



SOUTH AUSTRALIA IN A CHANGING CLIMATE:  
A BLUEPRINT FOR A SUSTAINABLE FUTURE

# ENERGY IN A CHANGING CLIMATE

## CCSA'S ENERGY VISION:

CCSA envisages a future where South Australia leads the nation and is at the forefront of international activity with our holistic adoption of sustainability initiatives. This will involve the development of an overarching sustainability master plan setting out a transition pathway to a low-carbon economy. Renewable energy, energy efficiency, Transport Oriented Developments (TODs) and localised food production are all integral to this and will lead to improvements across the triple bottom line of environment, economy and society.

**Energy:** The capacity or power to do work, such as the capacity to move an object (of a given mass) by the application of force. Energy can exist in a variety of forms, such as electrical, mechanical, chemical, thermal, or nuclear, and can be transformed from one form to another. It is measured by the amount of work done, usually in joules or watts.

### **Current energy trends**

Energy underpins nearly every aspect of our modern industrialised and technological society. Currently nearly all of our energy requirements for the production of electricity, goods and services and for all our transport needs come from non-renewable and greenhouse gas (GHG) intensive fossil fuels such as coal, oil and gas<sup>48</sup>.

Energy use in South Australia is growing, driven by growth in the economy, population and energy dependence of our lifestyles<sup>49</sup>. In the 27 years from 1974 to 2001 total energy consumption in Australia grew on average by 2.5% per annum. The Energy Efficiency and Greenhouse Working Group estimates energy consumption will continue to grow at approximately 2.3% per annum in the short term, and 2.1% in the longer term to 2020 representing a significant increase in energy consumption and corresponding greenhouse gas emissions<sup>50</sup>.

The residential sector is a key driver of South Australia's greenhouse gas emissions. While our population increased by 9.4% from 1990 to 2006, residential emissions increased by an alarming 28% over the same period<sup>51</sup>. Residential emissions made up a quarter of the state's total net emissions in 2006. South Australia faces the daunting challenge to fulfil both its Strategic Plan objectives of accommodating an estimated additional 390 000 households by 2050<sup>52</sup>, whilst simultaneously more than halving 1990 greenhouse gas emission levels.

An increase in population will also see increased pressures on the transport sector. 'Business as usual' would imply a substantial increase in vehicles numbers, fuel consumption and overall kilometres driven. The challenge for South Australia (with the second-oldest vehicle fleet in Australia) will be to make substantial reductions in the energy intensity of the transport sector largely through integrated planning, including (TODs), increasing the share of public and active transport (walking and cycling), improving the fuel efficiency of vehicles (including a substantial shift towards low and zero-emission vehicles) and shifting freight from road to rail.



The transition to a renewably powered future is both urgent and essential. Aiming for a carbon neutral economy will create many opportunities – provided we have the political will and foresight to take advantage of those opportunities.

In 2007/08, gas-fired generation supplied approximately 55% of the state's electricity needs, a relatively high proportion, while coal and wind generation supplied around 34% and 10% respectively. Since 2002, levels of wind generation in the South Australia have increased significantly. South Australia has 53% of the nation's wind farms and 37% of its grid-connected solar panels. In 2007/08, wind generation accounted more than 90% of the state's renewable electricity generation<sup>53</sup>.

South Australia's stationary energy generation has a lower greenhouse intensity than that of other mainland Australian states. The proportion of our state's electricity sourced from renewable resources has increased from less than 1% in 2002 to 10% in 2007/08. To maintain this level throughout the major expansion proposed for the mining and resources sectors will require the mining industry to make a strong commitment to utilising renewable energy.

In addition to energy generation, the trends of demand need to be reviewed. Energy efficiency is the 'low-hanging fruit' in the suite of responses to climate change and can achieve substantial reductions in emissions

by simple, common sense steps and behaviour changes. Retrofitting insulation, solar hot water services and other initiatives such as shading, pergolas and verandas can make substantial inroads into reducing the demand for energy and our corresponding emissions.

#### Energy in a changing climate

In 2003, the CSIRO undertook some climate change modelling for South Australia. It predicted that by 2070, the average number of days over 40°C each year would increase from 1 to 2-11<sup>54</sup>. In 2009 we are already moving into the higher end of that range. In 2008 a new record of 15 consecutive days over 35°C in Adelaide was set, three of which were over 40°C.

