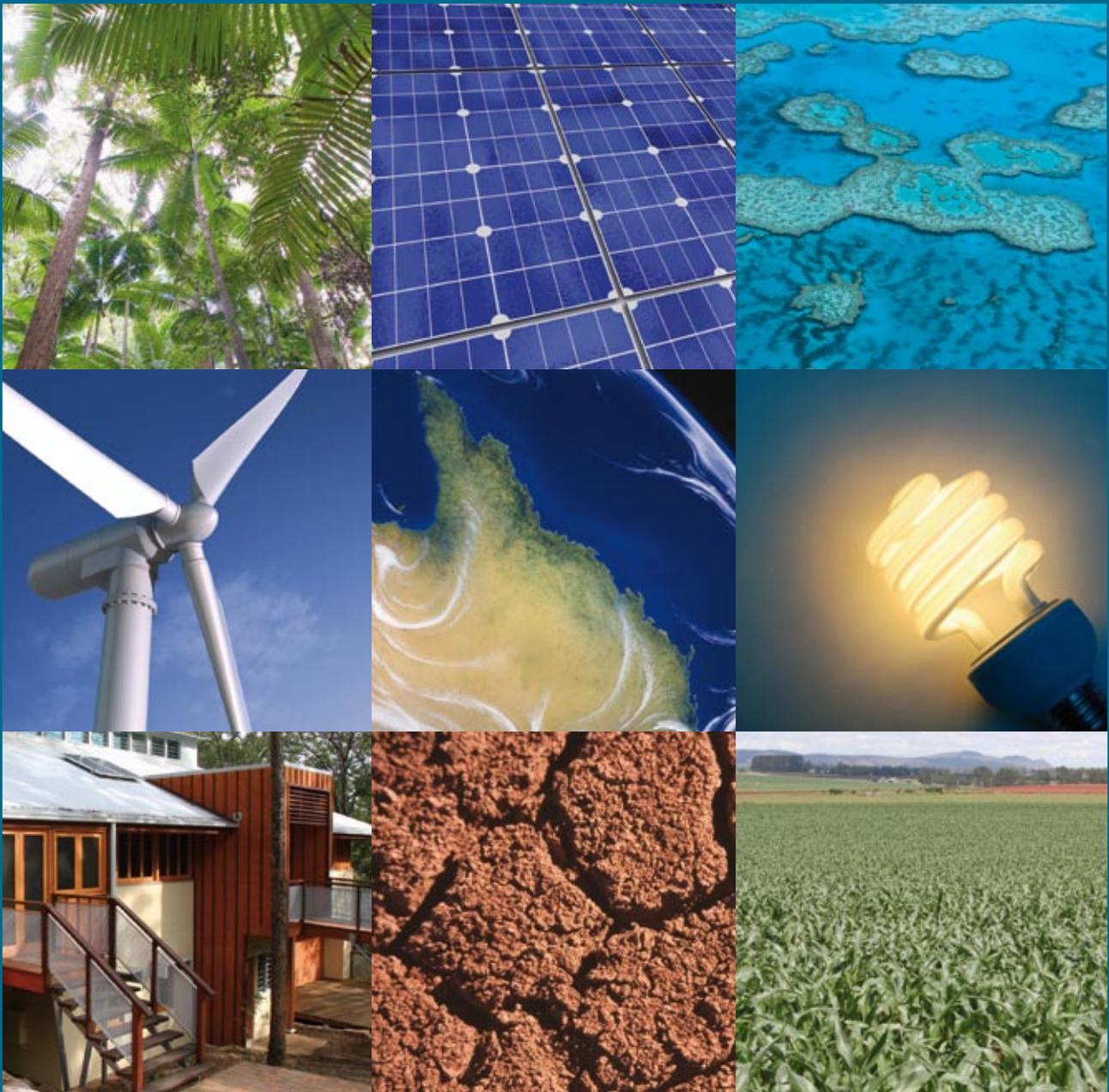


Review of the Queensland Government climate change strategy



■ Minister's foreword



The national and international climate change agenda is moving at a rapid pace. The ratification of the Kyoto Protocol, the release of the Garnaut Climate Change Review Draft Report and the release of the Commonwealth Government Green Paper on emissions trading all provide an opportunity for Queensland to be part of a proactive national response to climate change.

There is agreement that a national emissions trading scheme will be the primary driver for greenhouse gas emission reductions across Australia and Queensland. However it cannot be relied on as the sole mechanism to reduce our emissions.

As part of its Toward Q2 vision, the Queensland Government is committed to the long term prosperity of the state and protecting our lifestyle and environment. The government's ambition is that tomorrow's Queensland has community, business, industry, and government all playing their role in tackling climate change by reducing their carbon footprint and living and working sustainably.

To support our work to reduce greenhouse gas emissions and build Queensland's resilience to climate change, a revised *Queensland ClimateSmart Strategy* will build on the suite of measures contained in the current *ClimateSmart 2050* strategy and *ClimateSmart Adaptation 2007–12 action plan*.

This Issues Paper seeks feedback on the effectiveness of existing measures, the issues relevant to our major sectors and possible measures to mitigate greenhouse gas emissions and adapt to climate change. This feedback will be considered in the preparation of the revised *Queensland ClimateSmart Strategy*.

The Garnaut Climate Change Review Draft Report identified that Queensland will be hit hard by climate change if we do not all take immediate action. I encourage you to provide your thoughts and ideas on these important issues.

A handwritten signature in black ink that reads "Andrew M. McNamara". The signature is written in a cursive, flowing style.

Andrew McNamara MP

Minister for Sustainability, Climate Change and Innovation

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■ Introduction

Australia is entering a new phase in responding to the challenge of climate change. The ratification of the Kyoto Protocol and the commitment by the Commonwealth Government to introduce an emissions trading scheme (ETS) by 2010 provides an opportunity for Queensland to be part of a proactive national response.

The Queensland Government is taking this opportunity to build on current mitigation and adaptation measures and review, update and consolidate its current strategies contained in: *ClimateSmart 2050: Queensland climate change strategy 2007: a low carbon future (ClimateSmart 2050)* and Queensland's *ClimateSmart Adaptation 2007–12: An action plan for managing the impacts of climate change (ClimateSmart Adaptation 2007–12)*.

This review will provide a further opportunity to strategically position Queensland at the forefront of the national climate change response.

The review will build on the suite of greenhouse gas reduction measures contained in the original *ClimateSmart 2050* and contribute to achieving the national target of a 60 per cent reduction in greenhouse gas emissions below Australia's 2000 levels by 2050.

The review is also an opportunity to build upon the *ClimateSmart Adaptation 2007–12* action plan, which provides the foundation for building Queensland's resilience to climate change.

This Issues Paper is a key step in the review process and seeks to identify relevant issues in each of our major sectors. The Office of Climate Change will consider all written submissions made on the Issues Paper during the development of a revised *Queensland ClimateSmart Strategy*.

Context



In 2007, the Intergovernmental Panel on Climate Change (IPCC)¹ released its Fourth Assessment Report on the state of knowledge on climate change. This report found that warming of the global climate system is now unequivocal and that most of the observed increase in average global temperatures since the mid-20th century is very likely due to the observed increase in atmospheric greenhouse gas concentrations, as a result of human activities (IPCC, 2007).

Queensland's climate change challenges are to:

- drive significant greenhouse gas emission reductions
- build on Queensland's skills and knowledge base to make our cities, towns and critical infrastructure more resilient to the impacts of climate change
- support all Queenslanders to prepare for the impacts of climate change
- support new technologies to assist Queensland's producers and consumers transition to a low carbon economy and encourage the export of new skills and products
- ensure the costs of climate change are distributed equitably.

Climate change impacts and implications for Queensland

The build-up and long life of greenhouse gases already in the atmosphere will cause global temperatures to continue to rise. The IPCC (2007a) estimates that even if greenhouse gas concentrations are kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected. In general, surveys of the literature suggest increasing damage if global temperature increases about 1–3°C above current levels (Hadley Centre, 2005).

The IPCC (2007c) analysis of greenhouse gas emission scenarios suggests that to keep within a range of global average temperature increase of 2.0–2.4°C above pre-industrial levels and to avoid the worst impacts, CO₂ equivalent concentrations are required to stabilise at 445–490 parts per million (ppm). Emissions need to peak by 2015 and decline sharply thereafter. The best estimate of total CO₂e concentrations in 2005 is 455 ppm (IPCC, 2007c).

