primary Industries and Resources (PIRSA), provides stewardship and national secretariats for Australia's membership in the International Energy Agency's Geothermal Implementing Agreement and the Australian Geothermal Energy Group.

Under the climate change legislation, the State Government is developing a draft renewable energy industry development plan, which will be finalised by the newly established RenewablesSA. The plan will build on existing strengths and maintain South Australia's leading position in supporting renewable technologies.

Progress:

- The Government has committed to a target of having 33% of the State's energy coming from renewable sources by 2020
- RenewablesSA was established in June 2009. It aims to develop and oversee the implementation of a framework for attracting renewable energy investment to South Australia and to provide strategic advice to the Government on renewable energy policy issues. RenewablesSA will also oversee the disbursement of the new \$20m Renewable Energy Fund to accelerate investment in the sector. The fund will assist in fostering innovation and creating green jobs in the renewables industry alongside the defence and mining sectors.
- In August 2009, the Premier committed \$1m towards a feasibility study for increasing the State's electricity transmission capacity and bringing renewable energy to market
- The feed-in scheme for small-scale solar photovoltaic (PV) grid-connected installations commenced on 1 July 2008. Solar PV owners now receive 44c/kWh for excess electricity that is returned to the grid and some retailers have chosen to provide additional top-up to the feed-in tariff. The number of grid-connected solar systems in this State has increased from 1,500 to over 8,000 systems since South Australia announced its intention to have a scheme.
- A Solar Riverland study was undertaken to identify opportunities for the deployment of solar energy
- A major solar installation at Adelaide Airport and an interpretive display in the airport terminal building was completed. The Adelaide Airport is now the second largest grid-connected rooftop solar installation in Australia.
- Funding of \$8m has been provided by the South Australian Government for a 1MW roof mounted solar installation at the Adelaide Showground. This is the largest installation of its kind in Australia.
- The State Government has contributed funding of more than \$1.2m for an upgrade of the Umuwa solar power station in the far north-west of South

Australia. The project increases the annual electrical output of the solar power station from 335 megawatt hours to 715 megawatt hours a year, saving more than 400 tonnes of greenhouse gas emissions each year.

- The State Government, in conjunction with the Commonwealth Government and private investors, is developing a solar power project for Coober Pedy
- Five SWIFT MkI mini-wind turbines were installed, as a trial, on prominent buildings in Adelaide and the metropolitan area in 2006. The State Government continued to work on trialling mini wind turbines with three additional technologies purchased for testing.
- The Government has supported the implementation of wave power technology in South Australia by assessing the potential of marine energy zones and by granting the State's first wave licence. The AECOM Australian Pty Ltd report, "Mapping South Australia's Potential Marine Energy Zones", commissioned by the Government and released in July 2009, identifies both wave and tidal marine energy resources, evaluates electricity grid connection opportunities and assesses environmental issues associated with wave and tidal power generation. The report includes critical information of interest to potential wave and tidal power proponents. The first South Australian wave power licence was awarded in February 2009 to Carnegie Corporation to test a site along the Limestone Coast of SA with a view of building a demonstration 50 MW wave power station. Wave Rider Energy was also approved to build a \$5m pilot plant on the State's west coast in May 2009.
- From April 2005 to September 2009, South Australia has awarded \$3.9m in grants for geothermal research and projects.

Assessment

Initiatives in this sector overlap with those in other sectors. Improving the efficiency of energy use is reported mostly in the context of the residential energy efficiency target, which impacts mostly on the community sector, although the industry and commercial building energy programs are equally important.

Monitoring of the residential target to date indicates a 1% improvement in household energy efficiency since 2003-04. This is not unexpected as many of the measures implemented to attain this target, such as building standards, water heater requirements and the Residential Energy Efficiency Scheme will require a number of years of operation for their effects to be observed. Efforts are also being taken to improve the monitoring of energy use so that a clearer picture of residential energy use can be obtained.

Achieving a low carbon energy sector is captured for the most part by the research, development and demonstration activities of the industry sector. It overlaps with the objective of increasing the take-up of renewable and low emission technologies.

For the latter, the Renewable Energy Industry Plan may provide the lead policy direction but development in this area is only just commencing.

TRANSPORT AND PLANNING

Overview Greenhouse Gas Emissions from Transport and Planning

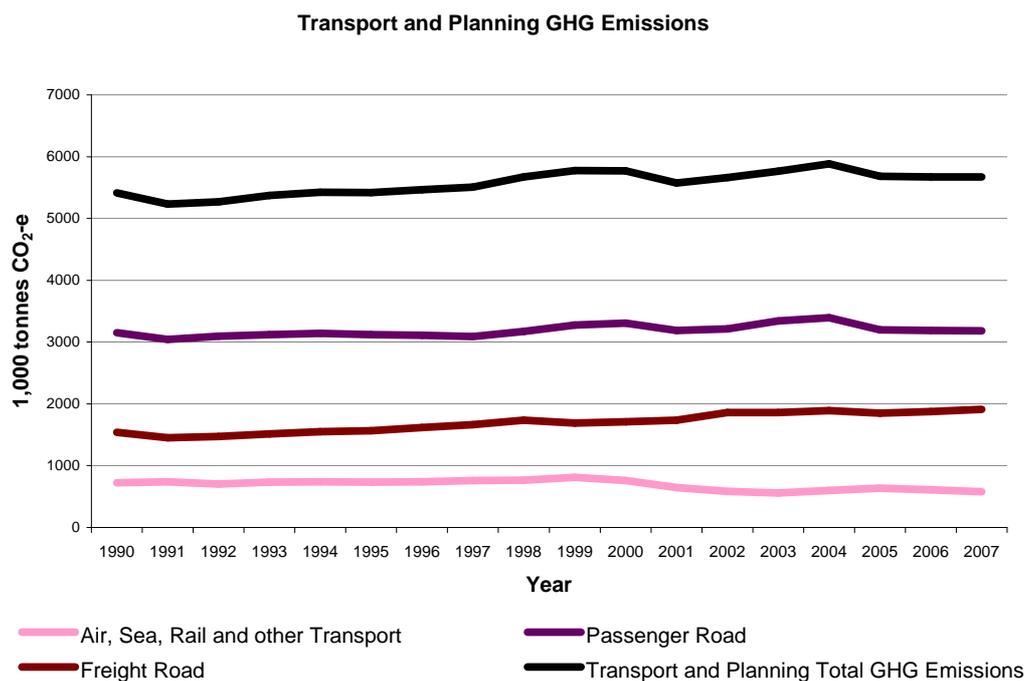
GHG emissions in the Transport and Planning sector increased by 4.7% from 5,400 kt CO₂-e (1990) to 5,700 kt CO₂-e (2007). Contribution of the Transport and Planning sector to total South Australian GHG emissions increased from 16% (1990) to 18% (2007).

Analysis of Transport and Planning Subsectors

Subsector Passenger Road is discussed under sector Community.

GHG emissions from Air, Sea, Rail and Other Transportation decreased by 21% from 730 kt CO₂-e (1990) to 580 kt CO₂-e (2007). Within this subsector, GHG emissions from Railways, Navigation and Other Transportation decreased, whereas GHG emissions from Civil Aviation increased between 1990 and 2007.

GHG emissions from freight road increased by 24% from 1,500 kt CO₂-e (1990) to 1,900 kt CO₂-e (2007). All categories within this subsector show an increase in GHG emissions.



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI)

Planning for Climate Change – A new Urban Form

A new urban form will make one of the most important contributions to both reducing the growth of greenhouse gas emissions and creating environments that are more liveable in the likely event of climate change. This is a fundamental component of the approach being taken to land use planning and development in the new draft 30 Year Plan for Greater Adelaide. Regional planning strategies being

developed for the remaining areas of South Australia will also pursue climate change mitigation and adaptation goals.

The 'urban form' is the way neighbourhoods and communities are organised, including the location of housing, jobs and services.

These planning strategies set the context within which the task of reducing transport and building emissions can be tackled as the planning system guides the locations, densities and form of urban development.

Planning for freight corridors and major roads as part of the input to the Greater Adelaide Strategy and the Strategic Infrastructure Plan for South Australia are aligned with the Government's population target and the public transport target of an increase to 10% of metropolitan weekday passenger vehicle kilometres by 2018.

Planning initiatives intended to deliver more energy efficient buildings are discussed in the BUILDINGS section of this document. Initiatives that will deliver a new urban form and greater transport outcomes are discussed below.

Progress:

- The draft 30 Year Plan for Greater Adelaide has undergone public consultation, closing on the 30th September 2009. The Plan provides an aggressive framework for addressing a range of land use, development, transport and climate change issues, including the need for a more compact urban form and a reduced reliance on private vehicles. The Plan focuses on Transit Oriented Developments (TODs) and transit corridors as key drivers for achieving these aims.
- The TOD potential for all 148 stations on metropolitan rail corridors has been assessed and the 30 Year Plan for Greater Adelaide identifies higher order transit oriented development locations for 13 new TODs and more than 20 sites that incorporate transit oriented development principles and design characteristics. Structure Plans for TODs will prescribe mixed uses and densities.
- Bowden/Hindmarsh, West Lakes, Marion/Oaklands and Noarlunga have been identified as high priority TOD sites. The Government purchased land at Bowden (the former Clipsal Site) for the future development of a 10 hectare 'green village' and an innovative land swap has been negotiated by the Government to pave the way for a purpose built TOD at Woodville.
- In addition to encouraging more people to live closer to public transport, the 30 Year Plan also seeks to:
 - locate people closer to employment opportunities
 - create walkable neighbourhoods
 - develop suburbs and neighbourhoods that are world's best practice in sustainability and urban design
 - create a network of greenways and open space precincts which will absorb carbon emissions and provide sheltered, cooler places for people to use
 - support SA's position as a national leader in the renewable energy sector through a more efficient planning system
 - position SA to export green energy to other states and territories

- To help drive the implementation of these new climate change policy initiatives the government has established a new Climate Change, Housing Affordability and Sustainable Neighbourhoods Task Force with expertise from across planning, sustainability, development and energy professions

Infrastructure

One way to abate transport-related greenhouse gas emissions is to improve the design and accessibility of transport infrastructure. The State Government has undertaken significant initiatives including improvements to rail networks and provision of infrastructure for climate change friendly transport modes.

Progress:

- To give greater priority to emission-efficient modes, planning for transit lanes and bus priority measures within the metropolitan area has been undertaken together with improved traffic management measures as part of the Metropolitan Road Development Plan. This included the Arterial Road Bicycle Facilities Program and Cycling Projects and State and Commonwealth Black Spot Program - DTEI Cycling Projects and Safety in Numbers Action (see Transport Programs subsection for further information).
- The light rail extension to the City West Campus was completed. Significant work was undertaken on the Port River Expressway and the Northern Expressway. Work commenced on the Glenelg Tram South Road overpass and on upgrading the passenger rail network. Work also commenced on the 5.5 kilometre extension of the Noarlunga rail line to Seaford Rise.
- Provision of \$2 billion has been made in the state budget for a range of transport initiatives, including infrastructure, which will reduce transport-related greenhouse gas emissions. This investment will be augmented by a further \$646m from the Commonwealth through the Building Australia Fund. Some of the infrastructure initiatives include:
 - Investigations into the design of new and existing road space to give greater priority to emission-efficient modes and intelligent transport systems to improve fuel efficiency
 - Establishment of Transit Lanes and Bus Priority lanes on key roads within the metropolitan area
 - Rail gauge standardisation
 - Rail electrification of the Outer Harbour, Noarlunga, Grange and Gawler lines incorporating conversion of existing diesel rolling stock and purchase of new electric railcars and concrete re-sleeping of the Noarlunga, Gawler and Belair lines
 - Extension of the tram network to the Entertainment Centre, Port Adelaide and Semaphore
 - Establishment of an Aldinga rail corridor
 - Planning for the installation of bicycle lanes and appropriate cycling facilities.

