

DEVELOPING A NEW CLIMATE CHANGE STRATEGY FOR SOUTH AUSTRALIA

Reduce consultation paper



INTRODUCTION

South Australia has a strong record on greenhouse gas emissions reduction, but it is important that this momentum continues. The work of advisory bodies such as the Climate Change Authority (CCA) indicates that early action is likely to be less expensive than later action and will ensure we maintain or improve our competitiveness.¹

Most of our emissions reductions will come from changing the way we produce and use energy and making these changes will unlock new opportunities for environmental outcomes, economic growth, prosperity and community health and wellbeing. Our state can achieve a low emissions pathway that allows robust economic growth into the future even as emissions fall.

This paper provides an overview of:

- South Australia' greenhouse gas emissions profile
- Achievements to date in reducing emissions
- Activities and potential opportunities to reduce emissions in specific industry sectors.

Community input is welcomed on any issues raised within this paper, in particular in relation to:

- The suitability of an increased target and whether any new target should be included in the *Climate Change and Greenhouse Emissions Reduction Act*
- Whether the 50% renewable energy target should be legislated
- The value of setting interim reduction targets
- The opportunities for greater energy efficiency at industrial and household levels
- The future policy priorities for the land, forestry and conservation sectors with regard to greenhouse gas abatement
- How to encourage and best incentivise individuals to switch to cleaner forms of transport and which forms would deliver the greatest emissions reduction benefits.

¹ Climate Change Authority, 2015



SOUTH AUSTRALIA'S GREENHOUSE GAS EMISSIONS PROFILE

The Commonwealth Department of the Environment reports South Australia's net greenhouse gas emissions, including emissions associated with electricity flows between the states and territories. The latest figures were published in May 2015 in the *State and Territory Greenhouse Gas Inventories Report for 2012/13*.

South Australia's net greenhouse gas emissions, including land use, land use change and forestry (LULUCF), and emissions associated with electricity flows between the states and territories, were 29.25 mega tonnes (Mt) or 29.25 million tonnes of carbon dioxide equivalent (CO₂e) in 2012/13. The 1989/1990 baseline has been estimated at 32.31 Mt of CO₂e.

Approximately 75% of South Australia's emissions came from the production and consumption of energy (including electricity generation and transport fuels), while agriculture was the next largest emitter, contributing 19% of South Australia's total inventory. The primary industries sector such as forestry and some forms of agricultural land use play an important role in storing carbon, which recorded a net negative emissions figure in 2012/13 (Figure 2). A breakdown of emissions in key sectors is provided in Table 1.

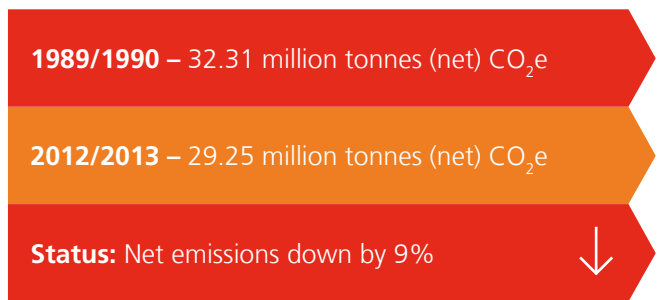


Figure 1 - SA Key Emissions Statistics

SOUTH AUSTRALIAN GREENHOUSE GAS EMISSIONS PROFILE IN 2012/13

South Australia's Greenhouse Gas Emissions Profile source: Department of Environment, 2015

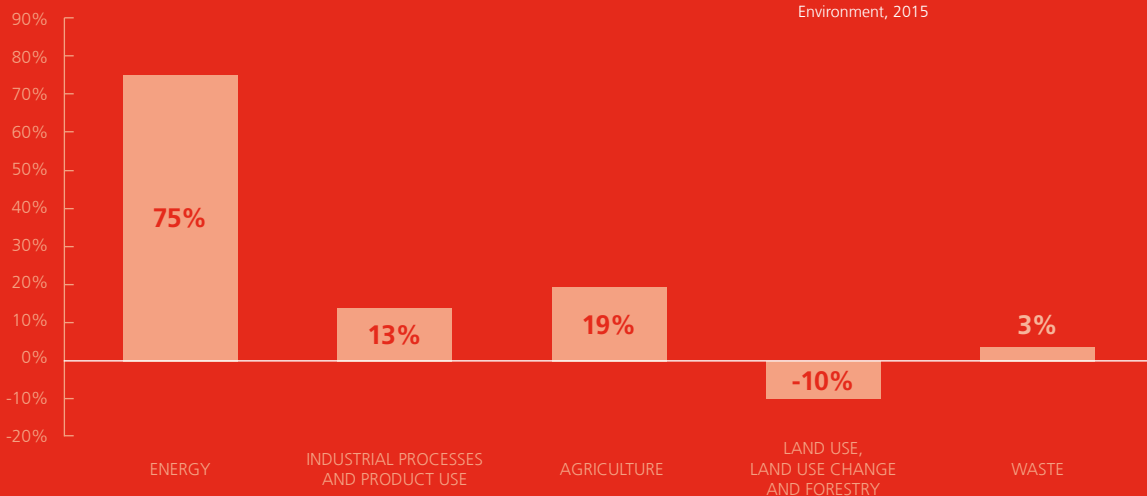


Figure 2 - South Australia's Greenhouse Gas Emissions Profile source: Department of Environment, 2015