Queensland is particularly vulnerable to the projected climate change impacts. Many of our key sectors are climate dependent, most of our population lives on the coast, and our ecologically rich areas are vulnerable to significant biodiversity loss (Office of Climate Change, 2008, IPCC, 2007b).

On 4 July 2008, Professor Ross Garnaut released the Garnaut Climate Change Review Draft Report which identified Queensland as the Australian state most affected by unmitigated climate change. Identified impacts on Queensland include:

- at 450 ppm, the Great Barrier Reef will be exposed to massive coral bleaching and at 550 ppm, it could disappear and be replaced by seaweed and soft corals
- export oriented mining and agriculture sectors are expected to be adversely impacted by unmitigated climate change
- in a no-mitigation scenario by 2100, Queensland will suffer disproportionately from heat related deaths (up to 4 000 additional deaths per annum) and expansion of the geographic region suitable for the transmission of Dengue virus to southern Queensland
- the Wet Tropics of far north Queensland are likely to face high levels of extinction under an expected 1°C temperature rise by 2030 and a 2°C rise (expected by 2050 with no mitigation; by 2070 under 550 ppm; and 2100 for 450 ppm) would force all endemic Australian tropical rainforest vertebrates to extinction and see a 50 per cent decrease in the area of highland rainforest
- the net impact of climate change on Queensland water supply at the 450 ppm and 550 ppm scenarios is considered high (including the impact of increased heat related events)
- research suggests that tropical cyclones may move further south in Queensland and hit the Australian coastline with greater intensity, potentially causing many billions of dollars damage to property on the Sunshine Coast, Brisbane and the Gold Coast.

Responding to climate change requires a mitigation and adaptation response to address both the cause and the effects. The first response is to reduce greenhouse gas emissions to help lessen the rate and overall magnitude of climate change. At the same time, we need to adapt and learn to live in a changing climate.

¹ A United Nations scientific body which is a major source of information for the United Nations Framework Convention on Climate Change (UNFCCC) negotiations.

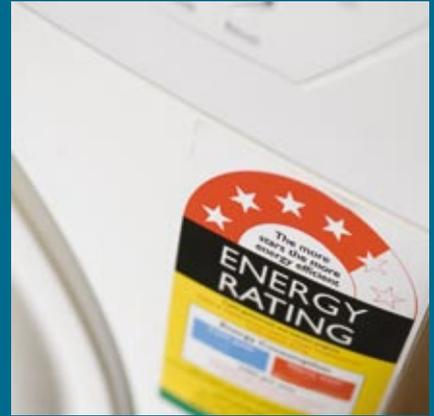
Minimising the cost of abatement

As part of the process to identify additional measures for possible inclusion in the revised *Queensland ClimateSmart Strategy*, the government has commissioned the development of a Marginal Abatement Cost Curve (MACC) for Queensland. This MACC will assist government, the community and industry identify least cost and cost effective measures to reduce greenhouse gas emissions.

A MACC reflects the range of additional costs involved in reducing each additional unit (tonne) of carbon emissions across the entire economy. In February 2008 McKinsey & Company published its Australian cost curve for greenhouse gas reduction (Figure 1).

While this Australian MACC in broad terms identifies the abatement costs across the Australian economy, a MACC based on the costs structures in the Queensland economy will provide accurate information about the least cost abatement options unique to our state.

Framework for action



This review will update and consolidate the current suite of greenhouse gas reduction measures under *ClimateSmart 2050* and the actions under *ClimateSmart Adaptation 2007–12* that are working to build Queensland’s resilience to climate change.

With climate change science pointing to the need to make significant progress on emissions reductions urgently, the following sections aim to identify emerging issues for each of our major sectors.

Emissions trading

There is agreement that a national emissions trading scheme (ETS) will be the primary vehicle for delivering emissions reductions. The Commonwealth Government is currently consulting on the design of the Carbon Pollution Reduction Scheme. While all the specific design elements have not been finalised, it is understood that the scheme will:

- be based on the cap and trade model, which sets a limit on the amount of overall emissions permitted and then allows the trade of permits
- place Australia on a low emissions path in a way that best manages the economic impacts of transition, while ensuring ongoing economic prosperity
- include maximum coverage of sectors of the economy to the extent that is practical
- enable international linkages to other schemes
- address the competitive challenges facing emissions-intensive trade-exposed industries
- utilise permit revenue to assist households adjust to the impacts of a carbon price.

A well-designed national ETS will be the primary driver for emission reductions across Australia; however, it cannot be relied upon as the only instrument to deliver all the required emissions reductions. Complementary measures will be required to achieve additional emissions reductions. Recognising this need, COAG is working to support consistency and a co-operative approach to developing such complementary measures.

The review will seek to identify climate change measures that deliver lasting emissions reductions outside the direct influence of the Carbon Pollution Reduction Scheme.

Addressing market failures

Market failure refers to a situation when the market fails to allocate resources efficiently. The greatest market failure even seen, according to Professor Garnaut, is the failure to price greenhouse gas emissions in a manner that reflects the atmosphere’s true scarcity value.

In the context of climate change, the ETS will provide a price signal that reflects the pollution caused by greenhouse gas emissions to the world’s atmosphere. However, additional measures may be needed where the price signals provided by the ETS are insufficient to overcome other market failures. These market failures act as barriers that prevent the development and adoption of cost-effective abatement measures. Examples of possible market failures include:

Technology adoption

Investors have less incentive to undertake research and development if they are unable to capture the full benefits of research, development and innovation. For example, if new ideas are used cheaply by others without payment to the originator or if there are high costs to develop the appropriate workforce skills or physical capital. This could result in sub-optimal investment in low-emissions technologies.

Imperfect information and transaction costs

These costs can prevent the uptake of cost-effective abatement. For example, consumers may lack information on how choosing more or less efficient appliances will affect their future electricity bills. The cost to the consumer of researching different purchasing options may also be too high for most consumers to attempt individually.

Problems relating to public goods

Public goods — which can include basic research, infrastructure, institutions and standards — tend to be underprovided by the market, because it is difficult (or impossible) for the initial investor to benefit from their investment. For example, new infrastructure for electricity transmission may be underprovided because the cost of building a new connection to the grid is borne by the first new generator.



For new, low emission generators located far from existing transmission infrastructure (such as geothermal, solar thermal and wind energy) there could be long delays in new generation coming on board if the costs of new transmission lines are not shared between generators.

Where these market failures exist and can be clearly identified, there is a role for government in addressing barriers to encourage faster technology development and uptake of cost-effective abatement.

■ Energy



Queensland will require additional electricity generation capacity to meet the demands of a growing population and economy over the medium to long term. Over the last 10 years, annual electricity demand in Queensland has grown by over 53 per cent and, in a medium growth scenario, is expected to grow by an average 3.2 per cent per annum to 2015.

Managing greenhouse gas emissions from the energy sector will require significant efforts to reduce demand, improve efficiency, increase the energy supplied from low and zero emission sources and develop emerging technologies to reduce emissions of greenhouse gases (Queensland Government, 2006).

Gas — its role as a transitional fuel

Queensland has abundant energy resources including coal, coal seam methane and renewables such as solar, geothermal and wind. Under an ETS, conventional coal fired generation will face increased costs as it has higher carbon emissions than other forms of generation. Because of its lower carbon emissions, gas-fired generation will become more competitive as the carbon price increases. Renewable energy generation will not face direct increased costs under the ETS.

Gas is the key transitional fuel as we move to a low carbon economy where renewables and carbon capture and storage technologies play a leading role in energy generation.

Early action by the Queensland Government to establish a Gas Scheme has advanced and supported this transition. Specifically the gas target has:

- successfully stimulated investments in the coal seam methane industry, increasing production from 2 petajoules (PJ) in 2000 to 116 PJ in 2007 and

reserves from a zero base in 1995 to 7 050 PJ (as at December 2007), creating a rapidly growing industry currently worth \$500 million per annum

- supported the expansion of gas-fired electricity generation in Queensland from 900 mega watts (MW) to over 1 800 MW, with a further 1 500 MW of new generation to be commissioned by 2010
- reduced the cost of compliance with an ETS to the Queensland economy
- reduced the greenhouse gas intensity of the stationary energy sector in Queensland by an estimated 2.7 Mt CO₂e per annum.

