ClimateSmart 2050

28224

Queensland climate change strategy 2007: a low-carbon future

Queensland **the Smart State**

Queensland Government

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Premier's foreword

In April this year, I announced that Queensland would play its part in meeting a national greenhouse gas emissions reduction target of 60 per cent below our 2000 levels by 2050. In doing so, I committed the Queensland Government to ensuring the long-term prosperity of the State.

Climate change will not discriminate. It will impact on everyone and, if left unchecked, it will have devastating consequences on our economy, our unique environment and our lifestyle.

Facing up to climate change is about making a difference today for future generations—our children, grandchildren, and their children. Employment, water security, clean air, secure infrastructure, safety and nutrition are the values we put at risk if we do not take action now and in the future.

Queensland has been proactive in addressing climate change. We have banned broadscale clearing of vegetation across the State, we are building the South East Queensland Water Grid as a critical part of the statewide water strategy to provide water security, and we are developing on Queensland's *ClimateSmart* adaptation plan. In March, I opened the Queensland Climate Change Centre of Excellence—the first of its kind in Australia—to draw together all the best information and science about climate change and its impacts.

We aim to achieve all this by:

- engaging in national and international efforts to establish emissions trading
- reducing our greenhouse gas emissions by investing in technological innovation in clean coal and renewable energy sources
- supporting Queenslanders to lower their emissions and conserve water at home, at work and in their local communities.

ClimateSmart 2050 is the Queensland Government's contribution to not only Australia's, but also the global effort, to tackle climate change. How we generate the energy we use is a major contributor to Queensland's greenhouse emissions. *ClimateSmart 2050* outlines a long term strategy to secure a clean energy future for the State based on investing in the development and deployment of clean coal technologies. In the interim, gas, which has an emissions profile half that of coal, will be utilised to meet our medium-term energy needs. This strategy also supports deployment of existing renewable technologies such as solar power, wind, hot rocks and biomass (e.g. the waste from sugar cane milling), and supports the development of emerging renewable technologies.

ClimateSmart 2050 represents new investments across all sectors totalling $414 million to deliver the next steps in Queensland's climate change response. A key commitment is the establishment of a $300 million Queensland Climate Change Fund, with interest earned on the fund providing an estimated ongoing funding source of $20 million each year for future climate change initiatives. In addition, $114 million will support the delivery of new initiatives outlined in this strategy. Underpinning all of this is a strong commitment to the coal industry, which has 250 years worth of reserves, employs 13 500 Queenslanders and earns $15 billion in exports for the State.

Our aim is to turn an environmental negative into a positive. We are doing this the smart way by investing heavily in clean coal technology, to be deployed in cleaning up electricity generation in Queensland and exported to major emitting countries such as China and India to help them reduce their greenhouse gas emissions.

These new investments complement the government's existing $300 million commitment to the delivery of clean coal technologies. With combined industry contributions of $600 million, Queensland's commitment to climate change totals $1.3 billion.

There is no quick fix for tackling climate change, which is why *ClimateSmart 2050* involves a staged strategy with a diverse range of short, medium and long-term policies that move Queensland to a ClimateSmart future.

ClimateSmart 2050 provides the platform for Queensland to make a difference and achieve the changes necessary to ensure our continued prosperity.

Peter Beattie
Premier and Minister for Trade

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Executive summary

ClimateSmart 2050—Queensland Climate Change Strategy

Facing up to climate change is about making a difference today for future generations. In the future, Queensland will experience longer and hotter summers, less rainfall, more evaporation, increased severe storm and cyclone activity, and sea level rises of up to 88 centimetres by 2100 (Preston & Jones 2006). These impacts are real threats to our economy, community, natural environment and Queensland lifestyle.

Tackling climate change is a long-term agenda. Queensland has already been proactive but we need to do more. *ClimateSmart 2050* establishes Queensland's long-term goals and provides a platform for the government, community and industry to move to a low-carbon future.

ClimateSmart 2050 is a $414 million investment to deliver the next steps in Queensland's climate change response. A key commitment is the establishment of a $300 million Queensland Climate Change Fund, with interest earned on the fund providing an estimated ongoing funding source of approximately $20 million each year for future climate change initiatives. In addition, $114 million will support the delivery of new initiatives outlined in this strategy.

These new investments complement the government's existing $300 million commitment to the delivery of clean coal technologies. When combined with industry contributions of $600 million, Queensland's commitment to climate change totals $1.3 billion.

Early actions

The Queensland Government has been proactive in addressing climate change. We have banned broadscale vegetation clearing across the State, preventing up to an estimated 20 million tonnes of greenhouse gases entering the atmosphere. This action alone is largely responsible for assisting Australia meet its Kyoto targets.

Climate change will impact on our stressed water resources. The Queensland Government is making record investments to secure Queensland's water future including the construction of the South East Queensland Water Grid, statewide demand management programs, and extending the Rural Water Use Efficiency Initiative.

In 2000, the government reduced the overall emissions intensity of our energy generation fleet by introducing the Queensland 13 per cent Gas Scheme. The government is supporting the Queensland ethanol industry by mandating a five per cent blend of ethanol for all petrol sold in Queensland by 2010. This year the government opened the Queensland Climate Change Centre of Excellence (QCCCE)—the first of its kind in Australia—bringing together Queensland's climate change scientific and policy expertise.

Summary of ClimateSmart 2050 initiatives

Energy

$900 million investment in demonstrating clean coal technologies

Coal-based energy sources will continue to be a significant part of Queensland's energy mix as we move to a low-carbon future. The Queensland Government has allocated $300 million from the Queensland Future Growth Fund to develop clean coal technologies. The government will work with the State's coal industry, which has agreed to provide $600 million over 10 years towards clean coal technology.

$300 million Queensland Climate Change Fund

Dealing with climate change is a long-term investment. Initiatives contained in *ClimateSmart 2050* represent a range of short to medium-term actions that the government will commit to delivering now. As our understanding of climate science increases, future initiatives will be developed.

The establishment of the Queensland Climate Change Fund will involve an estimated initial contribution of $300 million. This funding will be generated from the sale of government-owned wind farm assets (which are mainly located interstate) and the remaining gas assets of the Enertrade business. These gas assets include the Moranbah to Townsville gas pipeline, the Moranbah to Gladstone gas pipeline project and associated contracts. This initial investment could be expected to provide an ongoing annual funding source of approximately $20 million for future climate change initiatives, such as the development of hydrogen fuel cell technologies.

$50 million Queensland Renewable Energy Fund

This fund will provide valuable support to leading-edge renewable energy technologies. It will be accessed through a competitive bidding process and assessed by an expert panel. This funding will allow emerging technologies, such as geothermal and solar thermal technologies, to develop in Queensland.

$10 million investment to identify future geosequestration sites

Storing the carbon dioxide that results from burning fossil fuels is an essential part of clean coal technology. The government will spend an initial $10 million on geological research to identify and locate suitable sites in Queensland for the long term safe and secure storage of carbon dioxide emissions.

Queensland renewable and low-emission energy target of 10 per cent by 2020

The development of renewable and low-emission technologies is a key part of climate change mitigation. A target of 10 per cent by 2020 provides a strong commercial incentive to develop renewable and low-emission technologies and will optimise investments in renewable energy industries such as solar hot water systems, solar photovoltaic cells, wind, geothermal, biomass (e.g. the waste from sugar cane milling) and landfill gas projects. The target will be set to reach 6 per cent by 2015, increasing to 10 per cent by 2020 and remaining constant at 10 per cent until 2030. The Queensland Government has incorporated low-emission technologies in this target to demonstrate our commitment to bring clean coal technologies to the market as soon as possible as future deployment of these technologies is essential to achieving deep cuts in carbon emissions.

Increase the Queensland Gas Scheme to 18 per cent by 2020

Generating electricity using natural gas produces up to 50 per cent fewer emissions than conventional coal-fired generation. Gas is the key transitional fuel source for reducing the emissions intensity from electricity generation while emerging renewable and clean coal technologies are being developed. Queensland established Australian's only gas scheme in 2000 and achieved the target of 13 per cent of all power sourced by electricity retailers and major industries to be from Queensland-based gas-fired generation. Building on the success of this scheme, the target will be increased to 18 per cent by 2020 to provide additional lower-emission generation for Queensland.

Queensland feed-in tariff for solar power

Solar panel systems on people's homes can often produce more power than the household requires. A feed-in tariff will pay consumers for energy they contribute to the electricity grid from a solar panel system. This tariff will ensure that Queenslanders can maximise the benefits of the federal Photovoltaic Rebate Program.

Investing in hydrogen fuel cells

The government will support research into hydrogen fuel cell technologies for general use. The direct conversion of hydrogen into energy is more efficient than burning fuel in an internal combustion engine or other heat engine. Hydrogen fuel cells are a clean, zero-emission energy source. They do not introduce pollution into the environment, only emitting pure water. The use of hydrogen fuel cells in the automobile industry is advanced but there are many other applications of this technology that will potentially deliver clean and efficient energy storage and use.

New electricity generation

Over the next decade, as Queensland moves to a lower-emission environment, the government will balance the issues of: reducing greenhouse gas emissions, securing low-cost electricity supply to maintain our quality of life, robust economic growth and to support the coal industry—one of Queensland's major economic drivers.

Coal-fired generation will inevitably remain a major part of Queensland's generation mix, along with gas and renewable resources. As Queensland moves to a cleaner energy environment over the next few decades, new coal-fired power stations built in the State will be required to deploy newly emerging clean coal technologies, which provide for carbon capture and storage, and efficient water practices.

Where new generation capacity is required before commercial-scale clean coal technologies become available, coal-fired projects will only be considered where power stations can demonstrate:

- the integration of electricity generation with carbon capture or with carbon capture and storage, e.g. clean coal technology demonstration plants;
- they are associated with foreign direct investment in a major energy-intensive project in Queensland, which might otherwise be attracted to a nation that is a Non-Annex 1 country under the Kyoto Protocol, and they adopt best-practice generation technology; or
- security of electricity supply in Queensland is compromised, cannot be economically met by alternative energy sources in the relevant timeframe and the project utilises best-practice generation technology.