Industry	Major Sources	Total 2012/13 (Mt CO2e)	Percentage %	Total 1989/90 (Mt CO2e)	Percentage difference to 1989/90
Energy (fuel consumption and fugitive emissions)	Energy industries Manufacturing and construction Transport	21.8	75	21.5	+1.5%
Industrial Processes	Mineral products (e.g.steel) Cement production Refrigerants	3.7	13	2.8	+32.9%
Agriculture	Livestock Farming practices	5.7	19	6.6	-13.8%
Land use	Afforestation and reforestation Deforestation Forest management Cropland management Grazing land management	-3.0	-10	0	-n/a^
Waste	Solid waste Wastewater	1.0	3.0	1.4	-27.7%
TOTAL (rounded)		29.2	100	32.3	-9.4%

[^]Due to LULUCF switching from an emissions source before 1990 to a significant emission sink since, the percentage decrease is very large in numerical terms and therefore is not included in this table.

Table 1 - Detailed table of South Australia's emissions by sector. Source: Dept. of the Environment, 2015

REDUCING GREENHOUSE GAS EMISSIONS – AIMS AND ACHIEVEMENTS

As highlighted in the *Lead* paper, Australia became a party to the Kyoto Protocol in 2008 and met its target of limiting emissions to 108% of 1990 levels, on average over the Kyoto period 2008-2012. Over that period, Australia’s net emissions averaged 103% of the base year level. South Australia’s emissions averaged 91% of the base year level.

Net emissions peaked in the state during 2005/06 at 35 Mt of CO₂e or approximately 8% above 1990 levels. South Australia’s net greenhouse gas emissions have been reducing since and the latest estimate indicates that between 1989/90 and 2012/13, emissions declined from 32.31 Mt to 29.25 Mt of CO₂e, equating to a net reduction of 9%. During this time South Australia’s Gross State Product (GSP) grew 60% from \$55.2 billion in 1989/90 to \$94 billion in 2012/13, demonstrating that economic growth can be decoupled from growth in greenhouse gas emissions. (Figure 3).

SOUTH AUSTRALIAN ECONOMIC GROWTH AND GREENHOUSE GAS EMISSIONS 1989-90 TO 2012-13

Gross State Product versus GHG emissions (exclusive of emissions associated with electricity interconnector imports and exports) 1989-90 to 2012-13 (Source: Australian Bureau of Statistics, 2014)

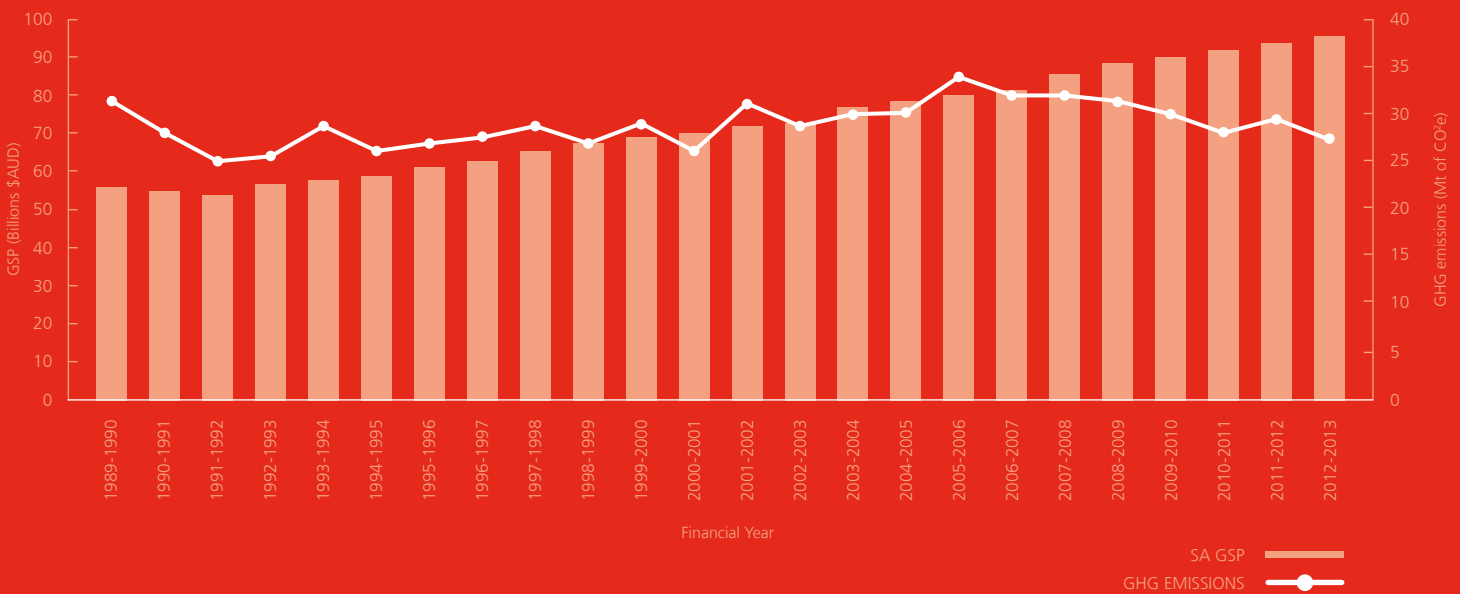


Figure 3 - Gross State Product versus GHG emissions (exclusive of emissions associated with electricity interconnector imports and exports) 1989-90 to 2012-13 (Source: Australian Bureau of Statistics, 2014)