An ETS should increase the cost of carbon to the point where gas is competitive with conventional coal-fired generation, however this may not happen in a suitable timeframe that supports the transition to low emission generation. Should the ETS result in a carbon price which supports sufficient new gas generation for Queensland, the Queensland Gas Scheme will be transitioned into the ETS.

The option for Queensland coal seam gas to be exported to international markets through the proposed Liquefied Natural Gas plant in Gladstone has the potential to impact upon the supply and price of gas for domestic generation during this important transition period. The Western Australian Government has mandated a domestic supply allocation for Liquefied Natural Gas.

Research and development support for new low emission technologies

Queensland has considerable potential for electricity generation from low and zero emission energy sources. Solar thermal systems are being deployed and there are considerable geothermal resources.

The state is demonstrating its commitment to addressing emissions from fossil fuel generation by substantially investing in the demonstration of carbon dioxide capture and storage technologies, including the identification of suitable geo-sequestration sites. Ongoing support for the development of low and zero emission technologies will be required to further reduce the greenhouse intensity of Queensland's energy supply.

Attracting renewable energy investments

The Federal Government will introduce legislation later this year to give effect to a 20 per cent national mandatory renewable energy target (MRET). This target will stimulate significant investment in renewable energy projects. It is expected that under this target, renewable energy will provide up to 60 000 GWh by 2020. Opportunities for Queensland to secure a portion of this investment should be investigated.

Understanding our renewable energy potential

There is currently limited understanding of Queensland's renewable energy resources and their proximity to centres of demand and the electricity grid. Similar to mineral resource identification, this information could be used to identify areas in local and regional plans suitable for development, and support general renewable energy industry development.

While some recent commitments have been made in relation to solar resource mapping across Queensland, a detailed assessment of key renewable energy resources would be a significant step in supporting the emerging Queensland renewable energy industry.

Promoting energy efficiency and conservation

It is now internationally recognised that improving energy efficiency should be given high priority in the minds of policy makers. The International Energy Agency (IEA) advocates energy efficiency as a core requirement for delivering on the challenge of addressing climate change with a least-cost strategy. Investing in energy efficiency reduces greenhouse gas emissions, provides better energy services and delays investment in new electricity generation (IEA, 2002).



Developing a better understanding at consumer and enterprise level of the unique energy efficiency opportunities in Queensland and potential barriers to uptake would provide the government with a platform for future policy development and significant savings for users as well as improved competitiveness across the Queensland economy.

Managing load growth

Growth in the number of residential air-conditioners has significantly increased the peak load on electricity generation and network infrastructure. Each kilowatt of peak load added to the electricity network has been found to require \$800 in additional generation infrastructure costs, \$700 worth of additional transmission infrastructure and \$1 500 worth of distribution infrastructure. For example, the installation of a new three kilowatt air conditioner would impose an additional \$9 000 in new energy infrastructure charges.

Under a business as usual model, electricity peak demand in Queensland is forecast to increase by 74 per cent from 2007–2020, increasing by 5 100 mega watts. To deliver this demand by 2020 through traditional supply is expected to cost around \$15 billion. These additional costs will be paid by all electricity users through higher electricity prices.

What are your views?

- 1 What conditions should be attached before any new coal-fired generation is approved in Queensland?
- 2 How best should Queensland transition the Gas Scheme in light of the impending ETS?
- 3 What should the Queensland Government do to facilitate domestic gas supply which supports sufficient new generation?
- 4 What should the Queensland Government do to attract investment in renewable energy generation in Queensland, what are the barriers to investment and how could they be addressed?
- 5 What are the barriers to energy efficiency in Queensland and how could they be addressed?
- 6 What are the opportunities to reduce the growth in energy demand in Queensland?
- 7 How could Queensland reduce the growth in demand for electricity associated with the increased use of air conditioners?



Queensland Government initiatives to reduce greenhouse gas emissions from the energy sector

- **Contributing to the development of the Commonwealth Government's national Carbon Pollution Reduction Scheme:** (emissions trading) which will drive a transition to lower emission generation technologies.
- **Carbon Capture and Storage:** the government has contributed \$300 million to develop carbon capture and storage technologies in cooperation with the state's coal industry. The carbon capture and storage technology demonstration projects underway include: ZeroGen, Callide Oxyfuel, the state initiated Carbon Geo-storage Initiative, and the Fairview project.
- **The \$50 million Renewable Energy Fund:** provides support for renewable energy generation across Queensland including the Queensland Geothermal Energy Centre of Excellence at the University of Queensland.
- **The Queensland Gas Scheme increased to 18 per cent by 2020:** a commitment to increase the proportion of gas in power sourced by retailers and major industries.
- **Queensland Feed-in Tariff for solar power:** the *Clean Energy Act 2008* establishes Queensland's Solar Bonus Scheme, or Feed-in Tariff, to pay consumers for energy they contribute to the electricity grid from solar panel systems.
- **The 10 per cent Renewable and Low Emission Energy Target by 2020:** requires electricity retailers to purchase a set amount of energy from renewable or low-emission sources.

How other Australian states and territories are reducing greenhouse gas emissions from the energy sector

- **South Australia**
Planning Guidelines for Renewable Energy Projects: South Australia has established best practice land use planning rules for the construction of wind farms. SA has about 50 per cent of the national wind generation capacity.
Skills Development — Renewable Energy Centre of Excellence: South Australia has established a dedicated site for delivery of renewable energy studies, offering training in the design and installation of wind generation, solar panel and grid-connected systems, and in conducting energy audits.

What international initiatives are reducing greenhouse gas emissions from the energy sector

- **Texas, USA**
Energy Efficiency Improvement Program: under the Energy Efficiency Resource Standard program utilities were required to operate programs that reduce load growth by at least 10 per cent annually. Energy efficiency programs were funded through utility transmission and distribution rates. Texas utilities met these goals with relative ease and now discussion is taking place to increase the target to 50 per cent.
- **California, USA**
Energy Action Plan: the California Public Utilities Commission places energy efficiency as the first priority in utility loading. These investments seek to reduce peak demand by nearly 5 000 MW and reduce energy use by over 23,000 GWh by 2013.

■ Industry



The Queensland economy is dominated by energy-intensive industries as well as industries such as tourism, agriculture and forestry that are susceptible to the physical impacts of climate change.

The Queensland Government will ensure industry is informed about the impacts of climate change and a carbon price, and will work with industry to prepare for both the challenges and opportunities of a low carbon economy. This will be particularly important for regional industries and the communities that depend on them.

Providing information on climate change

Queensland businesses need to understand the potential impacts of climate change to enable them to reduce risks, capture opportunities, reduce emissions at least cost and remain competitive in a global economy. To do this Queensland enterprises of all sizes need reliable, up-to-date and practical information and tools.

Preparing industry for the impacts of the Carbon Pollution Reduction Scheme

On 16 July 2008, the Commonwealth Government released its green paper canvassing design options on the form of Carbon Pollution Reduction Scheme (CPRS) which will be the primary vehicle for delivering emissions reductions across Australia. While the Commonwealth is leading the development of the CPRS, the Queensland Government is seeking opportunities to support businesses to prepare for and minimise the impact of a carbon price. This could include assisting industry to improve their performance and buffer the impacts of increased energy costs as a result of the CPRS.

Building resilience to the physical impacts of climate change

A priority for action is to further assess the implications of climate change on key Queensland industries, particularly those which are highly climate-dependent, and continue to work with stakeholders to develop adaptation responses.

Providing assistance to industry to improve resource efficiency

Improving industry resource efficiency will deliver greenhouse gas emission reductions and improve business competitiveness. Existing regulatory and voluntary programs assist industry to identify these opportunities. The Smart Energy Savings Program requires large energy users to identify energy efficiency actions and the ecoBiz program currently helps industries improve their eco-efficiency.



The Queensland Government is looking for opportunities to further support small and medium business to benefit from improved energy efficiency. For example, there may be opportunities to build on the recently implemented water efficiency management plans as a mechanism to achieve these outcomes.