Industry

$55 million Smart Energy Savings Program

Energy efficiency makes good business sense and offers the cheapest form of greenhouse gas abatement. This program will target medium to large energy users and will require them to undertake energy efficiency audits and implement energy savings measures that have a three year or less payback period (that is, the money invested will be paid back through returns, profit or savings within three years).

The program is complemented by an Energy Saving Fund that will provide incentives for small and medium enterprise energy users to invest in energy efficiency measures. Funding will be allocated through a competitive bidding process and provided through various mechanisms including direct grants, interest rate subsidies and low interest loans.

Projected program outcomes include savings of $78 million in customer energy costs, 4100 gigawatt hours in energy consumption, 3280 kilotonnes in greenhouse gas emissions, 760 megawatts in overall demand and 5650 megalitres in water consumption (over 10 years) by generators.

Community

$7.25 million ClimateSmart Homes rebates

This program will target remote areas of the State that will not get access to full retail competition for electricity. Rebates will be provided to households for installing greenhouse-friendly hot water systems, replacing refrigerator seals, decommissioning second energy-inefficient refrigerators, and installing insulation and compact fluorescent light bulbs. The scheme will lower individual electricity bills and provide remote communities with affordable energy security.

$1.5 million ClimateSmart Living education campaign

Changes in individual behaviour can make a difference. A ClimateSmart Living education campaign will encourage Queenslanders to take the carbon challenge and reduce greenhouse gas emissions. This is a $2.5 million campaign, which includes $1 million from existing resources. A website with carbon calculators and practical advice on actions that individuals can take will be supported by television and radio advertisements and regional forums.

$500 000 Home EnergyWise tools

Building on the record uptake of the Home WaterWise service, Home EnergyWise tools will be incorporated into the WaterWise program. Households participating in the WaterWise service will be provided with Home EnergyWise tools including home energy efficiency self-audit tools and materials containing practical advice on ways to use energy more efficiently in the home. Implementation of the self-audit kits will reduce household energy demands and household energy costs.

Energy Choices program

A package of complementary incentives, announced during the last election campaign, will be offered to all Queenslanders. This is a $14.25 million program that includes residential gas installation rebates, energy audit service (participants will be provided with two free compact fluorescent light bulbs), school energy efficiency action plans and an EnergyWise off-peak campaign.

Planning and building

Four-star energy efficient commercial buildings

Building on improved standards for energy efficiency in residential homes, all new commercial buildings in Queensland will be required to reach a minimum four-star energy efficiency rating by 2010 under the Australian Building Greenhouse Rating scheme. Setting an introduction target of 2010 allows sufficient time for developers and builders to adjust and learn what will be required of them from 2010 onwards.

Develop a State planning policy for climate change

A State planning policy for climate change will ensure that climate change risks and issues—such as vulnerable and threatened areas, and the type of development suitable for use—are incorporated into Queensland's planning and development system.

Phase-out of electric storage hot water systems

All new houses approved from 1 March 2006 have been required to install greenhouse-friendly hot water systems. The average Queensland household uses 35 per cent of its energy to heat water. Utilising non-electric systems for water heating is an effective means of reducing greenhouse gas emissions and reducing household electricity requirements.

In an Australian first, from 2010, the Queensland Government will begin phasing out electric hot water systems in existing homes. This will mean, when an existing electric hot water system expires it can only be replaced with a greenhouse-friendly system.

The government will provide rebates for gas and solar replacement systems.

The first step will involve mandating the phase-out of electric hot water systems by households within the reticulated gas network area. For households not within the reticulated gas network area, switching to a greenhouse-friendly system will be voluntary.

The government will consult with the community and industry in the design of the post-2010 rebate scheme aiming to minimise the financial impact on households, particularly low income households, and encourage connection to the gas network in Queensland.

In the meantime, to assist Queenslanders install greenhouse-friendly systems in existing homes, the government will provide an initial $4 million in rebates to convert to gas. The rebate will provide $300 for converting to a gas hot water system and an additional $200 for conversion to other gas appliances such as stoves, ovens, space heaters and clothes dryers. This will also allow time for the manufacturers of greenhouse-friendly hot water systems to prepare to meet demand from 2010.

Replacing all domestic electric hot water systems in Queensland with greenhouse-friendly alternatives should reduce demand by 300 megawatts of electricity and eliminate approximately 2.6 million tonnes of greenhouse gases. This would provide the energy needs of 328 000 houses.

Primary industries

Queensland Carbon Offsets Policy

The policy will ensure that Queensland is positioned to benefit from all potential offset opportunities that will be available through a proposed national emissions trading scheme, and prepare Queensland industries that will provide or purchase carbon offsets. As part of this policy, the Queensland Government will investigate the potential for regrowth vegetation on leasehold land to be utilised as a carbon offset.

Green Invest

The Queensland Government has developed a policy framework for the use of environmental offsets (currently excludes carbon) to compensate for any unavoidable negative environmental impacts that might result from development. The government is also establishing an offsets exchange facility called Green Invest as a mechanism to assist developers find offsets for vegetation clearing. Both tools have the potential to facilitate carbon offsetting arrangements, and will undergo further refinement over the next six months, in close consultation with industry including agricultural, forestry and secondary industrial sectors.

Transport

More infrastructure and services for public transport, walking and cycling

With trends indicating continued growth in road transport, particularly in South East Queensland, reducing the number of car journeys will help reduce Queensland's greenhouse gas emissions. To encourage people to replace private vehicle travel with public transport, walking and cycling, the Queensland Government is expanding the public transport network and improving services. This includes providing additional bus services in South East Queensland in response to growth in passenger demand; extending the busway network in South East Queensland; increasing the CityTrain fleet by approximately 30 per cent over the next four years; improving public transport in regional Queensland; and expanding walking and cycling facilities including investing $235 million in the South East Queensland integrated regional cycle network between 2005–26.

Reducing and neutralising vehicle emissions

As part of the 2007-08 Budget, the Queensland Government will, with effect from 1 January 2008, alter motor vehicle transfer duty arrangements. The new arrangements, which provide a graduated rate scale based on number of cylinders, are part of the government's efforts to reduce emissions by encouraging the purchase of smaller vehicles.

Queenslanders will be encouraged to offset emissions from their vehicles through the annual registration renewal process. Offsetting would be achieved through balancing the emissions produced by a car through measures such as planting trees. Similar to the national GreenPower program, consumers can elect to pay to have their emissions offset through an accredited scheme. This program is voluntary and will support and link to the ClimateSmart Living education campaign.

Adaptation

ClimateSmart adaptation plan

Following extensive community consultation, this comprehensive plan is designed to guide Queensland's climate adaptation response. Adaptation planning will make sure that the community, economy and environment are prepared for climate change. The plan outlines adaptation strategies to be undertaken in the areas of water planning and services; human settlements; natural environment and landscape; emergency services and human health; tourism, business and industry; and agriculture.

Government leadership

Queensland Government office buildings carbon neutral by 2020

The Queensland government will set a positive example by achieving carbon-neutral government office buildings by 2020. Actions will include setting energy savings targets, mandating air-conditioning temperatures and designing all new buildings to achieve four-and-a-half-star star energy efficiency ratings. The government will also offset emissions from the vehicle fleet, offsetting 50 per cent by 2010 and 100 per cent by 2020.

› Introduction

Introduction—setting the context

Australia is responsible for only 1.4 per cent of global emissions (World Resources Institute 2003). However, we are one of the world's highest per capita emitters. It is important that we prepare for a carbon-constrained future—now.

The Queensland Government will continue responding to the challenges generated by climate change. To date, the government has led development and implementation of initiatives such as banning broadscale vegetation clearing, improving building energy efficiency standards, promoting the uptake of gas energy resources and planning for Queensland's adaptation. Growing scientific certainty about the impacts of climate change is focusing government efforts to deliver more comprehensive approaches to addressing climate change.

The Queensland Government will meet its obligations in the national response to climate change and, through policy, will provide certainty for industry and the community. *ClimateSmart 2050* presents a long-term view as well as a practical, realistic path to achieve its goals. *ClimateSmart 2050* positions each part of the Queensland community to play its part.

There is no quick fix. Much of the research has some uncertainty but it is important to test all possible solutions to the problems caused by global emissions as part of the government's commitment to future generations. Recognising that new knowledge about climate change and necessary responses are critical, the Queensland Government is investing in acquiring new knowledge and will actively seek it from others.

Through short, medium and long-term strategies, Queensland will move to a low-carbon future and contribute to a national greenhouse gas emissions target of 60 per cent below 2000 levels by 2050.

The greenhouse effect and climate change

In 2005, the Australian Greenhouse Office described the greenhouse effect as a natural process important for creating the climatic conditions that humans, plants and animals need to survive. Evidence shows that human activities—such as the use of fossil fuels, broadscale tree clearing and land use changes—are accelerating the greenhouse effect. These activities are increasing the atmospheric concentrations of greenhouse gases such as carbon dioxide, methane and nitrous oxide. This is known as the enhanced greenhouse effect, and is responsible for the rise in global temperatures recorded through the twentieth century. Figure 1 shows these effects.

The rise in global temperatures is causing variability in the global climate, hence the greenhouse effect is broader than simply global warming and is more accurately reflected by the term 'climate change'.