The increase in renewable energy generation continues to contribute to a fall in emissions from the Energy sector (electricity generation). Also contributing to the reduction in emissions is a decline in the Agricultural and Waste sectors. Modern agricultural practices and an increase of waste recycling, including hard waste and waste water recycling, have contributed to this decline. Significant abatement has occurred in the LULUCF sector, which has reversed from an emissions source prior to 1990, to a significant emissions sink up to 2012/13. This can be attributed to an end of broad acre clearance of native vegetation since the 1980s when regulatory restrictions were introduced, and an increase in revegetation and plantation forestry during this time.

A NEW REDUCTION TARGET?

The *Climate Change and Greenhouse Emissions Reduction Act 2007* currently sets a target to reduce greenhouse gas emissions in the state by at least 60% of 1990 levels by the end of 2050. In formal advice to the Minister for Climate Change set out in *South Australia's Climate Change Vision: Pathways to 2050*, the Premier's Climate Change Council (PCCC) recommended that the Government negotiate bipartisan agreement for deep cuts in greenhouse emissions by 2050 and interim greenhouse and renewable energy targets for 2025.

Scientific consensus, including expert advice from the IPCC, advises that limiting global temperature rises to 2 degrees Celsius or less is likely to require a substantial reduction in global energy sector greenhouse gas emissions of as much as 90% or more below 2010 levels between 2040 and 2070.²

Internationally, a number of sub-national Governments have adopted this advice. These include Quebec, California and the Basque Country who recently committed to the Global Climate Leadership Memorandum of Understanding

(Under2MOU) initiative, which requires them to pursue emission reductions consistent with a trajectory of at least 80% below 1990 levels by 2050, and to set a midterm target and pathways to meet that target.

CARBON NEUTRAL ADELAIDE

Carbon Neutral Adelaide is an exciting State Government initiative to make the City of Adelaide (the CBD, North Adelaide and surrounding Park Lands) the world's first carbon neutral city. The plan includes a range of strategies designed to drive further emissions reductions, increase the demand for renewable energy, build the State's green industries, increase resource efficiency, improve waste management and facilitate the transition to cleaner transport modes. Adelaide will become a showcase of successful mitigation initiatives that can be adopted across the State, Australia and internationally. The Government aims to work with the Adelaide City Council (ACC) to achieve this bold ambition. Building on the work undertaken through the Adelaide Green City Sector Agreement (2007-2012) entered into under the *Climate Change and Greenhouse Emissions Reduction Act 2007*, a further agreement between the Government and the ACC is being negotiated.

Both the Government and the ACC have already undertaken a significant amount of work in relation to reducing emissions and adapting to climate change. By working together, we can achieve even greater results and move towards achieving carbon neutrality. Government, however, cannot do this alone. Industry and community participation is crucial to achieve this goal.

Community comment on the proposal and its development is sought as a part of the consultation process around the new Climate Change Strategy. Information about this initiative is included in the *Carbon Neutral Adelaide* paper.

² Intergovernmental Panel on Climate Change, 2014

SOUTH AUSTRALIA'S ELECTRICITY GENERATION CAPACITY IN 2013/14

- Gas (2730 MW)
- Wind (1473 MW)
- Coal (770 MW)
- Diesel 270 MW)
- Hydro (3 MW)
- Solar PV (565 MW and growing)

Source: Renewables SA

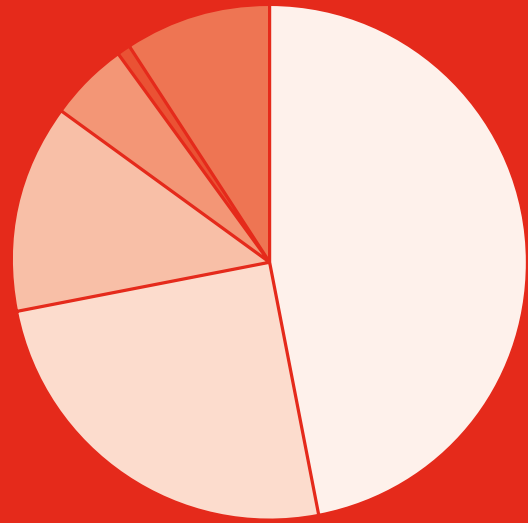


Figure 4 - South Australia's electricity generation capacity in 2013/14 (source: Renewables SA)

SCOPE 2 EMISSION FACTORS FOR ELECTRICITY PURCHASES

Scope 2 emission factors of electricity purchases in states and territories (Department of the Environment, 2014)



Figure 5 - Scope 2 emission factors of electricity purchases in states and territories (Department of the Environment, 2014).

ACTIVITIES AND PRIORITIES IN KEY SECTORS

REDUCING EMISSIONS FROM ELECTRICITY GENERATION

In 2012/13, South Australia emitted 7.71 Mt of CO₂e from the generation and consumption of electricity within the state (including emissions associated with electricity flows between states/territories), approximately 26% of the total emissions inventory².