Creating an environment to support new green/clean technology development

Climate change provides an opportunity to position Queensland as an exporter and world leader in mitigation technology, management processes, adaptation knowledge, skills and innovative technologies. The Queensland Government has a role to encourage businesses to come to Queensland with environmentally sustainable solutions and is seeking to identify barriers and opportunities for developing new green/clean energy and technology.



What are your views?

- 1** What are the barriers to improving the energy efficiency performance in the industrial sector and how could they be addressed?
- 2** Are the existing industry programs adequate to support Queensland industry to transition to a low carbon economy?
- 3** Should the Queensland Government develop an energy efficiency strategy in partnership with industry?
- 4** Are there key skills shortages to developing clean technology industries in Queensland?

Queensland Government initiatives to support the industry sector to reduce greenhouse gas emissions and prepare for climate change

- Since 2004, **EcoBiz** has helped Queensland industries achieve competitive advantage by moving beyond compliance to new standards of eco-efficiency and eco-marketing.
- **The Smart Energy Savings Program:** via the *Clean Energy Act 2008* requires medium to large energy users to conduct audits, submit energy savings plans to the government, and publicly release information on their energy savings.
- **The \$50 million Smart Energy Savings Fund:** complements the Smart Energy Savings Program and provides incentives for small to medium enterprise energy users to invest in energy efficiency measures.
- The Queensland Government is delivering **industry climate change impacts workshops** with the wine and tourism sectors through the Queensland Tourism Strategy.
- **The Queensland Sustainable Energy Innovation Fund:** is designed to give Queensland-based organisations the kick start to move their new technologies to the commercialisation phase by providing grants of up to \$200,000 through a competitive merit based assessment process.

How other Australian states and territories are reducing greenhouse gas emissions from the industry sector

- **Victoria**
Environmental and Resource Efficiency Plans: regulatory requirement for all large commercial and industrial sites to produce plans as to how to reduce their energy and water consumption and waste production. This program is designed to support business efforts to improve the way resources are used and save business money.
- **New South Wales**
Energy Efficiency Trading Scheme: establishes a state-based target for energy efficiency. Retailers will be required to pursue additional energy efficiency measures in households and businesses from the start of 2009. A new class of tradeable certificate will be established to support the enhanced energy efficiency target, which will be designed to achieve an optimal level of energy efficiency.

There are a number of projects eligible under the energy efficiency trading scheme such as modifying an installation which reduces electricity consumption; replacing an installation with another installation that consumes less electricity; implementing a new installation that consumes less electricity; fuel switching; and substituting electricity generated on-site for electricity supplied from the grid.

What international initiatives are reducing greenhouse gas emissions from the industry sector

- **France**
White Certificate Trading: suppliers of energy must meet government-mandated targets to energy savings achieved through the suppliers' residential and tertiary customers. Eligible activities include: promotional programmes, providing incentives and raising awareness. A penalty of EURO.02 per kWh is in place for energy suppliers who do not meet their obligation. The scheme will result in 54 TWh of energy savings.

■ Community



The community will play a vital role in helping Queensland achieve a low carbon future. Queenslanders have demonstrated their capacity to change their habits through world-leading reductions in water consumption in response to the recent drought conditions and through initiatives under the current ClimateSmart Living campaign. It is essential that the community continues to be aware of and takes action to prepare for the potential impacts of climate change.

The Queensland Government is committed to working with the community to continue to reduce greenhouse gas emissions and prepare for the impacts of climate change.

Providing information on actions the community could take to reduce emissions and prepare for climate change

Simple behaviour changes by the Queensland community can reduce greenhouse gas emissions and result in significant savings on energy bills. There are opportunities to build on the success of the current ClimateSmart Living education campaign and support the community to further reduce greenhouse gas emissions. The community also needs information to understand the potential impacts of climate change to enable them to make choices to prepare for the future. The Queensland Government is seeking opportunities to help the community prepare for climate change.

Ensuring adequate infrastructure to respond to climate change impacts

Extreme weather events already feature in Queensland's variable climate. However, projected increases in both average and extreme temperatures across the state as well as the intensity of rainfall events will place greater pressure on emergency response plans and recovery operations. To respond to these challenges, emergency and infrastructure planning and response will need to take into account a range of climate change issues including:

- increased bushfire risk and decreased water availability for fire fighting
- decreased time periods suitable for controlled burning
- extreme rainfall events and severe storm tides resulting in flooding.

More frequent and extreme weather events have the potential to have significant impacts on communities, particularly those close to the coast. Ongoing research is required on how the impacts of climate change will be felt by communities.



Assisting those most at risk from climate change impacts

The health impacts of climate change will depend on a person's location, access to health services and availability of critical incident and public health infrastructure. There is increasing recognition of the impact that climate change may have on people. These impacts may result from:

- rising temperature and resulting impacts of heat stress
- impacts on water availability and quality
- alterations to geographical range and seasonality of some mosquito-borne and other infectious diseases
- increased intensity and frequency of food-borne and water-borne diseases due to warmer temperatures and increased rainfall variability
- increased isolation of remote communities following extreme weather events
- increased exposure to solar radiation.



What are your views?

- 1 How could we replicate our water saving success under the Target 140 to greenhouse gas emissions reductions and energy savings in Queensland?
- 2 What are the barriers to communities and households reducing their greenhouse gas emissions and how could they be addressed?
- 3 What could the Queensland Government do to help the community prepare for the impacts of climate change?

Queensland Government initiatives to support the community to reduce greenhouse gas emissions and prepare for climate change

- **The \$60 million ClimateSmart Home Service:** will deliver 260 000 services across Queensland to assist householders to reduce their greenhouse gas emissions and electricity costs. A qualified tradesperson will conduct an energy audit, install energy saving tools and supply 15 compact fluorescent light bulbs.
- **The \$5.5 million ClimateSmart Living education campaign:** encourages Queenslanders to take the carbon challenge and reduce greenhouse gas emissions. Campaigns include: Change a Light Bulb day in September 2007, Cool it by Degrees day in November 2007 and in June 2008 the Low Carbon Diet initiative was launched to provide information and resources to help Queenslanders reach a carbon-loss target of 2 000 kilos a year.
- **The Queensland Solar Homes Program:** will deliver 1 000 1kW solar power systems to households in south-east Queensland, Cairns, Rockhampton, Toowoomba and the Fraser Coast. Using the Queensland Government's bulk purchasing power, the costs of these systems has been reduced from \$15 000 to \$8 185.
- **The \$14.25 million Energy Choices Program:** includes the residential gas installation rebates and school energy efficiency action plans.

How other Australian states and territories are supporting the community to reduce greenhouse gas emissions and prepare for climate change

- **South Australia**
Residential Energy Efficiency Scheme: requires gas and electricity retailers from 2009 to offer, as a condition of their license, financial or other incentives to households to adopt energy saving measures such as ceiling insulation, draught proofing, and more efficient appliances.
Climate Change Community Awareness and Behaviour Change Program: statewide program which includes research, community targets and partnerships involving individuals, households and the community to reduce their greenhouse gas emissions.
Climate Change Education Resource: is currently being developed and trialled for incorporation into the curriculum of all South Australian Schools.

What international initiatives are helping the community reduce greenhouse gas emissions and prepare for climate change

- **California, USA**
Million Solar Roofs program: \$3.2 billion invested in small-scale solar electric power systems over eleven years and establishing the statewide goal of building a million solar electric roofs, or 3 000 MW of solar electric power. This became part of a statewide solar power program designed to cut the cost of solar power in half and create a mainstream market for solar power within ten years.
Self-Generation Incentive Program: provides financial incentive funding to customers that install new, qualifying, distributed generation facilities to meet all or a portion of energy needs.
- **Canada**
ecoENERGY for Aboriginal and Northern Communities program: provides CA\$15 million to support renewable energy projects, improve energy efficiency, improved diesel generation efficiency (in off-grid communities) and encourage the adoption of alternative energy sources in Aboriginal and Northern communities.

■ Planning and building



Photo courtesy Timber Queensland

Queensland has a growing population and economy. Providing the necessary buildings and infrastructure to accommodate this growth will have a significant impact on the greenhouse gas profile of the state. There are key opportunities to manage emissions growth through the investments we make now. The cost to improve the performance of buildings and infrastructure delivered today will be less expensive than the cost of retrofit at a later date.