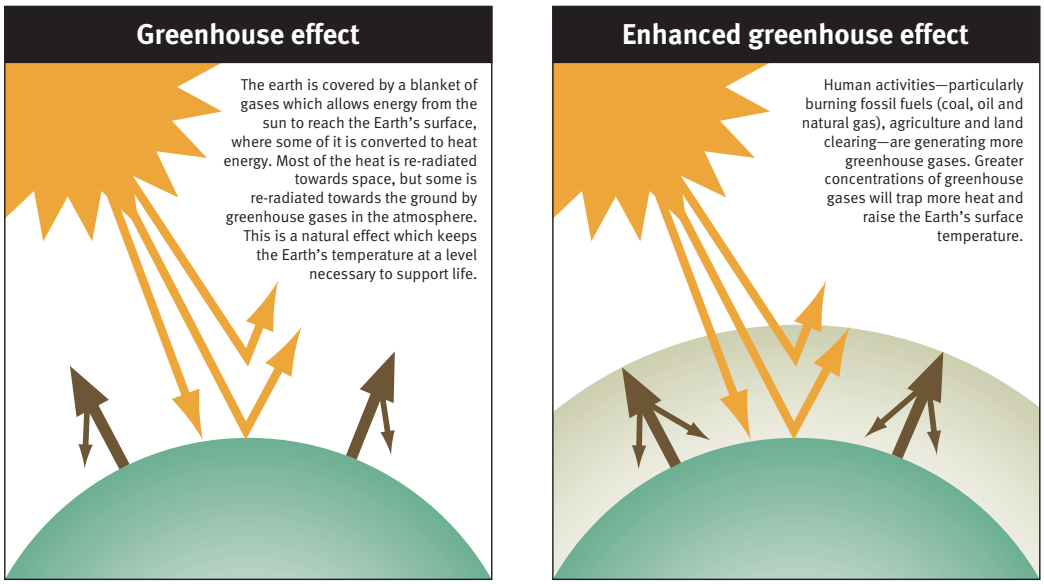


Figure 1: The greenhouse effect (Australian Greenhouse Office 2005a)

Climate change projections for Queensland

The world is experiencing accelerated climate change as a result of human activities, resulting in worse droughts, hotter temperatures, increased cyclone and severe storm activity and intensity, and rising sea levels.

Over the past century, the world has warmed by an average of 0.6 °C (Houghton et al. 2001). The climate of Australia has also changed, with documented increases in temperature of around 0.7 °C and an average sea-level rise of between 120 and 160 millimetres (Preston & Jones 2006). CSIRO projections for Queensland were developed with sophisticated computer-based models for global climate, and scenarios of future global greenhouse gas and aerosol emissions. The projections (relative to 1990 conditions) indicate the following:

- higher temperatures—average annual temperature increases of 0.4–2 °C by 2030 and 1–6 °C by 2070, with the greatest warming in inland areas (Australian Greenhouse Office 2002)
- more hot days and fewer cold nights—10–100 per cent increase in the average number of days over 35 °C and 20–100 per cent fewer nights below 0 °C (Preston & Jones 2006)
- a tendency for less rainfall, with more droughts anticipated (Preston & Jones 2006)
- an increase in cyclone intensity, with maximum wind speeds up by 5–10 per cent by 2050 and rainfall associated with these events up by 20–30 per cent (Hennessy et al. 2004)
- a rise in global average sea level of 8–88 centimetres by 2100, with regional differences (Preston & Jones 2006)
- increased risk of storm surges along Queensland's coast—for example, an expected 1-in-100-year storm surge in Cairns becoming a 1-in-55-year event by 2050 (Hennessy et al. 2004).

These changes will have significant consequences for all Queenslanders, communities and industries (such as agriculture and tourism) and the State's unique natural environments.

The case for change

International evidence has put beyond doubt the overwhelming need to take urgent action against climate change. Recent reports including the Stern Review, the International Panel on Climate Change findings and the Australian Business Roundtable on Climate Change all support early action. Global consensus is that significant cuts in greenhouse gas emissions are required to stabilise atmospheric concentrations and mitigate climate change impacts (Australian Business Roundtable on Climate Change 2006). This is a global issue and will require multilateral action.

Queensland's economic prosperity and rich resource base position the State well to respond to climate change, supporting the transformation of the economy and maintaining current quality of life.

The move to a low-carbon future will require commitment and action by government, industry and the community. This strategy will ensure a ClimateSmart future for Queensland.

Alignment with national initiatives

Queensland cannot act alone in addressing climate change. Success depends on a coordinated, multi-jurisdictional effort. The Queensland Government will continue to play an active role in national initiatives to address climate change including the:

- National Climate Change Adaptation Framework
- National Agriculture and Climate Action Plan
- National Biodiversity and Climate Change Action Plan
- Great Barrier Reef Climate Change Response Program.

As a member of the Council for the Australian Federation, Queensland has also committed to a declaration on climate change, paving the way for an enduring national response including actions to:

- implement a national emissions trading scheme
- strengthen standards and ensure consistent accreditation for GreenPower and emission offsets
- accelerate the National Framework on Energy Efficiency
- develop a national mandatory energy efficiency system
- explore incentives for the uptake of decentralised renewables
- promote the adoption of new technologies.

Participating in the domestic response to climate change will provide the government with the credibility, experience and knowledge to participate in, and contribute, to global action.

New business and employment opportunities

Climate change is not just an environmental challenge. It is becoming a defining fact of economic development. (World Resources Institute 2007)

Climate change may result in the most serious market failure that the world has yet seen (Stern 2006). For Queensland to remain an economic powerhouse of the Australian economy, the government must intervene to maintain a competitive advantage (Mackenroth 2005). Responding to climate change could bring substantial business and employment opportunities to Queensland industry.

The Stern Review concluded that if action is not taken now, climate change will negatively impact on economic growth in the order of 5 per cent each year (Stern 2006). In Queensland, this could equate to approximately a $10 billion reduction in the size of the economy. Taking into account the effects of droughts, floods, cyclones and heightening sea levels, the negative impact could escalate up to 20 per cent.

Moving to a low-carbon future does not need to be painful. International evidence suggests that early action will cost less in the long term and provide Queensland with medium and long-term economic advantages (Australian Business Roundtable on Climate Change 2006). Australian Bureau of Agricultural and Resource Economics modelling by the CSIRO's Energy Futures Forum (including BHP Billiton, Rio Tinto, Westpac, World Wildlife Fund and Australian Council of Social Service) shows that strong economic growth is set to continue if action is taken.

The Australian Business Roundtable on Climate Change found that GDP would continue to grow by 2.1 per cent each year with early action, and would increase from $0.8 trillion in 2005 to $2 trillion in 2050 (Australian Business Roundtable on Climate Change 2006). This can occur while Australia reduces emissions by 60 per cent below 2000 levels by 2050. Last year, the roundtable concluded that delaying action 'may lead to a major disruptive shock to the Australian economy', would result in 250 000 fewer jobs being created by 2050 and would cause future electricity prices to rise three times higher than if the early action scenario was taken (Australian Business Roundtable on Climate Change 2006).

The response to climate change will also bring substantial business and employment opportunities for Queensland industry. Increasing constraints on the use of carbon will lead to the need for industry innovation to provide low-emission energy technologies and reduce energy demand. This may lead to the establishment of new industry sectors and the development of technologies suitable for export. The Queensland Government will act to facilitate uptake of these new opportunities in Queensland.

Moving Queensland's emissions profile

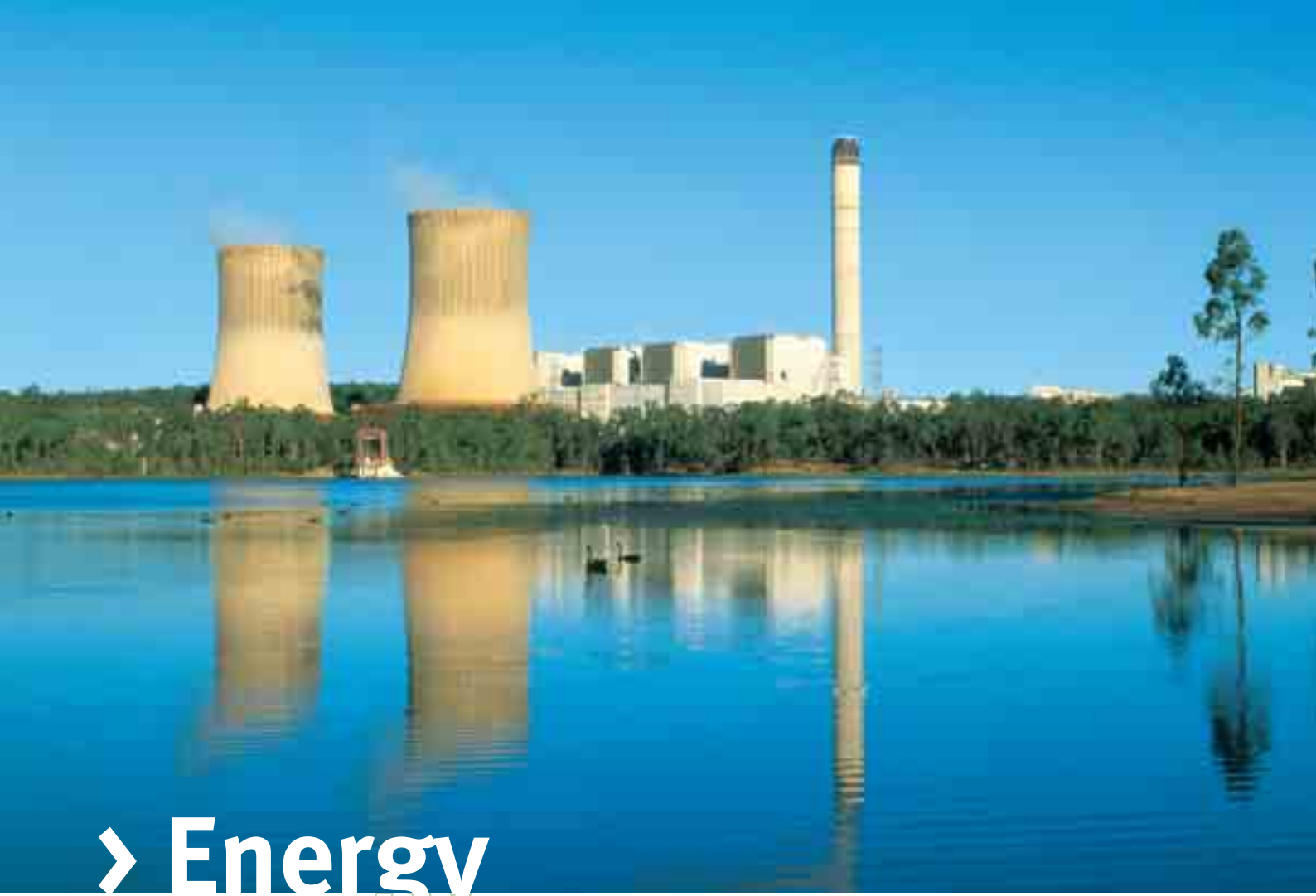
In 2004, Queensland's greenhouse gas emissions were 158.5 million tonnes, or 28 per cent of total emissions in Australia (Environmental Protection Agency 2006). On a global scale, Queensland's emissions contribute only 0.4 per cent of total emissions. However, when comparing per capita consumption, Queensland is one of the highest emitters of greenhouse gas in the world. This is largely due to dependence on coal-fired energy generation, a relatively large, energy-intensive industry base and dependence on road transportation.