South Australia has approximately 5,000 MW of installed electricity generation capacity based on coal, gas, diesel and wind sources (Figure 4). The state's generation profile has been changing as a result of a reduction in energy demand (mainly due to improvements in energy efficiency) and growth in renewable energy. Due to its use of relatively less carbon intensive gas-fired generation and high penetration of wind energy and domestic solar photo-voltaic, South Australia's electricity generation and consumption profile is one of the better greenhouse performers in Australia (Figure 5).

Wind energy is now the second largest generation source in the state, and combined with solar PV, accounted for as much as 39% of energy generation within the state in 2013/14 (Figure 6). South Australia now has 41% of Australia's operating wind farm capacity. South Australia also has the highest penetration of rooftop solar in the National Electricity Market (NEM), with approximately 565MW of capacity in 2013/14, and this continues to grow.

Under the *Climate Change and Greenhouse Emissions Reduction Act 2007* South Australia has renewable energy consumption and generation targets of 20% by 2014, and a generation target of 33% by 2020. In 2014, almost 40% of South Australia's electricity grid generation was powered by renewable energy. Having achieved its previous targets the State Government has now set a target of 50% generation by 2025, underpinned by a \$10 billion low carbon energy investment target. Further detailed information is available in the Low Carbon Investment Plan for South Australia strategy paper.

The State Government has taken a strategic approach to attracting this investment capitalising on national policy settings such as the national

RENEWABLE ENERGY GROWTH PERCENTAGE OF ELECTRICITY GENERATION

Source: RenewablesSA.

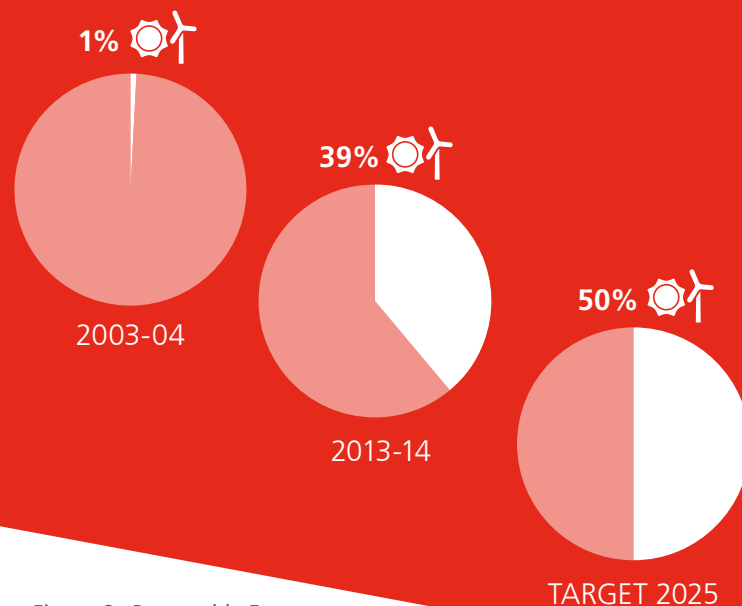


Figure 6 - Renewable Energy Generation Growth in South Australia.

Renewable Energy Target (RET) by being an early mover and putting in place the most supportive regulatory frameworks for renewable energy development in Australia.

South Australia was the first Australian jurisdiction to provide a premium feed-in tariff mechanism to support the installation of solar photovoltaic systems. This scheme commenced on 1 July 2008 and, whilst it is now closed to new entrants, it was an important stimulus for the sector with 1 in 4 South Australian households now having solar photovoltaic systems. South Australia was also the first jurisdiction in Australia to introduce planning guidelines for wind farms in 2003.

Over the coming years, it is likely that the composition of our energy sector will continue to change, particularly as the coal-fired power stations at Port Augusta, operated by Alinta Energy, are scheduled to close by 2017.

Discussions have taken place in recent years about the potential for new technologies to replace the electricity generation infrastructure at Port Augusta. For example, Alinta Energy is in the final stages of a feasibility study into a proposal to build a solar thermal power station. However, the discussion about replacing large scale electricity generation infrastructure is occurring within a landscape of changing energy demand patterns.



From a South Australian perspective, sufficient local baseload generation capacity and integration with the National Electricity Market via the Heywood Interconnector in Victoria could conceivably service electricity requirements for the short to medium term, along with a further expansion in renewable energy generation and penetration of alternative centralised power generation technologies. In either scenario, the South Australian Government's aspirational target of 50% renewable energy generation by 2025 is likely to facilitate further expansion in zero carbon renewable energy and will continue to reduce the greenhouse gas intensity of South Australia's electricity network. This includes attracting investment, including wind farms, in the development pipeline and continued expansion of rooftop solar, supported by the RET.

The Low Carbon Investment Plan for South Australia strategy paper is intended to stimulate discussion about the strategies and initiatives that will allow us to achieve the South Australian Government's investment target of \$10 billion in low carbon generation investment by 2025.

Stakeholders are encouraged to also provide feedback via the consultation process being led by the Department of State Development, which will run in parallel with the Climate Change Strategy consultation. Due to the climate change benefits associated with low carbon investment and development, and on the basis of what has been discussed in this paper, the outcomes of the consultation processes are likely to influence the direction of both strategies.