Public Transport

South Australia's Strategic Plan (SASP) includes a target to increase the use of public transport to 10% of metropolitan weekday passenger vehicle kilometres travelled by 2018 (T3.6), which will assist in achieving reductions in greenhouse gases associated with metropolitan travel.

Actions below contribute to achieving the SASP target. These initiatives complement behaviour change programs aiming to increase people's awareness and facilitate a sustained change in travel behaviour through both a reduction in total trips and modal shift.

Progress:

- Currently, 40% of public transport buses (350) are on B20 (20% biodiesel blend) with a depot-by-depot transition underway. 35% continue to operate on a B5 blend and around 25% are fuelled by compressed natural gas.
- Funding of \$64.4m over four years has been committed to progressively increase the bus fleet by 20 buses per year for four years and to provide recurrent funding for the operation of those buses
- Further commitments have been made for the purchase of 15 new trams and 50 rail carriages and the upgrading of existing carriages
- Improvements to public transport services in 2008 occurred across the metropolitan system. DTEI also supports a range of diverse passenger transport services in major regional areas.
- Investigations into the bus priority options and studies into inner-city east-west bus movement are underway
- Continuous improvements have been made to peak hour public transport services and to the frequency, speed and connectivity of public transport services.

Transport Programs

The section below describes programs and initiatives aiming to achieve changes in travel behaviour, shifts to greenhouse-friendly modes and arrangements and improved vehicle maintenance habits. It also looks at changes in the coastal shipping of freight.

Progress:

- In South Australia, the TravelSmart Program comprises:
 - TravelSmart Communities including household projects and a community grants program
 - TravelSmart Workplaces Program including government and non-government workplaces.

Evaluation of the "TravelSmart Households in the West" program has been completed. The results showed that the program produced an 18% reduction in vehicle kilometres travelled by participants, whilst non-participants increased their travel by 6% (i.e. TravelSmart reversed this trend). Public transport patronage increased by over 6% in the project area, whereas in other areas of metropolitan Adelaide this increase was less than 2%.

- Monitoring the implementation of *Safety in Numbers, A Cycling Strategy for SA, 2006-2010* continued
- "Way2Go", is a program for South Australian primary schools and the community which facilitates safer, greener and more active travel
- The State Government provides subsidy funding to assist local councils with providing bicycle facilities on the local road network through the *State Bicycle Fund and State Black Spot Program – Council Cycling Projects*
- In 2008-2009 Adelaide's bicycle network known as Bikedirect had an increase of 14 kms of bicycle lanes and 5 kms of shared use paths
- The State Government is committed to include safe, direct and attractive cycling facilities that are planned, designed, constructed and maintained in accordance with national standards in all urban arterial road projects or road upgrades, e.g. the Stuart O'Grady Bikeway along the Northern Expressway and bicycle lanes for the Gallipoli Underpass on South Road
- A car-sharing program was launched in Adelaide in August 2008. GoGet Carshare operates in Adelaide with a vehicle pool comprising four Toyota Yaris hatchback vehicles. The Adelaide City Council provided in-kind support.
- In supporting the environmental initiatives of government the SA Government Driver Training and Education Program has an environmental component, aimed at targeting driver behaviour to reduce the environmental impact of government vehicles
- Preliminary analysis into the evaluation of the benefits of 'eco-driving' programs was undertaken, indicating significant potential reductions in fuel consumption related to improved driver behaviour and minor vehicle maintenance
- Through its involvement with the Australian Transport Council (ATC) Environment Standing SubCommittee, a joint South Australian and Victorian eco-driving pilot program is now underway
- Preliminary analysis and testing of vehicles at Transport SA's Regency Park Emissions Testing Facility has been completed indicating a link between appropriate maintenance practices and fuel efficiency. Options for dealing with in-service diesel emissions are being evaluated.
- The State Government is actively participating in work with other jurisdictions to implement the COAG national transport reform agenda for heavy freight vehicles including the adoption of Euro 4 emission standards and performance-based standards for heavy vehicles
- On behalf of the Australian Maritime Group (AMG), South Australian Government officials project managed the International and Domestic Shipping and Ports Study which, in part, aimed to identify issues concerning coastal (domestic) shipping, and what could be done to increase shipping's share of the domestic freight task. The study was completed in May 2007 and is currently being considered by the AMG.

Assessment

The transport sector has made significant progress in influencing long term transport outcomes through changes to the planning system and infrastructure investment.

The investment in public transport and associated rise in demand from consumers will make a significant difference to South Australia's transport emissions profile.

The TravelSmart and Travel Behaviour Change programs are a successful and low cost method of greenhouse gas emissions reduction. Other initiatives to move toward sustainable travel behaviour and to improve the performance of vehicles and fuels have been implemented on a smaller scale or are at a preliminary stage so it is too early to assess their success. In addition, as some initiatives will be implemented nationally, such as fuel and vehicle standards, these are being progressed in a coordinated way through relevant national bodies, such as the Australian Transport Council. South Australia remains actively involved in these processes.

As mentioned, changes in this sector rely on long term structural changes and will take a reasonable time to become apparent in the high level data.

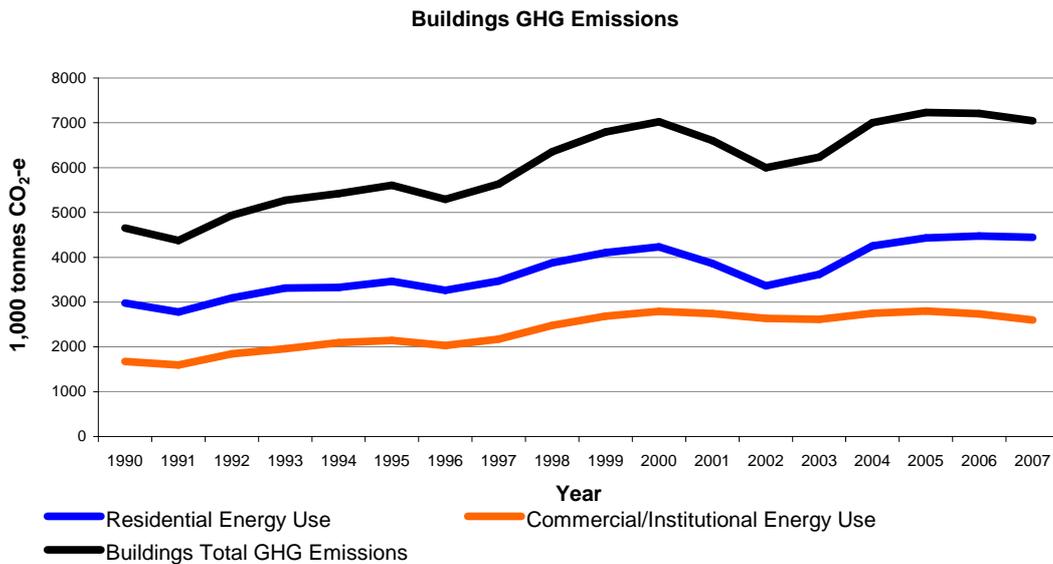
BUILDINGS

Overview Greenhouse Gas Emissions from Buildings

GHG emissions in the Buildings sector increased by 51% from 4,700 kt CO₂-e (1990) to 7,000 kt CO₂-e (2007). Contribution of the Buildings sector to total SA GHG emissions increased from 11% (1990) to 23% (2007).

Analysis of Building Subsectors

Subsector Residential Energy Use is discussed under sector Community, and subsector Commercial/Institutional Use under sector Energy.



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI)

Planning for Buildings

The planning system provides important foundations for building development and key areas of progress are reported in the section on Planning Initiatives under TRANSPORT AND PLANNING. A number of initiatives to develop building rating tools, climate change standards and energy efficiency performance for appliances and in both the commercial and residential buildings sectors are being progressed at a national level and are reported under LEADERSHIP.

The State Government is pursuing a number of actions to assist with planning for sustainable buildings. These actions range from reducing red-tape in the approval process to sustainability rating tools.

Progress:

- The State Government is examining the further development and expansion of the application of the Lochiel Park sustainability-rating tool in the context of planning reforms. This tool has potential for adoption at a national level.
- The South Australian Government is a foundation member of the Green Building Council of Australia, and has invested in the development of green rating tools for health and education facilities

- A consultancy investigating the development of a strategic tool to enable calculations of the Ecological Footprint and greenhouse emissions for residential development has been completed. It is intended that once the tool is developed it could be used when planning for new growth and urban infill areas and for reporting purposes.
- Land Management Corporation (LMC) has developed a whole of corporation and projects sustainability strategy, which sets guidelines and targets for sustainable development in all its land release and urban regeneration projects, and supports South Australia's Strategic Plan and the Greenhouse Strategy
- The Seaford Heights Land Release which encouraged proponents to demonstrate moving towards a zero carbon built environment resulted in developer Fairmont Homes mandating 6 star housing and offsetting all the embodied energy from the construction of the infrastructure and the houses
- A Land Division Guideline on how Best Practice Land Division can contribute to Household Energy Efficiency was released in November 2007 to assist developers, builders and councils with the application of sustainability planning
- The Design Guidelines for Sustainable Housing and Liveable Neighbourhoods provide clear and consistent information outlining Housing SA's requirements for new housing and major upgrades. The Guidelines include site layouts and house designs, land titling and service infrastructure, amenity targets, adaptable housing, housing modifications and upgrades and environmental sustainability.
- LMC has commenced a life cycle assessment of Lochiel Park to verify its carbon footprint with a view to offsetting the greenhouse emissions in line with a greenhouse-friendly application and the draft national carbon accounting requirements.

Building Sustainability

The South Australian Government is pursuing a broad range of measures to ensure that residential and non-domestic buildings achieve sustainability and energy efficiency outcomes, and reduce their impact on climate change. These measures include requirements for energy performance rating of buildings, standards for appliances and equipment.

Measures which aim to reduce the carbon footprint of the domestic buildings sector contribute to attaining the energy efficiency target for residential dwellings. Therefore, this section can be cross linked with the ENERGY section of this report.

Training activities in energy efficiency, waste management, sustainable design etc also contribute to establishing a sustainable buildings industry and initiatives reported under INDUSTRY should be considered in conjunction with this section.

Progress:

- Greenhouse Standards for Water Heaters in new homes in reticulated gas areas commenced on 1 July 2006
- Enhanced and expanded Greenhouse and Flow Rate Requirements for Water Heaters commenced on 1 July 2008, with full implementation occurring on 1 July 2009. The standards apply to water heaters that are installed in new and existing dwellings to reduce their energy, water and greenhouse impacts.