ClimateSmart 2050 is the short, medium and long-term plan designed to improve Queensland's emissions profile and contribute to the national target to reduce emissions by 60 per cent below 2000 levels by 2050.

Country	Total emissions (million tonnes of CO_2)	Emission per person (tonnes of CO_2 per person)
Queensland	158.50	41.30
Australia	564.70	28.20
China	3650.00	3.05
United States of America	6746.00	24.09
United Kingdom	656.00	11.01

Table 1: Comparison of greenhouse gas emissions (Environmental Protection Agency 2006; Carbon Planet 2006)

› Achievements to date and future initiatives



› Energy

Power stations and stationary energy generally, are Australia's single largest source of greenhouse gas emissions.

The stationary energy sector (power stations) generates the electricity that Queenslanders need for homes, businesses and industries. More than 80 per cent of Queensland's electricity is produced by coal-fired power stations (Department of Mines and Energy 2007a). The stationary energy sector accounts for approximately 40 per cent of total Queensland emissions, or about 58.8 million tonnes of carbon dioxide equivalent every year (Australian Greenhouse Office 2005b). Maintaining a business-as-usual model will result in greenhouse gas emissions from this sector reaching 78 million tonnes by 2030, or around 200 per cent of 2000 emission levels. No other sector has a more substantial responsibility in responding to climate change.

Strong economic and population growth are increasing the demand for electricity in Queensland. Managing greenhouse gas impacts from this sector will require efforts to reduce demand, improve energy efficiency, improve the diversity of energy sources to increase the amount of energy from renewable resources and increase investments in technologies such as emerging renewable energy sources, clean coal technologies and hydrogen fuel cells.

With an aggressive range of short, medium and long-term programs, targets can be met and balance achieved between Queensland's energy security, climate protection and industry competitiveness. These options do not include nuclear power. Responding to community concerns about proliferation challenges and managing nuclear waste, the Queensland Government has banned the development of nuclear facilities in Queensland—including uranium conversion and enrichment plants, nuclear fuel fabrication plants, nuclear reactors, spent fuel reprocessing plants and facilities used to store or dispose of material associated with the nuclear fuel cycle (Queensland Government 2007).

Actions to date

Cleaner Energy Strategy

Introduced in 2000, this strategy aimed to achieve cuts in greenhouse gas emissions by more than 30 million tonnes over 10 years and save the Queensland economy about $80 million each year. The strategy committed more than $50 million over five years to programs targeted at supporting renewable and innovative energy technologies and reducing greenhouse gas emissions. The sustainable energy programs consisted of energy efficiency and renewable energy initiatives including:

- the 13 per cent Gas Scheme, which:
  - has delivered $1 billion of investment into the coal seam gas industry since 2000
  - will reduce Queensland's emissions intensity from 0.917 tonnes of carbon dioxide per megawatt hour in 2000–01 to 0.794 tonnes of carbon dioxide per megawatt hour in 2011–12
- carbon sequestration rights—legislation was amended to recognise the right of ownership to carbon sequestered in vegetation on freehold land
- encouraging power stations to plant trees—since 2001, 30 000 hectares of forest have been planted in Queensland for timber production and carbon sequestration
- the Solar Hot Water Rebate Scheme—installations increased from less than 1000 systems installed each year to 12 000 systems in 2005, abating 1.8 million tonnes of greenhouse gas each year
- the Queensland Sustainable Energy Innovation Fund (QSEIF)
  - since 1999, QSEIF has committed over $6 million in funding to over 60 projects in Queensland, attracted $2 million of further state and federal funding and $6 million in private investment
  - QSEIF has supported the development of innovative energy technology, saving 16 800 megawatt hours of energy and 20 000 tonnes of carbon dioxide emissions each year. Sales from technology developed have so far exceeded $6.5 million.

Clean coal investments

Coal-based energy sources will continue to be a significant part of Queensland's energy mix with the move to a low-carbon future. Queensland's vast coal deposits and major investments in advancing clean coal technology have the potential to position the State as a global market leader in new energy technologies and carbon capture.

The Queensland Government has also established the Centre for Low Emission Technology, which will advance research and development and provide the basis for developing a future strategic direction for electricity generation in Queensland and the rest of Australia. The government also supports the Queensland Centre for Advanced Technologies and its program of working on cutting-edge solutions to improve the performance of coal.

Commitment to emissions trading

Emissions trading represents a key medium and long-term strategy for reducing the carbon intensity of the stationary energy sector and will drive improvements in generator efficiency standards over time. The Queensland Government supports the development and implementation of a national emissions trading scheme led by the Federal Government. Queensland will continue to work with the Federal Government and other states and territories to develop a national scheme by 2010.

Future initiatives

- **$900 million investment in demonstrating clean coal technologies.** Coal-based energy sources will continue to be a significant part of Queensland's energy mix with the move to a low-carbon future. The Queensland Government has allocated $300 million from the Queensland Future Growth Fund to develop clean coal technologies. This will be used in the development of a world-first integrated gasification combined cycle plant and carbon sequestration project to demonstrate the production of baseload electricity through the integration of coal gasification, and the capture and safe storage of carbon dioxide. This project will build on the experience of Zerogen and has the potential to deliver technology that achieves deep cuts in greenhouse gas (75 per cent) over the long term. The government will work with the State's coal industry, which has agreed to provide $600 million over 10 years towards such clean coal technology projects.
- **$300 million Queensland Climate Change Fund.** Dealing with climate change is a long-term investment. Initiatives contained in *ClimateSmart 2050* represent a range of short to medium-term actions that the government will commit to delivering now. As the understanding of climate science increases, future initiatives will be developed. The establishment of the Queensland Climate Change Fund will involve an estimated initial contribution of $300 million. This funding will be generated from the sale of government-owned wind farm assets (which are mainly located interstate) and the remaining gas assets of the Enertrade business. These gas assets include the Moranbah to Townsville gas pipeline, the Moranbah to Gladstone gas pipeline project and associated contracts.
  This initial investment could be expected to provide an ongoing annual funding source of approximately $20 million for future climate change initiatives, such as the development of hydrogen fuel cell technologies.
- **$50 million Queensland Renewable Energy Fund.** This fund will complement investments in clean coal technologies and provide support for the development of emerging renewable technologies such as geothermal and solar thermal technologies. The fund will operate on a competitive bidding process with all applications assessed by an expert panel, chaired by the Department of Premier and Cabinet. This fund will be used to provide $7.5 million towards a CSIRO solar thermal demonstration plant, and to investigate additional sources of hot rocks for geothermal energy close to existing transmission lines.
- **$10 million Identifying future geosequestration sites.** Storing the carbon dioxide that results from burning fossil fuels is an essential part of clean coal technology. The government will spend an initial $10 million on geological research to identify and locate suitable sites in Queensland for the long-term safe and secure storage of carbon dioxide emissions.
- **Queensland renewable and low-emission energy target of 10 per cent by 2020.** Introducing an emissions trading scheme is unlikely to generate an initial carbon price capable of stimulating investment in next-generation renewable and low-emission technologies. By establishing a target of 10 per cent by 2020, Queensland will reduce emissions from the energy sector by increasing the diversity of Queensland's energy mix. By the introduction of a target, electricity retailers will be required to purchase a set amount of their energy sales from Queensland-based renewable or low-emission energy sources.

  The target will be set to reach six per cent by 2015, increasing to 10 per cent by 2020 and remaining constant at 10 per cent until 2030. It will optimise investment in the Queensland renewable energy industry, including solar hot water systems and solar photovoltaic cells, wind, biomass and landfill gas projects. The target incorporates low-emission technologies that can achieve 250 kilograms of carbon dioxide per mega watt of energy produced to provide additional incentive for the uptake of clean coal technologies or more efficient gas proposals.

