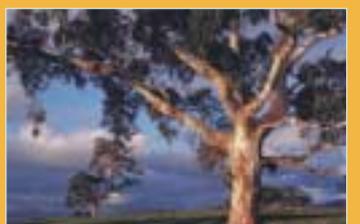




VICTORIAN GREENHOUSE STRATEGY



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MINISTER'S FOREWORD

The Bracks Government is committed to a better quality of life for current and future generations. We will pursue this commitment by ensuring our economy, our society and our environment are developed in a balanced way.

The Government's framework for the future – *Growing Victoria Together* – has a vision for Victoria as being a State where:

- protecting the environment for future generations is built into everything we do; and
- innovation leads to thriving industries generating high quality jobs.

The Victorian Greenhouse Strategy is a practical demonstration of how the Bracks Government is working to realise this vision.

Ten years ago the international community met in Rio de Janeiro for the United Nations Conference on Environment and Development – the 'Earth Summit'. A key outcome of this meeting was the United Nations Framework Convention on Climate Change, which was signed by 154 countries, and included an objective to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human interference with the climate system.

Although much remains to be done to achieve this objective, the past decade has seen important steps taken. Agreement has been reached on the Kyoto Protocol, which is likely to come into force in 2002. The Bracks Government believes the Kyoto Protocol provides a responsible framework for international action on climate change and should be ratified by Australia as soon as possible.

Climate change is an issue which impacts on the whole community – including individuals, business and all levels of government. All members of the community must play their part if a truly sustainable solution is to be achieved. The Victorian Greenhouse Strategy will facilitate the establishment of partnerships, and build capacity throughout the community for greenhouse action.

The development of the Victorian Greenhouse Strategy has benefited from extensive public consultation. I would like to express my thanks to the many people who made submissions to the Strategy Discussion Paper and attended public forums, and to the organisations who participated in a number of Stakeholder Reference Groups that provided advice on the formulation of the Strategy.

The Bracks Government will continue to ensure that key stakeholders and the wider community are engaged in the process of implementing the Strategy, and in the ongoing work to monitor, review and enhance the Strategy over time.



The Victorian Greenhouse Strategy is a significant first step on the long road to addressing the threat of climate change. I urge all Victorians to work together as we embark on this important journey.

The Honourable Candy Broad, MLC
Minister for Energy and Resources



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INTRODUCTION

CLIMATE CHANGE IS ONE OF THE MOST SERIOUS CHALLENGES FACING THE WORLD COMMUNITY. ALL COUNTRIES AND ALL COMMUNITIES ARE VULNERABLE TO CLIMATE CHANGE AND ITS RELATED SOCIAL, ENVIRONMENTAL AND ECONOMIC IMPACTS.

Since 1750, the concentration of carbon dioxide (CO₂) in the atmosphere has increased by 31 percent. The present concentration of CO₂ has not been exceeded during the past 420,000 years, and is unlikely to have been exceeded during the past 20 million years. This situation is the result of industrial and social changes that have taken place over the past 250 years at a scale and pace not previously experienced.

The Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), which was released in early 2001, concluded that climate change will result in large, possibly irreversible changes to the earth's systems. The question is not whether climate will change, but rather when, where, and by how much? Above all, the key issue for governments and the community is what is to be done now and in the future to minimise the extent and impacts of climate change.

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (FCCC) is the key platform for the international community's response to climate change. The Victorian Government supports the Protocol as providing a responsible framework for international action on climate change.

Despite the United States indicating that it will not participate in the Protocol, agreement reached in international negotiations at the 7th Conference of the Parties to the FCCC in Marrakesh in November 2001, means that it is likely that the Protocol will come into effect – possibly in time for the World Summit on Sustainable Development in Johannesburg in September 2002.

The Commonwealth Government has indicated that, regardless of whether the Protocol comes into effect internationally, it remains committed to work-



ing to meet Australia's target under the Kyoto Protocol – to limit emissions in the 2008-2012 period to 108% of 1990 levels. Victoria will have a significant role to play in ensuring the target is met.

The Victorian Government recognises, however, that even if the targets of the Kyoto Protocol are achieved, larger reductions in emissions will be needed over time if the adverse effects of climate change are to be minimised. This will require greater effort from developed countries, as well as the participation of developing nations.

Although the international policy framework will continue to evolve, it is incumbent on all Victorians to act now for the sake of our children and future generations. Greenhouse issues must be tackled by concerted and cooperative action by all members of the community – including Government, business and individuals. The Victorian Greenhouse Strategy provides the framework and programs for such action in this State.

The suite of actions in the Victorian Greenhouse Strategy will deliver significant reductions in greenhouse gas emissions over the next decade, as well as establishing the basis for the directional change that is needed to respond to the escalating threat of climate change. The Strategy will seek to ensure that adjustments occur in a way which enables Victoria to move towards a sustainable greenhouse future without putting at risk the State's prosperity.

The Strategy includes action on three fronts: the reduction of greenhouse gas emissions; the sequestering of carbon through enhancement of greenhouse sinks; and the development and implementation of strategies to adapt to climate change. It also uses the range of different policy tools available to governments – including regulation; financial incentives; cooperative/partnership-based programs; information and education; and support for Research, Development, Demonstration and Commercialisation activities – to address the diversity of factors influencing Victoria's greenhouse gas emissions.

Importantly, in addition to delivering greenhouse benefits, many of the actions in the Strategy will bring about other benefits that will improve the quality of our lives – including enhancements in the competitiveness of our economy and improvements in the health of our ecosystems.

The Victorian Greenhouse Strategy is presented in two parts.

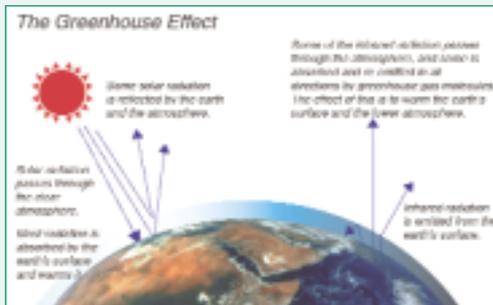
Part A provides an overview of the key contextual and strategic considerations that have guided the development of the Strategy, and which will continue to guide its ongoing implementation and evolution, including:

- the scientific basis for action on climate change and the nature of the international and national policy response to climate change
- Victoria's greenhouse gas emissions profile

What is the enhanced greenhouse effect?

About half of the Sun's energy reaching the top of our atmosphere penetrates to the Earth's surface. The rest is either reflected back into space by the atmosphere or absorbed by gases and dust particles. The solar energy that does reach the Earth's surface warms the land and oceans. In turn, the land and oceans release heat in the form of infrared radiation.

Greenhouse gases absorb some of this radiation, warming the lower atmosphere. This absorption of heat, which keeps the surface of our planet warm enough to sustain us, is called the greenhouse effect. Without heat-trapping greenhouse gases in the air, the Earth's surface temperature would average a frigid -18°C , rather than 15°C .



Water vapour is responsible for about three-quarters of the natural greenhouse effect. The next most significant greenhouse gas is carbon dioxide.

Emissions of greenhouse gases due to human activities are leading to an increase in the concentration of greenhouse gases in the Earth's atmosphere. This results in increased trapping of infrared radiation and adds to the natural greenhouse effect, producing an *enhanced* greenhouse effect.

The Earth's climate system is finely balanced. Increased temperatures in the lower atmosphere are likely to produce changes to weather and climate world-wide. Consequently, the enhanced greenhouse effect is often referred to as climate change or global warming.

- the goals of the Victorian Greenhouse Strategy
- the key strategic considerations influencing Victoria's greenhouse response
- the processes to be established for monitoring, reviewing and further developing the Strategy.

Part B details the Government's greenhouse policies and programs and is presented in 10 Modules:

- Government leadership
- Energy supply
- Greenhouse best practice in Victorian industry and commerce
- Reducing greenhouse gas emissions through improved management of wastes
- Working with local government and the community
- Greenhouse-friendly households
- Influencing travel choices and behaviour
- Greenhouse sinks and natural resource management
- Supporting greenhouse best practice in agriculture
- Climate change impacts and adaptation

These Modules outline actions already being implemented by the Victorian Government, as well as introducing new actions to strengthen Victoria's greenhouse response.

Over time, the efforts of all governments and communities – both in Australia and overseas – to reduce greenhouse gas emissions will need to be further enhanced, with new policies and programs being adopted to take advantage of developments in technology, and to respond to developing international commitments. The Victorian Government will monitor and update the Victorian Greenhouse Strategy over time in response to these developments to ensure the Strategy remains at the leading edge of greenhouse policy. Consistent with its commitment to democratic, open and inclusive decision-making processes, the Government will ensure that the monitoring, review and further development of the Strategy will occur through processes which engage key stakeholders and the wider community.



PART A

THE STRATEGY



1

SCIENTIFIC AND POLICY CONTEXT

In little more than a decade, climate change due to the enhanced greenhouse effect has moved from being an issue of interest primarily to the scientific community, to one that is recognised as presenting a major challenge to the global community with important environmental, social and economic implications.

This recognition is manifest at both the international and national levels through:

- the research findings of the international scientific community – most notably through the Intergovernmental Panel on Climate Change – which are pointing with increasing certainty to the fact that human activities are impacting on the earth’s climate
- the establishment of the United Nations Framework Convention on Climate Change and agreement to the Kyoto Protocol as the basis for efforts by the international community to reduce greenhouse gas emissions
- the commitment by State, Territory and Commonwealth Governments to the National Greenhouse Strategy, and to specific programs of action within each jurisdiction.

1.1 The findings of the Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organisation and the United Nations Environment Program as the body responsible for providing the international community with authoritative advice on scientific, technical and economic issues relating to climate change.

In 1995, the IPCC released its Second Assessment Report which concluded that the ‘balance of evidence suggests a discernible human influence on global climate’. These conclusions were strengthened in the IPCC’s Third Assessment Report – released in 2001 – which stated that there is new evidence that most of the warming that has occurred over the last 50 years is attributable to human activities. Other key findings from this report include:

- data for the past 1000 years suggests that warming over the past 100 years was unusual and unlikely to be natural in origin
- the 1990’s was the warmest decade and 1998 the warmest year in the



instrumental record since 1861

- globally averaged surface temperature is projected to increase by 1.4 to 5.8°C from 1990 to 2100
- recent regional climate changes, particularly temperature increases, have already affected many physical and biological systems
- natural systems are vulnerable to climate change, and some will be irreversibly damaged
- sea levels are projected to rise by 0.09 to 0.88 metres from 1990 to 2100
- in Australia water is likely to be a key issue due to projected drying trends over much of the region and change to a more El Nino-like average state
- Australian ecosystems that are particularly vulnerable to climate change include alpine systems and freshwater wetlands
- some species with restricted climatic niches and which are unable to migrate due to fragmentation of the landscape, soil differences, or topography, could become endangered or extinct
- adaptation is a necessary strategy to complement climate change mitigation efforts.

The IPCC's Third Assessment Report concludes that human activities are changing the Earth's climate. In light of these findings, the Victorian Government reaffirms its commitment to pursuing a strong greenhouse response program through the Victorian Greenhouse Strategy.

1.2 International policy response – the United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (FCCC) arose from increasing international concern about the implications of climate change and a recognition that international cooperation is needed if this global problem is to be tackled effectively. The ultimate objective of the FCCC is to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the climate system. 186 countries, including Australia, have ratified the FCCC.

The first Conference of the Parties (COP1) to the FCCC in 1995 set in train a process to establish a protocol to the FCCC to specify commitments by developed countries to reducing their greenhouse gas emissions. These negotiations were successfully concluded at COP3 in Kyoto, Japan in December 1997, where agreement was reached on the Kyoto Protocol.

Under the Kyoto Protocol, 'Annex B' countries (ie. developed countries and countries undergoing the process of transition to a market economy) agreed

to reduce their greenhouse gas emissions as a whole from 1990 levels by at least 5% by 2008-2012. In recognition of the fact that Annex B countries have different economic circumstances and differing capacities and costs in achieving emissions reductions, each country was assigned a specific, differentiated target. Australia's target is to limit its growth in greenhouse gas emissions in the 2008-2012 period to no more than 8% above 1990 levels.

The Kyoto Protocol does not include emission reduction targets for developing countries. However, it has been agreed that negotiations to set targets for periods after 2012 will begin by 2005, with a key issue in this round of negotiations being the role of developing countries.

While 84 countries have signed the Kyoto Protocol, it will not come into force until ratified by 55 countries representing 55% of Annex B country emissions. As at the end of April 2002, 54 (mostly developing countries) had ratified the Protocol (information on the status of ratification of the Protocol can be found on the web at www.unfccc.int/resource/convkp.html).

A key prerequisite for ratification of the Kyoto Protocol by developed countries has been agreement on the operational details of the Protocol. COP4 – held in Buenos Aires in 1998 – laid out a Plan of Action involving a 3 year schedule of negotiations to finalise these details. COP6 in the Hague in November 2000 failed to achieve resolution of the Buenos Aires Plan of Action, largely because of disagreement about the rules governing how countries could utilise carbon sinks to offset their emissions. In July 2001, COP6 resumed in Bonn and, despite an announcement by the United States that it would not ratify the Protocol, a political agreement was reached that settled many of the outstanding issues.

The Bonn agreement covered four principal areas: operating rules for emissions trading and the other flexibility mechanisms; how the sequestration of carbon by forests and other sinks will be credited toward Kyoto emission targets; funding to help developing countries combat and cope with climate change; and mechanisms to encourage and enforce compliance with the Kyoto targets.

COP7 was held in Marrakesh, Morocco in November 2001. It sought to finalise agreement on the operational details for commitments under the Kyoto Protocol, and to bring to a close the three years of negotiations outlined in the Buenos Aires Plan of Action. Despite the fact that the United States reaffirmed that it does not intend to ratify the Protocol, there was widespread optimism by many of the parties at the conclusion of COP7 that operational details have indeed been finalised and that the way is open for entry into force of the Kyoto Protocol. The UN Framework Convention's Executive Secretary, Michael Zammit Cutajar stated that:





“After several years of tough negotiation, the institutions and detailed procedures of the Kyoto Protocol are now in place. The next step is to test their effectiveness in overseeing the five-percent cut in greenhouse gas emissions by developed countries over the next decade”.

The European Union, Japan, Russia and New Zealand have signalled their intention to ratify the Protocol. Ratification by the number of parties required to bring the Protocol into effect may occur in time for the World Council on Sustainable Development to be held in September 2002 in Johannesburg.

The Commonwealth Government has stated that it remains committed to working to meet Australia’s Kyoto target, regardless of whether the Protocol comes into effect internationally. On February 28 this year, the Federal Environment Minister – Dr Kemp – announced an agreement between the Australian and US Governments to establish a Climate Action Partnership. In making the announcement, Dr Kemp highlighted Australia’s continued commitment to playing a constructive role in international negotiations and to working closely with the US. At this stage, the Commonwealth Government has not announced its final position on ratification of the Kyoto Protocol.

The Victorian Government believes that it is important for Australia to take the steps necessary to ratify the Protocol in line with most other developed countries. Bearing in mind the serious threat posed by climate change and the need for collective international action, the Victorian Government believes that the Kyoto Protocol offers the best way forward on this issue. In addition, it is recognised that there are a number of potentially significant implications for Australia of not ratifying the Protocol – including:

- if Australia was the only developed nation, besides the US, not to ratify the Protocol, it is possible that parties to the Protocol would impose trade restrictions on Australia
- while Australia has committed to meet its Kyoto target regardless of whether the Protocol comes into effect internationally, it is likely to be more expensive attempting to do this without access to the Kyoto flexibility mechanisms of emissions trading, the Clean Development Mechanism, and Joint Implementation
- once the Protocol is ratified and enters into force, parties not ratifying would not be at the table for continuing discussions in Meetings of the Parties to the Protocol – other than as an observer.

The Victorian Government recognises that current international and national commitments are only a first step to meeting the ultimate objective of the FCCC. As noted by CSIRO in its submission to the 2000 Senate Inquiry into

Global Warming, to stabilise concentrations of greenhouse gases in the atmosphere, be it at double or triple pre-industrial levels, global emissions must be reduced to significantly less than current emissions.

The Victorian Government believes that:

- dealing with the threat of climate change requires a commitment by all countries to significant reductions in their greenhouse gas emissions
- developed countries should play a leadership role both in setting an example through emissions abatement, and in assisting developing countries through capacity building and technology transfer
- the Kyoto Protocol provides a responsible framework for international action on climate change – the Australian Government should take the steps necessary to ratify the Protocol.

Climate change will continue to demand an effective international and national response, and it is likely that action to reduce emissions will need to be progressively strengthened. Consequently, the Victorian Government:

- recognises that the Victorian Greenhouse Strategy represents an important, but by no means final step in Victoria's contribution to meeting Australia's target under the Kyoto Protocol and to the emissions reductions that will be required to achieve the ultimate objective of the FCCC – to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the climate system
- will implement the Victorian Greenhouse Strategy and build on this Strategy over time, taking into account policy developments at the national and international level, but recognising that action needs to proceed even in the absence of ratification of the Kyoto Protocol
- believes it is important to provide flexibility for Victoria in terms of future greenhouse responses, and to ensure that future greenhouse response actions are not made more difficult or costly by a failure to take appropriate action today.

1.3 Australia's national policy response – the National Greenhouse Strategy

Actions to address greenhouse issues have been pursued nationally in Australia since the early 1990s. The National Greenhouse Strategy (NGS), which was endorsed in November 1998 by all State and Territory Governments and the Commonwealth Government, superseded the 1992 National Greenhouse Response Strategy (NGRS).

The NGS includes a range of greenhouse gas mitigation measures, including those which are undertaken by:

- the *Commonwealth Government* – because national legislation or programs are required to implement some actions, these need to be pursued by the Commonwealth Government (eg. Mandatory Renewable Energy Target; efficiency standards for electricity generators; fuel consumption standards for motor vehicles)
- *coordinated action at the national level involving States, Territories and the Commonwealth Government* – some actions are most effectively and efficiently pursued through cooperative action by all Governments (eg. Minimum Energy Performance Standards for appliances)



- *State and Territory Governments* – some actions are a constitutional responsibility of the States and Territories (eg. urban planning; land clearing controls; waste management).

Details of the NGS and the actions it contains are available on the website of the Australian Greenhouse Office at www.greenhouse.gov.au

The Victorian Government is committed to ensuring the effective implementation of its responsibilities under the National Greenhouse Strategy (NGS). The Victorian Greenhouse Strategy does more than just meet Victoria's commitments under the NGS – it represents a significant strengthening of action beyond those commitments.

1.4 Growing Victoria Together

In November 2001, the Premier of Victoria, Steve Bracks, released *Growing Victoria Together* – a 5 to 10 year plan which sets out the Government's social, environmental and economic goals for the State, and details how the Government will lead the way in achieving them.

Growing Victoria Together sets out a sustainable and long term direction for the State's future across all major areas of Government responsibility. As the signpost that will guide budget and policy decisions over the next decade, the plan:

- recognises that it is necessary to have a broader measure of progress and common prosperity than economic growth alone; and
- provides a way of thinking, working and governing which starts by valuing equally Victoria's economic, social and environmental goals.

In releasing the plan, the Premier noted that:

“it is a statement to the people of Victoria about the challenges we face, the direction we are taking, and the priority actions needed to take us forward,”

and

“under the Growing Victoria Together framework, by 2010, Victoria will be a State where innovation leads to thriving industries generating high quality jobs ... and protecting the environment for future generations is built into everything we do.”

Growing Victoria Together incorporates a number of commitments of relevance to Victoria's greenhouse response, including in the areas of renewable energy development; reducing Government energy consumption; waste recycling, and increasing the share of travel undertaken by public transport. The Victorian Greenhouse Strategy will be an important vehicle by which these commitments will be pursued.



2

VICTORIA'S GREENHOUSE GAS EMISSIONS PROFILE

Table 1 presents data on Victoria's greenhouse gas emissions and sinks in 1999, and the changes in these since 1990. Trends in these data between 1990, 1995 and 1999 are presented graphically in Figure 1.

The key points to note are:

- Victoria's total greenhouse gas emissions increased by 15.4 megatonnes or 15.9% between 1990 and 1999 – emissions growth was particularly strong over the period 1995 to 1999
- greenhouse gas emissions from the stationary energy sector (primarily the production of electricity and the use of gas) grew by nearly 32% over this period – within this sector, emissions from electricity production increased by 18.1 megatonnes (41%)
- the stationary energy sector was responsible for nearly 72% of Victoria's total emissions in 1999
- emissions from transport increased by 12.6% from 1990 to 1999
- emissions from the agriculture and waste sectors both declined marginally over this period
- emissions from industrial processes declined significantly – albeit from a relatively small base – from 1990 to 1999, falling from 3.4 to 1.6 megatonnes – a reduction in emissions of PFCs from aluminium production was a key reason for this
- the net greenhouse sink provided by the forestry sector declined from 13 megatonnes in 1990 to 11.6 megatonnes in 1999
- emissions from land clearing declined from 6.3 megatonnes in 1990 to 2.5 megatonnes in 1999.