- The increased energy efficiency requirements of 5 stars for all new dwellings built in South Australia came into effect on 1 May 2006. The requirement also applies to alterations or additions to existing homes.
- The National Strategy on Energy Efficiency (NSEE) includes measures to improve the energy efficiency of residential and commercial buildings, such as more stringent energy efficiency requirements in the 2010 Building Code of Australia. The South Australian Government negotiated as part of this process a 10% improvement in minimum energy performance standards for air-conditioners to be introduced in 2011.
- Energy audits were completed on five CBD government owned office buildings identifying energy conservation options, which will be included in future annual programs
- Twenty new projects to the value of \$630,000 were initiated on a variety of government owned assets as part of an annual energy improvement and asset management replacement program
- The South Australian Government, through its grant programs and activities, offers financial incentives to develop and/or increase the capacity of companies that recycle materials or produce products from recycled materials
- Sustainability measures such as energy efficiency, passive solar design, sun shading, water conservation, urban wastewater management and building construction are actively promoted as part of affordable housing public displays at major community events
- The selection and design of Housing SA development and redevelopment projects incorporates an assessment of the desired future character of the locality, and has regard to the appropriate design solutions to individual site considerations such as topography, and local cultural and environmental features
- TAFE SA introduced a number of courses that provide training for trades and professionals in energy management. Current capability enables training of complete renewable energy competencies from the Utilities training package at TAFE Regency Campus. LMC is developing a sustainable education centre at Lochiel Park for use in education with the building industry and the community.
- The \$2 million *Building Innovation Fund* was announced in 2008. Five projects received funding in the first round of the program. Projects included the implementation of innovative renewable energy and energy efficient technologies, development of a green roof and a green wall. The green wall would become the first in Australia to be developed on a large scale and to be applied to a commercial building. Two feasibility studies were also funded in the first round of applications.
- The State Government contributed to the Australian Sustainable Built Environment Council's Second Plank report, examining issues relating to energy efficiency in buildings and the complementary role that energy efficient buildings can play in supporting the Commonwealth Government's Carbon Reduction Pollution Scheme
- The State Government has released the Water Sensitive Urban Design (WSUD) Technical Manual providing a technical base for mandating WSUD in new residential and commercial developments for local conditions in the Greater Adelaide Region by 2013

- As part of Housing SA's water conservation strategy, projects have been initiated on two medium density sites to capture and re-use stormwater. The first was the installation of two 22,500 litre above ground rainwater tanks at the Tram Barn site in Maylands where stormwater is collected and re-used in the common garden areas through a dedicated irrigation system. The second project is being undertaken on a medium density public housing site with over 100 units. The project involves the installation of two underground concrete tanks with a total capacity of approximately 660,000 litres to capture stormwater from the site to irrigate the landscaped grounds. The project is due for completion during 2009-10.
- LMC has undertaken a study to determine the cost impacts of moving from a 5-star to 6-star housing requirement at the Playford Alive display village.

Assessment

A key objective of this sector is to develop high performance green standards for building design, construction and operation. Persistent increases in building standards through the planning system are being achieved but this approach can only be effective in eliminating the worst performance.

Promotion of best practice projects occurs to some extent and the industry continues to work on rating and performance tools that will be broadly accepted by the sector. The Land Management Corporation is seeking to provide an exemplar for the development of greenfield sites for housing. The *Building Innovation Fund* program aims to improve the performance of existing commercial building stock.

Lochiel Park Sustainability Centre will be a focus as part of the LMC sector agreement with Government to provide an opportunity for developers, community and industry to better understand sustainable design in residential development and how to live sustainably.

There are no in-depth activities aimed at the objective of increasing market and community awareness of improved building performance.

The objective of sustainable built environments that are responsive to climate change is addressed at a strategic level through the planning system. Activities to improve the impact of building materials will also contribute to sustainability.

The improvement of the building stock is likely to be a long term process and the abovementioned initiatives are in the early stages of development.

NATURAL RESOURCES AND EMISSIONS

Overview Greenhouse Gas Emissions and Removals from Natural Resources

GHG emissions in the Natural Resources sector decreased by 64%, from 8,200 kt CO₂-e (1990) to 2,900 kt CO₂-e (2007). Contribution of GHG emissions from Natural Resources to Total SA GHG emissions decreased from 25% in 1990 to 9% in 2007.

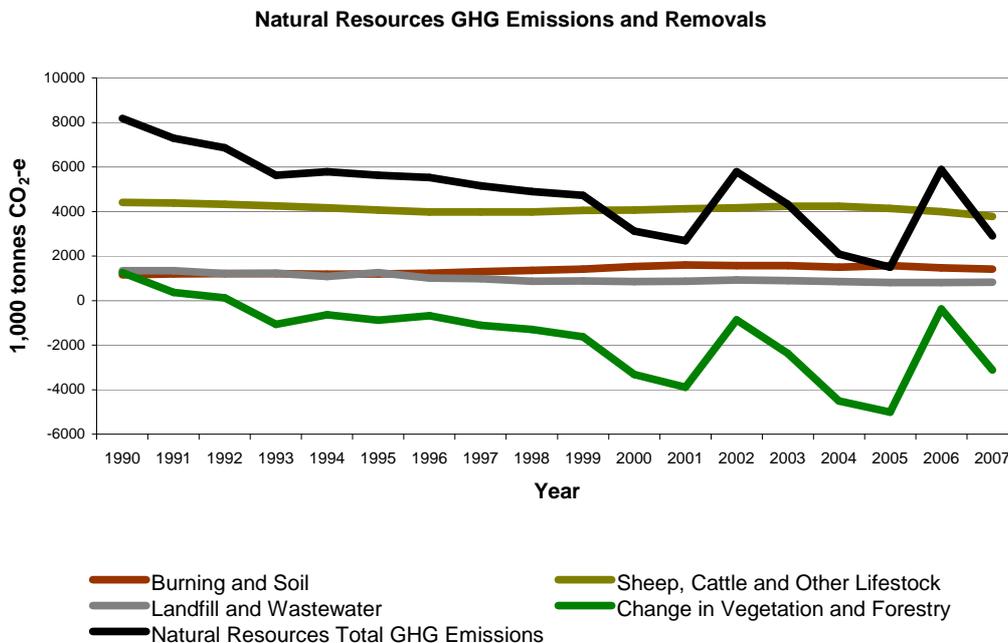
Analysis of Natural Resources Subsectors

Subsector Landfill and Wastewater is discussed under sector COMMUNITY.

GHG emissions from Burning and Agricultural Soils increased by 23% from 1,200 kt CO₂-e (1990) to 1,400 kt CO₂-e (2007). Within this subsector, Agricultural Soils contributed most to the increase, with GHG emissions of 1,100 kt CO₂-e in 1990 and 1,400 kt CO₂-e in 2007, (+25%).

GHG emissions from Sheep, Cattle and Other Livestock decreased by 15%, from 4,400 kt CO₂-e (1990) to 3800 kt CO₂-e (2007). Within this subsector, GHG emissions from Enteric Fermentation – Cattle increased by 26%, from 1,500 kt CO₂-e (1990) to 1,900 kt CO₂-e (2007), whereas GHG emissions from Enteric Fermentation – Sheep decreased by 41%, from 2700 kt CO₂-e (1990) to 1600 kt CO₂-e (2007). These trends reflect changes in livestock numbers.

GHG emissions/removals from Change in Vegetation and Forestry decreased by – 350%, from 1,300 kt CO₂-e (1990) to –3,100 kt CO₂-e (2007). Change in Vegetation and Forestry transformed from a GHG source to a GHG sink, reflecting SA's forestry policies.



Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI)

Sequestering Carbon

The State Government is implementing a number of initiatives, including the Million Trees Program, the River Murray Forest policy and *NatureLinks* plans, to incorporate opportunities for biosequestration.

Progress:

- The State Government River Murray Forest initiative was launched in August 2007 to plant 2.5 million native trees and shrubs throughout the River Murray corridor between the State border and Tailem Bend, with a recent expansion to the southern extent of the River Murray – Coorong Naturelinks corridor. Approximately 1000 hectares of plantings have been commissioned to date. In addition to these habitat establishment outcomes, the project will deliver greenhouse benefits through carbon biosequestration, with plantings protected via registered agreements. The initiative involves the development of a range of Forest Property Agreements under the *Forest Property Act 2000* to allow land owners, forest vegetation owners and government to jointly collaborate in plantings, and to assign carbon rights from plantings.
- Approximately 1.85 million trees and associated understorey species have been planted on public land to date as part of the State Government's Million Trees Program, keeping it well on track to achieve its goal of 3 million trees and shrubs by 2014. Over 1,000 hectares of plantings have already been established and when completed, the program will have reconstructed approximately 2000 hectares of predominantly woodland habitat. Over its lifetime, this reconstructed habitat will absorb an estimated 600,000 tonnes of carbon dioxide equivalents.
- The State Government is involved in a leading national project by Integrated Biosystems Science Program Area focused on sustainable waste streams management. The project integrates the management of agricultural enterprises so that waste is minimised. This innovative support tool and farm management system will contribute to increasing industry adaptation to climate change impacts.
- The South Australian Government undertook a pilot study to evaluate and predict carbon sequestration rates from sustainable woody crops and environmental revegetation plantings in the medium rainfall (400mm-650mm) dryland agriculture zones of the eastern Mount Lofty Ranges and southern Murraylands region of South Australia. This work advances SA's ability to capture opportunities in carbon trading through revegetation.

Assessment

Sequestration initiatives are in the early stages of development. It will be critical in their further development that the benefits of sustainability and biodiversity are considered.

ADAPTATION

Natural Resource Management adaptation activities have been included under the broader heading of adaptation.

Research

The Research Institute for Climate Change and Sustainability established at the University of Adelaide, SA Research and Development Institute (SARDI) and the Department of Health play an important role in undertaking adaptation research in South Australia. The National Climate Change Research Facility has a key role in adaptation research on a national basis.

Progress:

- The South Australian Government established the Chair of Climate Change at the University of Adelaide and Professor Barry Brook was appointed to the position
- Through the Future Farm Industries Co-operative Research Centre, the State Government is involved in a range of projects that together will deliver novel perennial plant-based technologies that are integrated into farming systems, adapted for climate variability and drought
- Research has been undertaken on heatwave mortality and morbidity. The study indicates significant increases in renal and mental hospital admissions during heatwaves and increases in mortality.
- South Australia's Natural Resource Management (NRM) Research Alliance has been formed to foster and strengthen linkages between the users and providers of NRM science, technology and innovation. The State Government continues to develop collaborative relationships with various institutions in relation to climate change adaptation.
- The *Research Capacity Mapping for Natural Resource Management, Climate Change Adaptation and Impact Report* was commissioned and produced to assess South Australia's capacity and gaps to address the current policy priorities for climate change adaptation and impact science at the state and national levels
- SARDI has completed a project funded by the Grape and Wine Research and Development Corporation studying the management of heat stress in grapevines. This project developed state-of-the-art techniques to impose heat stress in the vineyard and monitor the impact on vine growth and berry quality.
- The Premier's Science and Research Fund provided \$1.2m towards a major research project called Climate Change, Communities and Environment involving the University of Adelaide, State Government agencies and the NRM boards. The project brings a diverse range of skills together to increase our knowledge and understanding of how to keep our regions productive and viable and at the same time look after the soil, water, native plants and animals.
- The SA Government is funding a scientific analysis of rainfall in southern Australia. This project will examine the evidence surrounding possible step changes in rainfall by inspecting current rainfall and climatic observation records using a variety of statistical tests for regions around Southern Australia.
- The South Australian Research and Development Institute has worked with Dr Warwick Grace, previously a Deputy Director of the Bureau of Meteorology, to research the weather conditions associated with heat waves and to develop a simple mathematical model to understand the frequency and duration of heat

waves. This information on heatwaves has been provided to growers in a series of industry magazine articles.