REDUCING TRANSPORT EMISSIONS

Reducing greenhouse gas emissions from transport involves transitioning to technologies that improve emission standards and efficiency, fuel switching to low/zero emission sources and incentivising the necessary lifestyle adjustments to include more walking, cycling and use of public transport.

South Australia emitted 6.6 megatonnes of CO₂e from its transport sector in 2013, equating to approximately 23% of its total inventory (Australian Government Department of the Environment, 2015). Making reductions requires a broad set of policies and initiatives that facilitate the transition toward alternative means of transport or alternative, less carbon intensive transport fuels.

The Government is working to encourage the uptake of hybrid electric and plug-in electric vehicles for both government fleet and private use, among other low emission alternatives such as biofuels and gaseous fuels via its *Low Emission Vehicle Strategy 2012-16 (LEVS)*, which seeks to identify and remove barriers to their uptake.

In addition, the *30 Year Plan for Greater Adelaide* and the *Integrated Land Use Plan* aim to increase urban infill and density, increase public transport usage and ensure new or refurbished developments are pedestrian and cycle friendly.

Passenger vehicles

The number of passenger vehicles on our roads increases annually. In 2014, there was 1.3 million registered vehicles in South Australia, a 9.7% rise since 2009 (Australian Bureau of Statistics, 2014). Consequently, reducing emissions in passenger vehicle use in the medium to long term will be an important factor.

Hybrid, electric and even hydrogen vehicles are progressively being released into the car market. Factors such as affordability, technological advancements (eg speed to recharge or refuel, and range) and availability of infrastructure (eg charging and refuelling stations) will enable viable alternatives to conventional vehicles to successfully penetrate the market. The Government has supported the installation of seven electric vehicle charging stations throughout the central business district (CBD) and metropolitan Adelaide through a number of small grants. In addition, a further six charging points have been installed on Kangaroo Island, and three Nissan LEAF electric vehicles are being trialled in a semi-remote location.

The Carbon Neutral Adelaide initiative will look at opportunities to increase the uptake of low/zero emission source vehicles within the city. The Adelaide City Council, in partnership with the South Australian Government, has recently announced that the expansion of the *Sustainable*

City Incentives Scheme would include grants of up to \$500 for the installation of an electric vehicle charging controller by businesses and residents within the City of Adelaide.

Public transport

The South Australian Government is committed to increasing public transport patronage through measures designed to improve customer experience and provide greater services, and is continuing to investigate new ways to achieve this. For example, the Metrocard system, real time passenger information system and the introduction of new fare options were introduced to improve user experience of public transport and encourage greater patronage. In addition, new and expanded Park 'n' Ride facilities at Klemzig, Tea Tree Plaza, Clovelly Park and Mount Barker, and additional peak bus services along the O-Bahn and to Mount Barker have facilitated greater numbers of passengers choosing to commute to the CBD via public transport.

While greater patronage of public transport has a positive greenhouse gas emissions outcome due to reducing private vehicle use, South Australia has been able to introduce alternative, less carbon intensive fuels into its bus fleet to the extent that 20% of buses in the Adelaide Metro fleet use Compressed Natural Gas (CNG), while 48% use B20 and 32% use B5 biodiesel blends. In addition, 33% are Euro5 EEV compliant. The Government is also trialling two diesel-electric hybrid buses, which improve fuel efficiency by 20-30%.

Electrification of the Seaford railway line has been undertaken and will be extended to the remainder of the metropolitan rail network. Electrification reduces emissions associated with operation of the trains in multiple ways. For instance, the switching of liquid fuel to the South Australian electricity grid is a switch to a less carbon intensive source due to the penetration of renewable energy in the grid. In addition, trains are not required to travel to the rail depot located at Dry Creek for re-fuelling, and do not need to carry fuel, making them lighter and more efficient. Regenerative braking also captures the energy generated by braking and makes it available for other trains, thereby reducing the overall power consumption on the network.

Government vehicles

Under the Low Emissions Vehicle Strategy (LEVS), the South Australian Government has been active in trialling electric vehicles for their suitability in the Government Fleet. The LEVS sets a target of a 10% reduction in emissions intensity per km for the government's light vehicle fleet by 2014/15 (based on 2009/10 levels). This equates to a target of 241.8g/km and entails a reduction of 26.9g/km. This target is on track to be met.

Promoting cycling and walking

There is an emerging culture of cycling in South Australia. In 2014, nearly 17% of South Australians (about 282,000 people) rode a bike for some purpose in a typical week. Online resources such as *Cycleinstead*, an interactive cycle journey planner, assist riders to find the most efficient and safe bike routes possible. The key to further increasing the uptake of cycling as a transportation mode is improving safety for cyclists. The Government will continue to invest in and encourage cycling and walking through a variety of initiatives, including the development of pedestrian and cycling-friendly infrastructure and schemes that facilitate greater uptake of cycling as a means of transport.

Adelaide's network of bicycle lanes and paths has been extended from around 480 kilometres in 2002 to approximately 1,120 kilometres in 2013. Use of the Mike Turtur bikeway, a key piece of cycling infrastructure connecting Glenelg to the Adelaide CBD, has grown by 66% to an average of 570 persons per week in 2012. In the summer months this figure reaches 1000. It is now the busiest cycling route in Adelaide, surpassing the River Torrens Linear Park path in Hackney.