The 1999 National Greenhouse Gas Inventory (NGGI) showed an increase in Australia's total greenhouse gas emissions of 7.3% from 1990 to 1999. As noted above, Victoria's emissions growth over this period was 15.9% – consequently, Victoria's share of total national emissions increased from 19.7% in 1990 to 21.3% in 1999.

As indicated in the notes to Table 1, there is considerable uncertainty in the estimates of net emissions from 'Forestry and other' and from 'Land clearing'. As improved data becomes available through the National Carbon



Accounting System (NCAS), it is possible that data for these sectors may change significantly.

It should also be noted that the Victorian Greenhouse Gas Inventory – as is the case with the NGGI – is prepared according to guidelines issued by the IPCC. There are significant differences in inventory data prepared under these guidelines and emissions accounting under the Kyoto Protocol – particularly in relation to the treatment of greenhouse sinks such as forestry.

Table 1 – Victorian greenhouse gas emissions by sector

| Source | Megatonnes (Mt) CO ₂ -equivalent 1999 | % of total Victorian emissions | Change from 1990 to 1999 * | |
|-------------------------------|--|--------------------------------------|-----------------------------------|--------------|
| | | | Mt CO ₂ -equivalent | % |
| Stationary energy | 80.9 | 71.8% | 19.5 | 31.7% |
| Transport | 18.2 | 16.1% | 2.0 | 12.6% |
| Fugitive emissions from fuels | 3.0 | 2.7% | - 1.5 | - 33.4% |
| Industrial processes | 1.6 | 1.4% | - 1.8 | - 52.9% |
| Agriculture | 14.2 | 12.6% | - 0.4 | - 2.7% |
| Forestry and other † # | - 11.6 | - 10.3% | 1.4 | - 11.0% |
| Land clearing † | 2.5 | 2.2% | - 3.8 | - 60.1% |
| Waste | 3.9 | 3.5% | - 0.1 | - 1.0% |
| Total | 112.8 | 100% | 15.4 | 15.9% |

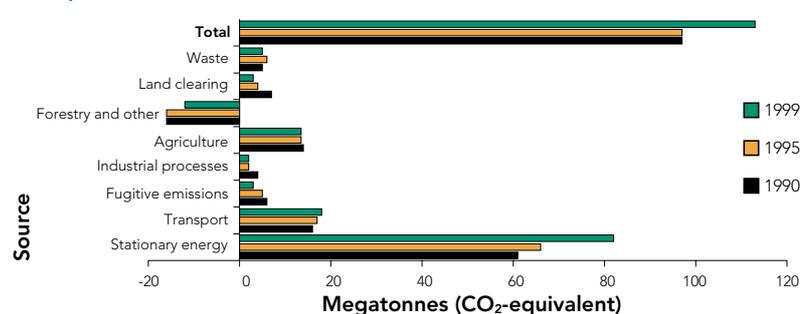
Source: Victorian Greenhouse Gas Inventory 1999

* The emissions data in this table are derived from the Victorian Greenhouse Gas Inventory 1999. This Inventory has been compiled in a manner consistent with guidelines issued by the IPCC. There are significant differences between these guidelines and the definition of sources and sinks under the Kyoto Protocol which are currently being finalised. The percentage change figures in this table will, therefore, be different to changes based on Kyoto Protocol definitions.

† Estimates for 'Forestry and other' and for 'Land clearing' are subject to considerable uncertainty. Work is occurring through the National Carbon Accounting System (NCAS) to improve these estimates. It is possible that these estimates will be subject to significant revision.

Forestry activities are both a source of, and sink for, greenhouse gases. In 1999, the sink component exceeded emissions from forestry activities by 11.6 megatonnes: hence Table 1 shows emissions of -11.6 megatonnes. The extent of forestry activities as a net sink for greenhouse gases declined from 13.0 megatonnes in 1990 to 11.6 megatonnes in 1999. Consequently the final two columns of Table 1 show an increase in net emissions from this sector of 1.4 megatonnes (a change of -11% over this period).

Figure 1 – Trends in Victorian greenhouse gas emissions by sector – 1990, 1995 and 1999





3

THE GOALS OF THE VICTORIAN GREENHOUSE STRATEGY

The Victorian Greenhouse Strategy has been developed in recognition of the serious environmental threat posed by climate change, and of the need for an effective response to this threat at the global, national and local levels.

The Goals of the Victorian Greenhouse Strategy are to:

1. Build awareness and understanding of greenhouse issues
2. Limit Victoria's greenhouse gas emissions and enhance greenhouse sinks
3. Position Victoria to prosper in a future carbon constrained economy – including by creating an environment in which Victorian industry can take advantage of business opportunities in greenhouse gas mitigation
4. Develop a greater understanding of climate change impacts and, where appropriate, initiate adaptation actions relevant to Victoria.





4



STRATEGIC CONSIDERATIONS INFLUENCING THE VICTORIAN GREENHOUSE STRATEGY

There are a number of important considerations that have a bearing on the nature of Victoria's greenhouse response. These include:

- the need for a comprehensive greenhouse response
- the importance of seeking the best environmental, social and economic outcomes for Victoria
- the need to take a long term perspective with respect to climate change issues
- the need to recognise that action to address climate change is a responsibility of all Victorians, including State and local government, businesses and individuals throughout the community
- the importance of ensuring that actions implemented under the Victorian Greenhouse Strategy do not duplicate or conflict with actions being pursued at the national level to address greenhouse and climate change.

4.1 A comprehensive response

Climate change issues are pervasive. Greenhouse gas emissions are generated from a wide range of human activities. These human activities also influence the capacity of the environment to sequester carbon dioxide through carbon sinks. Changes in climate resulting from increased atmospheric concentrations of greenhouse gases will impact on human and natural systems and, in many cases, bring about a need for adaptive responses by those systems.

The Victorian Greenhouse Strategy provides a comprehensive response to climate change that pursues cost-effective opportunities for emissions abatement – including sink enhancement – across all sectors of the economy, and that deals with issues relating to climate change impacts and adaptation.

While the Strategy will put in place a comprehensive suite of actions, it is important to recognise that energy production and use – including in the transport sector – is responsible for around 88% of Victoria's greenhouse gas emissions (see Section 2). Consequently, the Victorian Greenhouse Strategy needs to include a focus on cost-effective actions to reduce emissions from these sectors.

4.2 Seeking the best outcomes for Victoria

The Victorian Government is committed to integrating the principles of ecologically sustainable development¹ into decision-making processes in order to ensure that Government policies and programs deliver the best environmental, social and economic outcomes for Victoria. In this context, important considerations for the Victorian Greenhouse Strategy include:

Taking actions that deliver multiple benefits – seeking outcomes which, wherever possible, deliver other economic, social and environmental benefits to the Victorian community.

Integrating greenhouse and other policy objectives – actions pursued through the Victorian Greenhouse Strategy must take into account the range of environmental, social and economic objectives of the Victorian community; while actions pursued as part of other Government strategies, policies and programs must address greenhouse issues wherever possible.

Minimising costs and adjustment burdens, and taking advantage of business opportunities – Victoria's economy has historically been founded on a strong manufacturing base, underpinned by low cost, but greenhouse-intensive, electricity generated from the extensive reserves of Latrobe Valley brown coal. In implementing the Victorian Greenhouse Strategy, and in further developing the Strategy over time, it will be important to: establish directions and adjustment paths that take account of the State's circumstances and competitive strengths; ensure that potential impacts on energy and/or greenhouse emissions-intensive industries are recognised; and ensure that adjustment costs are minimised.

It also is important to recognise that significant local, national and global opportunities are emerging for the expansion of existing Victorian businesses, and for the attraction of new businesses to Victoria, to meet demands in areas including:

- *Renewable energy* – Victoria has strong potential for the development of renewable energy sources including wind, solar (particularly for small scale electricity generation and water heating) and a wide range of biomass energy sources. There also is potential for Victoria to attract new investment in industries that supply inputs for renewable energy generation, such as renewable energy equipment manufacturing.
- *Environmental and energy efficiency products, services and technologies* – demand is growing for the products, technologies and services of companies which can assist businesses to better manage their environmental performance and energy use in order to improve their 'triple bottom line'.



¹ As set out in the principles of environmental policy in the Intergovernmental Agreement on the Environment.



- *Expansion of carbon sinks* – Victoria has significant opportunities for revegetation through restoration of native vegetation and the establishment of forest plantations on previously cleared land. Such activities not only deliver greenhouse benefits but, if managed well, can also support biodiversity through the maintenance or restoration of habitat and assist in reducing salinity and soil erosion. The development of industries to use plantation timbers offers regional economic development benefits, as does investment in revegetation activities.

4.3 Taking a long term perspective

While it is important to act now to reduce greenhouse gas emissions, it also is important to recognise that the causes, implications and responses to climate change need to be addressed from a long term perspective.

As discussed in Section 1.2, the current policy responses of the international community are but a small step towards the scale of response that will ultimately be needed if the objective of the United Nations Framework Convention on Climate Change – to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the climate system – is to be realised.

The Victorian Greenhouse Strategy lays the foundations for action beyond current commitments and does so in a manner which ensures flexibility for future action by keeping options open, and which ensures that decisions made today do not make future actions more difficult or costly.

Many of the public and private assets that generate greenhouse gas emissions have relatively long lives. The assets in place today are largely the result of investment decisions made at a time when greenhouse emissions were not recognised as a significant issue. The Victorian Greenhouse Strategy will ensure that greenhouse issues are fully considered in future decisions regarding asset refurbishment and replacement, and the creation of new assets. In this context, it is particularly important to consider the greenhouse implications relating to future developments in the energy sector, and developments relating to transport and urban planning.

It must be recognised that some greenhouse gas abatement actions have a long lead time before they have a discernible effect – changes to urban form being a case in point. To realise the benefits associated with long term actions, they should be implemented as soon as practicable.

In taking a long term perspective, the Victorian Greenhouse Strategy also addresses the potentially serious economic, social and environmental implications of climate change for Victoria. Significant structural changes in the Victorian economy could occur as a result of climate change, particularly in

the agricultural sector where patterns of production are likely to be affected by changes in rainfall and temperatures. Rises in sea level could severely impact on human and natural systems in coastal areas. Changes in rainfall patterns – and particularly more frequent storms – will affect infrastructure such as drainage systems, water supply, roads and bridges. The ski industry would be adversely affected by a climate-change induced reduction in snow cover. Heat stress and the spread of tropical diseases would have serious consequences for human health. It is important that the Victorian Greenhouse Strategy supports research into these potential impacts, and into the adaptation responses that may be needed to ameliorate them.

4.4 A shared responsibility

An effective greenhouse response requires all Victorians – including governments, business, and the wider community – to play their part. This requires:

- the building of awareness and understanding in the community of the responsibility of all Victorians to contribute to efforts to reduce greenhouse gas emissions, and of the variety of means by which they can do so
- establishment of partnerships for greenhouse action between industry, the community and all levels of government.

While recognising that we must all play a part in responding to the greenhouse challenge, the Victorian Government will play a leadership role by:

- taking steps to raise the level of awareness and understanding in the community of climate change issues and of the need for an effective Victorian response
- reducing emissions from its own operations in order to show leadership by ‘setting an example’
- addressing instances of market failure through actions appropriate to sectoral circumstances – including partnerships, education, funding support, regulation, research and development etc.

4.5 Integrating Victorian and national greenhouse programs

The Victorian Greenhouse Strategy cannot operate in isolation from other strategies, policies and programs the Victorian Government is pursuing to meet the range of environmental, social and economic goals of the Victorian community. The Government is pursuing a number of major strategies, policies and programs which, while not being driven by greenhouse objectives, will have significant greenhouse implications. These are discussed in a number of the action Modules in Part B.

There are also policies and programs in place at the national level – particularly in the energy and transport sectors – that have potentially significant





implications for directions taken in the Victorian Greenhouse Strategy. These policies and programs are also discussed in the action Modules of Part B. The Victorian Greenhouse Strategy is integrated with action at the national level to ensure that efforts at all levels of government are coordinated and complementary, rather than duplicative or conflicting.

Two potential new national greenhouse policy instruments are currently under investigation by the Commonwealth Government: emissions trading; and a 'greenhouse trigger' under the Environment Protection and Biodiversity Conservation (EPBC) Act. The Victorian Government will continue to engage in, and seek to influence, the national debate on these instruments.

Emissions trading

Emissions trading² is one of the key flexibility mechanisms provided for under the Kyoto Protocol. If the Protocol comes into force, it is likely that an international emissions trading system will be established to assist parties to the Protocol in meeting their targets.

Work is occurring in Australia and overseas to prepare for the possible introduction of trading in greenhouse gas emissions. The Australian Greenhouse Office (AGO) released a series of Discussion Papers in 1999 with the aim of increasing understanding of the range of issues relating to emissions trading. Overseas, the Canadian and British Governments have introduced voluntary emissions trading systems to enable businesses in their countries to gain early experience in trading. The European Commission is working on a draft directive for an emissions trading scheme aimed at harmonising national schemes and leading to international trading and a single price for carbon. A number of international businesses (eg. BP and Shell) have introduced internal emissions trading schemes as pilot programs to assist them in preparing for the introduction of emissions trading, and in identifying cost-effective opportunities for greenhouse gas abatement within their operations.

The Victorian Government is supportive, in-principle, of international emissions trading given its potential to minimise the costs of achieving a given level of greenhouse abatement. However, the Government also recognises that emissions trading could have a potentially significant impact on the Victorian economy. A final position on this issue is, therefore, reserved pending details of the proposed system design and rules for international trading.

At the domestic level, the Victorian Government supports a policy of no disadvantage under any future trading arrangements for industries which take

² International emissions trading would enable countries to buy or sell part of their assigned emissions allocation under the Kyoto Protocol. Trading would occur between countries with different opportunities and costs for reducing emissions. Countries that have exhausted their lower-cost abatement opportunities would be able to purchase permits from countries that have substantial low-cost emissions abatement opportunities.

The Australasian Emissions Trading Forum

As part of its commitment to supporting and participating in discussions relating to emissions trading, the Victorian Government is sponsoring the Australasian Emissions Trading Forum (AETF). The objectives of the AETF are to provide:

- information on Australian, New Zealand and international emissions trading developments and research
- exposure of, and debate on, issues through the AETF website and newsletter, and through conferences and workshops
- a 'neutral ground' forum where a wide spectrum of views can be accommodated
- considered analysis of global developments from a range of perspectives, but with a particular focus on matters of significance for Australia, New Zealand and the Asia-Pacific.

early action to abate greenhouse gas emissions. It also is supportive of voluntary schemes that may prepare the economy for international trading or assist key industries to identify least cost abatement options. However, the Government does not support the introduction of a *mandatory* domestic emissions trading scheme in advance of international emissions trading – trading involving many countries will deliver lower cost emissions abatement opportunities than can be achieved by any country operating its own trading system.

The Victorian Government also believes that, if and when domestic emissions trading is introduced, it must not be relied upon as the sole instrument of greenhouse gas abatement. The overall cost to the Victorian and national economies of achieving emissions reductions is likely to be lower if emissions trading is supported by a complementary package of policies and programs targeted to facilitating emissions abatement across all sectors.

The Victorian Government will continue to be an active participant in discussions within Australia regarding emissions trading.

Greenhouse Trigger

A 'greenhouse trigger' under the Commonwealth's Environment Protection and Biodiversity Conservation Act would potentially involve the invoking of an approval under the Act for new developments associated with significant greenhouse gas emissions. Under the model being considered by the Commonwealth, the trigger would apply to actions or developments likely to result in greenhouse gas emissions over 0.5 Mt of CO₂-equivalent in any 12 month period. This would, for example, require Commonwealth approval for major power generation projects.

From the Victorian Government's perspective, important issues that require consideration with respect to a greenhouse trigger include the relationship between the proposed trigger and other existing or proposed greenhouse emissions reduction measures being pursued under the National Greenhouse Strategy; and how Commonwealth duplication of State environmental impact assessment processes could be avoided in implementation of the trigger.



5

MONITORING, REVIEW AND FURTHER DEVELOPMENT OF THE VICTORIAN GREENHOUSE STRATEGY

In order to assess the effectiveness of the Victorian Greenhouse Strategy, and to ensure that it retains its currency over time, progress with implementation of the Strategy will be monitored and its contents reviewed and updated as necessary.

Monitoring and reporting

Progress in implementing the Victorian Greenhouse Strategy will be monitored annually on a financial year basis. Commencing in 2003, progress reports will be published by October of each year on the Government's greenhouse website www.greenhouse.vic.gov.au

The progress reports will include information on:

- trends in Victoria's greenhouse gas emissions; and
- progress in implementing the actions contained in the Victorian Greenhouse Strategy.

Review and further development of the Strategy

A formal review of the Strategy will occur biennially, with a first review to be conducted during 2004. Earlier reviews may occur if necessitated by substantive changes in national or international policy settings.

Reviews and updates of the actions in Part B of the Victorian Greenhouse Strategy will be guided by the strategic considerations set out in Section 4, and will consider:

- information obtained from the annual monitoring of progress with implementation of the Strategy
- developments relating to national and international climate change policy
- the emergence of new opportunities for action as a result of technological or other developments
- new and improved information on the cost-effectiveness of greenhouse response actions.

Consistent with its commitment to consulting with Victorians about key policy decisions, the Government will actively seek the views of key stakehold-

Positioning Victoria to prosper in a future carbon constrained economy

As identified in Section 3, an important goal of the Victorian Greenhouse Strategy is positioning Victoria to prosper in a future carbon constrained economy. A prerequisite for pursuing this goal is the conducting of analyses that provide the Government, business and the wider community with further information regarding:

- the nature of the benefits and costs that are likely to accrue to Victoria and Australia resulting from pursuit of Australia's Kyoto target
- the most cost-effective approach Victoria can take to contribute to the achievement of Australia's target for the first commitment period of the Kyoto Protocol
- the steps that need to be taken in the short, medium and long term to build the capacity of the Victorian economy to accommodate possible international emissions abatement requirements beyond the first commitment period – a risk assessment and management approach will be adopted as an integral component of this work.

To support this work, the Government will develop and maintain a range of analytical tools including assessments of trends in the Victorian Greenhouse Gas Inventory, and projections of greenhouse gas emissions – an emissions projections exercise will be commenced during 2002.

This work will be coordinated by the Greenhouse Policy Unit that was established by the Government in 2000.

Significant opportunities exist for cost-effective greenhouse gas emissions abatement. Assessments of these opportunities must play a key role in the development of greenhouse action at the national level, and will be particularly important in informing reviews of the National Greenhouse Strategy (NGS). The Victorian Government will actively encourage the Commonwealth and other State and Territory Governments to support the development of such assessments as a key input to reviews of the NGS.

ers and the wider community when assessing the continued relevance and effectiveness of the Strategy. A Government/industry greenhouse roundtable – chaired by the Minister for Energy and Resources and involving senior representatives of key Victorian-based companies – will be established to provide strategic advice to the Government, particularly in relation to greenhouse strategies for business and industry (Action 3.9).





PART B

GREENHOUSE RESPONSE ACTIONS



INTRODUCTION

The Victorian Greenhouse Strategy provides a blueprint for action to reduce Victoria's greenhouse gas emissions. It establishes a framework which has both a short and long term perspective, and which will provide flexibility to adapt Victoria's greenhouse response in light of future changes in international and national policies, and the emergence of new issues and opportunities for action.

The program of actions in the Victorian Greenhouse Strategy demonstrates Victoria's leadership on greenhouse issues, and strongly supports national endeavours while recognising that Victoria – particularly in the energy sector – has its own set of issues to address in the greenhouse context. This program includes actions that:

- have been in place for some time and already have made impressive gains in, for example, energy efficiency and cleaner production
- have recently been introduced by the Government – for example Solar Hot Water Grants and a target to reduce energy consumption in Government buildings by 15%
- are new and are included in the Victorian Greenhouse Strategy for the first time – these actions are identified using green text in the table of actions in each Module in Part B.

Consultation

The process by which the Victorian Greenhouse Strategy has been developed has involved an extensive program of public consultation. A Victorian Greenhouse Strategy Discussion Paper was released in August 2000, supported by public forums in regional Victoria and metropolitan Melbourne. A total of 108 submissions were received addressing the issues raised in the Discussion Paper – a summary of submissions is available at www.greenhouse.vic.gov.au

Four Stakeholder Reference Groups – addressing issues relating to energy supply; energy use; transport; and agriculture & sinks – were also established, and included representation from industry, the wider community and local government.