Future initiatives

- **Increase the Queensland Gas Scheme to 18 per cent by 2020.** Generating electricity using natural gas produces up to 50 per cent less emissions than conventional coal-fired generation. Gas is the key transitional fuel source for reducing the emissions intensity from electricity generation while emerging renewable and clean coal technologies are being developed. Queensland established Australia's only gas scheme in 2000 and established a target of 13 per cent of all power sourced by electricity retailers and major industries to be from gas-fired generation. Building on the success of this scheme, the target will be increased to 18 per cent by 2020 to provide additional lower-emission energy generation for Queensland. This target will be transitioned into an emissions trading scheme as soon as is practicable.
- **Establish a Queensland feed-in tariff for solar power.** Solar panel systems on homes can often produce more power than the household requires. A feed-in tariff will pay consumers for energy they contribute to the grid from a solar panel system. Experience overseas has shown that introducing these tariffs can significantly increase the uptake of household 'micro-generation' or solar photovoltaic systems. Queensland can implement a feed-in tariff, without levying a supporting tax, by funding the program through community service obligations' savings generated in areas serviced by isolated generation systems and the Ergon Energy distribution network. A feed-in tariff will ensure that Queenslanders benefit from the federal Photovoltaic Rebate Program.
- **Investing in hydrogen fuel cells.** The government will support research into hydrogen fuel cell technologies for general use. Hydrogen fuel cells are electrochemical devices that combine hydrogen and oxygen to produce electricity. Clean, quiet and highly efficient, they are being developed to work as clean energy storage devices, similar to a battery. For example, a hydrogen fuel cell may split water into hydrogen and oxygen using a renewable source such as solar power. The only emissions would be energy from the hydrogen, which would be captured and stored, and water. The direct conversion of hydrogen into energy is more efficient than burning fuel in an internal combustion engine or other heat engine. The automobile industry is already employing hydrogen fuel cells but there are many other applications of this technology that could potentially deliver clean and efficient energy storage and use.
- **New electricity generation.** The Queensland Government has made a commitment to reduce national greenhouse gas emissions to 60 per cent below 2000 levels by 2050. The government is also committed to ensuring security of low-cost electricity supply to Queenslanders, supporting robust economic growth and the sustainability of Queensland's coal industry, one of the State's major economic drivers.

  The government is paving the way for deep greenhouse gas reductions, which will make the most difference. With Queensland's energy industry dominated by coal-fired power stations, it is in this area where there is the opportunity, through advances in clean coal technology, to achieve the greatest cuts in greenhouse gas emissions, ensure low-cost electricity supply and support the coal industry.

  Coal-fired generation will inevitably remain a major part of Queensland's generation mix, along with gas and renewable resources. As Queensland moves to a cleaner energy environment over the next few decades, new coal-fired power stations built in the State will be required to deploy newly emerging clean coal technologies, which provide for carbon capture and storage, and efficient water practices.

  Where new generation capacity is required before commercial-scale clean coal technologies become available, coal-fired projects will only be considered where power stations can demonstrate:

  - the integration of electricity generation with carbon capture or with carbon capture and storage, e.g. clean coal technology demonstration plants;
  - they are associated with foreign direct investment in a major energy-intensive project in Queensland, which might otherwise be attracted to a nation that is a Non-Annex 1 country under the Kyoto Protocol, and they adopt best-practice generation technology; or
  - security of electricity supply in Queensland is compromised, cannot be economically met by alternative energy sources in the relevant timeframe and the project utilises best-practice generation technology.

› Industry

Moving towards a low-carbon future.

Energy efficiency saves money, creates jobs and reduces carbon emissions.

The Queensland economy is dominated by energy-intensive industries. Figure 2 shows the sectors contributing to Queensland's greenhouse profile in 2004 (Australian Greenhouse Office 2004). Queensland's industries need to position themselves for a carbon-constrained market and to manage the forecast energy price increases through energy efficiency savings.

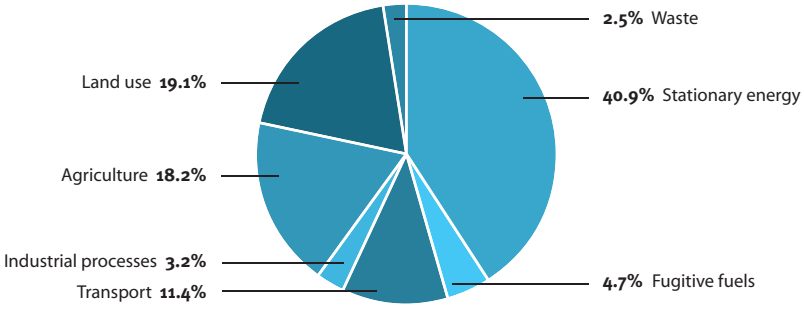


Figure 2: Queensland greenhouse gas emissions by sector for 2004 (Australian Greenhouse Office 2004)

The National Framework for Energy Efficiency group estimates that energy consumption can be reduced by up to 30 per cent with the use of current technology (Council of Australian Governments 2006). Capitalising on energy efficiency will decrease the amount of energy required by industry, reduce bottom-line energy costs and reduce greenhouse gas emissions.

The government will ensure that Queensland's economy is well-positioned to reduce emissions through mechanisms that protect economic interests, minimise costs to industry and facilitate domestic and export market opportunities in 'climate-friendly' processes, products and technologies.

Actions to date

ecoBiz

ecoBiz is a partnership program with Queensland business and industry, designed to help businesses achieve cost savings and take advantage of the profitability through improved environmental performance. Over 309 companies have signed up to the program, with key clients including Golden Circle, Buderim Ginger, Bundaberg Distillery and Mirvac. To date, ecoBiz has helped businesses implement actions, which have had the potential to:

- save 68 700 gigajoules of energy and 18 400 tonnes of carbon dioxide
- save 577 megalitres of water
- save 15 000 tonnes of waste
- leverage $9.96 million of private investment by industry through $1.68 million in rebates paid to date.

Future initiatives

- **$55 million Smart Energy Savings Program.** This program will achieve reductions in greenhouse gas emissions and provide assistance to Queensland industry in moving to a carbon-constrained future. The program will require medium to large energy users to undertake energy efficiency audits and implement actions that have a three year or less payback period—that is, money invested will be paid back through returns, profit or savings within three years.

  The program involves a savings fund accessible by small and medium enterprise energy users to invest in energy efficiency measures. Funding will be allocated through a competitive bidding process and provided through various mechanisms including direct grants, interest rate subsidies or concessional low-interest loans (excluding mandatory measures). Anticipated program outcomes include savings of:

  - $78 million in customer energy costs
  - 4100 gigawatt hours in energy consumption
  - 3280 kilotonnes in greenhouse gas emissions
  - 760 megawatts in overall demand
  - 5650 megalitres in water consumption (over 10 years) by generators.

› Community

The little things we do make a world of difference.

If every Australian household installed just one energy-efficient light bulb, it would deliver emissions savings equivalent to taking 130 000 cars off the road (Eco House 2007).

Individuals are important in helping Queensland achieve a low-carbon future. Queenslanders are concerned about climate change, and are looking for more information and advice about how they can play their part in reducing greenhouse emissions. Individual actions can make a difference. Queenslanders have already demonstrated a capacity to change their habits without compromising their quality of life. In response to drought conditions, Queenslanders have reduced their water consumption from 294 kilolitres a year in 1994–95 to 124 kilolitres a year in 2004–05, which is a saving of 58 per cent (Australian Bureau of Statistics 2006a).

To respond to the climate change challenge, Queenslanders will be encouraged to match their water saving efforts with energy savings to reduce the energy intensity of their lifestyles and achieve greenhouse gas savings.

The average Queensland household emits 11 tonnes of greenhouse gas a year, but there is potential to make a significant difference to emissions through simple daily changes that do not compromise quality of life.

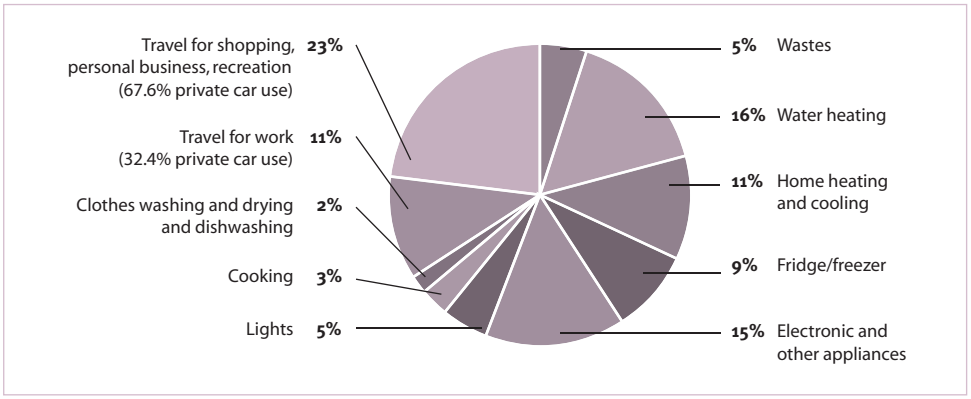


Figure 3: Breakdown of the average Australian household's greenhouse gas emissions (Australian Greenhouse Office 2007a)

Queenslanders will be encouraged to take the carbon challenge and reduce greenhouse gas emissions. A ClimateSmart Living education campaign will provide Queenslanders with the tools and information to help them reduce their carbon footprint and become carbon neutral. Over time, Queenslanders can reduce their emissions through actions such as:

- reducing standby loads (by turning off appliances), saving 300 kilograms of carbon dioxide
- replacing an old refrigerator with a five-star model, saving 400 kilograms of carbon dioxide
- installing energy-efficient light bulbs, saving around 500 kilograms of carbon dioxide
- replacing an electric water heater with a solar water heater, saving around 2.4 tonnes of carbon dioxide
- insulating ceilings and shading windows, saving around 1 tonne of carbon dioxide
- installing a one-kilowatt solar roof panel system, saving two tonnes of carbon dioxide.

Taking these actions not only reduces greenhouse emissions, it saves money on electricity bills. On average, Queensland households spend $1000 each year on energy bills (Australian Conservation Foundation 2006). If each household changed six of their 100-watt incandescent light bulbs over to 20-watt fluorescent light bulbs, this alone would save them $110 each year on electricity bills (Department of Mines and Energy 2006).

By making small changes, Queenslanders can reduce their emissions by as much as 9.8 million tonnes of carbon dioxide annually, which is equivalent to taking approximately 2.6 million cars off the road each year.