Use of the Mike Turtur bikeway linking Glenelg and the CBD has grown by 66%, to an average of 570 persons per week in 2012. In the summer months this figure reaches 1000. The Norwood-Magill Bicycle Boulevard also has facilitated greater cycling numbers, primarily through a series of safety improvements such as lane upgrades, crossing infrastructure and traffic calming measures such as raised junction platforms, and changes to roundabout designs.

Greenways are an attractive multi-use (walking and cycling) infrastructure that provide a safe, direct, continuous and attractive link between two locations. For example, the Outer Harbor Greenway, provides a link from the Adelaide CBD to Port Adelaide and the Lefevre Peninsula. The 20km route begins at the River Torrens Linear Park in the Adelaide Park Lands and connects to Coast Park at Outer Harbor. It generally follows local streets fronting the Outer Harbor railway line, diverging from the railway through Port Adelaide across the Birkenhead Bridge. The Greenway is currently open for use from Port Adelaide to South Road. An interim route is marked from South Road to the City.

REDUCING EMISSIONS FROM THE BUILT ENVIRONMENT

Over 20% of emissions in South Australia come from buildings, highlighting the importance of promoting cost effective energy efficiency initiatives and increased use of renewable energy.

Energy efficiency

The Government introduced water heater efficiency standards in 2008, promoting use of gas, solar and heat pump systems. It also introduced the Residential Energy Efficiency Scheme (REES) in 2009 and adopted a 6 star energy efficiency rating for new housing. The premium solar feed in tariff, the first to be introduced in Australia, has significantly increased solar photovoltaic systems on rooftops, with 1 in 4 households having a system installed.

In many cases there are now numerous advantages of implementing energy efficiency initiatives within the industrial and commercial sectors. Modern and energy efficient equipment, energy efficient lighting (such as LEDs) and improved thermal design of buildings all contribute to reduced energy use with the additional benefits of reduced operating and maintenance costs. Adding value to business operations is not only essential to remain competitive, it can also be undertaken without any compromise to productivity.

Building Upgrade Finance

Building Upgrade Finance (BUF) is a voluntary mechanism that helps building owners access finance to improve the energy, water and environmental efficiency of existing commercial buildings. The Government moved to legislate for this mechanism in early 2015 and it is expected to be operational later this financial year. \$1.9 million has been committed to the scheme over four years.

Government buildings

The State Government has a target to increase the overall energy efficiency of its buildings by 30% by 2020, compared to 2002/2003. This target is on track to be met. The *Government Buildings Energy Strategy 2013-20* sets out a range of actions for government agencies to improve energy management. In addition, the the Energy Efficiency Investment Framework (EEIF) allows agencies to retain cost savings associated with an energy efficiency project beyond the initial implementation cost.

All new government lease negotiations with an area greater than 2,000m² in the Adelaide CBD seek to achieve and maintain a 5 Star National Australian Built Environment Rating System (NABERS) tenancy rating where financially viable and NABERS ratings are also considered as part of all lease renewals and sustainability upgrade works. In 2013-14, 77% of

the CBD leased and owned office accommodation portfolio had a NABERS rating of 4 stars or above. This equates to a 30% improvement compared to the previous financial year.

Energy efficiency improvements of 15-20% have been achieved in some Government buildings; Roma Mitchell House, for example, has reduced energy consumption by 22%. In addition, the Department of Planning, Transport and Infrastructure has assisted with the delivery of various '5 Star Green Star' equivalent building redevelopments, including Modbury Hospital, Berri General Country Hospital and Tonsley Park Sustainable Industries Education Centre.

PRIMARY INDUSTRIES

Agriculture, land use and forestry

South Australia emitted 5.7 Mt of CO₂e from agriculture in 2013, equating to approximately 19% of the State inventory. However, 3 Mt of CO₂e were abated within the land use sector, including through forestry and revegetation (Australian Government Department of the Environment, 2015).

Primary industries have an important role to play to reduce and sequester greenhouse gas emissions. Forestry and carbon plantings sequester carbon dioxide from the atmosphere as part of photosynthesis, storing carbon in wood and within the soil. An increase in plantings, particularly native vegetation, also improves biodiversity, provides shade and habitat and can reduce impacts associated with pest species affecting crops.

Gases produced from agricultural waste can be captured and used for heating and generation of electricity to supply farm operations or feed into the electricity grid, significantly reducing greenhouse gas emissions (methane). Use of bio-gas is quite common practice particularly in Europe and has great potential in Australia to improve agricultural productivity.

Amelioration techniques in agricultural soils and croplands have significant potential to sequester and store carbon within the subsoil. Trials are already underway within South Australia through the Primary Industries and Regions of SA (PIRSA) New Horizons Program to demonstrate this method (see figure 7).

PIRSA NEW HORIZONS PROGRAM

The New Horizons program aims to improve poor quality soils and increase broad acre crops and pasture production.

Recent work has shown that placing clay, nutrients and organic matter in the soil profile can remove some of these constraints.

The adoption of these new practices would represent a new revolution in farm management, from managing the top ten centimetres to managing the top fifty centimetres of soil. By modifying the top soil it is expected that root growth, plant vigour and water use efficiency is improved.

This will lead to increased fertility, long term storage of carbon, reduced soil erosion risk, improved water use efficiency and hence a large increase in productivity and profitability for farmers (PIRSA, 2015).