Suggestions for directions for the Victorian Greenhouse Strategy, as well as ideas for new initiatives, were generated through these public consultation processes.



Determining the priorities for further action

As detailed in Part A, a number of strategic considerations were important in determining priorities for new and enhanced actions under the Victorian Greenhouse Strategy, including:

- the need for a comprehensive greenhouse response
- the importance of seeking the best environmental, social and economic outcomes for Victoria
- the need to take a long term perspective with respect to climate change issues
- the need to recognise that action to address climate change is a responsibility of all Victorians
- the importance of ensuring that actions implemented under the Victorian Greenhouse Strategy are not duplicative of, or in conflict with, actions being pursued at the national level.

Achieving emissions reductions now and setting the framework for the future

A balanced and comprehensive Strategy will inevitably include actions which pursue reductions in greenhouse gas emissions on a variety of timescales. Some actions will deliver immediate gains – for example, programs designed to improve energy efficiency in Government operations or in the commercial, industrial and household sectors.

Other actions will seek to bring about cultural change within organisations or industries, or to drive market transformation and the commercialisation of technologies – such actions will generally have an effect over the medium term. A third category of actions will only yield emissions reductions over a substantially longer time frame – actions in this category include research and development.

The Victorian Greenhouse Strategy is an important, but by no means final step in Victoria's greenhouse response. It has been developed to provide an enduring and strategic framework for greenhouse gas emissions abatement and climate change adaptation.

Action Modules

Actions in the Victorian Greenhouse Strategy are presented in a series of 10 'Action Modules', each of which commences with a statement of the Government's overall policy commitment, and includes a discussion of background and contextual information that provide the basis for the suite of actions that follow.

While the Modules provide a practical basis for presentation of the greenhouse response actions included in the Strategy, there are strong linkages between the Modules. Appendix 1 provides a guide to these linkages and

Estimated emissions savings from Victorian Greenhouse Strategy actions

Effectiveness in delivering greenhouse gas emissions abatement, and the cost-effectiveness in doing so, have been a key consideration in the development of the Victorian Greenhouse Strategy. In order to provide a strengthened analytical basis to the Strategy, consultants were engaged to estimate the emissions reductions expected to be delivered in the short to medium term by both existing and new actions under the Strategy.

It is estimated that the combined effect of actions included in the Victorian Greenhouse Strategy will deliver greenhouse gas emissions savings averaging 5 to 8.3* megatonnes CO₂-equivalent per annum over the period 2008-2012.

** In making estimates of the emissions savings expected to be achieved from implementation of the Victorian Greenhouse Strategy, assumptions needed to be made in relation to the likely impact of various actions. In cases where an estimate was particularly sensitive to these assumptions, low and high estimates of the impacts of actions were produced. The range of 5 to 8.3 megatonnes reflects the low and high estimates across the suite of Victorian Greenhouse Strategy actions.*

complementary actions across the Strategy as a whole. In particular, it provides a listing of actions in the Strategy, presented according to various key considerations including:

- support for the development of renewable energy
- reducing emissions from non-renewable energy
- increasing the efficiency of energy use
- reducing transport emissions
- support for greenhouse action in regional Victoria
- support for the efforts of local government
- provision of information to the community
- setting a regulatory framework for greenhouse action.

The 10 Modules, together with the statements of the Government's overarching policy commitment for each Module, are listed below.

Module

1. Government leadership

2. Energy supply

3. Greenhouse best practice in Victorian industry and commerce

4. Reducing greenhouse gas emissions through improved management of wastes

Statements of policy commitment

The Government will provide leadership by setting specific targets for reducing greenhouse gas emissions from its own operations and by integrating consideration of greenhouse issues into key government decision-making processes.

The Government will facilitate a reduction in the greenhouse intensity of Victoria's energy supply by supporting the development of less greenhouse-intensive forms of energy such as renewables and cogeneration, while continuing to support more efficient use of Victoria's brown coal resource.

The Government will support Victorian businesses to pursue greenhouse best practice, and to take advantage of business opportunities in greenhouse gas mitigation as part of its broader commitment to long-term sustainable development.

The Government will foster continuous improvement in waste management in Victoria in order to reduce greenhouse gas emissions and ensure that the State's resources are used as efficiently as possible.



| Module | Statements of policy commitment |
|---|--|
| 5. Working with local government and the community | <p>The Government will establish partnerships with local government and the community to deliver greenhouse abatement programs that are tailored to meet the needs, and reflect the strengths of, local communities – particularly in rural and regional Victoria.</p> <p>The Government regards education as the key to changing community behaviour – the formal education sector must play an important role in greenhouse learning, but there is also a need for innovative approaches to community education.</p> |
| 6. Greenhouse-friendly households | <p>The Government will require improved energy efficiency in new homes and appliances to underpin action by households to make greenhouse-friendly choices and reduce their greenhouse gas emissions. The Government will assist low-income households to achieve greater energy efficiency and cost savings in their homes.</p> |
| 7. Influencing travel choices and behaviour | <p>The Government will pursue reductions in greenhouse gas emissions by taking action to address the range of factors that influence emissions from the transport sector.</p> |
| 8. Greenhouse sinks and natural resource management | <p>The Government will encourage investment in carbon sinks, including nature conservation plantings and sustainable plantations, with an emphasis on maximising multiple benefits such as salinity mitigation and biodiversity enhancement.</p> |
| 9. Supporting greenhouse best practice in agriculture | <p>The Government will support the achievement of greenhouse best practice in agriculture while working to better understand the nature of emissions from agricultural activities and the impacts of climate change.</p> |
| 10. Climate change impacts and adaptation | <p>The Government will support efforts to substantially increase our understanding of climate change impacts, and of the actions that will need to be taken to adapt to a changing climate.</p> |



1

GOVERNMENT LEADERSHIP

Green Power purchase

The Government's purchase of 5% of its electricity from Green Power by 2005/06 (Action 1.2) will produce greenhouse benefits and support development of Victoria's renewable energy industry. It is estimated that this action will increase the demand for Green Power nationally by about 4% over the period to 2005, and has the potential to attract significant new renewable energy investment to Victoria.

This action will complement other Government programs to promote renewable energy and related industry development. The recent establishment of the Codrington wind farm – the first major new renewable energy installation in Victoria for 5 years – is a testament to the impact that Green Power purchases can have on the renewable energy industry.

THE GOVERNMENT WILL PROVIDE LEADERSHIP BY SETTING SPECIFIC TARGETS FOR REDUCING GREENHOUSE GAS EMISSIONS FROM ITS OWN OPERATIONS AND BY INTEGRATING CONSIDERATION OF GREENHOUSE ISSUES INTO KEY GOVERNMENT DECISION-MAKING PROCESSES.

The Government will play a key leadership role through the Victorian Greenhouse Strategy by:

- defining a comprehensive and strategic response to greenhouse issues tailored to Victoria's circumstances
- ensuring the community can participate in an informed way in policy debate and can contribute to an effective greenhouse response
- addressing instances of market failure through actions appropriate to specific circumstances – including through education, regulation, funding support and Research and Development.

The Government will also demonstrate leadership by taking action to reduce greenhouse gas emissions from its own operations, and by ensuring that greenhouse issues are considered in Government decision-making processes.

Reducing greenhouse gas emissions from Government operations

Energy use in Victorian Government buildings costs taxpayers more than \$80 million, and is responsible for around 1 megatonne of greenhouse gas emissions each year. The Government has, therefore, set targets to:

- reduce energy use by 15% in Government buildings (Action 1.1)
- purchase 5% of the Government's electricity requirements in the form of Green Power (Action 1.2).

These actions have the potential to reduce greenhouse emissions from Government operations by around 175,000 tonnes of CO₂-equivalent per annum, whilst achieving annual cost savings of around \$11.5 million.

The Government will introduce a target to reduce greenhouse gas emissions from the Government's passenger vehicle fleet by 10% (Action 1.3). As a practical demonstration of the importance of Government purchasing in



encouraging the uptake of leading-edge technologies, the Government has introduced 18 Toyota Prius hybrid vehicles to its fleet as part of a two-year trial.

The Government will also take out a subscription to *Greenfleet* for all vehicles in its fleet (Action 1.4). *Greenfleet* is a not-for-profit organisation which uses the funds raised from subscriptions to plant vegetation to sequester carbon dioxide as an offset to the greenhouse gas emissions from the operation of motor vehicles.

Considering greenhouse in government decision-making

As set out in *Growing Victoria Together*, the Government is committed to balancing economic, social and environmental goals, and to governing in a way which values these goals equally. The integrated triple bottom line agenda set down in *Growing Victoria Together* is being pursued at two levels. Firstly, the Government is committed to ensuring that its own operations are undertaken effectively and efficiently. In addition to the energy efficiency measures outlined above, all Government Departments will be required to implement a range of best practice tools for environmental management. Secondly, all new Government policies will be developed and formally assessed according to their impacts on social, environmental and economic factors – thereby ensuring that sustainability principles will be integrated into policy making and implementation. Government leadership by example in these areas will be a critical element in driving the adoption of sustainability more broadly by the Victorian community.

In late 2000, the Government announced a review of Victoria's environmental impact assessment procedures under the *Environment Effects Act 1978* to help deliver better-balanced environmental, social and economic outcomes. The procedures need to be updated to reflect leading practice and to ensure that Government decision-making on major public and private works is informed by comprehensive, open and accountable impact studies. The Government will ensure that where an assessment is required under the Act, appropriate examination of greenhouse gas considerations occurs (Action 1.5).

The Government will also strengthen consideration of the greenhouse implications of Major Projects to be developed in Victoria. The Office of Major Projects – which manages the Government's interests in key strategic construction and development projects nominated by the Premier and contributing to Victoria's economic and cultural development – will introduce requirements for energy efficiency issues to be considered in tender specifications for all Major Projects such as Docklands, and facilities for the Melbourne Commonwealth Games (Action 1.6).

Energy efficiency in Government – case study

The Department of Justice has been operating an energy management program for five years. Over this period, the Department has undertaken over 150 individual projects which have achieved energy savings of 19.5% and cumulative budget savings of \$1.13 million. Future annual energy expenditure will be almost \$500,000 lower than it would have been had there not been an energy management program in place.

The program has targeted large facilities – including prisons, courts and office buildings. Projects undertaken to date have included variable speed drives on pumps, lighting upgrades, occupancy and daylight sensors, improved maintenance procedures, upgraded heating and hot water systems, installation of electronic control systems, and optimisation of the start/stop times of plant. These projects have averaged an annual return on investment of over 40%.

Adopting best practice business tools for environmental management in Government

Improving the energy efficiency of government buildings is part of the Government's broad commitment to environmental best practice in the government sector. In February 2002, the Government announced that it would introduce best practice business tools for environmental management in all Government Departments. Under this policy, Departments will be required to:

- adopt an Environment Management System (EMS)
- develop an Environment Improvement Plan which includes waste reduction targets
- comply with a Green Purchasing Policy
- report annually on their environmental performance
- obtain independent audits of EMSs and environment reports.

Energy efficient traffic signals

As part of its research and development program, VicRoads has been working with industry to develop a traffic signal using LED (light emitting diode) technology. This work has now reached the stage where LED traffic signals are available for installation in the field.

Traffic signals using this new technology consume 55 to 75% less energy than conventional traffic signals.

VicRoads will be installing 50 sets of LED signals per year across Victoria. It is estimated that this program will deliver a reduction in greenhouse gas emissions of around 3,000 tonnes CO₂-equivalent in 2010.

Energy efficiency will be given a stronger focus in the design and management of Government-funded infrastructure. Key actions include the installation of energy efficient traffic signals (see Box), public lighting initiatives (Action 5.3) and improvements to the energy efficiency of new and existing public housing (Action 6.7).

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|---|---|---|
| <p>1.1 Government energy consumption reduction target</p> <p>Energy consumption in Government buildings will be reduced by 15%.</p> <p><i>Supporting programs:</i></p> <ul style="list-style-type: none"> • Assistance is provided to Departments and agencies to build capacity to develop and implement energy management programs and achieve energy savings. State Government energy consumption and greenhouse gas emissions will also be monitored and reported. • Schools are supported to incorporate sustainable energy in the upgrade of existing school facilities, and in the design of new school buildings. • Environmental Purchasing Policy – this will provide directions for agencies with respect to purchases of goods and services – the policy will include requirements relating to energy efficiency. | <p>All agencies</p> <p>Supporting programs provided by the Sustainable Energy Authority and the Victorian Government Purchasing Board</p> | <p>Target to be achieved by June 2006 with progress monitored and reported annually</p> | <p>Support programs are funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan</p> <p>Agencies will meet any capital costs to achieve targets from within existing budgets</p> |
| <p>1.2 Government purchase of Green Power</p> <p>The Government will purchase 5% of its electricity in the form of Green Power.</p> | <p>All agencies</p> | <p>Target to be achieved by 2005/06, with Green Power purchases progressively incorporated into new contracts and amendments to existing contracts or renegotiations on expiry.</p> | <p>To be met within existing agency budgets</p> |

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|---|---|---|---|
| <p>1.3 Greenhouse emissions reduction target for Government vehicles</p> <p>Greenhouse gas emissions associated with the operation of the Government's passenger vehicle fleet will be reduced by 10%. Fleet operators will pursue this target through a package of actions including: choice of vehicle (eg. better fuel economy); choice of vehicle fuel type (eg. LPG, CNG, hybrid vehicles); and travel demand management.</p> <p>The Government will also review the operation of its commercial vehicles to determine an appropriate emissions reduction target for this segment of its vehicle fleet.</p> <p><i>Supporting programs:</i></p> <ul style="list-style-type: none"> • A two year trial in the Government fleet of 18 hybrid vehicles. • Training of fleet managers on opportunities for reducing greenhouse gas emissions from transport. | All agencies coordinated by VicFleet in consultation with EPA Victoria and the Sustainable Energy Authority | Target to be achieved by June 2006 | Actions to achieve target to be funded from within existing agency budgets \$100,000 for Prius trial Funding for fleet manager training covered under Action 7.7 |
| <p>1.4 Government subscription to Greenfleet</p> <p>A subscription to Greenfleet will be made for all passenger vehicles in the Government fleet.</p> | Natural Resources and Environment | See Action 8.3 | See Action 8.3 |
| <p>1.5 Consideration of greenhouse issues in Environment Impact Assessment procedures</p> <p>The consideration of greenhouse gas emissions will be included in the guidelines for Victoria's Environmental Impact Assessment process. A review of Victoria's Environmental Impact Assessment process is currently under way.</p> | Infrastructure | Review of Environment Effects Act procedures to be completed and implemented during 2002/03 Ongoing | |
| <p>1.6 Energy efficiency in Major Projects</p> <p>The Government will require all Major Project developments in Victoria to incorporate high levels of energy efficiency. For example:</p> <ul style="list-style-type: none"> - the residential components of Major Projects will be required to achieve a minimum 5 star energy efficiency rating consistent with the residential energy efficiency requirements of the Victorian Building Regulations (see Action 6.1) - the commercial components of Major Projects will be required to demonstrate that they have considered greenhouse issues by reference to the Sustainable Energy Authority's 'Commercial Building Energy Brief'. <p>Energy efficiency will be an important consideration in the development of facilities for the 2006 Commonwealth Games.</p> | Infrastructure | | |

| No. Action | | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|---|--|----------------------------------|------------------------------------|---------------------------------|
| 1.7 Annual reporting by Government Departments/Agencies | As part of the Government's commitment to annual reporting of environmental performance, the Annual Reports of Government Departments/Agencies will include information on energy consumption in buildings and related greenhouse gas emissions; the purchase of Green Power; greenhouse gas emissions from motor vehicle use; and actions taken during the year to reduce energy use in buildings and the Government's vehicle fleet. | All agencies | Reporting to commence from 2002/03 | |



2

ENERGY SUPPLY

THE GOVERNMENT WILL FACILITATE A REDUCTION IN THE GREENHOUSE INTENSITY OF VICTORIA'S ENERGY SUPPLY BY SUPPORTING THE DEVELOPMENT OF LESS GREENHOUSE-INTENSIVE FORMS OF ENERGY SUCH AS RENEWABLES AND COGENERATION, WHILE CONTINUING TO SUPPORT MORE EFFICIENT USE OF VICTORIA'S BROWN COAL RESOURCE.

The delivery of high quality, reliable and cost-effective energy is critically important to the Victorian community and the Victorian economy.

Ninety-five per cent of the electricity generated in Victoria is fuelled by brown coal, helping to provide Victoria with one of the lowest priced sources of electricity in the world. This has created a competitive advantage that has seen Victoria established as Australia's leading manufacturing state. Abundant reserves of brown coal – estimated at over 500 years supply – are available in the Latrobe Valley.

Natural gas, which is primarily sourced offshore in the Gippsland Basin, is currently a minor fuel for electricity generation, but is used extensively in industry for generating steam and other forms of process heat, and in the residential and commercial sectors for space and water heating, and cooking. At current levels of consumption, Victoria's gas reserves appear adequate to meet Victorian demand for at least another 20 years. Increased demand will put pressure on this supply. Pending construction of suitable pipelines, other, more remote gas basins could help meet Victorian demands, thus ensuring a much longer economic supply of gas to the State. The transportation of gas over longer distances will, however, exert upward pressure on gas prices, although greater competition in the supply of gas could be expected to exert an opposite influence.

Crude oil, like natural gas, is mainly sourced offshore in the Gippsland Basin. Production peaked at 550,000 barrels per day in 1985 and has since declined to less than 200,000 barrels per day. Crude oil is refined to produce petroleum products that are largely consumed in the transport sector but are



also used as feedstocks in the petrochemicals industry. Small amounts of oil are also used for heating purposes.

The Victorian Government recognises that the importance of addressing greenhouse gas emissions means that Victoria's future energy needs cannot be met by mirroring past patterns of supply. To this end, the Government is committed to developing an integrated energy policy for Victoria, with the aim of ensuring that Victoria's energy supply and demand are sustainable in the long term.

The stationary (ie. non-transport) energy sector³ was responsible for around 72% of Victoria's total greenhouse gas emissions in 1999. Electricity generation contributed just over three-quarters of these emissions (or around 55% of Victoria's total emissions), with the direct use of gas by industry, commerce and the residential sector contributing the remainder. Greenhouse gas emissions from Victoria's stationary energy sector as a whole grew by 32% between 1990 and 1999, with emissions from electricity generation increasing by 41% over this period.

Coal-fired generation of electricity is the primary contributor to greenhouse gas emissions in Victoria. The physical composition of brown coal is an important reason for this – 60% of the content of brown coal is water, making combustion using existing technologies thermally inefficient. This thermal inefficiency, combined with the use of coal for around 90% of Victoria's total electricity generation, means that the greenhouse intensity of electricity delivered to end users in Victoria is around 25 to 40% higher than that in other States and Territories.

Reducing the greenhouse-intensity of Victoria's electricity supply is one of the most significant steps that can be taken to reduce Victoria's total greenhouse gas emissions. The Government will act on a range of fronts to achieve this goal, including:

- supporting the development of technologies that improve the emissions performance of brown coal-based electricity generation
- supporting strong growth in the use of renewable energy
- facilitating increased use of cogeneration
- working at the national level to improve the performance of energy markets.

Improvements in energy end use efficiency will also play an important role as part of the Victorian Greenhouse Strategy.

Integrated Energy Policy for Victoria

Despite improvements in energy efficiency, energy consumption in Victoria continues to increase due to population and economic growth, and the development of new uses of energy.

A range of policies and programs has been developed to ensure the delivery of an affordable, secure and sustainable supply of energy, and to promote action to improve energy end-use efficiency and conservation. There is a need, however, to determine longer-term policy directions.

The Victorian Government will develop an integrated energy policy that will address the long-term sustainability of Victoria's energy supply and demand – greenhouse emissions will be a critical consideration in this context.

As an initial step in the development of this policy, the Government will prepare an energy statement that will be released in 2002. The statement will provide the basis for further policy development and consultation with stakeholders on the future directions for energy policy in Victoria.

³ The Victorian Greenhouse Strategy deals with transport-related energy use and greenhouse gas emissions in Module 7.

National Generator Efficiency Standards

The Australian Greenhouse Office administers the Generator Efficiency Standards (GES) program which was launched in July 2000. The Standards cover emissions of all 6 greenhouse gases included in the Kyoto Protocol, and are expected to deliver emissions reductions in the order of 4 megatonnes per annum nationally.

The Standards, which utilise voluntary agreements between the Commonwealth Government and electricity generators, seek to apply world's best practice standards to electricity generators over 30MW in size, based on fuel type, age and commercial factors applying to each plant. Thirteen generators are currently signed up to the program representing 65% of total market capacity. Another 6 generators (representing a further 25% of capacity) are close to signing – 90% of market capacity is therefore expected to be covered by the GES program in the near future.