Whilst natural variations in climate have occurred in the past, human activities over the last 100 years, in particular the burning of fossil fuels, have caused a rapid increase in carbon dioxide and other greenhouse gases such as methane and nitrous oxide in the Earth's atmosphere. Before the Industrial Age of the 19th century, these gases had remained at near stable concentrations for thousands of years. The international scientific community, including the Intergovernmental Panel on Climate Change (IPCC) has acknowledged the unequivocal link between the increasing atmospheric concentration of carbon dioxide and other gases and changes in the global climate.

The latest evidence highlights climate change is happening dramatically faster than even the best estimates of only a few years ago could have predicted.

#### What are the key energy issues in South Australia?

The fundamental issue around energy use in South Australia is the need to de-couple energy production and use, and greenhouse gas emissions. The accelerating demand for energy is a major concern, as no matter how efficient we become, our ecological footprint (and contribution towards climate change) will continue to rise until we act to reduce it.

Greenhouse gas emissions from the energy sector comprise 70% of Australia's greenhouse inventory. Transport contributes 20% of that figure (14% of the national total), with stationary applications contributing the rest<sup>56</sup>. The majority – over one-third of Australia's emissions – comes from burning fossil fuels to generate electricity. In addition, the production and use of fossil fuels creates numerous environmental impacts associated with the mining, extraction, transport, use and disposal of waste products.

Transport consumes nearly 25% of the state's primary energy resources. This includes domestic, commercial and industrial transport of people and goods, foodstuffs, mineral ores and other bulk commodities<sup>57</sup>. Unfortunately as urban areas have continued to sprawl world-wide, dependence on motor vehicles as a primary sources of transportation has increased. Australia is no exception to this global trend. We need to tackle our car-dominated culture head-on if we are to seriously address the sprawl, pollution and destruction that accompanies it. A holistic approach is needed that incorporates integrated land use planning such as Transit Oriented Developments (TODs) that reduce the need for cars altogether, along with mode switching to cycling, walking and public transport, and the development of alternative-fuelled, zero-and low-emission vehicles. For the residential sector opportunities in both developing new buildings and retrofitting existing buildings are bound to improve efficiency of the industry, while at the same time achieving environmental benefits.



Australia has a very energy-intensive economy and, for many people, it is difficult to imagine the future where relatively cheap and abundant fossil fuelled energy is not available.

The mining industry is a significant economic contributor to South Australia. Further expansion of the industry is likely to considerably increase both demand on the state's energy supplies and production of greenhouse gas (GHG) emissions, unless urgent action is taken. The 2008 State of the Environment report determined a minimum of 20% renewable energy for all new mining developments will be required to ensure that the state's renewable energy targets remain on track. Large scale projects, such as the major expansion planned for Olympic Dam mine at Roxby Downs, will result in a massive increase in net emissions. This will make achieving South Australia's Strategic Plan targets for greenhouse gas emissions difficult, if not impossible to achieve without major investments in renewable energy generation across the board.



Many mining and other companies worldwide have begun looking at 'carbon offsets' to reduce their greenhouse gas emissions. The idea is that companies establish or fund projects that reduce carbon emissions elsewhere, and count those reductions against their own emissions as a counter-balance to their own ecological footprint. Poor landscape-based offset projects, (such as monoculture forestry plantations of exotic species) can lead to ecological damage and displacement and dislocation within local communities.

We believe there may be some value in offset projects that are truly best-practice in environmental and social terms. However they should never be a substitute for operating as energy efficiently as possible (utilising renewable energy, energy efficiency, co-generation, etc), and should be used only after these options have all been exhausted. For offsets to be an effective tool for environmental protection they must be closely regulated and monitored to ensure they operate effectively, appropriately and sensitively in all locations. Offsets cannot simply be a 'license to trash'.

The best possible use of such projects is to remove carbon already in the atmosphere from past polluting activity. This will be essential if we are ever to return to safer carbon levels below 350 ppm.



### Changing the future - new ways forward

To date South Australia has installed more wind power and more rooftop solar electricity than any other state and has undertaken most of the country's geothermal exploration activity. Doing more than most of the country however, does not necessarily mean that we are doing enough! The unabated growth in demand for energy is simply unsustainable. Whilst continuing to develop our renewable energy industry to meet this demand is important, we must also address the demand itself.

Ultimately, reducing energy consumption across all sectors of the community is the key component to reducing the environmental impact of energy use in South Australia and accordingly our contribution to climate change.