Existing cities and towns throughout Queensland will also be vulnerable to the impacts of climate change as their location and design is based on past and present climatic conditions. Some settlements will be more exposed than others. Possible climate change impacts on human settlements include:

- increased vulnerability of low-lying coastal areas to sea-level rise and storm surges
- increased flood risk, even in areas that have not previously experienced flooding, due to more extreme rainfall events
- increased risk of droughts and bushfires.

Rising temperatures, more extreme weather events and a decrease in available water have the potential to affect the built environment by:

- changing the reliability and cost of energy and water
- increasing the vulnerability of infrastructure which extends over large areas and has a long life span. Pipes, drains, power lines, bridges and other major facilities for towns and suburbs are built to last for decades. While most are not currently at risk, they may need to withstand changes in future extreme weather.

Addressing the challenge of improved environmental performance and housing affordability

In the current housing affordability debate there is a need to address the cost of improved environmental performance of the dwelling particularly for those trying to enter the housing market for the first time. Despite the fact that houses with greater energy efficiency are considerably less expensive to run over the life of the building and more than offset the additional purchase costs, there is a need to address up front cost of energy efficiency enhancements.

Ensuring Queensland's rapid population expansion and development addresses climate change resilience

The challenge for future land use planning and development is the integration of measures to address both the mitigation of greenhouse gas emissions and adaptation to climate change impacts. One of the issues highlighted by the IPCC (2007b) report is the risk to coastal settlements through greater coastal inundation and erosion, especially in regions exposed to cyclones and storm surges. Changes in climate add to the current pressures on ecosystems and native species habitat from landscape clearing to cater for rapid population and industry expansion.

Overall, planning measures are required to ensure that future development resulting from Queensland's rapid population growth is resilient to climate change and addresses adaptation and mitigation issues.

Addressing existing development and capacity building

The present planning framework in Queensland is only able to address future development, not existing development, which is at risk because of its location in vulnerable areas. Existing development presently relies on emergency response and preparedness actions and other adaptation responses.

Providing information to decision makers regarding climate change

Climate change should be a factor in decisions to replace or refurbish buildings and infrastructure. Better land use planning and infrastructure design standards, and amendments to the way new buildings are constructed, will make settlements and infrastructure more resilient.

There are a number of key challenges and information gaps that could be addressed in order to support work to make settlements and infrastructure more resilient including:

- Providing better information about climate change impacts at scales relevant to planning — climate change science is based on science modelled at a global scale, which is of limited value for land use planning purposes. There is a need for the development of regional scale climate change projections and a set of nationally consistent default climate change scenarios for use in planning, particularly coastal planning. Scenarios would need to be based on best available data, updated as new information becomes available and be used in the absence of more detailed information relevant to the local area.
- Planning for sea-level rise — given there is a significant degree of uncertainty regarding the range of sea level rise projections from the IPCC (and others), there is an emerging need for an agreed sea level rise benchmark figure for planning purposes in Australia.

- High resolution digital elevation model for the Queensland coast — the development of a digital elevation model for the coast will significantly enhance the Queensland Government and local authority capacity in future coastal planning and development assessment processes.

Building the capacity and expertise of those responsible for planning and management will also be important as not all local Governments have the capacity, expertise and resources to adequately address the impacts of climate change through the planning process, management activities and capital works.

Unlocking the low cost abatement opportunities in the commercial and residential sector

Almost a quarter of Australia's greenhouse gas emissions result from energy demand in the building sector (CIE, 2007). A number of projects have demonstrated that there are significant opportunities to reduce emissions from this sector on a cost effective basis. However there are market barriers to greenhouse and energy savings being captured, even under an ETS. Significant greenhouse gas savings could be delivered by establishing a market to overcome such barriers.

Promoting embedded generation

Embedded generation is any electricity generating plant that is connected to the regional electricity distribution networks. Embedded generation is usually either small in scale or can be produced economically in a range of sizes and in many cases is ideally suited to producing power where it is needed.

Industry has identified there are regulatory barriers such as air quality standards to the use of low emission embedded generation. However, deployment of these technologies can reduce greenhouse gas emissions, avoids transmission distribution costs and peak loads on energy networks.

What
are your
views?

- 1 Is there more the Queensland Government could do to improve the greenhouse performance of new and existing Queensland commercial and residential buildings?
- 2 Could we improve the environmental performance of houses without impacting on affordability?
- 3 What are the barriers for embedded generation in residential and commercial buildings and how could they be addressed?
- 4 What could the Queensland Government do to ensure climate change impacts are considered in planning decisions?

Queensland Government initiatives to reduce greenhouse gas emissions from residential and commercial buildings

- Queensland was the first state to introduce a **phase out of the installation of electric hot water systems** in existing homes from 2010 initially, in houses within the gas reticulated network. All existing electric systems must be replaced by greenhouse friendly alternatives such as solar, heat pump or gas.
- All new commercial buildings in Queensland will be required to reach a **minimum 4 star energy efficiency rating** by 2010.
- Building on the government's current Sustainable Housing Code released in March 2006, the new **Sustainable Housing Policy** will set higher targets for energy efficiency and require sustainability to be considered throughout the planning, design and building phases. This will ensure new houses in Queensland are built to be more socially, environmentally and economically sustainable.

How other Australian states and territories are reducing greenhouse gas emissions from the planning and building sector

- **Victoria**
Compulsory 5 Star energy efficiency ratings: requires all new houses and apartments to obtain a 5 Star energy rating for building material; plus a rainwater tank for toilet flushing or a solar hot water system. A one year transition period was implemented to enable building industry professionals and homebuyers the opportunity to get used to the 5 Star Standards.
Climate Change and Infrastructure – Planning Ahead: the first study of its kind in Australia to examine the potential risks from climate change to key infrastructure areas such as water, power, telecommunications, transport, and buildings.

What international initiatives are reducing greenhouse gas emissions from the planning and building sector

- **California**
Green Building Standards Code: new standards aimed at a further 15 per cent reduction in energy use on top of the existing requirements (approx. 7 stars) include sub-metering, a minimum 1 per cent of on-site renewable energy use and 50 per cent Greenpower, greywater, minimum renewable, reused and recycled material requirements, indoor air and environmental quality requirements and construction waste reduction. These will become mandatory by 2010.
- **United Kingdom**
Government Department's carbon neutral: central government departments will be carbon neutral by 2012. Carbon neutral means that government bodies must prevent as much carbon emissions as they produce. Once carbon neutrality is reached, the government has set an additional target to reduce carbon emissions from government offices by 30 per cent by the year 2020.
Microgeneration Strategy: aims to create conditions under which microgeneration becomes a realistic alternative or supplementary energy generation source for the householder, communities and small businesses. The government provides grant funding for installation of microgeneration technologies under the Low Carbon Buildings Programme.
Carbon Neutral initiatives: the Government is tightening local planning and building regulations to emphasise the preference for Carbon Neutral initiatives through the introduction of a star rating scheme for property's energy values called Energy Performance Certification Scheme.
- **Spain**
Technical Building Code: aims to improve the energy efficiency of new buildings through limiting energy demand, increasing the efficiency of thermal and lighting systems and the use of solar technologies. Solar thermal technology for hot water is compulsory in all buildings and photo-voltaic technology is compulsory for large buildings (commercial, hotels and hospitals) depending on their use and size.

■ Primary industries



The total value of Queensland's primary industries production was estimated at approximately \$12.3 billion in 2007–08 and includes livestock, horticulture, field crops, fisheries and forestry (DPIF, 2008).

Primary industry production in Queensland has the potential to be significantly impacted by climate change, through changes in water availability; temperature changes affecting plant and animal production; fisheries and animal welfare; loss of fisheries habitat; changed distributions of invasive weeds, pests and diseases; and increased frequency of extreme events (Office of Climate Change, 2008).

Understanding climate change impacts to existing agricultural practices

Managing the impacts of a highly variable climate is core business for Australian primary industries. This is achieved through research, development and extension into genetics, management practices and environmental factors (spatial, temporal, biophysical, water, climate, soils, etc.). Understanding the relationship between climate and production systems, improved water use efficiency and genetic tolerance to drought and heat stress will continue to be important to the Queensland agricultural sector.

While there is a broad understanding of the emissions profile of Queensland primary industries and the adaptation challenge it faces, there are still major gaps in the relevant science. These gaps include vulnerability assessments at a regional level, full understanding of the farm management systems that would minimise emissions, full understanding of the optimal temperature ranges of a number of commercially important crops, understanding the nature of impacts on aquatic habitats and fisheries, and understanding the biosequestration opportunities available in vegetation and soil.