Actions to date

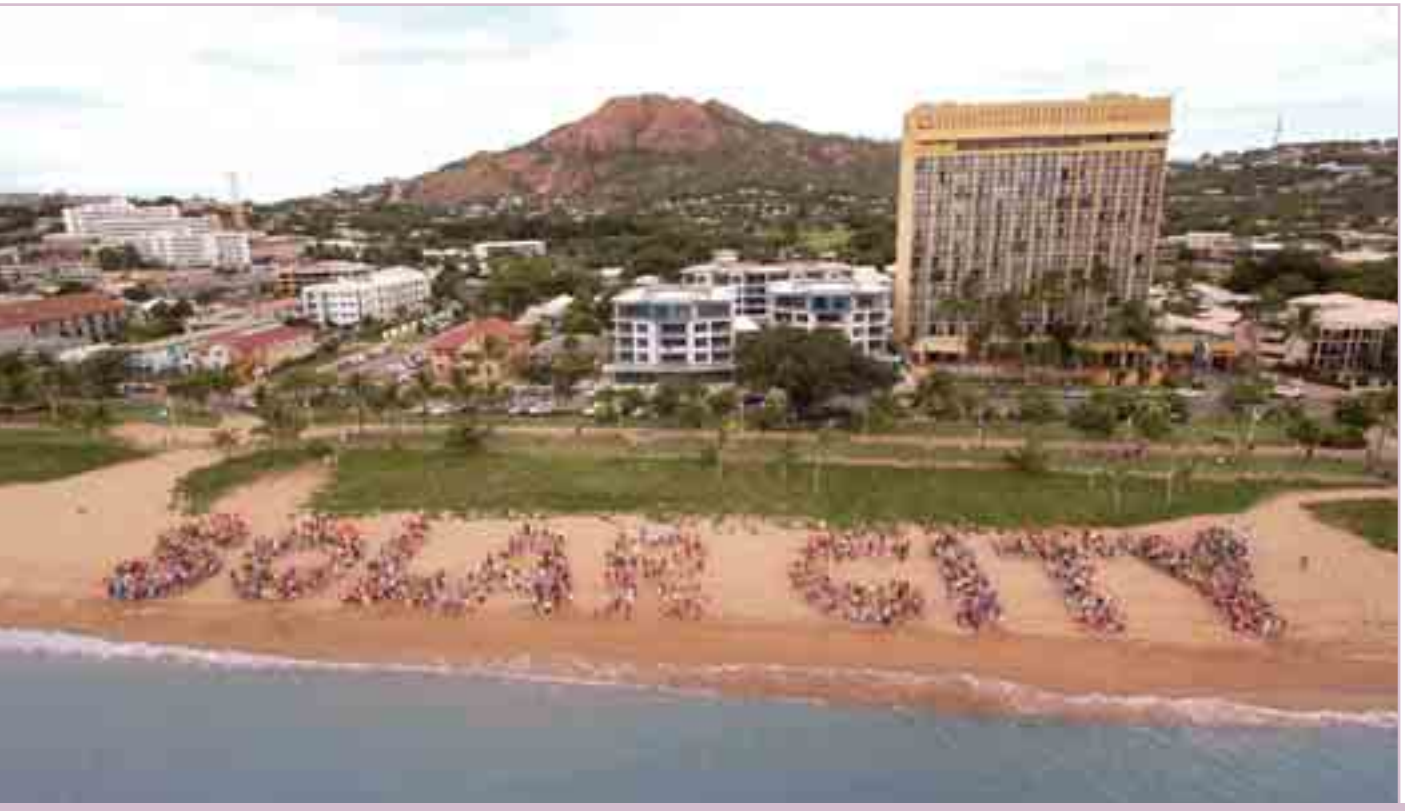
Solar towns

Bulloo Shire Council and the Queensland Government have taken the challenge and invested in creating Queensland's first 'solar town' at Thargomindah. Western Queensland's solar energy resources are greater than those of any other area in Australia. Thargomindah receives about 30 per cent more solar energy than Brisbane. At the end of the power grid, the town faced challenges accessing reliable energy supplies. In a bid to find local solutions, reduce energy costs and reduce environmental impacts, Bulloo Shire Council pursued solar energy applications for the town. The entire town installed energy-efficient heat-pump hot water systems and solar panels to provide all the energy required to run the council pool and provide 10 per cent of the council's energy supplies. By maximising an abundant renewable resource, the council has secured a reliable power source for the town.

The Townsville Solar City Project will see the installation of 500 solar panels and 2500 smart meters, delivery of 1700 energy audits and the trial of new approaches to electricity pricing within selected homes and businesses on Magnetic Island and in the central Townsville area. The project is expected to generate 11 gigawatt hours of renewable electricity over its life to 2013 and, in doing so, reduce greenhouse gas emissions by over 50 000 tonnes.

Energy Advisory Service

The Energy Advisory Service provides free advice on energy efficiency and renewable energy options for householders. The service provides brochures and materials to community members investigating household energy saving and efficiency options. Since starting in December 2003, the service has answered 7434 calls, averaging 46 calls each week.



Actions to date

Queensland residential gas installation rebate

The Queensland Government allocated $14.25 million to an Energy Choices package during the 2006 election campaign. This package includes a number of initiatives to increase energy efficiency in Queensland homes. A key element of Energy Choices is the $4 million gas installation rebate scheme. This rebate program promotes gas as an efficient and reliable energy option for Queensland homes, as well as being less harmful to the environment. The government will offer gas installation rebates of up to $500 to Queensland residents installing gas appliances in existing homes. Changing from electricity to gas for heating water and cooking reduces a household's greenhouse gas emissions by around two tonnes a year. Installations using reticulated (piped) natural gas, or liquefied petroleum gas (LPG) and LPG cylinders are eligible.

Commitment to Smart Meters

Queensland is committed to participating in the national roll-out of 'smart' electricity meters. These meters will introduce time of day pricing and allow users to better manage their demand for peak power. Smart Meters will not only play a role in addressing the challenges of greenhouse gas reductions but can generate significant savings to consumers by helping them understand their energy consumption.

Future initiatives

- **$7.25 million ClimateSmart Homes rebate program.** This program will target remote areas of the State that will not get access to full retail competition for their electricity. Rebates will be provided to households for installing greenhouse-friendly hot water systems, replacing refrigerator seals, decommissioning second energy-inefficient refrigerators, and installing insulation and compact fluorescent light bulbs. The program will lower individual electricity bills and provide remote communities with affordable energy security.
- **$1.5 million ClimateSmart Living education campaign.** This campaign will be conducted to raise community awareness about climate change and highlight actions Queenslanders can take to reduce their greenhouse gas emissions. This is a $2.5 million campaign, which includes $1 million from existing resources. The campaign will incorporate a web-based portal, which will contain carbon calculators, home energy efficiency self-audit tools and practical advice for home owners on ClimateSmart Living. The campaign will be supported by television and radio advertising, and regional forums.
- **$500 000 Home EnergyWise tools.** Building on the record uptake of the Home WaterWise service, Home EnergyWise tools will be incorporated into the WaterWise program. Homeowners participating in the WaterWise service will be provided with Home EnergyWise tools including home energy efficiency self-audit tools and materials containing practical advice on ways to use energy more efficiently in the home. Implementation of the self-audit kits will reduce household energy demands and household energy costs.
- **Energy Choices program.** A package of complementary incentives, announced during the last election campaign, will be offered to all Queenslanders. This is a $14.25 million program that includes residential gas installation rebates, energy audit service (participants will be provided with two free compact fluorescent light bulbs), school energy efficiency action plans and an EnergyWise off-peak campaign.

› Planning and building

Tomorrow's Queensland, today's choices.

Good planning and design will foster sustainable communities.

Well-planned and designed urban environments are an essential component of responding to climate change. The longevity of the built environment and urban infrastructure means that it is important for the implications of climate change to be considered in the planning and design stages. Good planning encourages energy and water efficiency, reduces transport energy use and ensures that development does not occur in vulnerable environments.

Since the 1980s, Queensland has experienced sustained and high population growth (Office of Urban Management 2005). In the south-east corner, population growth has averaged 50 000 people each year, and this growth is expected to continue (Office of Urban Management 2005). With each household producing, on average, 11 tonnes of greenhouse gases, Queensland homes contribute 9.8 million tonnes of greenhouse gas every year. The Australian Bureau of Statistics projects rises in household numbers of up to 2.4 million by 2026, increasing Queensland's total emissions to 16.8 million tonnes each year (Australian Bureau of Statistics 2006b).

There is significant scope to improve the efficiency of new and existing building stock, as well as ensuring that new homes and office buildings incorporate high levels of energy efficiency to reduce greenhouse gas emissions, improve comfort and lower energy costs for occupants.

Actions to date

Protecting vulnerable coastal areas

Since the mid-1980s, Queensland has employed science, planning and development assessment mechanisms to ensure that vulnerable coastal areas are not inappropriately developed. Key actions have included:

- developing a State Coastal Management Plan to ensure development does not expand or become more intensive in vulnerable coastal areas
- providing funding to local councils to undertake storm tide inundation mapping and assist in the preparation of shoreline erosion management plans for vulnerable parts of the coast
- installing an array of storm tide gauges and wave buoys to provide real-time information of tidal and wave conditions to ensure the best available information about the height of potential storm tide flooding during cyclone emergencies.

Smart Housing Program

The Queensland Government is investing in the construction of 30 sustainable demonstration homes across the State to raise community awareness and promote a smarter approach to housing design. The Smart Housing Program presents the case for, and benefits of, long-term investment in the upfront design and building of a home by demonstrating the future savings to be made.

Smart Housing promotes the need to take a more comprehensive and integrated approach to housing design beyond short-term financial considerations, so that occupants can be comfortable in their new home, while minimising their greenhouse gas emissions.

Sustainable Housing Regulation

All new houses approved from 1 March 2006 have been required to comply with minimum sustainable design measures to ensure that they use water and energy more efficiently. These measures cover greenhouse-efficient hot water systems, energy-efficient lighting, three-star rated shower roses, dual-flush toilets and water pressure–limiting devices. This will result in new houses using up to 33 per cent less electricity and up to 36 per cent less water, as well as providing financial savings on their running costs to the householder. New residential unit buildings and major renovations to existing homes are also required to address some of these regulatory standards.