Improving the emissions performance of electricity generation

Brown coal-based electricity generation will continue to play an important role in meeting Victoria's future energy needs. However, the Government believes that, in doing so, it is critical that greenhouse issues are addressed by driving improvements in the emissions performance of electricity generation from brown coal.

Some improvement in the greenhouse performance of Victoria's electricity generators has been achieved in recent years as a result of their participation in the Commonwealth Government's Greenhouse Challenge Program. In the future, the Commonwealth's Generator Efficiency Standards (see Box) will drive further improvements. However, more needs to be done, and the Victorian Government will be working on a number of fronts to achieve this.

The development and application of new technologies for electricity generation using brown coal will be critical in this regard. The Victorian Government will support the research, development, demonstration and commercialisation of such technologies through partnerships between it, the Commonwealth Government, research institutions, and various industries involved with the energy sector.

A key example of the Victorian Government's efforts in this area is its support for the Cooperative Research Centre (CRC) for Clean Power from Lignite (Action 2.4). This joint venture between industry and the State and the Commonwealth Governments, is currently researching and demonstrating Mechanical Thermal Expression (MTE) technology, which employs a combination of heat and high pressure to remove water from brown coal prior to combustion. MTE has the potential to significantly reduce the greenhouse intensity of electricity generation using brown coal. The CRC estimates that if all existing brown coal generators were to utilise MTE, it would reduce greenhouse gas emissions in Victoria by 9 megatonnes per annum. Although the technology has been in development for several years, an accelerated program of demonstration is required to move it to commercial viability. Action 2.4 supports this process by providing additional financial support for the construction of a one tonne per hour demonstration plant.

In addition to MTE, a range of new technologies could be incorporated into the design of future generating plant to deliver reductions in the greenhouse intensity of brown coal-based electricity generation.

The identification and uptake of new and existing energy technologies will also be supported by the Centre for Energy and Greenhouse Technologies (Action 3.3). This initiative will focus on a range of energy research, development, demonstration and commercialisation priority areas which are currently not being addressed.





The Victorian Government believes that, given these technological developments and the importance of reducing greenhouse gas emissions, any future additional electricity generating capacity in Victoria will not be provided by conventional brown coal technologies. Rather, such capacity will be provided by less greenhouse-intensive brown coal technologies, and by renewables and gas-fired plant.

Recognising the technological improvements that have occurred, and that will continue to occur, the tender documentation issued by the Government last year for exploration rights to brown coal resources in the Latrobe Valley stipulated that:

“Any successful tender will be awarded in accordance with the purpose of the Mineral Resources Development Act (1990), which is to encourage an economically viable mining industry which will make the best use of resources in a way compatible with the economic, social and environmental objectives of the State.”

and

“In particular, it is a clear expectation that any successful proposal will include processes and/or technologies that will deliver greenhouse gas emission intensities consistent with Victoria’s need to be an active and effective participant in meeting the challenge of global warming. Specifically, proposals should have emission levels consistent with or exceeding relevant international best practice. An example of the absolute minimum standards which would be expected to apply would be those contained within the Commonwealth Government’s Generator Efficiency Standards (GES) measure.”

A number of gas open cycle electricity generation plants have recently been approved to overcome potential power shortages at times of peak demand. Because of their role as ‘peaking plant’, these generators are expected to operate for less than 10% of the year. While combined cycle gas plants are more energy efficient than open cycle plants⁴, the former are not economically viable when operated solely to meet peak demand. Under the conditions of their EPA Victoria works approval, operators are required to report to EPA Victoria on the usage of turbines, and on the feasibility of converting to combined cycle plant if any turbine operates for more than 20% of the time in any calendar year.

⁴ Whilst not as efficient as combined cycle plant, open cycle gas turbines produce lower greenhouse gas emissions per unit of electricity produced than existing brown coal plants.

Mandatory Renewable Energy Target (MRET)

The Mandatory Renewable Energy Target, or MRET, was created by the Commonwealth Government as a means of growing renewable energy generation in Australia. MRET will eventually see 9,500 gigawatt hours (GWh) of renewable energy purchased by 2010 – this target will be achieved via a series of interim, annual targets.

The legislation behind MRET came into effect on 1 April 2001, and requires electricity retailers and major electricity users to purchase a specified percentage of their electricity from renewable energy generators. These parties must acquire Renewable Energy Certificates (RECs) which demonstrate that they have sourced power from renewable energy generators. Each REC represents one megawatt hour (MWh) of electricity. If an electricity retailer or major user hasn't acquired enough RECs to meet their annual target under the legislation, they must pay a \$40/MWh penalty.

MRET is currently the largest single driver of growth in the renewable energy sector in Australia and Victoria.

Growth in renewable energy

Growing Victoria Together identifies an increase in the development and use of renewable energy resources as a priority action of the Victorian Government.

Victoria has a potentially large renewable energy capacity. Renewable energy – which includes solar, hydro, wind, wave, tidal, biomass and geothermal energy – produces negligible or no greenhouse emissions.

A number of drivers are now in place that will lead to an increased take-up of these opportunities and significant growth in the renewable energy sector over the next decade. These include: the marketing of Green Power schemes by energy retailers; the Mandatory Renewable Energy Target (see Box) introduced by the Commonwealth Government; and a range of Victorian Government programs aimed at facilitating industry development.

Whilst pursuing these policy directions, the Government recognises that there are a number of issues that currently constrain the development of renewable energy resources, including:

- *relative prices of different sources of electricity* – Australia's electricity prices are currently amongst the lowest in the world, and renewables must compete in the National Electricity Market (NEM) with lower cost electricity generated primarily from fossil fuels
- *technical considerations* – renewable energy sources may occur in a form that is currently difficult to harness on a large scale in a cost-effective manner (eg. solar power); and Victoria's geothermal resources are not well understood and require further exploration, although some use of this resource is currently occurring in the Portland area
- *non-greenhouse environmental impacts associated with renewable energy generation in specific locations* – including visual impacts; impacts on aquatic systems (hydro-electricity); impacts on bird life (wind power); and amenity impacts associated with competing uses for a particular location (tidal power in certain coastal locations).

It is critical to address these constraints and to encourage and facilitate the growth of the renewable energy sector.

The Renewable Energy Support Fund (Action 2.1) will assist in overcoming economic hurdles by providing grants to assist the development of renewable energy generation projects in Victoria. The scheme will primarily be targeted to assisting the start up of small scale projects by providing capital funding support at a critical point in their development.

Consistent with the Government's commitment to triple bottom line outcomes, renewable energy developments will be encouraged in areas that



maximise social economic and environmental outcomes. A Windfarm Development Guide will be produced to assist proponents, local government and the community in determining appropriate locations for windfarms (Action 2.2). This will include a statement of planning policy on windfarm development, an assessment framework and an outline of Government support available for wind energy projects. The guide will seek to ensure a consistent and balanced approach to assessing windfarm development proposals across the State.

Action 2.2 also includes work to provide an assessment of the technical and economic opportunities in relation to a range of renewable energy sources so as to address the information barrier that exists – particularly in relation to small scale developments.

To encourage electricity customers to purchase their electricity in the form of renewable energy, the Government will continue to support Green Power accreditation, and will provide new funding to support the promotion of Green Power (Action 2.3).

Action 1.2 will place the Victorian Government in a leadership position with respect to renewable energy by ensuring that 5% of Government electricity purchases are Green Power.

Solar hot water rebates (Action 6.4) are helping to overcome the economic hurdle to renewable energy uptake through the provision of a subsidy to households and industry for the installation of solar hot water systems. In 2001 there were approximately 15,000 solar water heaters installed in Victoria, displacing roughly 31GWh of grid electricity per year.

The Centre for Energy and Greenhouse Technologies (Action 3.3) will include activities relating to research, development and demonstration of renewable energy technologies.

Increased use of cogeneration

Cogeneration, or combined heat and power, is an extremely efficient means of simultaneously satisfying both electricity and heat requirements from the same fuel source. Large facilities with substantial electricity and heating needs, such as hospitals, food processing and chemical plants, are ideal sites for cogeneration.

Any combustible fuel source can be used for cogeneration. The State's largest cogeneration facility – at Energy Brix Australia Corporation in Morwell – employs coal as a fuel source to produce 110MW of electricity, as well as process heat for briquette manufacture. The majority of cogeneration sites, however, employ natural gas as a feedstock.

Green Power

Green Power is a scheme whereby customers voluntarily pay a surcharge on their power bills in order to source their electricity from accredited renewable energy sources. The Green Power scheme operates nationally, with participation by electricity retailers in Victoria, NSW, Western Australia, Queensland, South Australia and the ACT.

Electricity customers who wish to participate in the Green Power scheme can contact their electricity retailer and purchase the particular Green Power product offered by that retailer. Currently there are about 63,000 Green Power customers nationally, with approximately 20,000 of these in Victoria. The emissions abatement achieved through the national program provides savings of about 400,000 tonnes of CO₂ per annum.

Determination of eligibility of energy sources for Green Power is made by a national accreditation body, in which Victoria participates. Electricity supplied under the Green Power scheme cannot be counted by retailers in meeting requirements under the Mandatory Renewable Energy Target (MRET). It therefore represents an addition to total renewable energy beyond the MRET requirements.

Renewable Energy Resources for Electricity Generation

Total installed renewable electricity generation capacity within the State of Victoria in 2001 was 637 MW – including 62 MW of cogeneration and 0.5 MW non-grid connected (Stand-Alone Power Supply). Output was approximately 1,940 GWh per annum, or about 3.5% of Victoria's total electricity generation.

This installed generation capacity represents only a portion of the State's potential renewable energy capacity. Based on known projects – including those under construction, planned or under consideration – Victoria is expected to have at least an additional 438 MW of capacity by 2010, yielding around 855 GWh of electricity annually. Further developments are technically possible (ie. the resource is available) but their installation is contingent on economic factors. Economic potential is influenced by the relative costs of competing electricity generation sources in the National Electricity Market, and the extent to which renewable energy development in Victoria will be stimulated by Green Power schemes and the national Mandatory Renewable Energy Target (MRET). Taking these factors into account, Victoria could potentially have up to 1,500 MW of renewable energy generation capacity by 2010 – producing around 5,000 GWh of electricity per year.

Although cogeneration can deliver financial savings to owners over the long term, a combination of lack of information and lack of capital often limits its uptake. In 2001 the Commonwealth Government, through the Greenhouse Gas Abatement Program (GGAP), provided \$26 million for the development of cogeneration projects. A substantial share of this funding is likely to be used to develop projects in Victoria, for example, by the Australian Ecogeneration Association. Further GGAP rounds will be conducted to 2003. Action 2.5 will facilitate the installation of cogeneration in Victoria by funding feasibility studies for specific sites around the State. With a detailed assessment of their site's potential, businesses can make informed decisions about the economic merits of installing cogeneration, and use this information as a basis for making applications for support under the Commonwealth Government funded program.

Improving the performance of energy markets

To address greenhouse emissions from electricity production, it is necessary to consider not only technical production issues, but also the institutional structures and economic drivers of the electricity market. The private ownership of much of Victoria's energy sector, and the competitive National Electricity Market (NEM), mean that different approaches to greenhouse abatement in the sector are required compared to those that might have been pursued in the past when the sector was largely publicly-owned and operated.

The NEM is based on a series of complementary bodies of legislation in several jurisdictions designed to create a single wholesale market in electricity. The institutional framework for the NEM overlies a complex network of physical infrastructure – generators, networks and end-use equipment. The NEM, which began operating in December 1998, currently operates in Victoria, Queensland, New South Wales, South Australia and the ACT, with a further link proposed to Tasmania (Basslink).

The NEM is based on national competition policy agreements and seeks to deliver least cost outcomes. Most electricity produced is sold into the NEM "pool". Smaller generators (<30 MW) have the option of not selling their electricity through the pool, but most larger (>30 MW) network-connected generators must do so.

While the NEM has achieved its aim of providing an effective national wholesale market for electricity, a number of issues are currently being addressed to further develop the market, including:

- the treatment of network costs by small (generally <30 MW) generators
- the role of demand side participation in the market
- extension of retail contestability to all electricity customers



- security of supply (particularly in peak demand periods)
- environmental concerns in NEM arrangements.

Concern has been expressed that greenhouse emissions have increased under the NEM due to greater use of low cost coal-based generation. In response to this concern, the Council of Australian Governments (COAG) agreed in June 2001 that a review of energy market directions would take place and include an assessment of options within the energy market to reduce greenhouse gas emissions. As a participant in both the NEM and COAG, the Victorian Government will seek to ensure that greenhouse issues are fully considered as part of this review.

Energy end use

Ultimately it is the demand for the services that energy provides (eg. heating, lighting etc) which drives the production and distribution of ever-larger amounts of energy and resultant greenhouse gas emissions. There are, however, means by which our demands for energy can be reduced without a decline in living standards or productivity. Actions to drive improvements in the efficiency of energy use in Victoria are included in Modules 1, 3, 5, 6 and 9 of the Victorian Greenhouse Strategy.

COAG, Greenhouse and Energy Policy

The Council of Australian Governments (COAG) has identified "mitigating local and global environmental impacts, notably greenhouse impacts of energy production, transformation, supply and use" as one of the 3 objectives of a national energy policy framework.

COAG also identified 3 priority areas for pursuing its national energy policy objectives:

- national energy policy leadership;
- immediate action on high priority national electricity market issues; and
- high-level strategic review of medium to longer term energy market directions.

To further these priority areas, three new oversight and review bodies have been created:

- a Ministerial Council on Energy will have the power to provide national leadership and coordination on energy matters – this Council will report back to COAG members out-of-session
- Ministers representing jurisdictions participating in the NEM have formed a policy forum to facilitate coordination on electricity market issues between jurisdictions
- a review of national energy markets will be undertaken with a view to identifying means of improving market performance and minimising greenhouse emissions.

Distributed Generation

Most electricity in Australia is generated by large power stations that are located at a considerable distance from their major end uses or "loads". To get electricity to its load, it is necessary to transmit it over long distances through high-tension wires. In doing so, a significant amount of energy is lost – on average around 5% of the electricity that was originally dispatched. This loss of electricity also equates to a large amount of greenhouse gas emissions, as more electricity must be produced to meet a given load.

Transmission losses can be lowered by reducing the need to transmit electricity. Distributed generation refers to the location of generators close to load and "embedding" them in the distribution network rather than being connected to it via a long transmission line.

It is not always possible, or desirable, to place large generators in populated urban areas. It is feasible, however, to install a significant amount of generation in the distribution network in the form of multiple, smaller plants. Some forms of generation, such as solar photovoltaics, small natural gas-fired turbines and cogeneration are ideal for this purpose. Developments located near sensitive land uses need to consider other environmental impacts, particularly with respect to local air quality.

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|---|-------------------------------|---|
| <p>2.1 Renewable Energy Support Fund</p> <p>Support will be provided for up to 20% of the total capital cost of small-scale renewable energy generation projects in Victoria, through mechanisms such as publicly advertised calls for grant applications. The focus of the Support Fund will be on projects and technologies that have demonstrated local market development potential.</p> | Sustainable Energy Authority | 3 year program from 2002-2004 | \$8.45 million |
| <p>2.2 Information and guidance to facilitate renewable energy development</p> <ul style="list-style-type: none"> i The Government will prepare a Windfarm Development Guide to facilitate the sensitive development of windfarms in Victoria. The Guide will include planning guidelines and information on the technical aspects of windfarm generation – including improved wind resource data. ii The Government will undertake an assessment of the technical and economic opportunities for a range of renewable energy sources in Victoria. The assessment, which will be made available to potential investors in renewable energy, will address economic considerations in terms of both the current and possible future policy environments. | Sustainable Energy Authority supported by the Departments of Infrastructure, Natural Resources and Environment, and Innovation, Industry & Regional Development | 2002 | \$500,000 |
| <p>2.3 Green Power accreditation and promotion</p> <p>Green Power is a voluntary program that enables customers to elect to pay a premium to their retailers for the supply of Green Power. A national accreditation program is in place to ensure that electricity retailers purchase renewable energy from approved sources.</p> <p>The program aims to promote investment in new renewable energy generation in Victoria and to increase the number of domestic and business customers purchasing Green Power.</p> <p>The Government will work in partnership with electricity suppliers accredited to sell Green Power in Victoria to support research and analysis of market needs and opportunities and to promote Green Power products using this improved market understanding.</p> | Sustainable Energy Authority | Ongoing | Green Power accreditation is funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan \$750,000 for Green Power promotions partnerships |

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|--|--------------------------------------|---------------------------------|
| <p>2.4 Research into new brown coal technologies</p> <p>Financial support is provided to the CRC for Clean Power from Lignite to develop and commercialise new technologies to improve the efficiency of, and to reduce the greenhouse gas emissions from, electricity generation using brown coal. The financial support includes a grant to accelerate research and development into the Mechanical Thermal Expression technology.</p> | <p>Natural Resources and Environment</p> | <p>3 year program from 2002-2004</p> | <p>\$2.78 million</p> |
| <p>2.5 Facilitating the use of Cogeneration</p> <p>The use of Cogeneration will be facilitated by:</p> <ul style="list-style-type: none"> - Providing funding to conduct preliminary feasibility studies on Government and non-government sites. Applications will be invited from the private sector for sites to be nominated for assessment of their suitability for cogeneration based on the site's demand for electricity and heat; the type and cost of plant required; installation and grid connection issues; financial feasibility and environmental impact. The Government contribution will be for 50% of the cost of conducting the assessment, or up to 100% where a project is considered as a potentially important case study. - Disseminating case studies and general information regarding the application of cogeneration technology. | <p>Sustainable Energy Authority</p> | <p>3 year program from 2002-2004</p> | <p>\$900,000</p> |



3

GREENHOUSE BEST PRACTICE IN VICTORIAN INDUSTRY AND COMMERCE

THE GOVERNMENT WILL SUPPORT VICTORIAN BUSINESSES TO PURSUE GREENHOUSE BEST PRACTICE, AND TO TAKE ADVANTAGE OF BUSINESS OPPORTUNITIES IN GREENHOUSE GAS MITIGATION AS PART OF ITS BROADER COMMITMENT TO LONG-TERM SUSTAINABLE DEVELOPMENT.

Industry and commerce are major users of energy and, therefore, major contributors to greenhouse gas emissions. Together they are responsible for 41% of Victoria's total greenhouse gas emissions. Industry is the major contributor, accounting for 29% of emissions, with 12% from the commercial sector⁵.

A key issue for the long term sustainability of individual enterprises and the Victorian economy is the need to improve the greenhouse performance of Victorian business. This will involve both a reduction in greenhouse gas emissions from existing activities, as well as the pursuit of new industry development opportunities.

The *Growing Victoria Together* framework – launched in November 2001 – outlines the Government's vision for a sustainable Victoria. The Government is committed to working closely with industry on developing ways to fulfil this vision. For example, in February this year, the Government sponsored the third national Business Leaders' Forum on Sustainable Development. Key messages arising from the Forum were: the importance of government leadership; the critical role that business and industry must play in protecting the environment; and the commercial advantages that arise for both individual enterprises and the State as a whole from putting the principles of sustainable development into practice.

Efforts to reduce greenhouse gas emissions and improve energy efficiency will not only deliver environmental benefits. Such efforts can also enhance business competitiveness by reducing costs, improving risk management, increasing the confidence of investors, insurers and financial institutions, and by improving relationships with local communities.

⁵ These figures are based on the publication – *Victoria's Greenhouse Gas Emissions 1990 & 1995: Cross Sectoral Analysis* (available on the web at www.greenhouse.vic.gov.au). Cross-sectoral (or 'end use') analyses allocate emissions arising from electricity generation to industry and commerce according to their share of electricity consumption.



In order to realise these benefits, three strands of activity will be pursued under the Victorian Greenhouse Strategy:

- driving business sustainability
- taking advantage of business opportunities through industry leadership and innovation
- improving the energy efficiency of new and existing commercial buildings.

A number of new actions have been developed to support these areas of activity. In many cases, these new actions build on and complement existing Victorian and Commonwealth Government policies and programs.

Voluntary programs have been instrumental in raising awareness of greenhouse issues in industry and commerce, in fostering industry/government partnerships, and in promoting leadership and establishing benchmarks of best practice. While such programs will continue to have an important role, the Victorian Government is strengthening action through regulatory frameworks that seek to drive broad adoption of innovation and best practice by Victorian businesses.

Driving business sustainability

For all industries, the pursuit of eco-efficiency and triple bottom line outcomes (economic, environmental and social) is an increasingly important management strategy. Pursuing eco-efficiency objectives such as reducing the material and energy intensity of goods and services; enhancing the recyclability of materials; and maximising the use of renewable resources ensures business sustainability and provides business opportunities – as well as benefits to the environment.