A hotter, drier climate will directly influence our energy needs - a 'business as usual' approach would see ever-increasing demand for air-conditioning, for instance. Ongoing warming and reduced rainfall has led to the fast-tracking of energy-intensive technological fixes like desalination plants. This is at odds however with the need to reduce our energy consumption, especially in light of planned population growth and further demands on infrastructure and natural resources.



The legislative and regulatory frameworks developed for the energy market at a federal level, such as the proposed Carbon Pollution Reduction Scheme (CPRS) and the Mandatory Renewable Energy Target (MRET), will implement our international obligations under the United Nations Framework Convention on Climate Change (UNFCCC, or as it is more commonly known, the Kyoto Protocol), to direct the extent and pace of change in the energy sector in Australia.

Not yet on the public radar is the issue of 'Peak Oil' - the point at which the availability of extractable oil and gas starts its inexorable decline. Whilst this will not see us 'run out of oil' in the immediate short term, the medium to long-term consequences of this will be profound and far reaching. Geo-political instability, social unrest and increasing environmental degradation are all likely.

CCSA has called for an Oil Vulnerability Assessment and a Peak Oil Action Plan to be developed to ensure that South Australia is prepared for the worst, and so that we take advantage of the challenges and opportunities to reshape and remake our societies in a more sustainable manner.

The role of government is critical in this transition phase, but so too is the need for communities and individuals to change to more sustainable lifestyles and behaviours. We can all reduce energy use through our everyday lifestyle choices. We can insulate our houses, install a solar hot water heater or retrofit our homes with curtains, blinds or a pergola. We can catch more public transport, cycle or walk, purchase energy-efficient vehicles and home appliances, buy locally produced food and products and reduce our meat consumption to reduce our overall ecological footprint. We can purchase our electricity from renewable sources, using accredited GreenPower which helps drive future investment in renewable and low emission technologies. Most energy companies now offer these options, or alternatively, households can invest in solar photovoltaic panels.

Businesses and public utilities are also major energy consumers and attention needs to be paid to their consumption, efficiency and waste. Adopting a 'greener' lifestyle can also influence the development of green industry and green jobs. For example, an increased demand for energy-efficient goods and services expands the market for these products in South Australia and across the nation. Demand from the public opens up new opportunities for research, development and commercialisation of energy conscious products, with resulting economic benefits, including a financial benefit of using and paying for less energy.

Energy is without doubt one of our great sustainability challenges - a workable solution must address our social, economic and environmental needs. One of the key questions is surely whether or not we have fully exploited the 'no regrets' opportunities - those solutions which provide not merely a 'compromise we can live with' between the three needs, but rather demonstrable progress on each. Often, in the problem, lies the solution.

# RECOMMENDATIONS

## Emissions reduction targets and green jobs

44. To ensure South Australia's greenhouse reduction targets remain meaningful in the context of the federal cap-and-trade approach, and the state has a capacity to adapt to climate change, the state government needs to lobby the federal government to:

- legislate far higher national greenhouse reduction targets. CCSA calls for a 90% cut of 1990 emissions by 2050 and 40-50% by 2020, with a regular review mechanism
- ensure voluntary action to reduce emissions reduces the cap, and does not free up permits for polluters
- ensure that permit allocations and compensation arrangements do not inhibit the necessary transformation to a low-carbon economy
- ensure that a substantial proportion of revenue from permits funds the massive adaptation effort required by the state.

45. South Australia should amend the *Climate Change and Greenhouse Emissions Reductions Act 2007* so that:

- its emissions reduction targets match the national targets called for above
- a mechanism to review targets regularly to keep pace with the best available science is incorporated
- emission reductions by sectors are mandated instead of voluntary, with associated penalty provisions.

45.1. The state government's carbon accounting methodology must be transparent, valid and consistent with best practice schemes used worldwide (e.g. the World Business Council for Sustainable Development standards or the World Resources Institute Greenhouse Gas Protocols).

45.2. Any offsets achieved through forestry or other landscape projects must meet best practice standards (e.g. the Climate, Community & Biodiversity (CCB) Standards) to achieve multiple benefits and prevent projects with negative environmental or social impacts.

46. The South Australian Government, industry and the education sector should work together to create a Centre of Excellence that includes renewable energy, energy efficiency research and development, greenhouse accounting and vocational training for 'green jobs'.



## Education and information to promote behaviour change

47. The state government should lobby for higher performance standards and product labelling at the national level, and fund state-based community programs that promote sustainable living choices within government, business and the community.

47.1. The state government should work co-operatively with the federal government to expand the Minimum Energy Performance Standards scheme to lighting and all electrical appliances, and progressively raise the standard required, including for standby mode.