- South Australia is integrally involved in the national Climate Change Research Strategy for Primary Industries. The strategy is a joint initiative of the rural Research and Development Corporations; Commonwealth, State and Territory Governments and the CSIRO covering six research priorities: understanding future climates, managing emissions, preparing industries, accessing information, facilitating change and linking decision makers.

Risk and Vulnerability Assessments

Integrated vulnerability assessments are key to the development of effective responses to the impacts of climate change. Currently these are being undertaken in some areas of the State but a more comprehensive approach is required.

Progress:

- Bioclimatic modelling of species and ecosystems in the Mount Lofty Ranges to predict the effects of different climate change scenarios on the distribution of species and ecosystems is underway. Modelling of the impacts of fire on selected vegetation communities on the Eyre Peninsula and mapping and hydrological modelling of wetlands across the State to provide a baseline for future risk assessment are also being undertaken.
- A series of coastal conservation and threat assessments for NRM regions across the State is being undertaken. These include the threat of climate change to natural resources including species and ecosystems. The Northern and Yorke NRM region's conservation and threat assessment is complete.
- The State Government is monitoring the development of the South Eastern Australian Climate Initiative which is an investigation of the causes and impacts of climate change and climate variability across south eastern Australia, home of the Murray-Darling Basin
- A quantitative assessment of the risk to development located in close proximity to the Adelaide foreshore has been undertaken
- A Regional Climate Change Decision Framework for Natural Resource Management project in the Adelaide Mount Lofty Ranges NRM region has been undertaken which included a vulnerability assessment that identified vulnerable industries. This included a land use case study working with the apple industry; a case study for the McLaren Vale viticulture and Fleurieu Peninsula oliveculture industries; and a case study mapping landscape values and perceived climate change risks on the Southern Fleurieu Peninsula.
- The State Government is currently undertaking a vulnerability assessment of the Northern and Yorke NRM region to identify assets and sectors most vulnerable to climate change
- The State Government, with support from the Commonwealth Government's National Disaster Mitigation Program, is implementing two pilot projects to assess coastal vulnerability to the effects of climate change in South Australia. The Yorke Peninsula Sea Flood Risk Mapping Project which is preparing sea flood risk maps (for different sea level rise scenarios) for a number of coastal townships on Yorke Peninsula and adjoining areas that are experiencing significant development pressure. The second project, South Australia's Vulnerability to

Tsunami, Storm Surge and Sea Level Rise – A Scoping Study, is currently being conducted and involves collation of all existing information relating to these risks in South Australia. It will identify knowledge gaps and priorities for future research.

- As part of the implementation of the National Tourism Action Plan on Climate Change a study into the impacts of climate change on five of Australia's leading tourism destinations, including the Barossa Valley, has been undertaken by the Sustainable Tourism Cooperative Research Centre. Likely adaptation and mitigation strategies are also scoped.
- An Inter-agency Technical Group on Biodiversity Monitoring and Evaluation for Climate Change was established in December 2007. This Group is identifying key species and ecological communities likely to be affected by climate change; determining indicators to measure change in these species/communities; determining roles and responsibilities for the measurement and analysis of indicators; determining mechanisms for integration and reporting; and identifying additional research required for affected species.
- The identification and monitoring of risk associated with establishing invasive species or exacerbating current pests in the face of climate change will be determined by the multi-agency Technical Group on Threatening Processes
- Mapping for sea-flood risk on low-lying areas of the Yorke Peninsula is being undertaken. Rezoning of land subject to climate change-induced coastal hazards is expected to be accomplished progressively as Development Plan Amendments are conducted.
- The Commonwealth Government has quarantined funding from the new Natural Disaster Resilience Fund to undertake a state risk assessment that will inform an emergency management State Risk Register.

Reforming Policy Instruments:

The State Government has a key role to play in ensuring that the right policy settings are in place to assist in the development of resilient communities.

- An on-going PIRSA Agriculture, Food and Wine Division project aims to incorporate areas of primary production significance into local government development plans and introduce stricter controls on forms of development not directly related to primary production. Implementation of this project will be pursued via the *30 Year Plan for Greater Adelaide*.
- A methodology for incorporating climate change considerations into reserve management plans to guide the management of reserves is currently being developed and a project to model the potential impacts of climate change on the South Australian reserve system is being scoped
- The Government amended the *Marine Parks Bill 2007* to recognise resilience to the effects of climate change as an object for the declaration of marine parks. In particular, multiple-use marine parks should provide sufficient size and flexibility to be adaptive to the effects of climate change.
- The Coast Protection Board of South Australia convened a Sea Level Rise Advisory Committee to review its policies in relation to new development and sea level rise. The advisory committee has presented its recommendations to the

Board, which will commence targeted stakeholder consultation on the proposed policy changes following endorsement by the State Government.

- The SA Government has developed criteria and models to help assess the impacts of climate change on the potential for soil (wind) erosion.

Adaptation Strategies

Demonstration projects are key to providing the community with some of the important tools for adapting to climate change.

Progress:

- The State Government seeks to establish projects in critical regions to demonstrate and trial adaptation techniques. A draft project/implementation plan has been prepared and a number of related projects in critical regions have been established, including:
 - Lucerne Improvement Program - developing dryland lucernes with enhanced establishment, productivity and persistence
 - Murray Darling NRM Project – improving dryland lucerne establishment
 - CRC Future Farm Industries projects – lucerne for acid soils and development of alternative perennials
 - Agronomy of Sulla - a new short term perennial pasture.
- The Climate Change and Land Capability project is being run which investigates the impact of climate change on land capability (including soil erosion risk), land management practices and farming systems
- The State Government is a member of the Australian Low Rainfall Tree Improvement Group. Current research projects include investigating suitable species and tree breeding/genetics to support forestry in low rainfall situations.
- The State Government has continued monitoring the outcomes from two specifically designed, long standing, afforestation climate change research trials: one now 17 years old, the other six years. These are ongoing trials which are continually monitored.
- The Commonwealth Department of Climate Change funded the South Australian Research and Development Institute to work with farmers and consultants on the upper Eyre Peninsula to identify features of grain farms that were likely to be resilient to climate change. This complemented work funded by the South Australian Government through state NRM funding that enabled SARDI to study Goyder's Line and how it might shift in a changing climate.
- PIRSA has published an introductory guide on climate change and adaptation for farmers and prepared a report on impacts of climate change and adaptation options and opportunities for primary industries
- NatureLinks is South Australia's primary strategy to guide on-ground action to increase the resilience of terrestrial, marine and freshwater biodiversity to climate change. The East Meets West NatureLinks plan was released in November 2008. Partnerships with a range of NGOs and community groups are being developed to support its implementation. NatureLinks plans are currently being drafted for the Cape Borda to Barossa, Flinders-Olary, River Murray Coorong and Arid Lands biodiversity corridors.

- The South Australian Government is funding a series of workshops through the Governor's Leadership Foundation. The workshops bring together a variety of individuals from various backgrounds to collaborate on ideas, focusing on the opportunities and barriers of communities to adapt to climate change.
- A long-term plan currently being developed for the Coorong, Lower Lakes and Murray Mouth is being prepared, taking into account modelling of predicted climate and water availability across the Murray-Darling Basin (MDB). The Plan will build resilience into these ecosystems to enable them to cope with expected climatic shifts.
- The MDB Ministerial Council approved the MDB Risks Strategy on 21 May 2008 as a framework for assessing and responding to current and potential risks to the shared water resources of the MDB, including climate change. The State Government provides input into implementation of this Strategy. Implementation plans are being developed to respond to the MDB Risks Strategy.

Water

There are many initiatives being undertaken in relation to water. Some key water and adaptation initiatives are the *Water for Good Plan*, implementation of *Water Proofing Adelaide* and the Water Allocation Planning processes conducted by NRM Boards.

Progress:

- The *Water for Good* plan was released in June 2009. The Plan considers the impacts of climate change on water resource availability and seeks to diversify water supplies to reduce the State's reliance on the River Murray and other rain-dependent water sources.
- The State Government is monitoring the CSIRO Sustainable Yields Project, which is reporting progressively on sustainable yields of surface and groundwater systems within the MDB in light of changes in climate and other issues to 2030
- Construction is underway on the \$1.83 billion Adelaide Desalination Plant. When fully operational, the plant will deliver 100 gigalitres of drinking water annually (almost half of Adelaide's annual water consumption), reducing dependency on the River Murray and increasing water security.
- Construction of the Glenelg to City recycled water project is well under way. A 30 kilometre pipeline network which will carry recycled water from the Glenelg Wastewater Treatment Plant to Adelaide's CBD and Park lands. The project is scheduled to begin to supply by mid-2010, enabling 5.5 billion litres of water a year to be reused.
- Interstate agreements have been established to provide for a shared understanding of water availability and examining contingency planning to secure water supply. These agreements are managed through various mechanisms, e.g. the *Groundwater (Border) Agreement Act 1985*, the Great Artesian Basin Coordinating Committee, the Lake Eyre Basin Intergovernmental Agreement. Shared access to the Murray Darling Basin is managed through the MDB Ministerial Council and the *National Water Act 2007*.
- The State Government/Local Government Association Stormwater Management Agreement was reached in March 2006. The agreement seeks to refocus available funds towards highest priority stormwater management works

determined on the basis of a total catchment stormwater management plan. The *Local Government (Stormwater Management) Amendment Act 2007* was established; and the Stormwater Management Authority and Stormwater Management Fund has been operating since 1 July 2007.

- The Premier's Science and Research Fund provided \$1.3m for a project to develop new technological approaches to address the variability in quality of water sourced from the Murray Darling Basin and ensure the continued provision of high-quality drinking water during periods of sustained drought. Investment will deliver a complementary suite of technologies that can be employed within existing water treatment infrastructure within three to ten years.

Hazard Management

Work is being undertaken at local, state and national levels to incorporate climate change impacts into hazard management plans.

Progress:

- The State Government seeks to incorporate climate change projections into catchment hydrology models and flood risk assessments. A climate change rainfall downscaling project is being conducted for all regions across South Australia.
- Hazard plans have been developed for eight of nine hazards identified by the State Emergency Management Committee. All hazard plans impacted by climate change have been developed.
- 12 Zone Emergency Management Committees have been established based on the new State regional boundaries. The Committees' All-Hazard Zone Emergency Management Plans will include consideration of climate change.
- Local government has endorsed its emergency management role statement and councils are progressively developing emergency management plans that will provide them with a vehicle to consider the impact of climate change on their communities
- Ongoing surveillance for infectious diseases program is already in place. The incidence rate of these notifiable diseases is monitored on an ongoing basis and any short-term trend and long-term increases are noted.
- Risk scenarios under the State Government/Local Government Association Stormwater Management Agreement will be updated as additional flood risk information becomes available
- The Natural Disaster Mitigation Program, Bushfire Mitigation Program and the National Emergency Volunteer Support Fund are being replaced by a new national partnership agreement, the Natural Disaster Resilience Program. Commonwealth funding is required to be matched by the State and its project partners. The new program specifically includes consideration of climate change.
- Funding in 2009/10 from the Natural Disaster Resilience Program has been allocated by the Commonwealth Government to undertake state risk assessments for natural disasters
- State Government agencies are participating in the development of a Climate Change Action Plan (for natural disaster hazards) by the Australian Emergency Management Committee

- Community FloodSafe program implemented in the inner southern metropolitan area (six councils). The program takes flood education and preparedness messages into local flood risk communities via community education State Emergency Service volunteers. The program empowers residents and businesses to protect their own families, workers and properties during emergencies, and enhances community resilience and the return to normal life after a flooding event.