The adoption of greenhouse best practice will be an important factor in maintaining the future competitiveness of Victorian enterprises and securing the long-term sustainability of Victoria's economy and the environment. Measures to reduce greenhouse gas emissions – especially those promoting the development and use of energy efficient technologies, practices and processes – will help Victorian commerce and industry compete in the national and international marketplace.

For some time, industry leaders in Australia and overseas have recognised that energy efficiency is good business practice and that, consequently, the management of greenhouse emissions is good for both business and the environment. However, awareness of these issues and the take-up of these opportunities is not broadly reflected across Victorian industry.

To ensure that Victorian industries develop appropriate responses to greenhouse issues, and to stimulate investment in energy efficiency, the

Agenda for new manufacturing

The Bracks Government is developing an agenda to stimulate innovation and growth in new manufacturing. The agenda will seek to create high skill, high wage jobs in positive workplace environments, and promote the adoption of sound environmental practices by Victorian manufacturers.

An environmentally sustainable manufacturing sector is critical to competitive advantage, and therefore the sustainability of Victoria's economy, society and environment. The Bracks Government will work with industry to ensure environmental best practice is achieved, and innovation and knowledge creation are pursued by Victorian businesses.

Victorian manufacturers will also need to increase business investment in R&D, promote the adoption of new technologies, improve on our export performance and embrace continuous improvement practices in the workplace.

The agenda for new manufacturing will be a shared action plan to build tomorrow's manufacturing businesses today.

Greenhouse best practice – case study

Through innovation and design, PBR Australia has grown to be a recognised world leader in the manufacture and supply of light-weight brake and clutch components to the automotive industry. Winner of the 1999 Energy Smart Best Manufacturers' Award, PBR has demonstrated a fundamental commitment to energy management, recycling and environmental responsibility.

Notable achievements include the design of the revolutionary Banksia Park Brake, which has reduced the number of components by 60%, and the installation of sophisticated plant-wide energy monitoring systems. Realised savings in the foundry alone equated to some \$60,000 per annum.

Cleaner Production and Business Sustainability

Cleaner production is a major tool for reducing energy use, improving energy efficiency and reducing greenhouse gas emissions, as well as producing business benefits. The adoption of cleaner production means that a company sets in place ongoing processes for identifying efficiency improvements and new ways of doing business that reduce the environmental impacts, including greenhouse impacts, of production processes. Experience has shown that pursuing eco-efficiency objectives, such as reducing the material and energy intensity of goods and services; enhancing the recyclability of materials; and maximising the use of renewable resources, can reduce business costs and provide opportunities for business growth in addition to providing benefits to the environment. In this way, the company is 'building in' business sustainability.

Several government agencies are involved in supporting cleaner production, including the Department of Innovation, Industry and Regional Development; EPA Victoria; the Sustainable Energy Authority; and EcoRecycle Victoria. They assist individual enterprises and work with industry associations on a range of issues such as: developing and implementing environmental management systems; assessing potential energy savings; identifying new markets for using recycled waste; and obtaining specialist advice on cleaner production practices.

Action 3.5 builds on this work with the aim of improving business uptake of cleaner production opportunities and generating significant reductions in greenhouse gas emissions. In particular, there will be an increased focus on the integration of programs across Government and improved communication with companies. A 'roadmap' for Business Sustainability will be developed providing information on how to identify and introduce cleaner production practices; the kind of support that is available; and where this support can be obtained.



Government introduced changes to the State environment protection policy (Air Quality Management) in December 2001. This Policy requires businesses subject to EPA Victoria works approvals and licensing to take action with respect to their energy use and greenhouse emissions (Action 3.1). A range of industry support services will be provided to assist businesses in meeting these new requirements.

In addition to the requirements for EPA Victoria licensees, the Government will implement a range of programs to facilitate the application of sustainability principles across the wider business sector (Actions 3.2 and 3.5); and to support innovation and the take-up of leading edge technologies (Actions 3.3 and 3.4).

A critical issue that has emerged in recent years for some industries relates to the use of hydrofluorocarbons (HFCs) as replacements for ozone depleting substances – HFCs are potent greenhouse gases that have a Global Warming Potential (GWP) up to 11,700 times that of carbon dioxide. The Victorian Government will continue to work with industry, the Commonwealth and other State and Territory Governments to help meet Australia's international obligations to phase out ozone-depleting substances⁶. The Victorian Government will also ensure that policies and programs take into account the impacts of any substitutes for ozone-depleting substances on global warming.

Taking advantage of business opportunities through industry leadership and innovation

Knowledge creation and its application through innovation is important as a driver for jobs growth, wealth creation and higher living standards. Innovation – in areas such as new products, services and business practices – is also the key to sustainability and reducing greenhouse gas emissions.

Developing the Innovative State is a key theme of the Government's *Growing Victoria Together* framework. The Government is developing detailed policies to support the growth of an innovation economy. Environmental technologies have been identified as a key strategic capability essential for underpinning the growth of sustainable businesses into the future.

The Government is working with business to exploit opportunities for industry growth, particularly in technologies, products and services relating to energy efficiency, environmental management and renewable energy indus-

Energy efficiency and greenhouse requirements for EPA Victoria licence holders

More than 1,000 Victorian businesses are subject to EPA Victoria works approvals and licensing. Under changes to the State environment protection policy (Air Quality Management), these businesses are required to take steps to improve the energy efficiency of their operations and to reduce their greenhouse gas emissions.

A Protocol for Environmental Management: *Greenhouse Gas Emissions and Energy Efficiency in Industry*, has been established detailing these requirements. Under the Protocol, existing licence holders whose energy consumption results in greater than 100 tonnes of CO₂-equivalent emissions per annum will be required to conduct an energy audit and to implement energy efficiency improvements identified by the audit that have a financial payback of up to 3 years. Existing licence holders will also be required to identify any non-energy related greenhouse gas emissions and, in consultation with EPA Victoria, to develop an action plan for their reduction.

Energy efficiency and greenhouse gas abatement will also be a key consideration in the assessment of applications for new works approvals and licences.

The Government is committing \$2.65 million over 3 years for support services to assist businesses in complying with these new requirements.

⁶ Ozone depleting substances cause different, but equally significant, impacts on the Earth's atmosphere. Progress is well under way internationally and within Australia to phase out the use of ozone depleting substances and minimise emissions of these substances to the atmosphere. Australia is a signatory to two international treaties relating to protection of the ozone layer – the 1985 Vienna Convention for the Protection of the Ozone Layer and the 1987 Montreal Protocol on Substances that Deplete the Ozone Layer (the Montreal Protocol). The *Industrial Waste Management Policy (Protection of the Ozone Layer)* forms the key statutory instrument for the management of ozone depleting substances in Victoria, updating the statutory framework for action introduced in 1990.

tries. In October 2001 the Government released a Strategic Audit of Environmental Management and Renewable Energy Industries. This comprehensive snapshot of commercial activity was conducted in consultation with relevant businesses, and found an industry sector which, although promising, was still young and fragmented. In response, the Government is preparing a Strategic Industry Plan. The Plan will contain specific initiatives by both Government and Industry to assist the Environmental Management and Renewable Energy Industries to meet their full potential, both within Victoria and in export markets.

Specific areas of business opportunity – many of which exist in regional Victoria – include:

- *Renewable energy* – the Government will seek to stimulate growth in electricity generation from renewable sources in Victoria through the Renewable Energy Support Fund (Action 2.1); Information and guidance to facilitate renewable energy development (Action 2.2); and Solar Hot Water Rebates (Action 6.3). There is potential for flow-on business opportunities in local equipment manufacturing as a result of these programs.
- *Environmental and energy efficiency products, services and technologies* – demand for services and products which can assist businesses to better manage their environmental performance and energy use is being driven by changes to corporate and environmental legislation and a heightened focus on due diligence, as well as market demands for environmental performance standards (eg. compliance with ISO 14001).
- *Investment in sinks and use of plantation timbers* – regional economic development benefits are likely to arise from increased investment in tree planting, and in particular the development and processing of plantation timbers – actions to be taken by the Victorian Government to support growth in this area are discussed in Module 8.
- *Product and service improvements* – Government regulation (eg. through appliance and equipment efficiency standards - Action 6.4) and market pressures will drive the redesign of consumer products and services to improve their energy efficiency, and the development of new products to meet society's needs for greenhouse abatement.

To provide recognition for companies that take up this leadership challenge, the Government has recently announced the introduction of a Premier's Business Sustainability Award. The Award will recognise groundbreaking innovation in sustainable business practices in Victoria – innovation that might come by way of a project, a product, a service or technology.

Industry leadership – industry showing the way to industry – provides a highly effective way of improving industry awareness of greenhouse issues





and, in particular, of driving innovation and increasing the take-up of best practice. Cooperative partnership programs, such as the Commonwealth's Greenhouse Challenge program, have an important role to play in fostering industry leadership.

The Sustainable Energy Authority works in partnership with individual companies and industry groups to develop projects that showcase the application of leading edge sustainable energy technologies and practices. The Authority also works to build capacity within industry to pursue sustainable energy outcomes and promote best practice design, technologies and management (Action 3.2).

A new Government/Industry Roundtable (Action 3.9) will promote industry-led greenhouse action and provide a mechanism for the Government to consult with, and draw on, the experience of industry leaders in the ongoing development of greenhouse responses. The Roundtable will also provide a focus for building and sustaining partnerships between industry and Government.

Innovation will also be supported through the establishment of a Centre for Energy and Greenhouse Technologies (Action 3.3). The Centre will provide Victoria with the capability to facilitate research, development, demonstration and commercialisation of energy efficiency and greenhouse abatement technologies. This will stimulate industry development in these areas and encourage broader adoption of best practice within an industry sector. The Centre will also play a key role in ensuring that Victoria has the technologies it needs to be competitive in a world where energy efficiency and greenhouse are major issues. The Centre will provide an enhanced capacity for identifying and adopting best practice technologies for electricity generation and greenhouse abatement technologies and processes relevant to Victorian industry.

The work of the Centre will be complemented by, and closely linked to, the provision of funding to assist Victorian enterprises to adopt leading edge energy efficient and/or greenhouse gas abatement technologies (Action 3.4). This program will support market penetration of existing technologies that have not been broadly taken up by Victorian industries, as well as trialing innovative products.

Improving the energy efficiency of commercial buildings

Commercial buildings consume large amounts of energy and have a significant impact on greenhouse gas emissions, accounting for around 12% of Victoria's total emissions. More than two-thirds of the energy used by commercial office buildings is in the form of electricity – our most greenhouse-intensive energy source.

Industry leadership – case study

For several years Ford Australia, in conjunction with the Sustainable Energy Authority, has been working with companies in its supply chain to promote sustainable energy practices. There have been significant benefits for all parties. During 2000, Ford working with its suppliers and associated companies, identified over \$1 million in savings in energy costs, and a reduction of 14,500 tonnes annually in greenhouse gas emissions.

Financial Sector Initiatives

EPA Victoria has set up a number of programs/events to help promote environmental issues to the Finance Sector, as part of an agreement with the United Nations Environment Programme to coordinate and promote its *Financial Initiatives* activities in Australasia.

EPA Victoria is working through industry-based committees to pursue specific issues, including:

Socially Responsible Investment – pushing the business sustainability agenda by promoting the introduction of investment funds that focus on companies that are environmentally and socially responsible in areas such as greenhouse emission management

Environmental Credit Risk Advisory Committee – providing advice on practical ways to promote environmental credit risk issues to financial institutions and other relevant organisations in Australasia, and to assist these organisations to deal with the implications raised by environmental credit risk

Insurance Advisory Committee – advising on measures to encourage and assist insurance companies to consider environmental risks during their assessment of applications

Operational Environmental Management – promoting consideration by financial institutions of the direct greenhouse and other environmental impacts of their own energy use and waste streams.

There is potential for the commercial sector to achieve significant savings in energy use. The Sustainable Energy Authority has found that existing buildings can save up to 25% in energy costs and, with new buildings, attention to good design and efficient operation can reduce energy costs by over 50%. A key constraint on the take-up of building energy efficiency improvements in the commercial sector is the 'split incentive' between tenants and landlords – building owners have little motivation or incentive to improve the energy efficiency of their buildings when they have no responsibility for paying the energy bills.

The Australian Building Codes Board (ABCB) is currently developing minimum energy efficiency requirements for inclusion into the Building Code of Australia (BCA). The aim is to eliminate worst practice in energy efficiency in non-residential buildings constructed after July 2004. This will apply to developments ranging from shopping centres to office blocks. The Government, through the Building Commission, is actively involved in the BCA Review and is committed to moving the process towards the facilitation of best practice, maintaining Victoria's leadership role in the regulation of building energy efficiency. The Government will be taking early action in this area. Minimum energy performance requirements will be developed, and provisions will be introduced into the Victorian Building Regulations to require energy performance assessments to be prepared for new commercial buildings (Action 3.6).

Major commercial developments to be constructed over the next decade are being designed and planned now, and Government action is required to ensure that opportunities to build in energy efficiency are not lost. The Government is introducing energy efficiency requirements for commercial buildings as part of its tender requirements for Major Project developments (Action 1.6). The Government is also working in partnership with the Property Council of Australia and the City of Melbourne to drive voluntary improvements in commercial building energy efficiency in the lead up to the introduction of BCA changes in 2004.

The Sustainable Energy Authority's activities in this area focus on developing industry capacity in the application of best practice technologies and management procedures, and working in partnership with individual companies to develop leading edge sustainable buildings (Action 3.7). Through the Victorian Greenhouse Strategy, the Government will provide funding to assist businesses to identify opportunities to improve energy efficiency and utilise sustainable energy within a number of large commercial buildings in Victoria (Action 3.8).





60L Green Building

The 60L Green Building project currently under way in Melbourne promises to be the leading example of green commercial building in Australia. The project aims to demonstrate the commercial viability of a building designed and operated to minimise its impact on the environment. 60L is a joint project of the Green Building Partnership and the Australian Conservation Foundation.

Key principles that have been adopted for the building are to:

- create a quality building that is commercially viable
- minimise the consumption of materials and maximise their reuse
- protect the natural environment by astute selection and use of materials
- minimise energy consumption and greenhouse gas emissions
- minimise the consumption of mains water and maximise recycling of treated wastewater
- adopt environmentally sound and healthy work practices, during both construction and occupancy – tenants will sign a Green Lease incorporating an Environmental Management Plan.

The 60L Green Building will set significant new benchmarks for energy efficiency, greenhouse gas emissions and water efficiency, and will provide significant savings to tenants in comparison to a typical commercial development.

Annual Energy Costs – expected energy savings are over 65 % per year compared with a conventional office building. Electrical energy for lighting will be reduced by over 80%, and for equipment and ventilation, heating & cooling by over 60%.

Annual CO₂ Emissions – use of electricity derived from non-fossil fuel sources (Green Power) will enable savings approaching 100 % in annual carbon dioxide emissions.

Annual Water Consumption – these measures will provide savings in average annual mains water consumption of over 90%.

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|---|---|---|
| <p>3.1 Works approvals and licensing</p> <p>Under the State environment protection policy (Air Quality Management), Victorian enterprises subject to the EPA Victoria works approvals and licensing system will be required to implement cost-effective opportunities for improving energy efficiency and reducing greenhouse gas emissions.</p> <p><i>Supporting programs:</i></p> <ul style="list-style-type: none"> • Extension services to support enterprises in meeting the new requirements under the State environment protection policy (Air Quality Management). • Greenhouse and Energy Management Toolkit – available in both published and web-based form – to assist enterprises to identify and incorporate sustainable energy technologies and practices into new and existing plant*. <p><small>* The Toolkit will also be available to enterprises that are not subject to EPA Victoria works approvals and licensing</small></p> | EPA Victoria supported by the Sustainable Energy Authority | 3 year program from 2002-2004 | \$2.65 million for the supporting programs |
| <p>3.2 Supporting the application of sustainable energy technologies and practices in manufacturing</p> <p>The Sustainable Energy Authority works in partnership with individual companies and industry groups to promote business productivity and environmental outcomes by:</p> <ul style="list-style-type: none"> - supporting projects that showcase and set new benchmarks for best practice in sustainable energy technologies and practices in manufacturing - building capacity within industry to pursue sustainable energy outcomes and promote best practice design, technologies and management - supporting the development of new sustainable energy products. | Sustainable Energy Authority | Ongoing | Funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan |
| <p>3.3 Centre for Energy and Greenhouse Technologies</p> <p>A Centre for Energy and Greenhouse Technologies will be established to provide an enhanced capacity for identifying and adopting best practice technologies in the generation and use of energy, and in the abatement of greenhouse gas emissions.</p> <p>The primary activities of the Centre will include:</p> <ul style="list-style-type: none"> - targeted Research, Development, Demonstration and Commercialisation of energy supply, energy use and greenhouse gas abatement technologies and processes - the surveillance, assessment and promulgation of best practice in these areas. | Natural Resources and Environment Innovation Industry and Regional Development Sustainable Energy Authority | Business Plan to be developed during 2002 Operation to commence in 2002/03 | \$14.25 million |

| No. Action | | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|---|--|--|-------------------------------|---------------------------------|
| 3.4 Support for the uptake of 'leading edge' greenhouse gas abatement technologies | <p>Funding will be provided to assist Victorian enterprises in trialing and demonstrating leading-edge greenhouse gas abatement (including energy efficiency) technologies.</p> <p>Funding will be targeted at:</p> <ul style="list-style-type: none"> - providing demonstration of existing technologies that have not been broadly taken up by Victorian industries, as well as the trialing of innovative, leading-edge technologies – including those emerging from the Centre for Energy and Greenhouse Technologies (see Action 3.3) - projects with application to key Victorian industry sectors and those that have the potential to be applied more broadly to other enterprises. | Sustainable Energy Authority Innovation, Industry and Regional Development | 3 year program from 2002-2004 | \$1.3 million |
| 3.5 Business sustainability initiative | <p>The delivery of the Government's business sustainability programs will be improved and enhanced through the development of an integrated 'road map' to Government programs and services – information and tools for business will be upgraded and made available in a systematic manner through Government websites and publications.</p> | Innovation, Industry and Regional Development | 3 year program from 2002-2004 | \$400,000 |
| 3.6 Energy efficiency of new commercial developments | <p>Other program elements will include:</p> <ul style="list-style-type: none"> - development and trialing of coordinated activities for strategic industries/sectors, including refinement of tools to assist industry to incorporate sustainability in an Environmental Management System framework - investigation and development of integrated and targeted business sustainability pilot programs for particular industries/sectors – building on insights from the Strategic Audits of Victorian Industries. <p>To drive improvement in the energy efficiency of commercial buildings, the Victorian Government will develop minimum energy performance requirements, and introduce provisions into the Victorian Building Regulations to require energy performance assessments to be prepared for new buildings.</p> | EPA Victoria Sustainable Energy Authority EcoRecycle Victoria Building Commission Sustainable Energy Authority | To be introduced in 2003 | |

ALL NEW PROGRAMS ARE INDICATED IN GREEN.

| No. Action | Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|------------|---|-----------------------------------|-------------------------------|---|
| 3.7 | <p>Accelerating the application of best practice sustainable energy in commercial buildings</p> <p>The Sustainable Energy Authority is supporting the building development and building management industries in the application of best practice sustainable energy technologies and management procedures through:</p> <ul style="list-style-type: none"> - partnerships with individual companies to accelerate the development and marketing of sustainable energy as a valued quality in their buildings - the development and application of a sustainable energy rating scheme, and promotion of resources such as the 'Building Energy Brief'. | Sustainable Energy Authority | Ongoing | Funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan |
| 3.8 | <p>Improving energy management in large commercial buildings</p> <p>Funding will be provided to support the identification of energy management opportunities and development of energy management programs in multi-tenanted commercial buildings. The program will target large commercial buildings and will be developed and delivered in partnership with the property industry.</p> | Sustainable Energy Authority | 3 year program from 2002-2004 | \$750,000 |
| 3.9 | <p>Government/industry greenhouse roundtable</p> <p>A Greenhouse Roundtable – chaired by the Minister for Energy and Resources and involving senior representatives of key Victorian-based companies – will be established to provide strategic advice to Government, particularly in relation to greenhouse strategies for business and industry.</p> | Natural Resources and Environment | To be established during 2002 | |



4

REDUCING GREENHOUSE GAS EMISSIONS THROUGH IMPROVED MANAGEMENT OF WASTES

THE GOVERNMENT WILL FOSTER CONTINUOUS IMPROVEMENT IN WASTE MANAGEMENT IN VICTORIA IN ORDER TO REDUCE GREENHOUSE GAS EMISSIONS AND ENSURE THAT THE STATE'S RESOURCES ARE USED AS EFFICIENTLY AS POSSIBLE.