The Climate Change Research Strategy for Primary Industries recently released by Land and Water Australia identifies the information and research needs for agriculture, fisheries and forestry at a national level.

A systems approach to managing climate change impacts

The implications of climate change are complex and will impact on not only the bio-physical environment (rainfall, weeds, pest animals and disease, temperature, soil condition) but also the socio-economic environment including return on investment, business risk, enterprise size and structure, land use, capital investment, debt levels, labour availability and skills and community structures.

A whole of farm system approach is required to develop the adaptive capacity of rural businesses and industries. This will require farmers, researchers and extension service providers in the public and private sectors to work closely together to pioneer solutions using an adaptive management approach and models to support decision making. This approach is consistent with the principles of the *Fresh Approach* to service delivery being implemented by the Department of Primary Industries and Fisheries.

An integrated, ecosystem based management approach will be required to enable fisheries to adapt to climate change. This will require research, vulnerability assessments and recognition in land use planning instruments.

Drought policy directions aim to achieve a level of self-reliance within Queensland's rural industries such that the risk of drought is adequately covered by sound property planning and management practices. The ability of producers to be prepared for drought and other forms of climate risk will be even more imperative as a result of climate change.

Managing the increased biosecurity risk

Significant biosecurity risks from climate change may occur due to changes in the distribution of invasive weeds, pest animals and diseases. Climate change will increase the risks of new incursions and increase the impact of some established invasive pests and diseases. On the other hand, climate change will also reduce the impacts of some pest species and there may be increased opportunities to better manage some species due to less favourable climatic conditions.

Climate change may create significant risks to Queensland's biosecurity status as a 'clean and green' supplier of food to the world. Temperature changes and extreme events could also have significant impacts on animal welfare, an important issue in its own right, as well as having a significant impact on Queensland's access to global markets.

Many of the broad biosecurity risks and opportunities associated with climate change have been identified, but more research is needed in this area.

Improving measurement and verification techniques for on farm carbon management including offsets

The agricultural sector will have a significant role in mitigation of emissions as it contributes a significant proportion of Queensland's greenhouse gas emissions. Investment has been made in research, development and extension (RD&E) to reduce emission intensity from the sector. Notwithstanding existing efforts, more RD&E is required to identify further sources and sinks of emissions, including opportunities to encourage the take-up of farm and grazing land management practices which minimise greenhouse gas emissions.

The carbon footprint of agricultural production needs to be determined to prioritise opportunities for emissions reduction through RD&E. Agriculture, including forestry, has a role in sequestering carbon through vegetation and soil, but this is difficult to quantify due to the wide spatial coverage and cost of obtaining accurate data. Australian accounting under the Kyoto Protocol recognises carbon sequestration in reforested land, but not in soils and some other vegetation types.

Environmental services such as carbon sequestration and biodiversity preservation may need to be increasingly integrated with the production of food and fibre in order to manage environmental as well as economic risks and for greenhouse gas mitigation.



Photo courtesy Department of Primary Industries and Fisheries

What are your views?

- 1 What are the barriers to the primary industries sector reducing greenhouse gas emissions and adapting to climate change and how could they be addressed?
- 2 What could the Queensland Government do to help our primary producers prepare for the impacts of climate change?
- 3 What are the research priorities for Queensland's primary industries in a changing climate?
- 4 What could the Queensland Government do to improve the greenhouse performance of the primary industries sector?

Queensland Government initiatives to assist Queensland's Primary Industries to respond to climate change

■ **Integrating climate change into Farm Management Systems:** the Queensland Government is establishing partnerships with key agri-industries and regional Natural Resource Management bodies to implement Farm Management Systems (FMS) that address a range of climate change issues. Partners include the sugarcane, grain, nursery and garden industry and dairy sectors.

■ **Drought Preparation:** the Queensland Government has invested significantly in assisting producers, regional businesses and communities cope with drought events. The Queensland Government has also invested more than any other state or territory in drought preparedness programs to help producers be better prepared for drought and climate variability. These include the development of climate forecasting techniques and a range of farm management tools that practically integrate climate forecasting systems into producers' operations. Queensland Government climate forecasting systems such as the Southern Oscillation Index phase system have become widely adopted internationally. Continued development of these applied forecasts and integrated decision support tools are integral to ensuring producers are able to adapt to an increasingly variable climate.

■ **Rural Water Use Efficiency Strategy:** the Queensland Government is working in partnership with rural industry groups to support irrigators to: achieve water use efficiency; meet the challenges of water reform; reduce off-farm impacts on the environment; and implement farm management systems. Funding of \$1.25 million was available in 2006–07 to accelerate the uptake of industry-based FMS which support rural industry groups to deliver water use efficiency programs.

How other Australian states and territories are reducing greenhouse gas emissions from Primary Industries

■ New South Wales

Research and Development: to investigate the potential for land management practices to increase soil carbon and develop a rapid and cost effective method for measuring soil carbon.

Char to soil: Researching the application of char to soil to assess likely benefits, including increased plant production, enhanced fertiliser efficiency, carbon sequestration, and reduced nutrient and pesticide run-off.

■ South Australia

Awareness Raising and Capacity Building: A guideline to climate change and adaptation in agriculture in South Australia provides farmers with an introduction to the issues, challenges and opportunities of climate change and a range of response options for their consideration.

Designated Primary Production Areas (DPPA's): South Australia's limited options for high-value production, especially irrigated and cool climate production, will be further narrowed by climate change. This project will identify key production assets (natural resources and/or existing farm infrastructure and investment) for current conditions and future scenarios. DPPAs will be incorporated into planning policy to ensure that land use decisions affecting these assets are fully informed.

■ Northern Territory

Research: A range of projects are aimed at refining the method for estimating emissions from savanna fires and improving understanding of greenhouse gas emissions from tropical savannas — carbon, methane and nitrous oxide fluxes under different land management conditions.

What international initiatives are helping reduce greenhouse gas emissions from Primary Industries

■ New Zealand

Research to support 'food miles': Lincoln University has studied the life cycle carbon footprint of dairy products exported from New Zealand to the UK and was able to demonstrate the footprint of the New Zealand products was still 30 per cent lower than local UK products even after transport. This research is important to demonstrate marketing concepts such as 'food miles' may have perverse effects of increasing greenhouse gas emissions and unnecessarily threatening Queensland exports.

■ Transport



Transport is the fourth largest greenhouse gas contributor in Queensland, comprising approximately 10.8 per cent of total emissions (Department of Climate Change, 2008). As Queensland's economic and population growth continues a key challenge is to deliver additional transport capacity without exacerbating greenhouse gas emissions.

Managing greenhouse gas emissions from the transport sector cannot be done in isolation from responses to other key transport issues, such as congestion. Climate change measures for the transport sector must be compatible with other transport objectives.

Encouraging sustainable transport choices

Public transport patronage has increased by 30 per cent in south-east Queensland since 2004. However, the majority of growth has been on week days during peak periods. At other times, public transport remains under-utilised. As almost 37 per cent of all trips in Brisbane are under 3 kilometres (km) and almost 52 per cent under 5 km, there is considerable potential for public transport, walking and cycling to play a greater role in managing transport emissions.

To facilitate this, public transport infrastructure and services need to keep pace with population growth, as well as build capacity beyond this for mode share shifts from car use. Cycle networks need to be well-connected and provide direct routes between destinations. Facilities to support cycling and walking to work, such as shower and bike storage centres, are also important infrastructure.

Improving greenhouse efficiency of the transport fleet

Queensland's passenger vehicles contribute approximately 50 per cent (or 9.18 Mt carbon dioxide equivalent (CO₂-e)) of Queensland's total transport sector greenhouse gas emissions (Department of Climate Change, 2008). In 2007, Queenslanders registered nearly 180 000 new passenger vehicles, of which:

- less than 4 per cent had a greenhouse gas (GHG) rating of 8 or higher (on a scale of 1 to 10 with 10 being the best²) — emitting on average 1.8 tonnes of CO₂-e per vehicle per annum
- over 36 per cent had a GHG rating of 7 to 7.5 — averaging 2.4 tonnes of CO₂-e per vehicle per annum
- nearly 60 per cent had a GHG rating of 6.5 or less — averaging 3.5 tonnes of CO₂-e per vehicle per annum.