Assessment

There are a considerable number of adaptation-related initiatives underway in South Australia. A national adaptation strategy is required to ensure sufficient Commonwealth resources are made available to develop the capabilities to adjust to climate change. Activities also need to be better coordinated across the different levels of government in South Australia.

As the emergency management sector matures, assessment and assurance processes will progressively be implemented and improved. For example, the State Mitigation Advisory Group is developing assurance guidelines for hazard plans and zone emergency management plans.

Section 2. Targets and determinations

This section fulfils the requirement of Section 7(2)(b) of the Act and provides a report on the recently announced renewable energy generation target (33% by 2020).

On 2 June 2009 the Minister for Climate Change announced a target of "33.3% of South Australia's electricity generation to come from renewable energy by 2020" pursuant to Section 5.7 of the *Climate Change and Greenhouse Emissions Reduction Act 2007*.

As a requirement of the *Climate Change and Greenhouse Emissions Reduction Act 2007* separate advices were obtained in choosing the renewable energy target for 2020 from MacLennan Magasanik Associates (MMA, see Attachment A) and the National Institute of Economic and Industry Research (NIEIR, see Attachment B).

MMA is Australia's pre-eminent modeller of energy supply and demand trends. It is regularly commissioned by the Commonwealth and other Australian Governments.

The NIEIR is used widely by the electricity industry to forecast electricity trends, energy demand and peak power needs. NIEIR modelling forms the basis of the Annual Planning Report, prepared by the Electricity Supply Industry Planning Council for South Australia. NIEIR also provides energy and demand forecasts for Victoria, Queensland and Tasmania.

The two independent analyses provided similar results, despite different approaches to developing the target.

MMA concluded that "to guide the market place on what is achievable within the State and not relying on interconnection development, then 30% would be appropriate as it could be achieved by a number of feasible and foreseeable pathways" and a "more stretching target of 40% relies on fulfilling the expectations in geothermal development and applying resources to network development so as to provide investor confidence".

MMA advised a range of 30-40% as appropriate. NIEIR identified 40% as a stretch target and considered 33% would be prudent. NIEIR concluded that "a stretch target of 40% may be attainable but we consider that given uncertainty surrounding future South Australian total and renewable electricity generation a target of 33.3% would be prudent and appropriate".

After receiving this advice, and pursuant to Section 5.7 of the *Climate Change and Greenhouse Emissions Reduction Act 2007*, the Minister set a target of "33.3% of South Australia's electricity generation to come from renewable energy by 2020".

Section 3. Report on the progress to achieve renewable electricity targets

This section fulfils the requirement of Section 7(2)(c) and provides a report on the progress made to achieve renewable electricity targets, which are as follows:

- to increase the proportion of renewable electricity **generated** so that it comprises at least 20% of electricity generated in the State by 31 December 2014
- to increase the proportion of renewable electricity **consumed** so that it comprises at least 20% of electricity consumed in the State by 31 December 2014.

In July 2009, the proportion of renewable electricity was 14% for generation and 14% for consumption.

The tables and the chart below illustrate the yearly progress towards the targets.

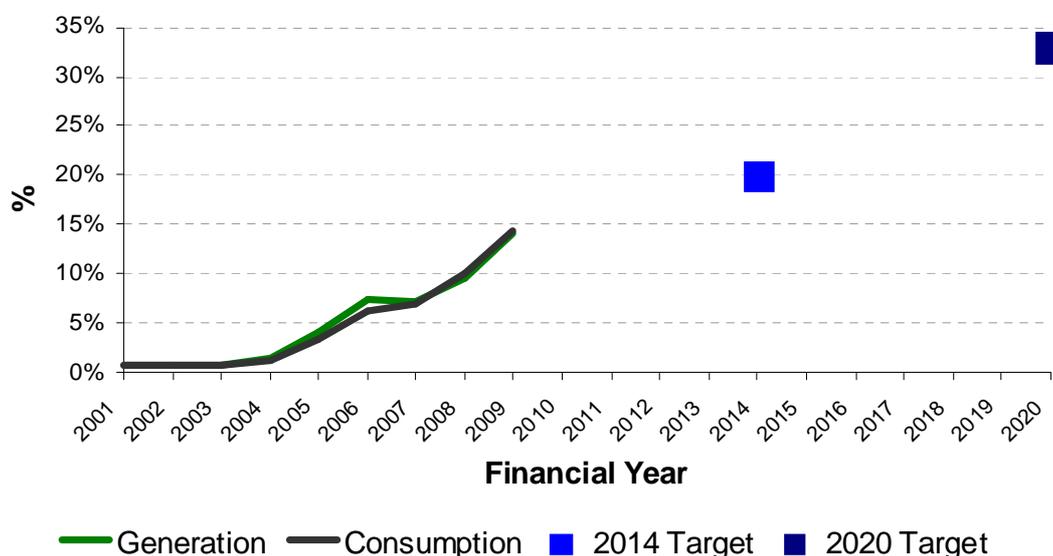
Progress towards the Renewable Electricity Generation Target

2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
0.7%	0.7%	0.7%	1.6%	4.0%	7.4%	7.1%	9.6%	14.2%

Progress towards the Renewable Electricity Consumption Target

2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09
0.6%	0.6%	0.6%	1.3%	3.4%	6.3%	6.9%	10.0%	14.4%

Progress to Renewable Electricity Targets



Source: CSIRO (2009) based on data from the Electricity Supply Industry Planning Council and Australian Electricity Market Operator

The methods used to calculate targets are based on recommendations by CSIRO as part of the review process for the *Climate Change and Emissions Reduction Act*

2007. These methods differ from those used to report against SASP T3.12¹
Renewable energy: support the development of renewable energy so that it comprises 20% of the state's electricity production and consumption by 2014.

The CSIRO approach provides different results as it seeks to fully incorporate network losses into the calculation by reporting the renewable targets at the regional reference node. For comparison the current reporting for SASP Target 3.12 indicates current progress at 14.8% and 16.4% for production and consumption respectively. This difference is detailed in Section 3 of the advice provided by the CSIRO.

¹ It is expected that this difference in methods will be addressed in the review of South Australia's Strategic Plan in 2010.

Section 4. Progress against sector-based or interim targets

This section fulfils the requirement of Section 7(2)(d) and provides a report on progress toward any sector-based or interim target.

No sector-based or interim targets were established under Section 5 of the *Climate Change and Emissions Reduction Act 2007* within the reporting period.

Section 5. Sector agreements

This section fulfils the requirement of Section 7(2)(e) and provides a report on sector agreements between the Minister and other person or entity entered into under the Act within the reporting period.

i. Sector agreements concluded

Sector	Focus	Current Implementation Status	Date Signed
Local Government	<ul style="list-style-type: none"> Adaptation Climate/Carbon Awareness Community Education Mitigation Renewable Energy Leadership 	<ul style="list-style-type: none"> Several steering committee meetings have been held to progress implementation Progress roll-out of the LGA Mutual Liability Scheme Risk Assessment Framework across Councils Implement behaviour change program across urban, peri-urban and regional council areas through CSIRO Provision of policy advice on Review of program areas subject to final design of the CPRS such as purchase of Green Power Work with LGA to streamline activity on the Eyre Peninsula for adaptive assessments as part of the South Australian Adaptation Framework 	Signed 4 June 2008 by the Premier and the President of the Local Government Association of SA, Mayor Joy Baluch at the Local Government Climate Change Summit
Property Sector	<ul style="list-style-type: none"> Energy Efficiency in Built Environment - \$2 million <i>Building Innovation Fund</i> Market Advantage Retro-Fitting Existing Buildings Distributed Electricity Generation Innovation 	<ul style="list-style-type: none"> Steering committee established with Property Council and relevant State agencies. Five projects received funding in the first round of the <i>Building Innovation Fund</i>. Projects included implementation of innovative renewable energy and energy efficient technologies as well as development of a prototype green roof and a prototype green wall in the CBD, and two feasibility studies. Progressing energy efficiency measures in commercial buildings in and around CBD 	Signed by the Premier and national Chief Executive Officer of the Property Council on 11 June 2009

<p>Wine Industry</p>	<ul style="list-style-type: none"> • Market Access • Market Advantage • Resource Efficiency • Streamlined Industry Education • Development of Wine Carbon Calculator • Significant Advantage for Industry to Transition to Carbon Constrained Economy 	<ul style="list-style-type: none"> • Project Officer appointed by the SA Wine Industry Association and the Wine Grape Corporation SA • Australian Wine Carbon Calculator developed and trialled by 28 volunteers across wine regions • Series of regional industry information sessions held between January and April 2009 in Barossa, McLaren Vale, Langhorne Creek, Adelaide Hills, Coonawarra, Clare and the Riverland • Targets include: <ul style="list-style-type: none"> ○ 20% of electricity consumed by participating facilities under the agreement to be supplied by accredited renewable energy sources ○ Sector associations and participating facilities to support the SA target to reduce greenhouse gas emissions by 31 December 2050 by at least 60% to an amount that is equal to or less than 40% of 1990 levels ○ 50% of wine grape tonnes grown and 50% of the wine grapes crushed (processed) – based on 2009 vintage – to commit to greenhouse gas emissions under the agreement ○ 40% of wine grape tones grown and 40% of the wine grapes crushed (processed) – based on 2009 vintage – to complete and lodge reports on their greenhouse gas emissions for the 2009/10 financial year ○ based on the report for 2009/10, determine 2010/2011 and 2011/2012 industry greenhouse gas emissions reduction targets for participating facilities • Results from 2008/09 showed a commitment to reporting carbon emissions. 97 businesses agreed to take part, representing @28% of 	<p>Signed 22 May 2008 by the Premier and the South Australian Wine Industry Association Inc. and the Wine Grape Council SA Inc. at the London Wine Fair</p>
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		<p>grapes grown and 99% of grapes processed in South Australia</p> <ul style="list-style-type: none"> • Agreement has been progressed to its second year of operation 	
Adelaide Brighton Limited	<ul style="list-style-type: none"> • Greenhouse Gas Reduction • Resource Efficiency • New Products/Innovation • Development of International Sector Agreements between Cement And Lime Industry • Industry Leadership • Local Business Collaboration 	<ul style="list-style-type: none"> • Contact officers have established communication process between ABL and State Government • ABL action plan is being developed and is due to be completed by December 2009 • Contact has been made through States and Regional Government Network to progress a cement and lime international sector agreement 	Signed by the Premier and the ABL Chairman, Malcolm Kinnaird and Managing Director, Mark Chellew on Thursday 13 August 2009
Anglican Church	<ul style="list-style-type: none"> • Community Leadership/Engagement • Resource Efficiency • Innovation • Partnerships 	<ul style="list-style-type: none"> • The sector agreement was concluded in consultation with the Arch Bishop's Office and the Dean of St Peter's Cathedral • Feasibility study for Green Cathedral project completed at end of June 2009. State Government received report in September 2009. • Targets include: <ul style="list-style-type: none"> ○ Commence energy audits of 63 parishes, congregations, schools, Anglicare facilities, St Barnabas College and St Peters Cathedral in first quarter of 2009 • The new Dean of St Peter's cathedral , Dr Sarah Macneil, met with SCCD in September 2009 to progress sector targets 	Signed by the Premier and Archbishop Jeffrey Driver on 22 February 2009
Electronics and ICT Association	<ul style="list-style-type: none"> • Energy Efficiency • Market Access • Market Advantage • Supply Chain Influence 	<ul style="list-style-type: none"> • Sector Agreement has been concluded with a focus on developing carbon accounting tool for industry members • A target has been set for achieving 5-10% greenhouse gas emissions reduction as part of the demonstration projects to be undertaken with industry members 	Yet to be signed