Methane – which has a global warming potential (GWP) 21 times that of CO₂ – is emitted from landfills and wastewater treatment systems when organic wastes (eg. garden waste, timber, paper, food and domestic and industrial sewerage) decay in the absence of oxygen (ie. anaerobically). Landfills and wastewater treatment respectively contribute 3% and 0.4% to Victoria's total greenhouse gas emissions.

Greenhouse gases are also emitted when energy is consumed in the transportation and processing of wastes. In addition, the disposal of non-organic products (eg. plastics, aluminium) to landfills results, indirectly, in an increase in greenhouse gas emissions – the energy that was consumed in producing these products represents a waste which could have been avoided if the products had been re-used or recycled, or the waste component avoided through product design.

Research by EcoRecycle Victoria and EPA Victoria has concluded that greenhouse gas emission reductions can be achieved by managing wastes in accordance with the waste hierarchy that emphasises, in order of preference:

- *avoidance or reduction of waste* – through waste minimisation and eco-efficient practices
- *reuse* – to conserve resources that otherwise would be consumed in production or recycling
- *recycling* – energy and resources consumed in recycling can be significant but are generally less than for 'first use' materials
- *energy recovery* – energy recovered from waste can be used as a substitute for fossil fuels
- *treatment* – to reduce the environmental impact of waste disposal
- *containment* – to reduce environmental impacts
- *disposal* – in an environmentally-responsible manner.



Green Waste Action Plan

In October 2000 the Government launched the Green Waste Action Plan. This Plan aims to reduce the amount of green waste going to landfill by 50% by 2010/11. Green wastes include food organics, garden organics and timber.

The management of green wastes in Victoria is changing rapidly. With the assistance of EcoRecycle Victoria, composting facilities are being expanded to take more garden organics. Councils are establishing collection programs, with 13 of the 30 Councils in Melbourne offering a regular kerbside service. A new facility to process commercial food wastes has been established by Natural Recovery Systems with financial assistance from the Government.

There is also increasing demand for green wastes as a source of raw material for waste-to-energy facilities. This is being driven by the Commonwealth Government's Mandatory Renewable Energy Target – which requires an additional 9,500 GigaWatt hours of renewable energy to be sourced by electricity retailers by 2010 – and by Green Power programs.

Given the variety of potential uses of green waste, a key consideration for the Green Waste Action Plan will be to carefully manage competition for waste to ensure that the best environmental outcome is achieved.

Environmental impacts of kerbside recycling

The Victorian Government recently commissioned a Life Cycle Assessment (LCA) to evaluate the environmental impacts of packaging and paper recycling compared with disposal to landfill.

The results show that by participating in kerbside recycling, the average household saves each week:

- over 3 kilograms of greenhouse gases
- enough electricity to run a 40 watt light bulb for 72 hours
- air pollution equivalent to the emissions created by 4.5 kilometres of travel in an average car
- over 90 litres of water
- 3.6 kilograms of solid waste.

According to the LCA report, almost half the greenhouse gas emissions savings result from avoiding the methane that would have been generated at landfill as paper and cardboard waste decomposes.

Growing Victoria Together identifies an increase in effective waste management and recycling as a priority action of the Victorian Government.

The Government already has a range of policies and programs in place to reduce greenhouse gas emissions from waste in a manner consistent with the waste hierarchy – including a Green Waste Action Plan (see Box); State environment protection policies for the Siting and Management of Landfills, and Air Quality Management; various best practice environmental guidelines (Actions 4.2 and 4.3); and the Kerbside Recycling Program (Action 4.4).

The approaches needed to strengthen these policies and programs will be determined through the development of a Solid Waste Strategy for Victoria (Action 4.1). This Strategy – which will be developed by EcoRecycle Victoria during 2001/02 to 2002/03 in consultation with all stakeholders – will have a 10+ year time frame and be consistent with, and evolve from, State environment protection policies.

The Solid Waste Strategy will provide a framework for EcoRecycle Victoria's business planning and solid waste management planning in each of the 16 Regional Waste Management Groups established throughout Victoria. In particular, the Strategy will identify opportunities for new systems, infrastructure and technology for both householders and industry. Some of the issues to be addressed in the course of the Strategy's development include:

- strategies to extend effective recycling to the commercial and industrial sector
- appropriate waste reduction and resource recovery targets for specific industry sectors and/or material categories
- the role of energy recovery and other new technologies in diverting residual materials from the waste stream, and their potential impact on the waste hierarchy and greenhouse gas emissions.

Energy recovery from landfill gas offers the potential to reduce greenhouse gas emissions. As it is based on organic (biomass) wastes, this energy is classified as renewable. Policies and programs such as the Mandatory Renewable Energy Target and Green Power (see Module 2), provide a growing market for energy recovery from waste streams.

In Victoria there is currently 40 Megawatts of electricity generating capacity from landfill gas, and 9 Megawatts from wastewater gas. It is estimated that these activities will reduce greenhouse gas emissions by 0.8 megatonnes CO₂-equivalent by 2010.

There is further scope for such activity as waste streams increase, as energy recovery technologies improve and as demands for renewable energy grow. Over the period 2001 to 2010, electricity production capacity based on these waste streams could increase from the current 49 Megawatts to around 200 Megawatts.





Energy from Waste

Visy Energy has built one of the world's most advanced energy from waste plants at Coolaroo in Melbourne.

The Eco Gasifier takes about 65,000 tonnes of waste from Visy's paper recycling mills and recycling facilities, and converts it into gas that is used to generate steam for paper making.

This environmentally sound system enhances Visy's environmental performance and production activities by diverting waste from landfill, reducing transport, and replacing energy that would otherwise be derived from fossil fuels. The process saves around 100,000 tonnes of greenhouse gases a year.

While the Eco Gasifier is used to raise steam for Visy's Coolaroo plant, future Visy energy facilities may include a steam turbine to generate green electricity. Future plants may also use clean waste from other sources such as households and commerce.

Further information on the Eco Gasifier is available by contacting Visy on 03 9247 4641.

Recycling in Victoria

The amount of material recovered for recycling has increased significantly over the past eight years. In 1992/93 the diversion rate of recyclables from landfill was 26%. By 2000/01, the quantity of waste material recycled in Victoria reached 3.98 million tonnes – representing a diversion rate from landfill of approximately 48%.

A strong emphasis on increasing recycling participation rates has seen the ongoing development of cost efficient and sustainable kerbside recycling collection services for householders and an improved state-wide network of transfer stations, drop-off and sorting facilities to provide the community with better access to recycling services.

Industrial waste accounts for some two thirds of all waste going to landfill in Victoria, with recyclable materials such as concrete, bricks, timber, paper/cardboard and green organics accounting for over 50% of the industrial solid waste stream. EcoRecycle Victoria has supported industry recycling initiatives through both its Infrastructure and Market Development grants programs. EcoRecycle's Business Program will build on the existing Waste Wise Business program and provide direct assistance to industry and other organisations to reduce waste generation and improve resource use efficiency. In addition, support is being provided to industry to develop value-added products containing a high percentage of recycled material.

These programs, and the commitment of Victorian businesses and the wider community, have resulted in significant quantities of materials being reprocessed in Victoria each year, including:

- 1.3 million tonnes of construction and demolition waste
- 896,000 tonnes of metals
- 711,000 tonnes of paper and cardboard
- 517,000 tonnes of garden and food organics
- 125,000 tonnes of glass
- 106,000 tonnes of textiles and rubber
- 151,000 tonnes of timber
- 83,000 tonnes of plastic.

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|---|-------------------------------------|--|--|
| <p>4.1 Solid Waste Strategy</p> <p>The Government will develop a Solid Waste Strategy as a means of determining the policies and programs required to reduce the volume of waste going to landfill and to ensure the management of waste occurs in a manner that promotes optimal environmental outcomes – including the reduction of greenhouse gas emissions.</p> <p>The Strategy will also seek to facilitate implementation of the Green Waste Action Plan.</p> <p><i>Supporting programs:</i></p> <ul style="list-style-type: none"> • A Study to determine the best environmental options for managing solid waste (including organic waste). The Study will consider a range of issues including: <ul style="list-style-type: none"> - the role of energy recovery and other new technologies in diverting residual materials from the waste stream, and their potential impact on the waste hierarchy and greenhouse gas emissions - the potential role of policy instruments such as landfill pricing in achieving the goals of the Solid Waste Strategy. • Provision of information to the waste management industry, including EPA Victoria case studies relating to <i>Enhanced Management of Greenhouse Intensive Solid Waste</i>. | EcoRecycle Victoria EPA Victoria | Solid Waste Strategy to be developed during 2001/02 - 2002/03 Study to be undertaken as part of the development of the Solid Waste Strategy | \$1.7 million |
| <p>4.2 Improving the management of methane emissions from landfills</p> <p>Requirements relating to greenhouse gas emissions from landfills will be applied under the State environment protection policy (Siting and Management of Landfills), and the State environment protection policy (Air Quality Management) – see Action 3.1.</p> <p><i>Supporting programs:</i></p> <ul style="list-style-type: none"> • EPA Victoria Best Practice Environmental Guidelines for Reducing Greenhouse Gas Emissions from Landfills and Wastewater Treatment Facilities • EPA Victoria Best Practice Environmental Guidelines for the Siting, Design, Operation and Rehabilitation of Landfills • A database of Victorian landfills providing estimates of methane emissions has been established to assist in identifying priority sites for greenhouse gas management. | EPA Victoria | Ongoing | \$90,000 * * funding relating to EPA Victoria works approvals and licensing included under Action 3.1 |

| No. Action | | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|------------|---|---|------------------|---|
| 4.3 | <p>Improving the management of methane emissions from wastewater</p> <p>Reductions in methane emissions from wastewater will continue to be pursued as part of requirements relating to greenhouse gas emissions from wastewater treatment facilities subject to EPA Victoria works approval and licensing – see Action 3.1.</p> <p><i>Supporting programs:</i></p> <p>EPA Victoria Best Practice Guidelines for Reducing Greenhouse Gas Emissions from Landfills and Wastewater Treatment Facilities.</p> | EPA Victoria Natural Resources and Environment | Ongoing | Funding relating to EPA Victoria works approvals and licensing included under Action 3.1 |
| 4.4 | <p>Kerbside recycling</p> <p>Kerbside recycling is supported through the funding of infrastructure and education to increase recovery of packaging and paper.</p> | EcoRecycle Victoria | Ongoing | <p>\$4 million *</p> <p>* including \$3.5 million from the Landfill Levy associated with the National Packaging Covenant Kerbside Recycling Transitional Arrangements</p> |



5

WORKING WITH LOCAL GOVERNMENT AND THE COMMUNITY

The Cities for Climate Protection program

The Cities for Climate Protection (CCP) program empowers local governments to cut greenhouse gas emissions from their own internal operations and within their communities. It provides local governments with a strategic milestone framework that helps them to: identify the greenhouse gas emissions from their operations and from their communities; set a reduction target; and develop and implement an action plan to reach that target.

CCP is a campaign of the International Council for Local Environmental Initiatives (ICLEI), with over 440 participating local governments from around the world. In Australia, the Cities for Climate Protection program is delivered by ICLEI in collaboration with the Australian Greenhouse Office, and now with the support of the Victorian Government. There are 143 local governments participating in the Program around Australia – including 34 in Victoria – representing more than 58% of the national population.

The City of Melbourne recently became the first Australian Council to reach Milestone 5 of the CCP Program – which involves review of the Council's first action plan and development of a second action plan.

THE GOVERNMENT WILL ESTABLISH PARTNERSHIPS WITH LOCAL GOVERNMENT AND THE COMMUNITY TO DELIVER GREENHOUSE ABATEMENT PROGRAMS THAT ARE TAILORED TO MEET THE NEEDS, AND REFLECT THE STRENGTHS OF, LOCAL COMMUNITIES – PARTICULARLY IN RURAL AND REGIONAL VICTORIA.

Local government has a critical role to play in working with local communities to reduce greenhouse gas emissions across the State. As the level of government closest to the community, Victoria's 78 Councils are uniquely placed to engage the community in greenhouse action and to influence behavioural change.

Studies indicate that local government can directly or indirectly influence up to 50% of emissions from their local area. In particular, Councils have significant regulatory powers and a primary role in land use planning, traffic management, open space planning, street lighting and waste management. Increasingly, local governments are taking on roles in local economic development, with some Councils showing an interest in attracting new emerging industries in renewable energy generation to stimulate local economies and generate employment opportunities.

Through the Victorian Greenhouse Strategy, the Government will work to build commitment to greenhouse action across all Victorian Councils and to engage them as active partners in developing and delivering greenhouse abatement action to their communities.

Local Government leadership

Providing effective leadership in the community requires the setting of a good example. Local government has a responsibility to ensure that it makes wise use of resources and can provide a model of greenhouse best practice for local businesses and households.

In recent years, a number of Victorian local governments have shown strong leadership in greenhouse action, particularly evidenced by the high partici-



participation rate of Victorian Councils in the Cities for Climate Protection (CCP) program. To date, 34 Councils across the State have joined the program with average corporate and community greenhouse reduction targets ranging between 10% and 30% over time frames of 10 to 15 years. Other Victorian Councils have made significant progress in energy management with the support of the Sustainable Energy Authority.

Recognising the achievements to date of the CCP program, the Government will work with ICLEI to support broader participation in CCP, particularly in rural and regional Victoria, and to make it easier for Councils to progress through the program milestones.

Experience to date has revealed that all Councils have the potential to achieve significant emission reductions within their own operations. The Government will assist Councils to realise this potential by providing additional funding for the identification and implementation of cost-effective energy efficiency measures within Council facilities and operations (Action 5.1). The initial focus will be on rural and regional Councils with an overall target of ensuring that all Victorian local governments achieve high levels of energy management in their internal operations over the next three years.

Council purchasing policies can play a significant role in improving energy efficiency and environmental performance in general. In partnership with the Municipal Association of Victoria (MAV), the Government has launched a *Local Government Buy Recycled Alliance* which has already recruited 28 Councils. The Government will support the MAV to build on this program to encompass greenhouse-friendly purchasing, and to extend participation to 50 Councils (Action 5.2).

For many urban local governments, street lighting is a major cost and contributes a significant proportion of their greenhouse gas emissions. Due to the complex management and maintenance arrangements for street lighting, limited work has been done in this area. The Government will work with the MAV to support local government in taking steps to improve the energy efficiency of public lighting (Action 5.3).

Regional and Rural Victoria

Improving the greenhouse performance of local government is an important starting point for community capacity building and local government leadership of community initiatives. The Regional Partnerships initiative (Action 5.5) will complement these local government programs as well as strengthening the delivery of greenhouse action in rural and regional Victoria.

City of Port Phillip Public Lighting project – case study

In August 2001, the City of Port Phillip commenced a project to install highly energy-efficient public lighting across the municipality. The lighting uses leading-edge technology to emit light from a silicon chip component called a 'dio', rather than a regular bulb. The technology is an evolved form of the LED screens used in mobile phones and calculators. Each light requires only 18 volts in comparison to the 240 volts used for conventional lighting.

The Council has replaced 290 public lights across the municipality with the new technology, resulting in a saving to ratepayers of more than \$36,000 per year on power bills, and annual savings of 110 tonnes of carbon dioxide.

Community Power

Residents and businesses will enjoy cheaper, greener electricity under a new joint partnership between the Cities of Darebin, Moreland and Port Phillip. The three municipalities have established *Community Power*, an electricity-buying group for residents and small businesses.

Following the introduction of full retail contestability in January 2002, *Community Power* will let a tender to provide more socially equitable, financial and environmental benefits for power consumers in their communities. The tender will include a component of Green Power – accredited renewable energy from sources such as solar and wind power.

The combined purchasing power of the three municipalities exceeds 130,000 households, which together spend millions of dollars each year on electricity. Initial market research reveals extremely strong consumer interest in the scheme. Even if only 37,500 households join *Community Power* with a 25% Green Power commitment, greenhouse gas emissions could be reduced by 187,000 tonnes a year.

The Regional Partnerships program encompasses the following three interconnected strands of activity:

- improved integration and delivery of Victorian Government greenhouse programs to rural and regional Victoria
- local government capacity building and leadership of community programs
- developing regional approaches to greenhouse issues through partnerships with non-government and government entities.

Through actions detailed in this and other Modules, the Government will ensure that its programs and services are tailored to the needs of regional and rural Victoria and are delivered in an effective manner including: enhanced delivery of information on sustainable energy (Action 6.5); support for investment in greenhouse sinks (Actions 8.2 and 8.4); promoting best practice in agricultural industries (Actions 9.1, 9.2 and 9.3); and planning to minimise climate change impacts (Actions 10.1 and 10.2). Regional and rural communities will also have an opportunity to seek funding support for innovative community-based greenhouse projects (Action 5.6).

To assist Councils as they seek to influence activities in their local communities, the Government will establish a local energy consumption database (Action 5.4). Councils will be able to use this energy data for commercial, residential and industrial sectors within their municipality, as a basis for developing targeted greenhouse programs within their communities. This will also assist CCP Councils in compiling their municipal greenhouse emissions inventory (a requirement for Milestone 1 of the CCP program). Difficulties in accessing community power consumption data have been cited by many Councils as a barrier to action.

Local governments have demonstrated that they can devise innovative strategies and projects for reducing community emissions, but in many cases they lack the funding and support for their implementation. The Government will establish a Community Action Fund (Action 5.6) to support community-based activities – including those involving local government – with the aim of achieving sustained change and greenhouse gas emission reductions.

In addition to the actions included in this Module, there are significant roles for local government with respect to issues arising in other Modules, including:

- Information and guidance for renewable energy development (Action 2.2)
- Kerbside recycling (Action 4.4)
- Land clearing controls (Action 8.1).





COMMUNITY EDUCATION AND INFORMATION

THE GOVERNMENT REGARDS EDUCATION AS THE KEY TO CHANGING COMMUNITY BEHAVIOUR – THE FORMAL EDUCATION SECTOR MUST PLAY AN IMPORTANT ROLE IN GREENHOUSE LEARNING, BUT THERE IS ALSO A NEED FOR INNOVATIVE APPROACHES TO COMMUNITY EDUCATION.

As outlined in other Modules, achieving sustained greenhouse emission reductions will require long-term behavioural and cultural changes by all sectors of the Victorian community – including government, business, rural industries and households. An important starting point is to ensure that individuals have access to reliable information about greenhouse issues so that they can play a responsible and active role as citizens and consumers.

The Victorian Greenhouse Strategy includes a strengthened commitment to research, policy development and reporting that will provide Victorians with better information about how Victoria is performing in terms of greenhouse emissions and how climate change is likely to affect them. In addition to targeted sectoral programs, broad community access to this information will be available through the Government's greenhouse website www.greenhouse.vic.gov.au

There is also a need for a community-based strategy for greenhouse education and behavioural change that is integrated with other environmental education initiatives. Campaigns to inform consumers of the benefits of purchasing energy efficient products have had some success to date. However, there is a need to extend and strengthen the message so that householders understand the greenhouse implications of their choices and behaviour and are influenced to modify their energy consumption, travel choices and how they manage domestic waste.

In particular, the Government is keen to pursue innovative approaches to influencing the behaviour and purchasing patterns of Victorian households. The Community Action Fund (Action 5.6) and the Regional Partnerships initiative (Action 5.5) will provide valuable avenues for trialing innovative community initiatives.

The Victorian Greenhouse Strategy also includes the following programs aimed at supporting action at the individual and community level:

- information on sustainable energy (Action 6.5)
- including greenhouse information on electricity bills (Action 6.6)
- Victorian travel behaviour change program (Action 7.2).

The formal education and training sector can also play a vital role in educating children and future citizens about greenhouse issues, and through them, informing and influencing the community.

The Centre for Education and Research in Environmental Strategies (CERES)

CERES is a non-profit community based organisation located in Brunswick. The Centre aims to foster awareness and action on environmental and social issues affecting urban areas. Around 55,000 people visit the Centre each year to participate in education programs covering topics such as climate change, environmental design, energy conservation, renewable energy, waste minimisation and recycling.

The site has displays and functional demonstrations on a range of environmental issues to show just what can be achieved at the household, community and global levels. There is an impressive diversity of community projects on the 4 hectare site, including a sustainable energy house, renewable energy demonstrations and the largest display of household composting systems in the Southern Hemisphere.

Understanding Climate Change booklet and the Australian Greenhouse Calculator

The *Understanding Climate Change* booklet was produced by the Government to assist in raising awareness and understanding of climate change issues in the community. It aims to increase knowledge and understanding by clearly answering questions people often ask about the greenhouse effect and climate change, including:

- What is the greenhouse effect?
- What are the greenhouse gases?
- What are greenhouse sinks?
- How will Victoria's climate change?
- What will be the impacts of climate change on Victoria and Australia?