Future initiatives

- **Four-star energy efficiency for commercial buildings.** As well as improvements to energy efficiency standards for residential buildings, the government will mandate four-star energy efficiency for new commercial buildings from 2010. By adopting energy-efficiency measures in commercial buildings, greater levels of comfort, reduced reliance on artificial heating and cooling, and significant financial savings associated with reduced energy use will be achieved. The Australian Building Greenhouse Rating Scheme will be adopted as the rating tool to support this initiative.
- **Develop a State planning policy for climate change**. The government will ensure that climate change issues are incorporated into planning schemes and development assessment. Developing a State planning policy for climate change will ensure that areas vulnerable to climate change are identified in planning schemes and appropriate development controls are exercised in and adjacent to these areas.
- **Phase-out electric storage hot water systems.** All new houses approved from 1 March 2006 have been required to install greenhouse-friendly hot water systems. The average Queensland household uses 35 per cent of its energy to heat water. Utilising non-electric systems for water heating is an effective means of reducing greenhouse gas emissions and reducing household electricity requirements.

  In an Australian first, from 2010, the Queensland Government will begin phasing out electric hot water systems in existing homes. This will mean, when an existing electric hot water system expires it can only be replaced with a greenhouse-friendly system.

  The government will provide rebates for gas and solar replacement systems.

  The first step will involve mandating the phase-out of electric hot water systems by households within the reticulated gas network area. For households not within the reticulated gas network area, switching to a greenhouse-friendly system will be voluntary.

  The government will consult with the community and industry in the design of the post-2010 rebate scheme aiming to minimise the financial impact on households, particularly low income households, and encourage connection to the gas network in Queensland.

  In the meantime, to assist Queenslanders install greenhouse-friendly systems in existing homes, the government will provide an initial $4 million in rebates to convert to gas. The rebate will provide $300 for converting to a gas hot water system and an additional $200 for conversion to other gas appliances such as stoves, ovens, space heaters and clothes dryers. This will also allow time for the manufacturers of greenhouse-friendly hot water systems to prepare to meet demand from 2010.

  Replacing all domestic electric hot water systems in Queensland with greenhouse-friendly alternatives should reduce demand by 300 megawatts of electricity and eliminate approximately 2.6 million tonnes of greenhouse gases. This would provide the energy needs of 328 000 houses.

› Primary industries

Preparedness for climate change protects Queensland's primary industries.

Queensland's primary industries are worth $11 billion a year and employ more than 75 000 people (Queensland Farmers' Federation 2006). The sector is large, contributing 23 per cent of all Australian primary production, and varies from livestock to horticulture, field crops, fisheries and forestry. The primary industry sector is also Queensland's second-largest emitter of greenhouse gases (primarily as a result of livestock emissions) contributing 30 million tonnes of carbon dioxide equivalent each year, or about 21 per cent of net emissions (Environmental Protection Agency 2006).

The recent Intergovernmental Panel on Climate Change report predicted that Queensland's primary industry production will decline by 2030 due to increases in drought and fire (Adger et al. 2007). Specifically, the environmental impacts of changes in rainfall patterns, decreases in soil moisture, evaporation, water availability, heat stress, drought, and the spread of pests and disease will affect many primary producers (Adger et al. 2007).

Helping primary industries reduce emissions and adapt to climate change

As opportunities for global emissions trading emerge, the government will increasingly direct research, development and extension into efforts to help primary producers access opportunities for carbon sequestration in forestry, grazing lands and cropping activities. In particular, the government is developing the Queensland Plantation Strategy to promote forestry development for a range of economic and environmental purposes, including carbon sequestration.

The government is also developing risk management and adaptation strategies to help primary industries manage climate variability and longer term climate change through initiatives such as improving on-farm water use efficiency, breeding more water efficient and drought-tolerant plant varieties, and developing adaptive farming systems. This work is underpinned by climate change and variability modelling that aims to improve primary producers' ability to respond to these challenges.

Actions to date

Vegetation Management Act

In accordance with the *Vegetation Management Act 1999*, the government stopped broadscale land clearing of native vegetation on 1 January 2007. As a result, it is estimated that up to 20 million tonnes of greenhouse gas emissions were saved from entering the atmosphere. This landmark Queensland initiative is largely responsible for assisting Australia meet its Kyoto targets.

Five per cent mandate for ethanol in fuel by 2010

In 2006 the government committed to mandating a blend of five per cent ethanol in all petrol produced in Queensland by 2010. This mandate supports the government's $7.3 million Ethanol Industry Action Plan to develop Queensland's ethanol industry and future. This initiative will reduce greenhouse gas emissions by approximately 500 000 tonnes each year.

Plantations for timber and carbon

Queensland is committed to encouraging an investment environment for new tree crops that reduce greenhouse gases and build rural industries in Queensland. New plantation forests sequester carbon and form part of the climate change response. Queensland currently supports around 220 000 hectares of private and publicly-owned timber plantations. Giving growers the capacity to get a return through supply of carbon offsets will help to make long-rotation plantations a more attractive investment.

Queensland has created the legislative framework for the ownership and registration of rights to trees and carbon, and the separation of those rights from the land on which the trees are planted. This allows plantation growers to rent another person's land for tree cropping.

Investing in research and development

Queensland has pursued research opportunities and will continue to do so in order to develop a better knowledge base about agriculture, climate change and greenhouse gases. Examples of research so far include:

- managing livestock emissions—investigating how we can increase productivity and reduce greenhouse gas emissions through strategic feed supplementation
- managing soil emissions—raising awareness of greenhouse gas emissions from agricultural practices within an environmental management system framework by focusing on nutrient pathways in the sugar industry
- analysing soil emissions—analysing greenhouse gas emissions from subtropical cereal cropping under different management practices.

Future initiatives

- **Queensland Carbon Offsets Policy.** This policy will position Queensland to benefit from all potential offset opportunities that will be available through a proposed national emissions trading scheme. It will also ensure that Queensland industries providing or purchasing carbon offsets are appropriately prepared for any emissions trading scheme introduced. As part of this policy, the government will investigate the potential for regrowth vegetation on freehold and leasehold land to be utilised as a carbon offset.
- **Green Invest.** The government has developed a policy framework for the use of environmental offsets (currently excludes carbon) to compensate for any unavoidable negative environmental impacts that might result from development. The government is also establishing an offsets exchange facility called Green Invest as a mechanism to assist developers find offsets for vegetation clearing. Both tools have the potential to facilitate carbon offsetting arrangements. Consultation will occur over the next six months with agricultural, forestry and secondary industrial sectors to examine the application of this scheme to the future carbon market.

› Transport

Travelling towards a sustainable future.

Transport is Queensland's fourth largest contributor to greenhouse gas emissions—after the stationary energy, land use and agriculture sectors—comprising 12 per cent of total emissions (carbon dioxide equivalent). Of this, 88 per cent is from road transport (Australian Greenhouse Office 2007b). As Queensland's population and economy grows, greenhouse gas emissions from transport are also rapidly increasing—for example, between 1990 and 2005, transport emissions increased by 58 per cent (Australian Greenhouse Office 2007b) and are projected to double by 2015 (Apelbaum Consulting Group 2006).

There is a close correlation between the number of vehicle kilometres travelled (VKT) and transport greenhouse gas emissions, even though vehicle fuel efficiency reduces emissions. A key climate change challenge is that VKT increased by 75 per cent between 1992 and 2003–04 in South East Queensland, contributing to the growth in greenhouse gas emissions from road transport. This increase was partly due to population growth; however, without intervention, VKT is projected to grow at an even faster rate (1.9 per cent each year) than population (1.7 per cent each year) between 2001 and 2026 (Queensland Transport 2005).

Reducing emissions from the transport sector will be a challenging task. The Stern Review identified transport as one of the most expensive sectors in which to reduce emissions because low carbon transport technologies are expensive, social costs are potentially high, and transport is one of the fastest growing sectors (Stern 2006).

Actions to date

The Queensland Government is committed to encouraging people to replace private vehicle travel with public transport, walking, cycling and car pooling.

TransLink Network Plan

In 2006–07, the government is spending over $700 million providing train, bus and ferry services in South East Queensland. In addition the government has rolled out a record public transport infrastructure program, including:

- rail network upgrades, such as duplicating the Gold Coast line from Ormeau to Coomera (with further stages including Helensvale to Robina and Salisbury to Kuraby being constructed now)
- new busways in South East Queensland, including the South East Busway and the Inner Northern Busway from Roma Street to Royal Brisbane Hospital (with the final inner city stage being constructed now).

In the first two years since the government introduced TransLink—which provides one ticket and standardised fares for trains, buses and ferries—patronage in South East Queensland has increased by 22.5 per cent. This equates to an additional 28 million journeys made by public transport over the two years, which has reduced greenhouse gas emissions.

Walking and cycling

In 2006–07, the Queensland Government is providing capital grants to local governments for cycling and walking infrastructure projects in South East Queensland. In addition, the government is constructing the Normanby Pedestrian and Cycle Link, due for completion in 2007, and is working with Brisbane City Council to build the Brisbane Cycle Centre. The Cycle Centre will provide bicycle parking, showers and lockers for cyclists and walkers.

TravelSmart programs

The government provided $2.7 million between 2003 and 2007 to encourage families, workers and school students to walk, cycle and use public transport.

Vehicle emissions testing

In 2006, the Queensland Government tested the emissions from 10 000 vehicles in a trial of remote sensing vehicle emissions technology. Results from this trial and from the government's On-road Vehicle Emissions Random Testing (OVERT) program, will assist the government develop policies to reduce vehicle emissions.