Figure 7 - Profile of PIRSA New Horizons Program supporting innovation and emissions reduction opportunities within primary industries.

Use of alternate cropping regimes within seasons can also improve farm productivity. For instance traditional food producing crops such as wheat and canola can be grown in the winter months and non-food producing nitrogen fixing crops grown in summer producing a feedstock to develop bio-fuels. The advantage of this is increased potential for agricultural income, reduced emissions from use of bio-fuels and improved soil quality and reduced topsoil loss.

Livestock research is enabling scientists and farmers to measure methane emissions and find alternate diets that enable a reduction of methane produced by livestock. Changes to herd management and regimes can also reduce methane emissions, whilst improving quality of soil and pasture, without compromising on productivity and income.

Opportunities exist under the Carbon Farming Initiative (CFI) as part of the Emissions Reduction Fund through approved methodologies. Carbon markets are also expected to expand in future as targets to reduce greenhouse gas emissions increase, with consequent growth in demand for carbon credits. This will enable land operators to find new sources of income and improve farm productivity and emissions reductions. Ongoing research and innovation within the sector will also enable improved on ground methods and innovation within the sector.

The State Government's *Low Carbon Investment Plan for South Australia* strategy paper outlines the ambition to develop a bio-energy roadmap for the state to support sustainable practices and clean energy production within primary industries.

Bolivar WWTP also harvests methane gases produced from wastewater which is captured and used to generate electricity to power local site operations. The energy generators have the capability of supplying up to 85% of the energy required to operate the whole facility. This has enabled SA Water to minimise costs of site operations, increase renewable energy and reduce greenhouse gas emissions produced by the site.

Figure 8 - Bolivar Waste Water Treatment Plant WWTP

WASTE

South Australia emitted 1 Mt of CO₂e from the waste sector in 2013, equating to approximately 3% of the state inventory.

South Australia's recycling efforts are among the world's best – and the State now achieves a resource recovery rate of more than 77%. South Australia has achieved a 25% reduction of waste to landfill since 2002/03. By diverting waste from landfill, less greenhouse gas emissions are released from landfill sites when waste decomposes.

Waste reduction and resource efficiency is an important area of focus in reducing greenhouse gas emissions in South Australia. A successful initiative in this sector has been the establishment of Zero Waste SA. The agency has invested over \$83 million on innovative, effective and well-targeted projects, helping councils, businesses and the community to reduce, recover, reuse and recycle.

Zero Waste has now expanded its responsibilities and has been renamed Green Industries and will continue to progress waste innovation, resource recovery and recycling within South Australia.

A number of landfill gas capture facilities exist in South Australia that produce electricity to self-supply operating facilities and also feed into the grid, reducing greenhouse gas emissions produced at landfill sites.

South Australia also leads the nation in waste water recycling. Over 25% of Adelaide's wastewater produced from sewer networks is collected, treated and reused. Reuse water produced by Adelaide's three major wastewater treatment plants is used to irrigate market gardens north of the city, vineyards south of the city and the Park Lands surrounding the Adelaide CBD. Further information on the Bolivar Waste Water Treatment Plant (WTP) is in Figure 8.

NATIONAL EMISSIONS REDUCTION OPPORTUNITIES

Additional opportunities associated with greenhouse gas mitigation exist at a national level. In particular, the Commonwealth's Direct Action Plan, through its \$2.55 billion Emissions Reduction Fund (ERF), provides opportunities to attract federal funding for industry and government level energy efficiency and mitigation projects which has a dual benefit of costs optimisation. The ERF operates as a reverse-auction, providing finance to those who make bids demonstrating lowest cost abatement. The CFI established under the previous Federal Government in 2011, has been incorporated into the ERF.

In its first auction, held in April 2015, a majority of projects supported were associated land sector based sequestration, including avoided deforestation, carbon plantings and landfill gas capture. Average price per tonne of abatement was about \$14 per tonne. Expert analysis indicates future auction projects are expected to increase for commercial energy efficiency and industrial sector related projects.³

South Australia has the potential to increase its participation under the CFI, including carbon plantings, increased use of biogas and soil carbon capture. Opportunities also exist for expansion of commercial energy efficiency related projects for business, industry and local government.

The state government is seeking to ensure the ERF provides opportunities for South Australia, to maximise Federal Government support and achieve lowest cost abatement outcomes. It is also important that our state is not overlooked or disadvantaged because of emissions reduction progress which has already been achieved prior to the scheme.

South Australia will also continue to capitalise on attracting renewable energy investment under the Federal Renewable Energy Target (RET) as part of the \$10 Billion Low Carbon Investment Plan.



³ Reputex – ERF Market Outlook May 2015

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GLOSSARY & ACRONYMS

BIODIESEL

A form of diesel fuel manufactured from vegetable oils, animal fats or recycled natural greases.

BIODIVERSITY

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

BIO-ENERGY

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

CARBON DIOXIDE EQUIVALENT (CO₂E)

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

CARBON FARMING INITIATIVE (CFI)

An Australian Government initiative that allows farmers and land managers to earn carbon credits by storing carbon or reducing greenhouse gas emissions on the land.

CARBON NEUTRAL

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

CARBON NEUTRAL ADELAIDE

A South Australian Government initiative to enable the City of Adelaide to become a carbon neutral city.