Understanding Climate Change has been sent to all secondary schools and Municipal libraries in Victoria. The booklet can be downloaded from the web on www.greenhouse.vic.gov.au or obtained by contacting the Department of Natural Resources and Environment's Customer Service Centre on phone 136 186.

The *Australian Greenhouse Calculator* was developed by EPA Victoria and released in December 2001. The Calculator – which has been provided to all secondary schools in Victoria – enables people to calculate the greenhouse gas emissions and energy costs associated with their everyday activities around the home and in the use of transport. It also enables people to estimate the savings in emissions that would result from changes such as the use of Green Power and more energy-efficient appliances.

A short version of the Calculator is available on the web at www.epa.vic.gov.au. The full CD-ROM version is also available from CSIRO Publishing, PO Box 1139, Collingwood 3066, on the web at www.publish.csiro.au or by phoning 1800 645 051.

Within the schools sector, the existing Curriculum and Standards Frameworks used in Victorian schools provides ample scope for addressing greenhouse and energy issues at various stages of study in primary and secondary schools – specialised study of energy and greenhouse issues is included in the VCE subject Environmental Science. However, increased take up of these opportunities and more effective teaching on greenhouse issues can be achieved by raising teacher awareness of appropriate support materials and resources, and improving access to these materials. This is particularly important in a newly emerging area of knowledge such as climate change, where information is rapidly evolving.

The Government has already taken steps to develop up-to-date greenhouse curriculum materials. In particular, it has led the production of an innovative CD-Rom and Internet-based learning tool – the *Australian Greenhouse Calculator* – and the *Understanding Climate Change* booklet, which provide valuable support to teaching and learning at the upper primary and secondary levels.

The Government is building on this base by raising teacher awareness of the opportunities to incorporate greenhouse issues within the curriculum; and by providing curriculum support materials to ensure that effective use can be made of greenhouse education resources (Action 5.7). This initiative will also improve the coordination of programs delivered by different areas of government – including the Department of Education & Training, the Sustainable Energy Authority, EcoRecycle Victoria, and EPA Victoria – and where appropriate, will foster partnerships between local government and school communities.

The Government is also supporting a pilot program of the *Victorian Sustainable Schools Project*, which has been developed jointly by the Gould League of Victoria and the Centre for Education and Research in Environmental Strategies (CERES). The program is based on a whole school approach to management of school resources such as waste, energy and water, and incorporates this into the curriculum. Involvement by schools in the project will lead to benefits in social, educational, economic and environmental terms.

In addition to their role in education, action by schools to implement energy efficiency improvements can provide an important stimulus to community action and raise awareness of the opportunities for cost savings and environmental benefits. The introduction of a 15% energy reduction target for government buildings (Action 1.1) – including the schools and TAFE sector – will provide further impetus for such activity.



The training sector also offers significant opportunities for enhancing workplace and community understanding of environmental issues. New national environmental competency standards adopted by Australian Governments in 2001 will, for the first time, incorporate specific environmental competency standards as part of the national training framework. In particular, the level 4 environmental competency standard is one of the small group of competency standards that must be selected as part of the endorsed Certificate IV Business Management qualification.

The environmental competency standards were developed by the national Industry Training Board (ITAB) for business services, in close consultation with the Victorian Government and in response to needs identified by industry and training providers. The new standards support generic training programs in relation to environmental performance by industry. They are relevant for all organisations, large and small, public and private, seeking to improve their environmental procedures and practices.

Action 5.7 will support the development of learner and trainer support materials as a means of maximising the number of trainer providers that offer the environmental competency standards as part of their courses.

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|-----------------------------------|-------------------------------|---|
| <p>5.1 Energy Management in Local Government</p> <p>Assistance is provided to local government to build its capacity to develop and implement energy management programs.</p> <p>Additional funding will be provided to facilitate the identification and implementation of cost-effective energy efficiency measures by rural and regional Councils.</p> | Sustainable Energy Authority | Ongoing | Funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan |
| <p>5.2 Local government purchasing policy</p> <p>Funding will be provided to the Municipal Association of Victoria (MAV) to extend the existing <i>Local Government Buy Recycled Alliance</i> to encompass greenhouse-friendly purchasing. The funding will be used to provide specific tools, fact sheets, case studies and product catalogues; and to enable MAV to increase from 28 to 50 the number of local governments participating in the Alliance.</p> | Natural Resources and Environment | 3 year program from 2002-2004 | \$300,000 |
| <p>5.3 Public lighting initiative</p> <p>For <i>greenfield locations</i> – the Sustainable Energy Authority will work with the MAV to develop and implement a strategy to drive improvements in the energy efficiency of public lighting. The strategy will include:</p> <ul style="list-style-type: none"> - model contract specifications between local government and power retailers to require energy efficient public lighting in new subdivisions - pilot projects and lighting trials in new industrial and residential estates. <p>For <i>established areas</i> – the Sustainable Energy Authority will work with local government to determine and implement opportunities for energy efficiency improvements in public lighting that provide a payback within an acceptable time frame, taking into account street lighting maintenance programs and the timing of negotiations with electricity retailers on existing public lighting services.</p> | Sustainable Energy Authority | 3 year program from 2002-2004 | \$1.2 million |

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|--|-------------------------------|---------------------------------|
| <p>5.4 Local energy consumption database</p> <p>A locality-based energy consumption database will be established to assist local government in developing and targeting community energy efficiency programs.</p> | Sustainable Energy Authority | 2002/03 | \$100,000 |
| <p>5.5 Regional partnerships</p> <p>The Government will establish regional partnerships for greenhouse abatement to:</p> <ul style="list-style-type: none"> - develop greenhouse abatement measures to address the specific needs, opportunities and priorities of various regions of Victoria - build the capacity of local government, community and the private sector to engage in greenhouse abatement and to be effective partners in the delivery of a range of State and Commonwealth greenhouse programs - improve integration and targeting of a range of Government services and programs. <p>The partnerships will involve stakeholders appropriate to each region, including local government, industry, and tertiary education institutions, Catchment Management Authorities, Regional Waste Management Groups etc.</p> | Natural Resources and Environment in liaison with Sustainable Energy Authority | 3 year program from 2002-2004 | \$1.06 million |
| <p>In the first year the program will focus on:</p> <ul style="list-style-type: none"> - identification of prospective regions and partners, based on an assessment of regional opportunities and challenges, with the aim of enhancing the delivery of key Government programs and priorities - capacity building aimed at regional groupings of Councils – in conjunction with the Cities for Climate Protection program and in consultation with the Municipal Association of Victoria – to provide leadership for future partnership activities with local communities. <p>Key elements of the State Government's contribution to the partnerships will be:</p> <ul style="list-style-type: none"> - funding of a facilitation officer for each region to assist in developing/supporting partnerships and to provide an interface to coordinate Government program delivery - support for rural and regional Councils to identify and implement cost-effective energy efficiency measures (see Action 5.1) - working with ICLEI to deliver to regional groupings of rural Councils a CCP program tailored to the needs of rural/regional local government and their communities. | | | |

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|---|-------------------------------|---------------------------------|
| <p>5.6 Community Action Fund</p> <p>Grants, on a matching dollar for dollar basis, will be provided for innovative community-based greenhouse projects including:</p> <ul style="list-style-type: none"> - demonstration projects of innovative, leading-edge technologies, practices and delivery processes with potential for broader application - community action programs (ie. community organisations working in partnership with local communities) aimed at supporting behavioural change - regional partnership programs (ie. local government groupings working in partnership with local communities) aimed at delivering abatement measures tailored to address specific rural and regional issues. <p>Applicants for grants will be required to form a partnership of at least two or more groups including, but not limited to, local government, community organisations, schools, universities, chambers of commerce, incorporated associations.</p> | Natural Resources and Environment | 3 year program from 2002-2004 | \$2.29 million |
| <p>5.7 Greenhouse information and education program</p> <p>The Government will pursue opportunities within the formal education sector and in the wider community to build understanding of greenhouse issues and promote active engagement in greenhouse abatement.</p> <p><i>i Schools</i></p> <p>The Government will support schools in building awareness of greenhouse issues and to make effective use of greenhouse education resources by: developing curriculum support materials and appropriate teaching and learning strategies consistent with the Curriculum and Standards Framework; promoting these resources at teacher conferences and regional meetings; and providing professional development for teachers via greenhouse information seminars.</p> <p><i>ii Community partnerships</i></p> <p>The Government will build partnerships between schools, local government and community organisations, and foster links to local community information networks such as municipal libraries, to support broader community education.</p> <p><i>iii Training</i></p> <p>The Government will support the development of curriculum support materials – including materials about greenhouse and energy management – for the training sector to assist in the incorporation of training about environmental practices and management.</p> | Natural Resources and Environment Education & Training EPA Victoria | 3 year program from 2002-2004 | \$250,000 |



6

GREENHOUSE-FRIENDLY HOUSEHOLDS

THE GOVERNMENT WILL REQUIRE IMPROVED ENERGY EFFICIENCY IN NEW HOMES AND APPLIANCES TO UNDERPIN ACTION BY HOUSEHOLDS TO MAKE GREENHOUSE-FRIENDLY CHOICES AND REDUCE THEIR GREENHOUSE GAS EMISSIONS. THE GOVERNMENT WILL ASSIST LOW-INCOME HOUSEHOLDS TO ACHIEVE GREATER ENERGY EFFICIENCY AND COST SAVINGS IN THEIR HOMES.

The daily activities of individuals – the use of energy in the home, the use of transport and the generation of waste – are important contributors to greenhouse gas emissions. There is an opportunity therefore, for individuals to make a very real difference to the level of Victoria’s greenhouse gas emissions. Greenhouse-friendly actions also have the potential to deliver cost savings to individuals and the broader community, promote more healthy lifestyles and foster community development.

This Module deals primarily with actions to reduce the level of household energy consumption. The consumption of energy in the home is a major contributor to Victoria’s greenhouse gas emissions, with the residential sector accounting for around 22% of energy-related emissions, and around 16% of total Victorian greenhouse gas emissions⁷.

The role that households can play in reducing greenhouse gas emissions by changing their transport behaviour – including by using public transport, or by walking or cycling rather than travelling by car – is discussed in Module 7. Module 4 deals with issues relating to the contribution that households can make to greenhouse gas abatement by reducing household waste, and by diverting waste from landfill by reusing and recycling household products and packaging.



⁷ These figures are based on the publication – *Victoria’s Greenhouse Gas Emissions 1990 & 1995: Cross Sectoral Analysis* (available on the web at www.greenhouse.vic.gov.au). Cross-sectoral (or ‘end use’) analyses allocate emissions arising from electricity generation to the residential sector according to its share of electricity consumption.

New Standards for Energy Efficient Housing (Action 6.1)

Energy use in homes is responsible for around 16% of Victoria's total greenhouse gas emissions. A major contributor to these figures is residential heating and cooling, which account for 50% of the energy consumed each year in the average Victorian home.

Improving the energy efficiency of homes built in Victoria is critical to reducing the demand for energy for heating and cooling. Currently, new homes built in Victoria have an average energy efficiency rating of 2.2 stars. The Government will amend the Victorian Building Regulations to require all new dwellings constructed in Victoria to meet a minimum 5 star energy efficiency rating.

These changes will mean that energy use for heating and cooling in new homes will be cut by half. This will result in a significant saving in household energy bills, and reduce greenhouse gas emissions by 1.3 tonnes per household per year.

Energy Smart Advisory Centres (Action 6.5)

Energy Smart Advisory Centres are located in Melbourne, Geelong, Ballarat, Bendigo, Wangaratta and the Latrobe Valley. The Centres provide independent information and advice to assist the community to select energy smart appliances; design and construct energy smart buildings; reduce energy costs through energy saving practices; utilise renewable energy technologies; and facilitate access by local communities to other services provided by the Sustainable Energy Authority.

Improving the energy efficiency of new homes

On average, around 30,000 new dwellings are constructed in Victoria each year. Clearly, improving the energy efficiency of new houses and apartments will be critical for managing growth in greenhouse gas emissions from the residential sector.

Victoria has been a leader in dwelling energy efficiency – introducing insulation regulations in 1991. However, recent research by the Sustainable Energy Authority indicates that the typical new home built in Victoria achieves a relatively low energy efficiency rating of an average 2.2 stars.

Designing new homes to incorporate energy efficiency – through solar access, insulation, orientation of windows, double glazing and shading devices – will improve the comfort and lower energy costs for the householder as well as reducing greenhouse gas emissions.

The key driver for achieving these improvements will be the introduction of new standards relating to energy efficiency for residential buildings (Action 6.1).

The Government recognises that, in addition to regulatory requirements, partnerships with the housing construction industry can deliver improvements in the energy efficiency of new residential developments, and assist in raising the awareness of new home-buyers of the benefits of purchasing energy-efficient dwellings. The Sustainable Energy Authority works in partnership with individual builders and developers to promote best practice in housing energy efficiency (Action 6.2).

Greenhouse-friendly appliances

Consumer choice of greenhouse-friendly appliances and equipment can make an important contribution to reducing energy use and greenhouse gas emissions.

Hot water accounts for around one quarter of average household energy use. Across the State, households spend some \$300 million each year on hot water bills and contribute nearly four megatonnes of greenhouse gases into the atmosphere. Approximately 64% of Victorian households heat their hot water using gas systems, around 34% use electric systems and around 2% use other means such as solar or wood heating. From a greenhouse perspective, the priority is to encourage the replacement of electric hot water systems with less greenhouse-intensive systems such as solar and gas.

Victoria participates in national programs to introduce consistent minimum energy performance standards (MEPS) for residential appliances (Action 6.4). These programs drive a process of continuous improvement in the



appliance manufacturing industry for the ongoing development of locally-produced, energy-efficient household products. They also seek to influence consumer choice through appliance energy star-rating labelling, production of consumer purchasing guides and the education of retailers with respect to the energy efficiency characteristics of the products they sell.

Sales of air conditioners have trebled in the past five years. This raises major issues in terms of greenhouse gas emissions, and places pressure on the capacity of the electricity supply system during peak summer demand – reverse cycle air conditioners also increase peak loads on cold days in winter. A number of actions are being pursued to address this issue. Room air conditioners are required to display appliance labels which provide information to consumers on their energy efficiency, and a mandatory national minimum energy performance standard for air conditioners was introduced in October 2001. The promotion of passive climate control in dwelling design will also contribute to alleviating these pressures.

Changing household behaviour

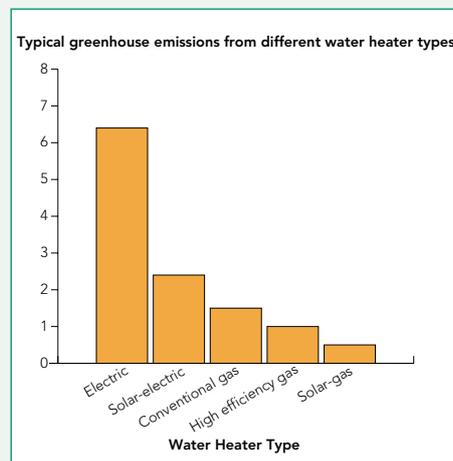
It also is important to promote changes in behaviour that result in energy conservation. Simple actions, such as turning off lights and appliances when they are not needed, can reduce greenhouse gas emissions and save householders money. The Sustainable Energy Authority provides information and advice to householders on the use of renewable energy and actions to improve the energy efficiency of their homes (Action 6.5).

Many consumers are unaware that their energy use is linked to greenhouse gas emissions. The Government has amended the *Electricity Industry Act* to introduce a requirement for all electricity retailers to disclose greenhouse gas information on electricity bills (Action 6.6). It is expected that the provision of this information will encourage consumers to take steps to reduce the greenhouse gas emissions associated with their electricity use – such as the purchase of Green Power and/or efforts to reduce energy consumption through improvements in energy efficiency and energy conservation.

Interval or “smart” meters can provide information on how much electricity customers use in finer time periods than traditional meters. As interval meters allow power usage to be related to the price of electricity at different times, they have an important role to play in managing electricity demand in higher cost peak periods. The Victorian Essential Services Commission (ESC) has an important role in ensuring the efficient operation of the State’s competitive energy market and for protecting customers, where this is necessary, in this market. The ESC is currently considering whether there would be a net benefit to customers from installing interval meters and, therefore,

Solar Hot Water Rebates

One of the most beneficial things a household can do for the environment is install a solar water heater. Such heaters can reduce household energy consumption for hot water by up to 75% – resulting in significant savings in greenhouse gas emissions and household energy bills. The graph below illustrates the typical greenhouse gas emissions from different water heater types.



The Victorian Government introduced Solar Hot Water Rebates in 2000 with \$15 million funding over the 3 years to June 2003 (Action 6.3). This initiative – which is administered by the Sustainable Energy Authority – provides rebates for solar water heaters that replace conventional systems for a positive environmental effect. The Rebate is structured so that it is generally a point-of-sale discount available from the manufacturer.

whether interval meters should be rolled out across the residential and business sectors in the near future. It is expected that this issue will also be addressed in the forthcoming reviews of the National Electricity Market (see Module 2).

Ensuring access to energy efficiency for all Victorians

The Government recognises that many people in the community will require assistance to take up opportunities to improve the energy efficiency of their homes.

While the cost savings associated with reduced energy consumption are needed most in low-income households, these households often cannot afford the outlays needed to make basic energy efficiency improvements to the fabric of their homes or to upgrade to more efficient appliances.

The Office of Housing (OoH) ensures that energy efficiency is an integral part of its public housing program. New dwellings constructed on behalf of OoH will be required to achieve a minimum energy efficiency rating of 5 stars.

OoH also spot purchases existing homes throughout the State each year to contribute to the public housing portfolio. Many of these require renovation before tenants move into them, allowing for energy efficiency improvements to be made. A trial will be conducted to evaluate the most cost-effective means of improving the energy efficiency of spot purchased dwellings and other existing housing stock (Action 6.7).

The Government will also introduce a pilot program, targeting low-income households, to fund the installation of energy-efficient products in existing homes in the private sector (Action 6.8).

| No. Action | | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|------------|--|---|------------------|---|
| 6.1 | Energy efficiency standards for new housing | Building Commission Sustainable Energy Authority | 2003 | |
| | <p>The Victorian Building Regulations will be amended to require all new dwellings constructed in Victoria to meet a minimum 5 star energy efficiency rating. This new requirement will be supported by initiatives to facilitate training and accreditation within the building industry, and to inform the public of the new requirements.</p> <p>To comply with these regulations, builders and designers will be able to use simple computer software packages such as <i>FirstRate</i> or <i>NatHERS</i>.</p> | | | |
| 6.2 | Best practice in housing energy efficiency | Sustainable Energy Authority | Ongoing | Funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan |
| | <p>Partnerships are established with builders and developers who wish to accelerate the development and marketing of energy sustainability as a valued quality of their product. Activities are undertaken to build capacity within the industry to deliver energy efficiency levels beyond minimum requirements using best practice design and technologies. The <i>FirstRate</i> house energy rating system will be upgraded to enable the assessment of sustainable energy levels beyond 5 stars.</p> | | | |
| 6.3 | Solar hot water rebates | Sustainable Energy Authority | 2002 - 2003 | \$10.1 million |
| | <p>Rebates of up to \$1500 are available for solar water heaters installed under this program. The amount of rebate is based on greenhouse emissions savings taking into account the performance of a system (as assessed by Australian Standard 4234) and the type of water heater that is being replaced.</p> | | | |

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|---|-----------------------------------|--|
| <p>6.4 Appliance and Equipment Energy Efficiency Program</p> <p>Victoria participates in the National Appliance and Equipment Energy Efficiency program to introduce nationally consistent minimum energy performance standards and labelling for a range of residential appliances and commercial and industrial equipment. The aim of this program is to introduce standards that meet international best practice.</p> <p>Energy efficient household appliances with high star ratings are promoted through a range of initiatives (eg. see Action 6.5).</p> | <p>Sustainable Energy Authority</p> <p>The Office of the Chief Electrical Inspector has responsibility for Minimum Energy Performance Standards and labelling regulations</p> | <p>Ongoing</p> | <p>Funded as part of the Sustainable Energy budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan</p> |
| <p>6.5 Information on sustainable energy</p> <p>Information on sustainable energy choices is made freely available to the public on the web and through six Energy Smart Advisory Centres located in metropolitan Melbourne, Geelong, Ballarat, Bendigo, Wangaratta and Traralgon. A range of other outlets will be established in partnership with various service providers to ensure that information is available to consumers at times and venues where related information is sought.</p> | <p>Sustainable Energy Authority</p> | <p>Ongoing</p> | <p>Funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan</p> |
| <p>6.6 Including greenhouse information on electricity bills</p> <p>Electricity retailers will be required to include information on customer bills regarding the greenhouse gas emissions associated with a customer's electricity consumption. This information will be provided to all households and businesses customers.</p> | <p>Sustainable Energy Authority Essential Services Commission</p> | <p>To commence from late 2002</p> | |

| No. | Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|-----|--|--|---------------------------|---------------------------------|
| 6.7 | <p>Public housing energy efficiency improvement program</p> <p>A trial will be undertaken to assess the most cost-effective approaches to improving the energy efficiency of spot purchased dwellings and the existing public housing stock. The trial will provide information to determine future funding needs and priorities with respect to this segment of the public housing stock.</p> <p>All new public housing will be designed to achieve a 5 star energy efficiency rating.</p> <p><i>Supporting programs:</i></p> <p>Social Housing Innovations Project – is looking at new ways of financing and developing social housing in the community. Environmental considerations are being addressed as part of the project.</p> | Office of Housing and Sustainable Energy Authority | Trial program during 2002 | \$1 million for trial program |
| 6.8 | <p>Energy Efficiency improvements for low-income households</p> <p>A pilot program – targeting low-income households – will be conducted to fund the installation of energy-efficient products in existing housing. The pilot program will be undertaken to assess the most cost-effective approach to improving the energy efficiency of houses owned or occupied by low-income households.</p> | Sustainable Energy Authority | 2002 | \$825,000 for pilot program |



7

INFLUENCING TRAVEL CHOICES AND BEHAVIOUR

THE GOVERNMENT WILL PURSUE REDUCTIONS IN GREENHOUSE GAS EMISSIONS BY TAKING ACTION TO ADDRESS THE RANGE OF FACTORS THAT INFLUENCE EMISSIONS FROM THE TRANSPORT SECTOR.