	<ul style="list-style-type: none"> • Industry Education • New Products/Innovation 		
RAA	<ul style="list-style-type: none"> • Greenhouse Gas Reduction • Energy Efficiency • Development of Centre of Excellence in Vehicle Emissions • Supply Chain Influence • Climate/Carbon Awareness • New Products/Innovation • Community Leadership 	<ul style="list-style-type: none"> • The sector agreement has been concluded and approved by the RAA Board and management • The proof of concept for the Centre will be progressed with the University of South Australia to provide vehicle performance information for the Australian consumer • RAA will develop an environmental management plan for operations including building management, energy use, travel and waste management • A motoring community education program will be progressed by February 2010 	To be progressed through Cabinet
Jeffries Group	<ul style="list-style-type: none"> • Climate/Carbon Awareness • Emissions Reduction • Research and Innovation • Partnerships • Supply Chain Influence • Energy Efficiency • Renewable Energy 	<ul style="list-style-type: none"> • The sector agreement has been concluded and approved by Jeffries Group Board and management • The primary focus is to reduce greenhouse gas emissions by 12% per tonne of compost produced • Jeffries Group will also aim to meet or exceed the consumption of 20% renewable electricity by 2020 • This agreement has been progressed as part of the Memorandum of Understanding with Business SA 	To be progressed through Cabinet
University Sector	<ul style="list-style-type: none"> • National and International Profile in Leadership and Research • Competitive Edge for Attraction of Atudents by Meeting Students 	<ul style="list-style-type: none"> • Agreement signed on 29 October 2009 • Key focus is to attract 12% of the funds available through research funds resulting from the CPRS • Develop consistent environmental management plans across the five universities 	Signed 29 October 2009

	<p>Needs for Future</p> <ul style="list-style-type: none"> • Competitive Edge for Attraction of Educators and Researchers • Competitive Edge for Attracting Research Funds • Collaboration • Resource/Operational Efficiency • Energy Efficiency 		
<p>Urban Development Institute of Australia (SA Division)</p>	<ul style="list-style-type: none"> • Sustainable Urban Design • Industry Leadership • Implementation of <i>Envirodevelopment</i> Standards in South Australia 	<ul style="list-style-type: none"> • The agreement is designed to promote leading practice in environmentally sustainable property development in South Australia • The agreement is near completion and will be consistent with Agreement with Land Management Corporation. 	<p>To be progressed through Cabinet</p>

ii. Sector agreements under negotiation

Sector	Drivers	Current Status	Expected Due Date
SA Water	<ul style="list-style-type: none"> • Sequestration and offsetting • Community Leadership • Emissions Reduction • Energy Efficiency • Renewable Energy Use 	<p>Final draft of agreement is near completion</p> <p>Targets include:</p> <ul style="list-style-type: none"> • For the period 1 January 2008 to 31 December 2012, SA Water will constrain greenhouse gas emissions to an amount equivalent to the South Australian Kyoto target of no more than 108% of 1990 levels – 405,000 tonnes • From 1 January, 2013 SA water will progressively reduce net greenhouse gas emissions to an amount, so that by 31 December 2050, SA Water’s emissions will be no greater than 40% of its 1990 levels – 150,000 tonnes • SA Water will achieve at least 20% renewable energy use from self generated and purchased accredited renewable energy from December 2008 	November 2009
Land Management Corporation (LMC)	<ul style="list-style-type: none"> • Energy Efficient Urban Development • Innovative Sustainable Design • Industry Leadership • Industry Assistance to Report on Monitoring and Reporting of Greenhouse Gas Emissions 	<ul style="list-style-type: none"> • LMC Board has given in-principle support to agreement • Agreement is the process of being negotiated • Targets include to: <ul style="list-style-type: none"> ○ reduce greenhouse gas emissions associated with the development and construction industry ○ increase the use of renewable energy sources ○ encourage industry partners and other external stakeholders to implement similar measures 	November 2009

<p>Eyre Peninsula Regional Sector Agreement</p>	<ul style="list-style-type: none"> • Regional Approach to Adaptation • Identification of Economic Opportunities Relating to Climate Change such as Renewable Energy Projects and Bio- Sequestration Opportunities • Community Engagement 	<ul style="list-style-type: none"> • The Government of South Australia and the EP Region are taking a collaborative approach to ensure the region is resilient to the changes resulting from climate change and to ensure its ongoing prosperity • Consultation is occurring with the: <ul style="list-style-type: none"> ○ Eyre Peninsula Natural Resource Management Board ○ Eyre Regional Development Board ○ Whyalla Economic Development Board ○ Eyre Peninsula Local Government Association • A draft agreement is currently being negotiated 	<p>November 2009</p>
<p>Barossa and Light Regional Development Board</p>	<ul style="list-style-type: none"> • Market Advantage • Climate/Carbon Awareness • Community Leadership • New Products/Innovation 	<ul style="list-style-type: none"> • Encouraged by Thinker in Residence Andrew Fearn to explore a sector agreement with a spatial/regional focus • A sector agreement has been drafted in consultation with the CEO of Barossa and the Light Regional Development Board • The agreement will potentially be an exemplar for Regional Development Boards and will provide an integrating mechanism for engaging the region on climate change and sustainability issues related to the built environment, regional food agenda, wine industry, transport and tourism 	<p>December 2009</p>
<p>Santos</p>	<ul style="list-style-type: none"> • Greenhouse Gas Reduction • Resource Efficiency • Market Access <p>Sequestration and Offsetting</p>	<ul style="list-style-type: none"> • Discussions have commenced with Santos officials about the opportunity to develop an agreement • An agreement will be drafted based on the agreement with Adelaide Brighton Limited 	<p>January 2010</p>

Mining, Oil & Gas and Renewable Energy Sectors	<ul style="list-style-type: none"> • Energy Efficiency • Market Access • Market Advantage • Supply Chain Influence • Industry Education 	<ul style="list-style-type: none"> • Discussions recommenced in September 2009 with the South Australian Chamber of Mining and Energy. A scoping paper will be prepared by SCCD for discussion. 	January 2010
Waste Management Association of Australia	<ul style="list-style-type: none"> • Industry Leadership • Greenhouse Gas Reduction • Develop Greenhouse Emissions Measurement Tool • Energy Efficiency 	<ul style="list-style-type: none"> • Agreement has been drafted with an initial focus on greenhouse gas emissions reduction associated with the collection, handling, transportation and management of household waste in SA • The agreement is currently being reviewed by State Government agencies 	November 2009
Penrice Soda	<ul style="list-style-type: none"> • Energy Efficiency • Greenhouse Gas Reduction • Industry Leadership 	<ul style="list-style-type: none"> • Initial discussions were held in early 2009 • Draft agreement to be completed for consultation • Consultation to recommence by end of 2009 	February 2010
Tourism	<ul style="list-style-type: none"> • Market Advantage • Supply Chain Influence • Climate/Carbon Awareness • Community Leadership 	<ul style="list-style-type: none"> • Sector agreement is being considered as part of <i>sustainability as a business driver</i> project under the auspice of the Minister's Tourism Roundtable • SCCD presented to the Minister's Tourism Roundtable in August 2009 • A scoping paper is to be prepared in consultation with the South Australian Tourism Commission 	
Adelaide City Council	<ul style="list-style-type: none"> • Leadership • Innovation 	<ul style="list-style-type: none"> • An agreement has been drafted through the Adelaide Capital City Committee • Document is currently being negotiated 	November 2009

	<ul style="list-style-type: none"> • Sustainability • Energy Efficiency • Water Sustainability • Smart Grid Opportunities • Sustainable Transport • Green Buildings- Urban Design 	<ul style="list-style-type: none"> • Long term target is for Adelaide to be an acclaimed leader amongst internationally recognised cities by 2020 	
VET Sector	<ul style="list-style-type: none"> • Skills Development for 'Green Economy' • Provide Educational and Training Opportunities for Industry Development to Capture Opportunities in Areas such as Renewable Energy, Energy Efficiency and the Water Industry 	<ul style="list-style-type: none"> • Discussions have commenced with VET sector • An agreement has been drafted for discussion with the industry 	November 2009
Water Industry Alliance	<ul style="list-style-type: none"> • Greenhouse Gas Reduction • Energy Efficiency • Market Access • Market Advantage • Supply Chain Influence • Climate/Carbon Awareness • New Products/Innovation • Workforce Attraction 	<ul style="list-style-type: none"> • The Water Industry Alliance, on behalf of SA Water, hosted a green water forum on 31 July 2008 to engage the water industry in a discussion of the risks and opportunities associated with a carbon constrained future and climate change • The potential for a sector agreement was discussed at the forum and is being progressed by the Water Industry Alliance through the State Government's Memorandum of Understanding (MoU) with Business SA 	December 2009

	<ul style="list-style-type: none"> • Community Leadership 		
Fairmont Homes	<ul style="list-style-type: none"> • Industry Leadership • Energy Efficiency • Supply Chain Influence • Greenhouse Gas Reduction 	<ul style="list-style-type: none"> • Implement practical and cost-effective actions that seek to reduce greenhouse gas emissions associated with the development of new housing sites, as well as to reduce the lifetime emissions and running costs of new homes • Implement sustainable design principles to ensure that the new developments are more sustainable in terms of water and energy use • A draft agreement has been prepared as part of the memorandum of Understanding with Business SA 	December 2009
OneSteel – Whyalla	<ul style="list-style-type: none"> • Measurement and Reporting of Greenhouse Gas Emissions • Product and Process Innovation • Industry Leadership • Government Support for Development of Sustainable Business Local Partnerships • Supporting the Development of a Global Steel Industry Sector Agreement 	<ul style="list-style-type: none"> • The agreement is based on the Adelaide Brighton Limited agreement • The agreement also commits the State Government to support the preparation of plans and submissions for structural adjustment funding for the surrounding community from the Commonwealth when the guidelines for the funding become available • The sector agreement is nearing completion 	December 2009

Section 6. Levels of emissions and renewable energy

This section fulfils the requirement of Section 7(2)(f) and provides a report on levels of the State's greenhouse gas emissions and the development of technologies to reduce greenhouse gas emissions or to remove them from the atmosphere. As a means of reporting on levels of renewable energy, reporting against consumption and generation of electricity from renewable sources has been used. The reporting against renewable electricity targets is provided in Section 3.

i. Analysis of South Australia's Greenhouse Gas Emissions 1990 – 2007, Total SA Greenhouse Gas Emissions

Total SA GHG Emissions comprise SA emissions including Land Use, Land Use Change and Forestry (LULUCF), and interconnector.