CARBON OFFSETS

Carbon offsets are units which represent abatement of greenhouse gas emissions. Abatement is achieved by either reducing or avoiding emissions, or removing carbon from the atmosphere and storing it (for example in soil or trees).

Offsets are usually purchased by individuals or companies and used to cancel out or 'offset' the emissions they generate during their normal course of business or day-to-day life, for example, by consuming electricity or catching a plane.

CARBON SEQUESTRATION

The term describing processes that remove carbon from the atmosphere.

CLIMATE CHANGE

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

CLIMATE CHANGE AUTHORITY (CCA)

An Australian independent Authority who provides expert advice on Australian Government climate change mitigation initiatives.

CLIMATE CHANGE AND GREENHOUSE EMISSIONS REDUCTION ACT 2007

South Australian legislation to provide for measures to address climate change by setting targets to achieve a reduction in greenhouse gas emissions within the State; to promote the use of renewable sources of energy; to promote business and community understanding about issues surrounding climate change and to facilitate the development of policies and programs to address climate change.

EMISSIONS REDUCTION TARGET

A measurable target to reduce the amount of greenhouse gas emissions released.

EMISSIONS REDUCTION FUND (ERF)

The Emissions Reduction Fund is an initiative of the Australian Government's Direct Action Plan on climate change. The fund is purposed to purchase lowest cost emissions abatement from various sectors across the economy.

ENERGY EFFICIENCY

The ratio of energy required to produce a certain level of service such as a kilowatt per unit of heat or light.

FEED-IN TARIFF

A payment made to household or businesses that generate their own electricity through means such as solar photovoltaic panels.

GREENHOUSE GAS EMISSIONS

The release of greenhouse gases into the atmosphere. A greenhouse gas is an atmospheric gas that absorbs and emits infrared or heat radiation, giving rise to the greenhouse effect. Typical greenhouse gases include carbon dioxide, methane, nitrous oxide and refrigerants.

GREENHOUSE GAS EMISSIONS BASELINE

The starting measurement by which future measurements of greenhouse gases are based on.

GROSS STATE PRODUCT (GSP)

The total value of goods produced and services provided in a subnational jurisdiction during one year.

HYBRID ELECTRIC/PLUG-IN ELECTRIC VEHICLES

A hybrid electric vehicle combines a conventional internal combustion engine (found in conventional motor vehicles) with an electric power train, which generates electricity through the operation of the vehicle and stores this energy in a battery. This enables the vehicle to be powered by both liquid fuel and electricity.

A plug-in electric vehicle obtains its energy from a battery pack, which can be recharged from an external source of electricity

HYDROGEN VEHICLES

Vehicles which use hydrogen as a fuel source as opposed to petroleum. Hydrogen vehicles convert the chemical energy of hydrogen to mechanical energy through burning hydrogen in an internal combustion engine or by reacting hydrogen with oxygen in a fuel cell.

INTERIM REDUCTION TARGET

Progressive targets established over shorter periods of time to assist in achieving a long term headline emissions reduction target.



Adelaide
Showground

LAND USE, LAND USE CHANGE AND FORESTRY (LULUCF)

A sector of a greenhouse gas inventory that covers emissions and removals of greenhouse gases resulting from direct human-induced land use, changes in land use and forestry activities.

LOW CARBON ECONOMY

An economy based on low carbon power sources that therefore has a minimal output of greenhouse gas (GHG) emissions.

LOW CARBON INVESTMENT PLAN

A South Australian Government initiative towards \$10 billion investment in low carbon energy generation by 2025 and 50 per cent of electricity production by renewable energy by 2025.

MEGATONNE (MT)

A unit of measurement, expressed as a million tonnes.

NATIONAL AUSTRALIAN BUILT ENVIRONMENT RATING SYSTEM (NABERS)

The national rating system that measures the environmental performance of Australian buildings, tenancies and homes.

PREMIER'S CLIMATE CHANGE COUNCIL (PCCC)

The Premier's Climate Change Council was established under the *Climate Change and Greenhouse Emissions Reduction Act 2007*. The primary function of the Council is to provide independent advice to the Minister responsible for Climate Change about matters associated with reducing greenhouse gas emissions and adapting to climate change.

RENEWABLE ENERGY

Energy that comes from resources which are naturally replenished on a human timescale such as sunlight, wind, rain, tides, waves, and geothermal heat.

RENEWABLE ENERGY TARGET (RET)

A policy which mandates a percentage of the electricity purchased by a retailer to be sourced from renewable energy generation. A generator is provided with certificates by the Clean Energy Regulator, which are 'surrendered' upon the sale of this energy. The intent of the RET is to encourage investment into new renewable energy sources.

SOLAR ENERGY

The harnessing of the radiant light and heat from the sun using a range of technologies such as photovoltaic panels or thermal power generation in order to produce electricity.

UNDER2MOU

The Subnational Global Climate Leadership Memorandum of Understanding is known as the Under 2 MOU in reference to:

- The goal of limiting warming to below 2°C, which Intergovernmental Panel on Climate Change (IPCC) scientists say is needed to avoid dangerous climate change.
- The MOU's shared goal of limiting greenhouse gas emissions to 2 tonnes per capita, or 80-95% below 1990 level by 2050.



www.environment.sa.gov.au/climatechange