This suggests there is considerable capacity to increase the number of 'green' vehicles currently being purchased.

Encouraging the development of new low emission technologies and fuels

The Queensland Government's Alternative Fuels Industry Policy aims to increase the proportion of non-traditional transport fuels, including renewable fuels such as ethanol and biodiesel. A number of new technologies, such as hydrogen, show promise. However, it may be decades before they are ready for commercialisation. In addition, once on the market it takes a number of years to substantially incorporate these innovations into the fleet. So while new technologies will be vital to meeting long term emission targets, policies are also required to encourage the widespread implementation of existing mainstream, low-emission, fuel-efficient technologies to ensure abatement is being maximised in the short term.

2 These ratings are based on the Commonwealth Green Vehicle Guide, which assesses vehicles on their grams of CO₂ per kilometre.

Integrating transport into land use planning

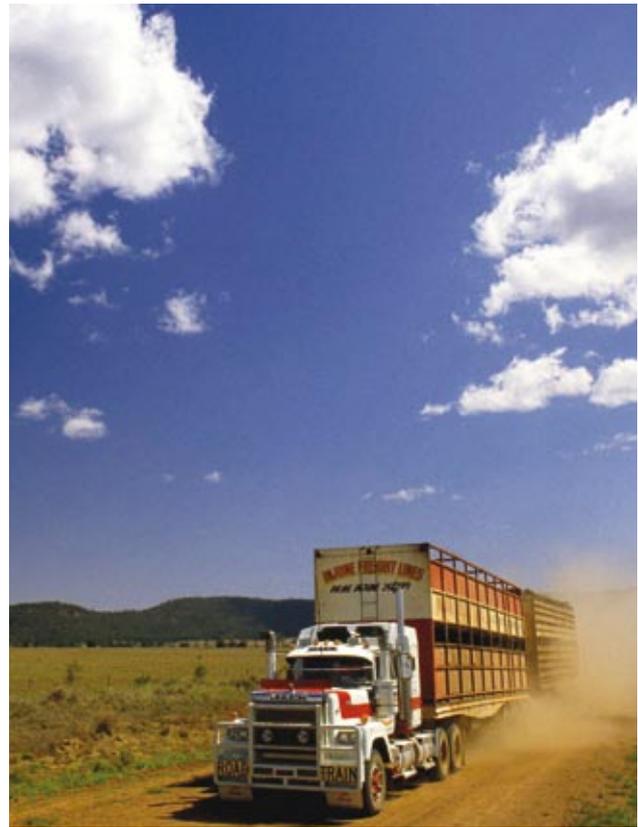
Queensland's regionalised nature, land use patterns and low population densities constrain travel by sustainable modes, leading to additional trips and greenhouse gas emissions. Furthermore, planning for commercial and industrial centres needs to consider accessibility for workers, and ease of access from a freight perspective to ensure accessible transport links between various stages of production chains, between suppliers and to import and export markets.

Integrated regional plans such as the South East Queensland Regional Plan and integrated regional transport plans are important tools to ensure that transport is integrated into Queensland communities and industrial areas and developments are planned in ways which reduce the need to travel and/or promote sustainable travel choices.



Adapting transport infrastructure and services to respond to climate change impacts

Given the potential climate change impacts, existing transport infrastructure in higher risk areas will need to be made more resilient where possible and may need to be complemented with alternative modes and access routes. Detailed planning will be necessary to facilitate these adaptations.



**What
are your
views?**

- 1 How can Queensland reduce the number of vehicles on the road?
- 2 What are the barriers to reducing transport related greenhouse gas emissions and how can they be addressed?
- 3 What could the Queensland Government do to improve the uptake of low emission vehicles?

Queensland Government initiatives to reduce greenhouse gas emissions from transport

- **Alternative Fuels:** the Queensland Government has committed to an ethanol mandate of 5 per cent by 2010.
- **The TravelSmart Queensland Program:** will give Queenslanders, especially in south east Queensland, more TravelSmart choices.
- The Queensland Government has introduced an **integrated electronic ticketing system** or *go* Card to support transport integration across bus, train and ferry services. The Queensland Government has introduced a new fee structure for trips taken on public transport in south east Queensland, discounting *go* Card trips by as much as 67.5 per cent from 4 August 2008. This provides Queenslanders with a cheaper alternative when deciding whether to use a car or public transport and provides more incentive to shift away from car use.
- **Brisbane buses fueled by CNG:** more than one third of Brisbane Transport's buses now run on compressed natural gas (CNG), with plans to gradually replace the remaining older diesel buses with CNG or alternative cleaner fuel buses.
- **Public Transport Investment:** the Queensland Government will invest \$168.4 million to improve customer services across the TransLink network, including funding for 90 new buses for Brisbane in 2008–09.

How other Australian states and territories are reducing greenhouse gas emissions from the transport sector

- **Australian Capital Territory**
Green Vehicles: stamp duty scheme commencing 2009, where stamp duty is linked to a vehicle's environmental performance.
- **Victoria**
Connecting Victorian Communities: is a 10-year, \$10.5 billion transport plan for metropolitan and regional Victoria. The plan aims to increase public transport use through improved train and tram access and orbital buses to complement the existing hub-and-spoke transport infrastructure and reduce inter-suburban car use.

What international initiatives are helping reduce greenhouse gas emissions from the transport sector

- **The Netherlands**
Ecodriving training: to stimulate individual drivers, professional chauffeurs and fleet owners in more energy-efficient purchase and driving behaviour, leading to a reduction in CO₂ emissions.
CO₂ Based Motor Vehicle Tax: registration tax is reduced or increased in accordance with the car's fuel efficiency.
- **Sweden**
BioGas Fuel: biogas plants in Sweden will be equipped to deliver a biogas that is upgraded to natural gas quality, either for direct use as vehicle fuel or for injection into the natural gas grid. The development of biogas as vehicle fuel is a result of a combination of a surplus of gas from biogas plants, primarily at sewage treatment plants, and a low electricity price that forces the biogas into markets other than electricity production.
- **United Kingdom**
Telecommuting: reduces dead time in transport, reduces the uncertainty of potential travel disruption and addresses security concerns.

■ Government leadership



Photo courtesy Department of Public Works

The public sector has a key role to play in responding to climate change through leadership in emission reductions. The Queensland Government can also use its purchasing power to drive improved emissions performance in its own activities and to influence markets, standards and take-up of energy saving technologies in Queensland.

Leading by example on our business performance

An accurate and comprehensive picture of the carbon emissions of Queensland Government departments will assist with understanding the government's carbon liability and business decisions regarding investments in carbon reduction measures. The Queensland Government could consider facilitating and/or participating in 'best-practice' projects that demonstrate the benefits of low-emission and energy-efficient technologies in buildings, particularly in high energy-consuming equipment such as lighting and air-conditioning.

Leveraging government purchasing power to support new clean, green products and services

As a major purchaser of goods and services as well as construction, the government could adopt more energy efficient practices. Green purchasing provides savings,

reduction in greenhouse gas emissions and leadership in supporting the market for appropriate purchase of climate friendly goods and services.

Reducing work related travel

Travel is responsible for a major part of an organisation's greenhouse gas emissions. Queensland Government staff travel for a variety of reasons, which include visiting regional service areas, and also travelling interstate to high-level meetings and conferences. The use of collaboration technologies, such as audio and web conferencing, desktop video and room-based videoconferencing have the capacity to reduce these 'face-to-face' meetings.

Increased uptake of teleworking

While teleworking is not applicable to all jobs in the public sector, appropriately implemented teleworking offers the potential to deliver important outcomes, such as reducing the environmental impacts of travelling to work, reducing operating costs (such as real estate and office space rental, parking and travel) and providing a greater capacity to attract and retain quality staff, especially in tight labour markets.

What are your views?

- 1 What demonstration projects could the Queensland Government support to stimulate innovation and investment in greenhouse gas reduction technologies?
- 2 How could the Queensland Government support research and development in greenhouse gas reductions?
- 3 What could the Queensland Government do to further reduce its greenhouse gas emissions?

Queensland Government initiatives to show leadership in reducing greenhouse gas emissions

■ **Reporting greenhouse gas emissions:** from September 2008, all Queensland Government agencies will be required to report their greenhouse gas emissions as part of corporate annual reporting.