Cleaner buses

The Queensland Government has funded 231 additional buses since 2004. Almost all of these buses use Euro 2, Euro 3 or Euro 4 diesel technology, which emit less greenhouse gases than conventional diesel or petrol engines. All new buses procured by the government will have Compressed Natural Gas or Euro 4 equivalent engines.

Future initiatives

Public transport

With trends indicating continued growth in road transport, particularly in South East Queensland, reducing the number of journeys by car will help reduce Queensland's greenhouse gas emissions. To encourage people to replace car trips with public transport, the Queensland Government is:

- providing additional bus services in South East Queensland to respond to growth in passenger demand
- extending the busway network in South East Queensland (e.g. completing the Inner Northern Busway linking the Queen Street Bus Station to the already completed stages of the Inner Northern Busway near Roma Street, and planning and constructing the Boggo Road Busway and the Eastern and Northern busways)
- duplicating lines and upgrading the rail network in South East Queensland (e.g. upgrading the Caboolture to Beerburrum line)
- delivering 44 three-car Citytrain carriage sets between 2007 and 2010 (the first new six-carriage train has already started services on the Gold Coast line). This will increase the CityTrain fleet by about 30 per cent
- outside South East Queensland, implementing fare equalisation for all regional urban bus services, providing higher frequency services and upgrading bus stops.

Walking and cycling

The Queensland Government is investing $235 million in the South East Queensland integrated regional cycle network between 2005 and 2026. In 2007-08, this will include delivering a bicycle and pedestrian bridge over the Western Freeway near the Toowong roundabout, and commencing a cycle and pedestrian underpass at Boronia Heights. In addition, the government is providing cycling and pedestrian facilities as part of new road projects, such as the Gateway Bridge duplication.

Reducing and neutralising vehicle emissions

As part of the 2007-08 Budget, the Queensland Government will, with effect from 1 January 2008, alter motor vehicle transfer duty arrangements. The new arrangements, which provide a graduated rate scale based on number of cylinders, are part of the government's efforts to reduce emissions by encouraging the purchase of smaller vehicles.

Queenslanders will be encouraged to offset emissions from their vehicles through the annual registration renewal process. Offsetting would be achieved through balancing the emissions produced by a car through measures such as planting trees. Similar to the national GreenPower program, consumers can elect to pay to have their emissions offset through an accredited scheme. This program is voluntary and will support and link to the ClimateSmart Living education campaign.

› Adaptation

Climate change is happening now. We must plan; we must adapt.

Queensland's climate has already changed. While significant effort is required to reduce greenhouse gas emissions to limit the extent of climate change, it is equally important to develop adaptation strategies that lessen the impacts of climate change. Because the consequences of climate change are far-reaching, adaptation must be considered within the context of our environment, community and economy.

Adaptation planning recognises Queensland's vulnerability to the consequences of climate change, and focuses on early planning to manage risks, avoid future costs and maximise potential benefits. The uncertainty about the nature and magnitude of climate change impacts means that ongoing investment in research will remain critical in guiding a response.

Actions to date

Queensland Climate Change Centre of Excellence

Queensland is already positioned as a world leader in climate research and application. The Queensland Climate Change Centre of Excellence (QCCCE) is a specialist unit that brings together policy and scientific expertise across government.

The QCCCE provides strategic whole-of-government policy advice and information about climate change to be used by decision makers across Queensland. Key activities include:

- developing Queensland's *ClimateSmart* adaptation plan
- preparing climate change vulnerability assessments of Queensland's regions and sectors
- researching the potential of cloud seeding in South East Queensland
- establishing national and international partnerships for collaborative work to improve climate models and projections
- continuing to build a science program that improves knowledge about climate change and its impacts.

Responding to climate change impacts on water resources

The Queensland Government is responding to the climate change impacts on water supplies. A Queensland Water Grid project will look at securing future water supplies by linking major catchments and centres between the Burdekin catchment and South East Queensland. A pre-feasibility study to confirm the suitability of a site for a Connors River Dam—for supply to the Bowen Basin coalfields—is proceeding. In South East Queensland, a grid of interconnected water sources will increase flexibility in response to local rainfall variability.

The modelling that underpins water resource planning provides for local assessment of the impacts of climate change scenarios, and enables planned responses. Trading will provide a market mechanism to adjust to changing water needs and values driven by climate change. A statewide demand management program is encouraging water-efficient urban design, and the uptake of water-efficient technology and behaviours. The State is also working with the irrigation industry through the Rural Water Use Efficiency initiative, particularly in the area of reducing evaporation losses.

Actions to date (continued)

Preparation for emergency response

The Queensland Government is working to identify actions that will improve community resilience to the hazards of climate change, especially in relation to heatwaves, floods, landslides and bushfires. Reviews are taking place on council disaster management plans, work is continuing on public disaster education and preparation, and training is continuing with emergency volunteers to make sure that their needs are met.

The government is working collaboratively with Emergency Management Australia, Geoscience Australia and other jurisdictions to develop strategies that will assist in addressing or adapting to the impacts of climate change. These include evacuation planning for vulnerable coastal communities, community education and awareness programs, enhancing spatial information and mapping capacity, developing a national single incident management system, improving rapid damage assessment and community information and warning systems.

Work is also under way to map threats to Queensland's coastal settlements and produce computer models to predict flooding and erosion caused by extreme storm events and sea level rises. The models will be used to create maps that will help local councils assess development and manage coastal environments, and even help individuals assess impacts on their region. The maps and modelling will help us pinpoint areas likely to be hardest hit by natural disasters. Projects initially under way include:

- a coastal vulnerability assessment project with the Burnett Mary Regional Group for Natural Resource Management to create climate change impact maps of coastlines from Noosa to Gladstone
- a project with the Gold Coast City Council to model the tidal flow, water quality and sediment transport dynamics of the Gold Coast's famous Broadwater and upstream estuaries
- a project assessing the health impacts of climate change in low-lying communities in the Gold Coast area.

Building resilient natural ecosystems

Climate change will make it more difficult for the natural environment to support the full range of social and economic services that depend on it. The scale of potential impacts of climate change means that there is a need to adopt a cautious approach to planning and managing natural ecosystems. To date, the Queensland Government has established a network of national parks and conservation areas of approximately 7.7 million hectares, nearly 4.5 per cent of Queensland's total area. To complement this investment, the government is progressively transferring a large proportion of State forests to conservation estates with more than 560 000 hectares transferred to date.

Voluntary conservation agreements have also been promoted with private landholders. The Nature Refuge program now protects over 600 000 hectares across Queensland. The government has also incorporated into planning strategies—such as the *South East Queensland regional plan 2005* and the complementary *Koala conservation plan 2006*—the impacts of development on stressed natural ecosystems.

Future initiatives

- Queensland's *ClimateSmart* adaptation plan. The government will release a comprehensive adaptation plan for the State. The plan will contain specific actions and will deliver a policy framework for the community, environment and economy to adapt to climate change. The plan will cover the following priority areas:
  - water planning and services
  - agriculture
  - human settlements
  - natural environment and landscapes
  - emergency services and human health
  - tourism, business and the community.

› Government leadership

Queensland Government—walking the talk.

The public sector has a key role in Queensland's response to climate change by demonstrating leadership in emissions reduction and dealing with future climate change impacts. Each year, the Queensland Government spends about $6 billion on goods and services and a further $4.5 billion on construction (Queensland Government Marketplace 2005). Adopting more energy-efficient practices and green purchasing is a short-term measure that provides savings in government energy costs and supports the market for climate-friendly goods and services.

Considerable benefits can be achieved. An office of 200 people could cut its electricity bill from $42 000 to $5000 simply by turning off all computers at night and using energy-star office equipment; this would also cut greenhouse gas emissions from 280 tonnes to 30 tonnes a year (Department of Public Works 2007). A computer left on overnight all year generates the same amount of greenhouse gas as a car driving from Sydney to Perth (Department of Public Works 2007).

Actions to date

Government Energy Management Strategy

The Government Energy Management Strategy (GEMS) is an energy efficiency initiative across the Queensland Government. By using less energy, agencies save money and reduce greenhouse gas emissions. GEMS has set a target of reducing the whole-of-government electricity bill by $22 million by 2010. Agencies taking up the GEMS challenge are rewarded financially by retaining savings made on their electricity bills, thereby redirecting funds to priority projects. To date, agencies have saved 5900 tonnes each year of greenhouse gases.

Government green energy commitment

The government has committed to purchasing five per cent of the energy used in government buildings from renewable energy sources. This investment supports the renewable energy sector and provides an offset for overall emissions. To date, 160 000 tonnes of greenhouse gas emissions have been saved through green energy purchases.

School programs

The government has introduced a Solar Schools program aimed at reducing greenhouse gas emissions in schools, reducing electricity costs and educating students about energy efficiency and renewable energy. Through this program 86 schools have received new solar systems. Each school's system will reduce greenhouse gas emissions by more than 3.2 tonnes per year, equivalent to taking a small car off the road. Excess electricity produced is exported to the electricity grid for use by the local community.

Other schools-based initiatives include:

- implementing strategies in South East Queensland schools to reduce water consumption, such as water flow restrictors and dual flush toilets
- providing ecologically sustainable school design and landscaping
- Exploring the application of the new education building green star rating system to new school design
- providing a network of 25 Outdoor and Environmental Education Centres to assist schools in their development of outdoor and environmental curricula.

Future initiatives

- **Carbon neutral Queensland Government office buildings by 2020.** The government will take the carbon challenge and commit to all office buildings being carbon neutral by 2020. This target will be met by establishing mandatory energy savings targets for agencies, mandating air-conditioning temperatures in government buildings of 24 °C for summer operation, constructing all new buildings to a four-and-a-half-star energy efficiency rating with refurbishments to achieve, where possible, four-and-a-half-star energy efficiency and introducing annual reporting of agency greenhouse gas emissions.

  The government will also commit to offsetting emissions from the vehicle fleet, offsetting 50 per cent by 2010 and 100 per cent by 2020.

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