47.2. Agricultural producers need incentives and education programs to shift to more sustainable agricultural techniques, such as organic farming, that reduce dependence on petrochemical inputs. Similar assistance to boost local food production must also be developed.

47.3. Consumers need education about foods with a high ecological footprint. Increasing information available to consumers via product labelling (e.g. regarding energy and water use) enables better choices. This could be used in conjunction with minimum standards for production, transport and packaging practices, if information alone is not effective.

47.4. Smart electricity meters should be progressively rolled out to South Australian households and businesses at no/low cost.

47.5. The state government should re-establish the Energy Information Centres and/or Neighbourhood Sustainability Centres, as accessible one-stop shops for information, advice, rebate applications, etc.

(See the Planning and Development recommendations for energy usage in the built environment and the transport sector.)



### Greening of Government Operations

48. The state government must re-invigorate its Greening of Government Operations (GoGO) program, or establish an alternative program to ensure that:

- there is a coordinated, consistent government approach to sustainability
- all agencies set targets to green their operations in the eight GoGO priority areas and achieve continuous improvement
- progress is reported to the public at regular intervals (e.g. every two years).

48.1. Energy measures should include mandating an increase in the government purchase of South Australian generated GreenPower to stimulate demand in the industry, above what is already required by national mandatory obligations.

48.2. With reforms to GreenPower, the South Australian Government should power its infrastructure (including its extended business enterprises and outsourced activities) with 100% renewable, accredited GreenPower by 2020, in addition to an 'energy reduction' strategy across government facilities.

### Vehicles

49. The state government should work through COAG for funding and regulation to deliver more fuel-efficient vehicles, and ensure its own funding and costing arrangements do the same.

49.1. Australia should set national uniform fuel consumption and greenhouse emission standards on all new vehicles, working towards an interim target of 5L/100 km by 2015.

49.2. The state government should lobby the federal government to enable all-electric vehicles to be registerable in Australia.

49.3. State and federal government funding for the automotive industry should be available only for low/zero emission vehicle development and commercialisation.

49.4. Registration and stamp duty costs should be substantially lower for highly fuel-efficient vehicles (including hybrid and electric) within the existing registration categories.

49.5. State and federal government subsidies that promote increased private car use and support fossil fuelled vehicles are perverse and should be abolished. The Fringe Benefits Tax should be scrapped and the Diesel Fuel Rebate phased out. The money should be re-directed into public transport initiatives.

### Renewable energy

50. The state government should lobby at COAG to increase renewable energy targets in national legislation. The government should also update our state's renewable energy generation and consumption targets in the *Climate Change and Greenhouse Emissions Reductions Act 2007* to 50% by 2020.

50.1. Further investment is required by the state and federal governments to commercialise renewable energies that can provide base load energy, such as geothermal, bioenergy and solar thermal.

50.2. The federal government should implement a national gross Feed-in Tariff that pays a premium of at least 60 cents per kilowatt per hour for the lifetime of the photovoltaic system, and the state government should upgrade its own Feed-in Tariff accordingly in the meantime.

### GreenPower

51. The GreenPower framework needs to be overhauled so that it is incorporated into the National Greenhouse and Energy Reporting System (NGERS), with the greenhouse benefits and use aspects legally assigned to the paying customer and not all grid customers.

51.1. Renewable energy accounting reform is required for GreenPower and for the sale of renewable energy to other states. South Australia should not claim what we sell in Renewable Energy Certificates to other states as energy used in this state.

51.2. State government must facilitate construction of an interconnector to overcome infrastructural bottlenecks to increased renewable energy entering the national grid.

### Coal

52. The state government needs to develop a comprehensive transition strategy for replacing coal as our primary source of electricity generation with renewable sources.

52.1. The state government should introduce an immediate moratorium on any new coal generation for South Australia. Existing coal-fired plants must be progressively transferred to gas-fired.

52.2. Research into carbon capture and gasification of coal as an interim solution for existing coal-fired generation should include alternatives to geo-sequestration such as the use of CO<sub>2</sub> as a feedstock for biofuels.

(See the Planning and Development recommendations for measures to address Peak Oil.)

### Nuclear power and uranium mining

53. The South Australian Government should legislate to prohibit the use and development of nuclear power, uranium processing, conversion and enrichment facilities and nuclear fuel fabrication.

54. Uranium mining should be phased out. If it is to continue however, it must be managed for the 'least worst outcomes' and the state government must enforce its policy commitments for the 'strictest environmental conditions' to apply.