■ **Carbon-neutral government-owned office buildings:** the Queensland Government has committed to making its office buildings 'carbon-neutral' by 2020. This will be achieved through strategies to reduce energy consumption and increase energy efficiency, such as mandating minimum air-conditioning temperature settings in summer and switching off lights, computers and office equipment when not in use.

■ **Energy-efficient government buildings:** the Queensland Government has recently mandated energy-reduction targets of 5 per cent by 2010 and 20 per cent by 2015 for all government buildings including schools, TAFE colleges, hospitals, prisons, police stations and office buildings.

■ **Minimum energy standards for new buildings:** all new government-owned office buildings need to be designed to achieve at least a 4.5-star energy rating.

■ **Climate Change Impact Statements:** Queensland is the first state to require all relevant Cabinet and budget submissions to include a climate change impact statement. The climate change information contained in the statements provides valuable information to support government decision making.

■ **Emission reduction in the Government Vehicle Fleet:** the QFleet ClimateSmart Action Plan 2007-2010 has committed to reducing CO₂ emissions from the QFleet vehicle fleet by 15 per cent by 31 December 2010 compared with 30 June 2007. Remaining emissions will be offset, with a target of 50 per cent by 31 December 2010 and 100 per cent by 31 December 2020. Minimum greenhouse emissions standards have been set for QFleet vehicles based on the Australian Government's Green Vehicle Guide.

■ The Queensland Government \$60 million **solar and energy efficiency program**, being delivered by the Department of Education, Training and the Arts, aims to reduce electricity consumption and greenhouse gases by having solar panels and other energy efficiency measures in all Queensland state schools and centres over the next three years.

How other Australian states and territories are reducing greenhouse gas emissions from government operations

■ **South Australia**
Carbon Neutral Government: purchasing 20 per cent of its energy supplies from certified GreenPower from 2008.

■ **Northern Territory TravelSmart Workplace Project:** to increase the use of sustainable modes of transport for journeys to and from workplaces of three Northern Territory government agencies.

What international initiatives are reducing greenhouse gas emissions from government operations

■ **United Kingdom**
Green Public Procurement considering energy efficiency: public authorities in the old European member states every year spend around 16 per cent of gross domestic product on purchasing goods and services. A Handbook explains how they can consider environmental aspects, including energy efficiency, in procurement practises.

Government Departments carbon neutral: central government departments and their agencies will be carbon neutral by 2012. Becoming carbon neutral means that government bodies must prevent as much carbon emissions as they produce.

■ Ecosystems



Queensland is one of the most biodiverse regions in the world. A number of ecosystems will be particularly vulnerable to climate change due to their extremely limited geographic range. Many species will be unable to adapt to the projected climate changes, especially at the current rate of warming and may disappear. Other species will adapt resulting in significant changes to existing ecosystems or producing new unknown ecosystem types.

The Queensland Government is seeking opportunities to expand our understanding of the strategies to manage biodiversity under a changing climate.

Identification of high value ecosystems

As many social and economic activities of the state are tied to our natural environment, the identification of high value ecosystems and research on the impacts of climate change on ecosystems together with the identification of new management approaches are a high priority.

The agriculture industry for example is playing an increasingly important role in the protection and management of biodiversity on private land. Such practices have the potential to enhance ecosystem resilience and facilitate native species' movement across the landscape.

Understanding how climate change will impact on ecosystems

Some ecosystems may not cope with future climate changes and species that are particularly climate-sensitive due to their limited habitat ranges or inability to migrate may disappear. The IPCC (2007b) highlighted projected climate change impacts, including significant loss of biodiversity in the Great Barrier Reef and Queensland Wet Tropics by 2020.

Queensland's natural environment and landscapes are vulnerable to impacts such as (Office of Climate Change, 2008):

- potential changes in plant growth and native vegetation patterns from hotter temperatures, less rainfall and carbon-dioxide fertilisation
- conditions becoming more favourable for pests, weeds and diseases, potentially changing their abundance and distribution
- reduced streamflow and decreasing water quality impacting on the ecological functioning of important river systems
- increasing stress on already threatened species and ecosystems, such as upland rainforests, reefs, arid and semi-arid habitats and aquatic ecosystems
- reduced viability of species or ecosystems, potentially leading to new threatened communities
- changes to species' breeding patterns and lifecycles impacting on population dynamics and species viability
- increasing frequency of bushfires, severe storms and droughts impacting on the ecological and landscape values of Queensland's natural areas.

Understanding how climate change will impact on ecosystems is a significant challenge. The response of these ecosystems to the changes and what adaptation measures are available and effective is being explored.

What are your views?

- 1 What research is needed to understand the potential impacts of climate change on Queensland's sensitive ecosystems?
- 2 How can we increase the resilience of Queensland ecosystems?

Queensland Government initiatives to minimise the impacts of climate change on ecosystems

■ **Building Resilience to Climate Change:** the Queensland Government has committed to increasing the National Park estate by 50 per cent by 2020. This will increase the area under protection from almost 7.6 million hectares to around 12 million hectares.

■ **Reef Water Quality Protection Plan:** the goal of the Reef Plan is to halt and reverse the decline in water quality entering the Great Barrier Reef within 10 years through reducing the load of pollutants from diffuse sources in the water entering the reef and rehabilitating and conserving areas of the reef catchments that have a role in removing waterborne pollutants.

■ **Wild Rivers:** the *Wild Rivers Act 2005* will preserve the natural values of wild rivers, by regulating future development activities within the declared wild river area. The legislation is the first of its type in Australia and is important to sustain healthy ecosystems for our native plants and animals as well as supporting sustainable economic activities.

How other Australian states and territories are minimising the impacts of climate change on ecosystems

■ Western Australia

The Gondwana Link Project: is an initiative that will effectively link the ecosystems of inland Western Australia with the wetter forests of the south west corner, a distance of almost 1 000 km. This is a collaboration between a broad range of community and non-government organisations.

■ Northern Australia

WildCountry: is based on an understanding of the large-scale and long-term connections in nature, which aims to solve environmental problems before they occur and restore the ecological processes and environmental flows which sustain the long-term health of nature. The program undertakes an analysis of ecological connections, variability in climate and environment, and availability of food and habitat, in both fragmented and intact landscapes across Australia which can be incorporated into conservation planning at national, regional and local scales.

What international initiatives are reducing the impacts of climate change on ecosystems

■ USA

Spine of the Continent project: will create a wildland network from Canada to Mexico to save and connect critical wildlife. The connection of wildland will help restore resilience for ecosystems facing habitat fracture and the impacts of climate change.

Next steps



Through *ClimateSmart 2050* and *ClimateSmart Adaptation Plan 2007–12*, the Queensland Government has outlined strategies to mitigate greenhouse gas emissions and increase our resilience to the impacts of climate change.

The Queensland Government is currently updating and consolidating these two strategies in light of the latest scientific assessments as well as national and international developments in climate change and climate change policy.

Invitation to comment

This issues paper is an opportunity for input and ideas on further programs and policy to support reductions in greenhouse gas emissions and adapt to the impacts of climate change. Comments will be used to shape measures under the reviewed *Queensland ClimateSmart Strategy*.

The Queensland Government welcomes your feedback on all the issues raised in this paper.

Submissions must be in writing and may be submitted to:

Review of Queensland Government's
Climate Change Strategy
Office of Climate Change
Environmental Protection Agency
PO Box 15155
CITY EAST QLD 4002

Or by email:

cs2050.review@climatechange.qld.gov.au

Submissions must be received by 5.00 pm
Monday 27 October 2008.

Further information

Further information about the review of the Queensland Government climate change strategy may be found at www.climatechange.qld.gov.au

Public access to submissions

Submissions may be accessible under *Freedom of Information Act 1992*. Please identify any submission, or part of a submission, that needs to be treated as “commercial-in-confidence”. Similarly if a submission contains details about a person’s personal affairs (his or her experience relevant to a matter covered in this document), and it is in the public interest to protect the person’s privacy, the “personal” information in that submission would not be accessible under the *Freedom of Information Act 1992*.

Disclaimer

This document is for discussion only and does not commit the Queensland Government to the views expressed or to any future action. This document does not necessarily represent government policy.

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■ Notes

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