Total GHG emissions including LULUCF and interconnector decreased from 33,000 kt CO₂-e (1990) to 31,000 kt CO₂-e (2007), or -6.4%.

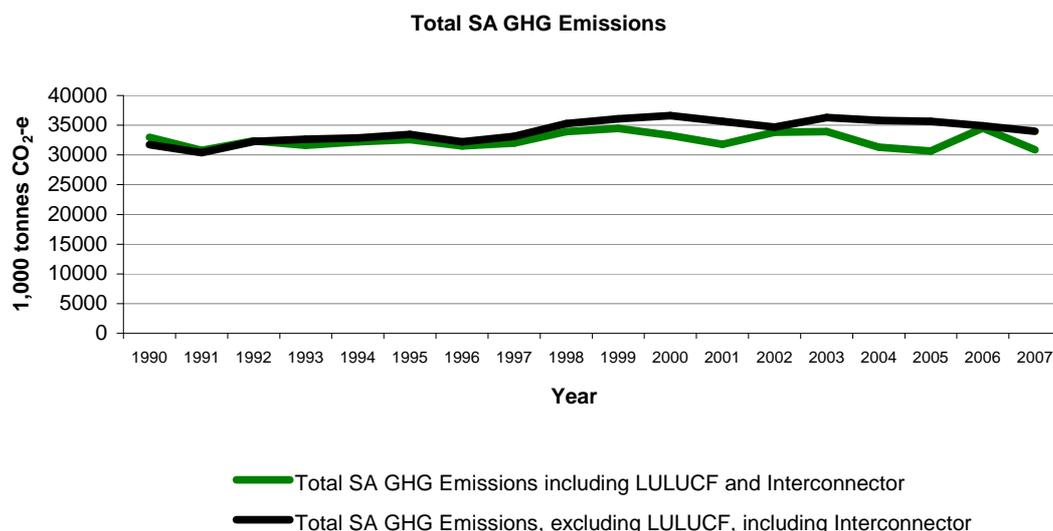
GHG emissions/removals from LULUCF changed by -350%, from 1,300 kt CO₂-e (1990) to -3,100 kt CO₂-e (2007).

GHG emissions from interconnector increased by 130%, from 600 kt CO₂-e (1990) to 1,400 kt CO₂-e (2007).

GHG emissions including interconnector and excluding LULUCF increased by 7.2% from 32,000 Kt CO₂-e (1990) to 34,000 kt CO₂-e (2007). This underlines the success of SA's LULUCF policies in reducing net GHG emissions/removals in this sector.

Emissions intensity per person² decreased by 15%, from 23 tonnes CO₂-e (1990) to 19 tonnes CO₂-e (2007).

Emissions intensity per m\$ GST³ decreased by 35%, from 700 tonnes CO₂-e per m\$ (1990) to 450 tonnes CO₂-e per m\$ (2007).

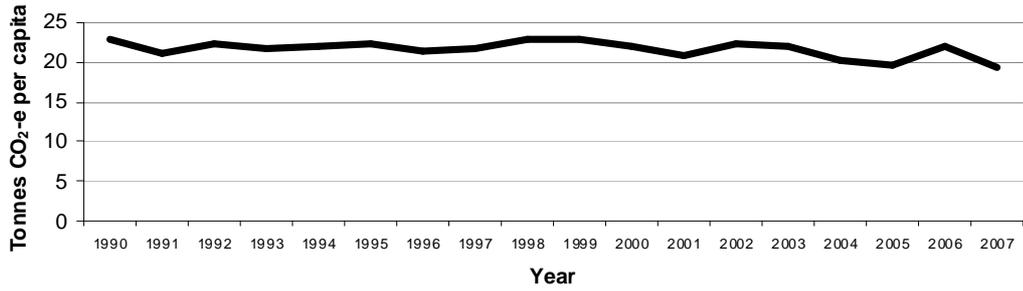


Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI)

² including LULUCF. Excluding LULUCF, emissions intensity per capita decreased by 3%.

³ Including LULUCF. Excluding LULUCF, emissions intensity per m\$ GST decreased by 25%.

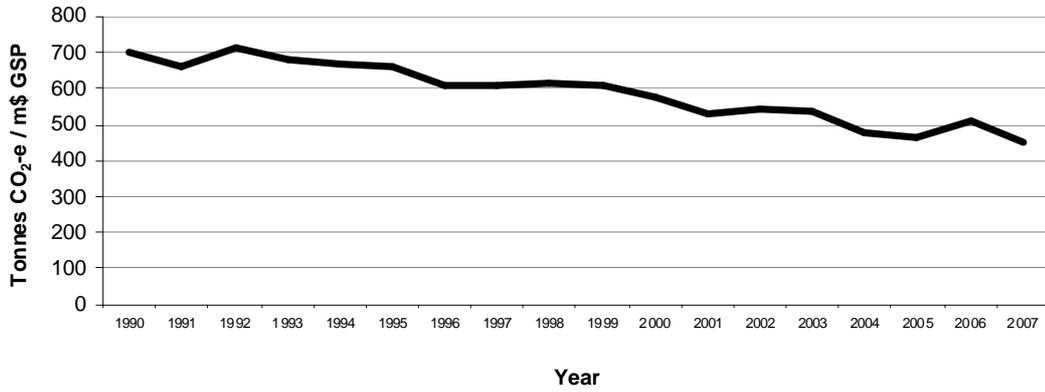
SA Emissions Intensity per capita



— tonnes CO₂-e per capita (incl. LULUCF and Interconnector)

Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI) and Australian Bureau of Statistics data

SA Emissions Intensity per m\$ GSP



— tonnes CO₂-e per m\$ GSP (incl. LULUCF and Interconnector)

Source: Department of the Premier and Cabinet (2009) based on National Greenhouse Gas Inventory (NGGI) and Australian Bureau of Statistics data

ii. Technologies to reduce or remove greenhouse gases from the atmosphere

There is a huge range of existing and emerging technologies that have the potential to decrease emissions. These can be split into two main groups: those that clean up energy supplies and those that increase energy efficiency. In combination they provide a powerful tool for emissions reduction.

There are also a number of emerging techniques that aim to address the emissions from agriculture and reduce emissions through increased absorption of carbon dioxide from the atmosphere.

Cleaner Energy Supplies

Renewable energy technologies offer the greatest promise for emissions reduction in the electricity supply. While mature technologies, such as wind and biomass, are already being deployed commercially, there are many technologies in the development and pre-commercialisation phases.

Activities are already underway to support renewable energy in the State. These include the development of better information for investors through a "Renewable Energy Atlas", the creation of a taskforce to oversee the development of a favourable marine energy regulatory regime and the commitment to fast track planning approvals for renewable energy and green technologies in South Australia's 30 Year Plan.

South Australia has experienced a significant growth in the wind energy industry fuelled by the Mandatory Renewable Energy Target, coupled with a proactive approach to planning. South Australia currently has nine wind farms in operation and an installed capacity of 740MW. Another four wind farms are under construction (two licensed, two seeking a license) and one is at the commissioning phase (planned for completion December 2009). Once these wind farms are complete, the installed capacity of wind generation in South Australia will be 1,150MW.

The South Australian Government also supports the development of mini-wind technologies. Five SWIFT MkI mini-wind turbines were installed, as a trial, on prominent buildings in Adelaide and the metropolitan area in 2006. The State Government continued to work on trialling mini wind-turbines with three additional technologies purchased for testing. The Premier's Science and Research Fund has also provided funding to enable the development of a business plan for a low-cost, high-efficiency, small-scale wind turbine system for stand-alone and grid-connected applications and a path to market.

Geothermal energy has the potential to deliver large scale, base load electricity at low cost, harnessing the energy from Australia's radioactive granites and aquifers. The technology is yet to be proven and the most advanced project is a 1MW demonstration plant due to come online later in 2009. While there is still significant technical risk to be overcome, it is expected that the first commercial size geothermal plants will start to come online in 2015, leading to around 1-2GW of installed capacity by 2020.

The State's natural geothermal resource endowment and supportive investment framework have attracted 28 companies to apply for 279 geothermal licences (70% of the total number of geothermal licences in Australia) covering more than 130,000 sq km in South Australia.

Marine energy is a significant source of future energy with the advantages of having vast availability and high predictability. The four main sources being developed are wave energy, tidal energy, marine current energy and Ocean Thermal Energy Conversion. A fifth energy source is being investigated and involves using salinity gradients within the ocean to generate power. Worldwide, many of these technologies are in the advanced stage of research and development. In February 2009 the South Australian Government awarded Carnegie Corporation the first license to investigate the potential for a commercial wave power plant. The license area covers 17,000 hectares adjacent to Port MacDonnell in South Australia.

Solar energy can be used for both large scale power stations, and distributed small scale generation. Solar thermal is well suited to medium to large plants and designs range from the mature parabolic troughs, to newer designs such solar concentrating towers, linear Fresnel reflectors and concentrating dishes. Solar photovoltaic, on the other hand, is highly modular and is already used widely for domestic power production. Emerging technologies, aimed at decreasing cost, include thin film technologies and concentrators, for both small and large scale applications.

The South Australian Government has provided support to such iconic solar demonstration projects as the second largest grid-connected rooftop solar installation at the Adelaide Airport and an corresponding interpretive display; 1MW roof mounted solar installation at the Adelaide Showground; and the upgrade of the Umuwa solar power station in the far north-west of South Australia.

In addition to electricity generation, there is the potential for renewables to be used to directly supply energy. Emerging technologies in this area include solar air conditioning, solar air heating and geothermal heat pumps.

Co-generation and tri-generation plants dramatically increase the efficiency of electricity generation over conventional gas by using the heat directly or indirectly for cooling through absorption chillers. Typically installed in buildings or industries with a large heat/cooling load, they also have the benefit of generating electricity at the point of use.

South Australia holds implementation responsibility for Measure 1.1.3 under the National Strategy on Energy Efficiency, which seeks to maximise the potential for the application of co-generation, tri-generation and other distributed generation technologies that increase energy efficiency. As a first step, Australian, state, territory and local governments will collaborate with the commercial building sector to deliver a national forum to explore the technical, regulatory and commercial policy issues associated with the application of co-generation, tri-generation and other distributed generation technologies.

Carbon Capture and Storage (CCS) offers a longer term solution for capturing carbon dioxide from coal fired electricity generators (clean coal) and could also be applied to other emissions intensive processes such as steel and cement manufacture. The three main steps of CCS: capture, transportation and storage of carbon dioxide, have been used and validated on a small scale, however they are yet to be incorporated into large scale power plants. In particular, the storage of carbon dioxide will require long term verification to ascertain the effect and efficiency of underground storage. Worldwide, it is expected that the first full-scale demonstration plants will come online between 2015 and 2030.