54.1. In-situ-leach (ISL) mining should be banned, with mandatory make-good provisions or rehabilitation of impacts on groundwater from acid leaching and from mine waste disposal. In the meantime, further approvals or development of ISL uranium mining projects should be subject to full *Environment Protection and Biodiversity Conservation Act 1999* environmental impact assessment.

- 54.2. Uranium mining companies should have responsibility for the transportation of radioactive materials and products, including spent nuclear fuel, or radioactive products arising from reprocessing, both locally and globally. Companies should have a responsibility to monitor the safe use of uranium, and disposal of its waste, once it leaves Australia, consistent with Greenhouse triggers built into legislation.
- 54.3. Uranium ore and radioactive copper concentrates should not be exported and processed overseas.
- 54.4. The *Roxby Downs (Indenture Ratification) Act* 1982 should be repealed and/or re-written to remove the extraordinary legal privileges that override state legislation, and that would apply to any other mining venture or commercial activity.
- 54.5. The proposed BHP-Billiton expansion of Olympic Dam at Roxby Downs should not proceed as an open cut facility due to its greenhouse emissions intensity.
- 54.6. BHP-Billiton's Olympic Dam mine should be subject to requirements to source at least 50% renewable electricity on the grounds of its scale and contribution to our emissions profile.

## Other Legislative Reforms

### 55. Several state Acts require amendment to improve outcomes related to mining and electricity supply.

- 55.1. The *Gas Act* 1997 should provide for a commercial energy efficiency scheme to ensure that the main contributors to greenhouse gas emissions are regulated.
- 55.2. The *Mining Act* 1971 should be reviewed and amended to strengthen the legal obligations of mining companies, for example by the introduction of environmental objectives as mandatory conditions to mining tenements.
- 55.3. The *Mining Act* 1971 in the exemptions to mineral land makes no mention of National Parks or Marine Parks, which may lead to protected resources being detrimentally affected.
- 55.4. The system of licensing used in all energy legislation is acceptable, especially as seen in the *Petroleum Act* 2000 with provision for Statements of Environmental Objectives, but the policies involved in applying this and other aspects of energy legislation should be scrutinised. General transparency and accountability should be improved.
- 55.5. Environmental considerations could be included more regularly in decision-making criteria set out in the *Climate Change and Greenhouse Emissions Reduction Act* 2007.
- 55.6. More thorough legal controls of damaging and disruptive activities are required in the case of exploration (and retention) licences. Exemptions which allow retention leases to utilise chemical leaching processes should be revoked.

<sup>48</sup> Environment Protection Agency (2008) *State of the Environment Report*, Government of South Australia, Adelaide

<sup>49</sup> Department of Premier and Cabinet (2007) *Tackling Climate Change: South Australia's Greenhouse Strategy 2007-2020*, Government of South Australia, Adelaide

<sup>50</sup> Energy Efficiency and Greenhouse Working Group (2003) *Towards a National Framework for Energy Efficiency: Issues and challenges*, Finsbury, Australia

<sup>51</sup> Environment Protection Agency (2008) *State of the Environment Report*, Government of South Australia, Adelaide

<sup>52</sup> Government of South Australia (2007) *South Australia's Strategic Plan 2007*, Accessed online <[http://saplan.org.au/images/pdf/South\\_Australia\\_Strategic\\_Plan\\_2007.pdf](http://saplan.org.au/images/pdf/South_Australia_Strategic_Plan_2007.pdf)>

<sup>53</sup> Electricity Supply Industry Planning Council (2008) *Draft Planning Annual Report*, Accessed online <[http://www.esipc.sa.gov.au/webdata/resources/files/Draft\\_2008\\_APR\\_Executive\\_Summary.pdf](http://www.esipc.sa.gov.au/webdata/resources/files/Draft_2008_APR_Executive_Summary.pdf)>

<sup>54</sup> CSIRO (2003) *Climate change projections for Australia*, Accessed online <<http://www.publish.csiro.au/>>

<sup>55</sup> Environment Protection Agency (2008) *State of the Environment Report*, Government of South Australia, Adelaide

<sup>56</sup> Garnaut, R. (2008) *The Garnaut Climate Change Review*, Accessed online <<http://www.garnautreview.org.au/index.htm>>

<sup>57</sup> Environment Protection Agency (2008) *State of the Environment Report*, Government of South Australia, Adelaide

<sup>58</sup> Environment Protection Agency (2008) *State of the Environment Report*, Government of South Australia, Adelaide