The Commonwealth Government has made major contributions towards the CCS development. The regulation of CCS facilities falls within the responsibilities of State and Territory Governments. South Australia's Parliament recently passed legislation

to include coverage of this issue under the *Petroleum and Geothermal Energy Act 2000* and the associated *Petroleum and Geothermal Energy Regulations 2000* which were proclaimed on 1 October 2009.

Biofuels, such as ethanol and biodiesel, capable of being blended with existing fuels and run within existing engines are being developed in order to reduce emissions in traditional transport fuels. Moving on from first generation biofuels, produce from traditional foodstocks, second generation biofuels are being developed worldwide from algae, plant wastes and methanol. In particular, biodiesel produced from microalgae has huge potential as the production per land area is increased by a factor of at least five relative to conventional biodiesel production. Work is also being undertaken on the production of alternative carrier fuels (hydrogen, methanol) from renewables.

South Australia is particularly well suited to the future production of second generation biodiesel from micro-algae. South Australia has significant research capability in developing biodiesel from microalgae, with work being undertaken at the South Australian Research and Development Institute (SARDI), Flinders University, Adelaide University and the CSIRO. A business plan is being developed to support the emergence of a long-term, and sustainable microalgae biofuels industry in the state

Increased Efficiency

Increasing the efficiency and reducing the use of all forms of energy is the focus of many new inventions and emerging technologies. In transport, a range of low emissions vehicles are being developed, ranging from increased fuel efficiency of conventional vehicles to hybrids, rechargeable electric vehicles and fuel cell vehicles. Fuel switching (petrol to electric) offers the opportunity for a zero emissions vehicle by using green electricity for charging.

The State Government has commissioned a report that will review what policy options should be considered to accommodate electric vehicles in South Australia. This report will review other global policy approaches to low carbon transport and provide recommendations for the most appropriate policy measure for implementation in South Australia in the near term.

Within industry, techniques such as heat recovery and the incorporation of newer technologies such as variable speed drives for compressors and motors and high efficiency burners are just few of the many process-specific techniques for increasing energy efficiency. Emerging building related technologies and techniques include the reduction of heating and cooling loads through passive design techniques, the use of green walls/roofs, heat/coolth storage, natural ventilation and solar air conditioning.

The South Australian Government provides funding through the *Building Innovation Fund* program to initiatives that demonstrate new and leading edge approaches to retrofitting existing buildings and significantly reduce building energy use and greenhouse gas emissions. The development of a green roof and a green wall was among successful projects in the first round of the program. The green wall would become first in Australia to be developed on a large scale and to be applied to the commercial building.

Behavioural change is key to reducing energy use and therefore emissions. The concept of the Smart Grid hinges around the development of a range of devices, aimed at behavioural change and intelligent energy use. This includes in-house displays, allowing the consumer to easily view and understand real time energy use

and market prices; and intelligent appliances such as fridges and air conditioner that are able to be controlled remotely to shift load.

Agriculture

To date, reforestation has been an attractive method for absorbing carbon dioxide and has been the basis of many carbon credit schemes. New techniques being investigated for increasing the absorption rate of carbon dioxide include the use of biochar as a soil conditioner and on small scales, using waste streams of carbon dioxide to improve growth rates of farmed plants.

Amongst key South Australian sequestration projects are the River Murray Forest initiative and the Million Trees program.

Section 7. Offset programs and national emissions trading scheme

This section fulfils the requirement of Section 7(2)(g) and provides information regarding any emissions offset programs established or recognised under this Act during the reporting period, and on progress in establishing a national emissions trading scheme.

i. A report on emissions offset programs established or recognised under the Act during the reporting period

No emissions offset programs have been established or recognised under this Act.

The Commonwealth is devising the National Carbon Offset Standard. It would not be appropriate to set up a competing State program, given that the South Australian Government is a signatory to the Document of Shared Understanding which commits jurisdictions to the development of a nationally streamlined set of climate change policies.

ii. A report on progress in establishing a national emissions trading scheme

On 10 September 2008 the South Australian Government provided a submission to the Commonwealth Government's *Green Paper on the Carbon Pollution Reduction Scheme (CPRS)* supporting the CPRS and covering issues such as:

- Support for the community during transition to a low carbon economy and particularly for low income households
- Support for emissions intensive trade exposed (EITE) industries including, regional impacts
- Support for renewables and a secure electricity supply
- Equity in the coverage of the waste sector.

The CPRS White Paper was subsequently released on 15 December 2008.

The Commonwealth Government released the exposure draft of the legislation on the CPRS on 10 March 2009.

The Premier of South Australia wrote to the Prime Minister, proposing that voluntary action be taken into account in the CPRS, in particular, verifiable and measurable action such as photovoltaic installation and GreenPower purchases.

In March 2009 the Senate established the Senate Select Committee on Climate Policy. The State Government provided a submission to the Committee recommending that voluntary action be considered in setting the national emissions cap and trajectory.

South Australia's input into the process of preparing the CPRS legislation has provided impetus for:

- The recognition of voluntary action by households for setting future emissions caps
- The acceptance of an industry value-added threshold for companies that have a high input costs for their revenue, such as Nyrstar in Port Pirie
- Commitments that revenue generated by the scheme will be provided to households and industry to smooth the transition to a low carbon economy.

In August 2009 the Senate did not pass legislation required for establishment of the CPRS. The Bill was reintroduced into Federal Parliament on 22 October 2009.

Section 8. Intergovernmental agreements

This section fulfils the requirement of Section 7(2)(h) and provides a report on inter-governmental agreements relevant to climate change entered into by the South Australian Government.

i. National Strategy on Energy Efficiency

In July 2009, COAG signed a National Partnership Agreement on Energy Efficiency, endorsing a 10-year strategy to accelerate energy efficiency improvements for householders and businesses across all sectors of the economy. The National Strategy on Energy Efficiency will complement the Carbon Pollution Reduction Scheme by addressing the barriers that are preventing the efficient uptake of energy efficient opportunities, such as split incentives and information failures.

South Australia played an active role in developing the strategy.

ii. Document of Shared Understanding

The Climate Change and Water Working Group of the COAG established the Complementary Measures Sub-Group to determine a nationally consistent set of measures to reduce greenhouse gas emissions that would be additional to an emissions trading scheme (CPRS).

Complementary measures are intended to support the CPRS by delivering extra abatement at lower cost by overcoming market failures that the CPRS is unable to address, such as externalities, the existence of public goods and information gaps or asymmetries, or to address equity issues.

The Commonwealth and State and Territory Governments agreed to undertake reviews of climate change mitigation measures in accordance with the Document of Shared Understanding at the COAG meeting in November 2008.

The South Australian Government has undertaken a review in accordance with its obligations under the agreement.

Section 9. National and international commitments

This section fulfils the requirement of Section 7(2)(i) and provides a report on international commitments or agreements relevant to climate change made or entered into by South Australia. National commitments and agreements have been reported on in Section 8.

i. Federated States and Regional Governments Statement of Action presented to the UNFCCC Poznan

In December 2008 a Climate Leaders Summit was held in Poznan, Poland involving representatives from Federated States and Regional Governments. The Premier of South Australia, as Chair of the 2008 Climate Leaders Summit, committed to a Statement of Action to advance the work of the Montreal Declaration, to which both South Australia and Manitoba are parties. The Statement of Action agreed on at the Poznan Summit therefore provides the framework to progress climate change initiatives internationally. Commitments included:

- Establishment of renewable energy targets
- Improvements to the greenhouse performance of government operations
- Exchange of information about best practice policy and research
- Provision of assistance to at least one region in a developing country
- Exchanges of leaders, practitioners and experts between sub-regional governments
- Make information regarding common systems of measurement for greenhouse gas emissions for regional governments.

Progress has been made against these commitments.

ii. MoU with Manitoba

In 2006 the South Australian Government signed an MoU with the Manitoba Provincial Government in Canada, including the commitment to share information regarding climate change.

The Department of the Premier and Cabinet is finalising four case studies regarding best practice policies aimed at reducing greenhouse gas emissions from the built environment and adapting to climate change. These will facilitate information sharing with Manitoba.

Section 10. Impacts of climate change

This section fulfils the requirement of Section 7(2)(j) and provides information on rates, trends or impacts associated with climate change.

In its 2006 report, the CSIRO has reported on climate conditions and outlined climate projections for 2030 and 2070 for South Australia, including:

- 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.

An executive summary of the 2006 CSIRO report is attached (see Attachment C), and the full report can be accessed at

http://www.climatechange.sa.gov.au/uploads/pdf/SA_CMAR_report_High_resolution.pdf.

A range of other documents include information on the rates, trends or impacts associated with climate change in South Australia. These include:

- *Water for Good* available from <http://www.waterforgood.sa.gov.au/the-plan/>
- The Garnaut Climate Change Review available from <http://www.garnautreview.org.au/index.htm>
- Draft 30 Year Plan for Greater Adelaide available from <http://www.dplg.sa.gov.au/plan4adelaide/html/plan.cfm>.

Section 11. CSIRO assessment (Attachment D)

This section fulfils the requirement of Section 7(5) which requires the Minister for Sustainability and Climate Change in the first of these two yearly reports *'and thereafter every alternate report'* to incorporate a report from the Commonwealth Scientific and Industrial Research Organisation (CSIRO) or an independent entity *'that assesses the extent to which any determination or target made or set under Section 5 is being achieved and, if it appears relevant, should be revised'*.

The South Australian Government also sought advice from the CSIRO regarding requirements of Section 5 (3) (a) to establish the method for calculating the 1990 baseline for the greenhouse gas target embodied in the Act. The CSIRO report provides advice in relation to this issue as well.

The South Australian Government provided the CSIRO with the relevant extracts of the Act, a methodology statement based on how the South Australian Government currently assesses progress towards South Australian Strategic Plan Target 3.5 'Greenhouse gas emissions reduction' and Target 3.12 'Renewable Energy', and the reports provided to the South Australian Government in the preparation of the 2020 renewable energy target announced by the Premier in June 2009.

The CSIRO sub-contracted MacLennan Magasanik Associates (MMA) to provide the expertise and resources required.

MMA is Australia's pre-eminent modeller of energy supply and demand trends. It is regularly commissioned by the Commonwealth and other Australian governments to provide advice on issues such as renewable energy markets and the effect of renewable energy on carbon markets.

The methodology currently used by the South Australian Government to set the 1990 baseline and measure progress towards meeting the legislated greenhouse gas emissions target has been described as *'valid and robust'* by the CSIRO.

The CSIRO do not propose amending the legislated greenhouse gas target as a result of *'considerable estimation risk'* in assessing future progress but notes progress towards the renewable energy targets will *'significantly enhance the probability of achieving the target'*.

The CSIRO have noted discrepancies identified by the South Australian Government in the source data for assessing progress towards renewable energy targets and have recommended monitoring of this discrepancy in the future. Concurring with previous South Australian Government deliberations in assessing progress toward the legislated renewable energy targets the CSIRO has recommended a methodology for assessing progress towards the targets that differs from that used to measure progress towards South Australian Strategic Plan Target 3.12.

The Government will review the CSIRO advice in future reporting against SASP Target 3.12.

The CSIRO state that regardless of whether the recommended methodology is adopted or if the existing methodology is continued, and considering the potential supply of renewable energy projects in South Australia, *'the CSIRO expects that South Australia will achieve its 2014 and 2020 targets'*.