Transportation is essential to the functioning of Victoria's economy and to our standard of living. However, the transport sector is a significant contributor to Victoria's greenhouse gas emissions – in 1999, transport was responsible for 16% of the State's total emissions.

Greenhouse gas emissions from the road sector are projected to grow significantly over the next decade⁸. Transport activities also give rise to a range of other environmental and social costs – including road congestion, accidents, noise and emissions impacting on urban air quality.

Greenhouse gas emissions from the transport sector are influenced by a variety of factors. Travel patterns and the extent of motor vehicle use influence – and in turn are influenced by – a city's urban form (the distribution of land uses and intensity of development) and its transport systems; demographics; the level and diversity of economic activity; and lifestyle preferences.

Distances travelled, and the modes of travel used, are influenced by factors including the:

- relative location of housing and activity centres (eg. employment, shops, schools, sporting activities)
- design of sub-divisions
- availability and relative attractiveness of different transport modes
- location of freight origins and destinations.

Other significant factors influencing the level of transport greenhouse gas emissions include the:

- fuel or energy source that is used by transport vehicles – eg. petrol, diesel, LPG, Compressed Natural Gas (CNG)

⁸ Although projections are not available at a state level, a report in 2000 by the Commonwealth Government – *Setting National Fuel Quality Standards* – estimated that emissions from the road transport sector are projected to grow by up to 43% between 1990 and 2010. Previous work by the Bureau of Transport Economics indicates that growth will be particularly strong in the freight sector – especially for light commercial vehicles.



- technical efficiency and the fuel consumption rate of motor vehicles
- mix of vehicles in the fleet – eg. the relative proportions of vehicles of different size/fuel consumption – larger passenger vehicles and, in particular, four wheel drives, typically have a significantly higher rate of fuel consumption than smaller vehicles
- way vehicles are driven and the conditions in which they are driven – eg. emissions are generally higher in congested traffic
- growth in just-in-time goods production and associated strong growth in vehicle kilometres travelled – particularly by light commercial vehicles
- growth in the use of E-commerce.

Given the diversity of factors influencing transport greenhouse gas emissions, the Government will institute a package of greenhouse gas abatement actions through the Victorian Greenhouse Strategy and other initiatives such as the Metropolitan Strategy. This package of actions will be structured in a way that delivers multiple benefits to the community.

The key areas of action to be pursued under these Strategies are outlined below.

Key areas for action and how the Government is responding

Integrated decision-making

The Government will ensure that its funding of transport promotes integrated cross-modal transport solutions. Through an Integrated Transport Investment Framework (Action 7.1), a ‘package’ approach to transport expenditures will be applied in order to focus outcomes on integrated cross-modal transport solutions, and Government financial contributions to major road projects will be assessed against economic, social and environmentally sustainable development criteria – including greenhouse emissions.

A reduction in the need for motorised travel

The Government is developing a Metropolitan Strategy – which will be released for public comment in 2002. The Metropolitan Strategy is being developed within a framework based on environmental, economic and social sustainability principles, and with a reduction in greenhouse gas emissions as one of its key environmental objectives.

Promotion of modal shift

The Government is committed to delivering a high quality public transport system that provides an efficient and effective mode of transport as an alternative to car-based travel. Improvements to urban and regional rail infrastructure and services; to the light rail system; and the bus network will be

Metropolitan Strategy

The Metropolitan Strategy will provide a framework and clear directions on how Melbourne’s land use and transport can be shaped to meet community needs into the 21st Century. It will be based on the principles of sustainability with a view to achieving economic, social and environmental outcomes. These outcomes will focus on the use and management of resources and infrastructure, management and protection of the environment – including greenhouse gas emissions – and access and equity.

The Strategy will be complemented by a range of supporting initiatives that will give greater detail and more explicit directions/actions on specific issues, including:

- travel demand management
- public transport
- walking and cycling
- freight and logistics.

The Victorian Activity and Travel Survey for 1999 indicates that almost 76% of personal travel in Melbourne is undertaken by private vehicle, 16% by walking, 6% by public transport and 2% by bike. Recognising this, the Metropolitan Strategy will support more energy efficient and functional land use and transport planning by facilitating public transport orientated precinct development, and by clustering activities to reduce the need for car-based travel.

Improving public transport

Growing Victoria Together identifies increasing the use of public transport as a priority action, and establishes a target for travel in Melbourne undertaken on public transport to increase to 20% of motorised trips by the year 2020 – a significant increase from the current 9%.

The Government has allocated approximately \$1 billion of its \$1.5 billion “Linking Victoria” program to improve Victoria’s public transport system. Actions to be funded include:

- improvements to the metropolitan tram and train network and service levels
- the replacement of 880 buses over 4 years with new buses with lower emissions
- extensions and improvements to suburban bus services
- standardisation of rail gauges
- fast trains to regional centres and the re-opening of country passenger rail services.

The Government is also trialing *Smart Bus* – a ‘cross-town’ priority bus service using arterial roads to offer a regular, efficient, accessible and reliable means of travelling across suburbs, providing connections between railway stations, shopping centres and other major destinations. Two major bus routes – Springvale Road and Blackburn Road – have been chosen for the trial of *Smart Bus*. If the trial is successful, consideration will be given to extending the service to approximately 30 other cross-town routes throughout Melbourne. These routes make up the envisaged cross-town network of premium services that connect major activity centres and the radial rail network.

Public Transport franchise agreements include a patronage growth incentive regime for metropolitan operators. The franchise arrangements also provide for major investments by operators in new rolling stock, infrastructure enhancements, and service improvements for public transport users. It is estimated that these arrangements, together with the development of faster rail links to regional centres, will deliver a reduction in greenhouse gas emissions from transport in Victoria of 240,000 tonnes CO₂-equivalent in 2010.

pursued in giving effect to this commitment. The Government is also investing in programs and infrastructure to increase the share of total travel that is undertaken by walking and cycling.

A key mechanism by which the Government will pursue its goals in relation to increasing the share of travel undertaken by public transport will be the development and implementation of **Train, Tram and Bus Plans** in the Metropolitan Region. These plans – which will set out priorities for investment in public transport in the short, medium and longer terms – will be essential contributors to pursuing the Government’s target for travel in Melbourne undertaken on public transport to increase to 20% by the year 2020 (see Box).

The Plans recognise that there is a hierarchy of public transport services in the metropolitan area, with the Principal Public Transport Network playing a central role in longer-distance travel, and most local route and feeder services provided by buses.

The interdependence of metropolitan and statewide heavy rail infrastructure has led to a decision that the **Train Plan** will cover the entire state. The Train Plan will set out a long-term vision that will meet both community and rail network user needs over time – from capacity issues to network extensions and infrastructure for improved operations. It forms a framework in which projects can be assessed and implemented. A more effective use of the network is expected. In the metropolitan area, urban and other developments envisaged in the Metropolitan Strategy will change demands for train services – so train operations and infrastructure will need to change to meet this demand.

The **Metropolitan Bus Plan** is a comprehensive bus improvement plan for services throughout Metropolitan Melbourne. Planning will cover premium cross-town services, route and local feeder services. Application of state-of-the-art techniques for bus operations will be evaluated, using new methods and technologies for best practice in service effectiveness, demand-responsive services, premium services (such as the *Smart Bus* program), vehicle design and operation, and road and traffic systems design.

The **Metropolitan Tram Plan** seeks to strengthen the role of the existing tram network by improving its performance and increasing its competitiveness with private motorised travel. In addition, extending the network to logical centres and the introduction of new cross-town services on the Principal Public Transport Network will complement the Transit Cities program. Tram stops and interchanges with other services will be reviewed, with a focus on access to services by people with disabilities. Service levels and performance standards for trams will also be revised.



The work of the three plans will be fully integrated so that mobility and access, rather than provision of a particular modal service, is the end-point.

Two new initiatives will be introduced through the Victorian Greenhouse Strategy to complement this work:

- Market testing of improved bus services (Action 7.3)
- Safe Walking and Cycling Routes to Schools Program (Action 7.4).

Improving the fuel economy and emissions performance of motor vehicles

Many of the actions that can be taken to pursue improvements in fuel economy and the emissions performance of motor vehicles – such as vehicle fuel consumption standards and vehicle emissions standards – can only be dealt with at the national level and, therefore, are primarily a responsibility of the Commonwealth Government.

However, through the Victorian Greenhouse Strategy, the Government will:

- promote the uptake of more fuel efficient vehicles, and of less greenhouse-intensive fuels and motor vehicle technologies, by showing leadership with respect to its own vehicle fleet (Action 1.3)
- conduct a study, in consultation with stakeholders, to determine the most appropriate role for the Victorian Government in promoting the use of alternative transport fuels and vehicle technologies (Action 7.5).

The Government will also take steps to improve the emissions performance of motor vehicles operating in Victoria by ensuring that vehicles are properly serviced and maintained. This issue is being addressed by EPA Victoria as part of the Government's Air Quality Improvement Plan for the Port Phillip Region (Action 7.6).

Improving traffic flow can reduce greenhouse gas emission rates per vehicle kilometre travelled. Improvements to SCATS – the State's computerised traffic control system – will assist in this regard (Action 7.9).

Transport choices and driver behaviour

As part of the Victorian Greenhouse Strategy, the Government will seek to influence travel choices and driver behaviour. In 2002, the Department of Infrastructure (DoI) will be developing and piloting methodologies for a Victorian Travel Behaviour Change Program (Action 7.2). A lifecycle approach will be adopted for this program recognising the diverse travel needs and expectations of various segments and ages of the population, and to enable a wide cross-section of people in Melbourne to be reached. The program will be based upon proven methodologies – including Travel Blending, Individualised Marketing, School Curricula and Green Transport Plans.

Walking and cycling

Walking and cycling will be given a high priority in the Metropolitan Strategy by ensuring that urban form and character are sensitive to the needs of pedestrians and cyclists at the neighbourhood level, as well as at activity centres. This will include design which supports accessibility by walking, cycling and public transport. These measures will contribute towards reducing a culture of car dependency and ultimately creating a more sustainable and environmentally friendly way of life.

The State Government has allocated \$15 million over the three years to 2002/03 towards bicycle network improvements. This will complement the established practice of VicRoads of constructing new bike path facilities as part of the road construction program. As part of the inter-modal improvement program, bicycle storage facilities will be progressively incorporated into rail station improvement works.

Work has commenced on a Walking Action Plan – this will be completed during 2002.

It is estimated that programs supporting cycling will deliver a reduction in greenhouse gas emissions from transport in Victoria of around 80,000 tonnes CO₂-equivalent in 2010.

Cars and the Environment – information for motorists

RACV has produced information tools to help motorists reduce the greenhouse gas emissions from their driving. The 'Cars and Environment' section of the RACV website contains information on choosing a car, maintaining it, driving efficiently and planning trips. It also contains the *Car EcoMeter* – an interactive web-based program produced jointly with EPA Victoria. The *Car EcoMeter* estimates a car's annual fuel consumption and its emissions of greenhouse gases and common air pollutants. People can use it to compare the emissions from their car with those of a typical new car and other cars on the road. The *Car EcoMeter* can be viewed on the web at www.motoring.racv.com.au/service/environment.cfm or www.epa.vic.gov.au

Information brochures and car pool matching software are also available by contacting RACV's Public Policy Department on 9790 2863.

Complementary tools and approaches being adopted by many European cities in the area of mobility management will also be considered and, where appropriate, integrated within the overall program to enhance its effectiveness.

The target audience for the program is individuals, households and organisations. Individuals and households will be reached through schools, workplaces and community-based approaches. Organisations are included in the target audience as there are opportunities to facilitate change in policy and practices towards those which support sustainable travel choices, and that provide benefits to the organisations.

The State Governments of Victoria, SA, Queensland and the ACT submitted a joint application to the Australian Greenhouse Office (AGO) for funding to conduct a National Travel Behavioural Change Program. The submission is being considered for funding through the Greenhouse Gas Abatement Program (GGAP). If approved, this funding would enable the scale and scope of the Victorian program to be increased and to continue for a further 3 years.

The TravelSMART – Better Ways to Work program (Action 7.8) will initially work with six employers in the City of Darebin, including the Council and La Trobe University, to assist businesses to reduce the costs and environmental impacts of work-related travel. It will do so by encouraging use of a shared car, public transport, cycling and walking. The program is designed to work with local governments to form a network of participating businesses. It will be expanded during the next two years and have Victorian Government funding of \$150,000 per annum.

Training and education to promote improvements in driver behaviour to reduce fuel consumption and greenhouse gas emissions will be pursued through the EcoDrive program (Action 7.7). This program will focus on the corporate sector and local government, and build on the work to promote 'eco-efficient' driving practices in the State Government (Action 1.3).

Freight transport

Recent research undertaken for the Victorian Government shows that road vehicles dominate the Victorian freight task.

A Freight and Logistics Strategy – addressing management and infrastructure issues relating to road, rail and ports – is currently being developed. The objective of the Strategy is to facilitate measures that will improve the efficiency and effectiveness of the freight sector. These measures will take the form of removing impediments such as institutional and infrastructure defi-





ciencies, and improving connectivity and accessibility to the transport network and major destinations.

Growing Victoria Together has set a target to increase the share of rail freight to ports from 10% to 30% by 2010. This will be achieved, in the main, by standardisation of rail gauges on strategically significant rail freight lines, development of metropolitan and regional rail freight hubs, and by improving rail access to ports.

Engaging in national programs

The Government is working closely with the National Transport Secretariat (NTS) to develop national policies and actions to address greenhouse and other environmental issues relating to the transport sector. The NTS is responsible for reporting to the Australian Transport Council (ATC) on six projects. Project 4 – *Improving the Environmental Performance of the Transport System* – involves the development of an *Emissions Abatement Package for Urban Transport*. This package is expected to comprise: National Strategic Positions and accompanying National Action Plans; and Jurisdictional Action Plans that set out specific actions to be undertaken by different State and Territory Governments to reduce greenhouse gas emissions from the transport sector.

| No. Action | | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|---|---|----------------------------------|---------------------------------------|---------------------------------|
| 7.1 Integrated Transport Investment Framework | <p>Under this framework, a 'package' approach to transport expenditures will be applied in order to focus outcomes on integrated cross-modal transport solutions. In addition, Government financial contributions to major road projects will be assessed against economic, social and environmentally sustainable development criteria – including greenhouse gas emissions.</p> | Infrastructure | Ongoing | |
| 7.2 Victorian Travel Behaviour Change Program | <p>This program will build partnerships with local government and public transport operators to pursue reductions in car-based travel by individuals and businesses, and encourage greater use of public transport, walking and cycling.</p> <p>An initial demonstration program is being undertaken with a view to implementing further demonstration programs*.</p> <p><small>* The Victorian Travel Behaviour Change Program has been incorporated into a National Travel Behaviour Change Program submitted for consideration for funding as part of the second round of the Commonwealth Government's Greenhouse Gas Abatement Program (GGAP). The scope and size of the Victorian Travel Behaviour Change Program will be reviewed if this funding bid is successful.</small></p> | Infrastructure | Initial demonstration program 2001/02 | \$1 million |
| 7.3 Market testing of improved bus services | <p>Market testing will be undertaken to evaluate the potential benefits of a package of bus service improvements – including route reconfiguration, enhanced frequency and priority of services – in outer and middle suburban areas. The results of the market testing will be an important input to the identification of bus service improvements to be considered in developing the Bus Plan.</p> | Infrastructure | 2002 – 2003 | \$300,000 |
| 7.4 Safe Walking and Cycling Routes to Schools Program | <p>The Government will fund a Safe Walking and Cycling Routes to Schools Program for 30 schools over an initial 3 year period. The Program will seek to reduce the extent of journeys-to-school by cars and to increase the number of journeys made by walking and cycling.</p> | Infrastructure/ VicRoads | 3 year program from 2002-2004 | \$1.05 million |

ALL NEW PROGRAMS ARE INDICATED IN GREEN.

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|----------------------------------|---|---|
| <p>7.5 Determining Victoria's role in promoting the use of alternative fuels/technologies</p> <p>A study* will be conducted, in consultation with stakeholders, to identify:</p> <ul style="list-style-type: none"> - which transport fuels and vehicle technologies should be promoted in Victoria in terms of their capacity to contribute to reduced greenhouse gas emissions and emissions of substances impacting on air quality - the most appropriate role for the Victorian Government in relation to promoting 'preferred' fuels/technologies – consideration will be given to existing strategies, policies and programs at both the State and national level and whether new state actions are needed to complement these. <p><small>* A starting point for the study will be the findings of the Australian Greenhouse Office (AGO) analysis of the full fuel cycle emissions from a range of transport fuels for heavy vehicles, and the extension of this analysis to light vehicles through a project involving the AGO and Victoria.</small></p> | EPA Victoria | June 2003 | \$140,000 |
| <p>Supporting programs:</p> <p>The Department of Infrastructure is monitoring the results of trials by bus operators running buses fuelled by ethanol and CNG.</p> | | | |
| <p>7.6 Improving 'in-service' vehicle performance</p> <p>As part of the development of the Government's Air Quality Improvement Plan for the Port Phillip Region, three options (and potential combinations of these options) for improving in-service vehicle emissions are being assessed with a view to making a recommendation to Government. The options are:</p> <ul style="list-style-type: none"> - requiring proof of servicing as a condition for annual vehicle registration renewal - establishing an extensive on-road emissions testing program using mobile testing facilities - implementing a public awareness and information campaign. <p>Key Factors to be considered in assessing these options and in determining a recommended approach for consideration by Government will include:</p> <ul style="list-style-type: none"> - effectiveness in reducing vehicle emissions - cost-effectiveness in achieving these reductions - social impacts - possible exemptions for particular types of vehicles (eg. vintage cars) and geographic coverage. | EPA Victoria | Recommendations to Government as part of the finalisation of the Air Quality Improvement Plan for the Port Phillip Region | To be determined following consideration of recommendations |

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|--|--|---|
| <p>7.7 EcoDrive Program</p> <p>In partnership with the corporate sector and local government, training will be provided for fleet managers on opportunities for reducing greenhouse gas emissions from transport through actions including: choice of vehicle (eg. better fuel economy); choice of vehicle fuel type (eg. LPG, CNG, hybrid vehicles); and travel demand management.</p> | EPA Victoria supported by the Sustainable Energy Authority | 2002 – 2003 | \$200,000 |
| <p>7.8 TravelSMART – better ways to work</p> <p>The TravelSMART program is a partnership program involving the Victorian Government, local government and businesses. It assists businesses in preparing plans that enable them and their employees to develop and use travel options involving modes other than the car, and to make more efficient use of car travel when such travel is necessary.</p> | Sustainable Energy Authority Infrastructure Human Services | 2002 – 2004 | Funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan |
| <p>7.9 Upgrade of 'SCATS'</p> <p>A prototype for an upgrade of SCATS – the computerised traffic control system that improves traffic flow – will be tested and, subject to its success, an upgrade of SCATS will be rolled out across the State.</p> | VicRoads | Prototype testing in late 2002 with roll out over following 3 years. | |



8



GREENHOUSE SINKS AND NATURAL RESOURCE MANAGEMENT

THE GOVERNMENT WILL ENCOURAGE INVESTMENT IN CARBON SINKS, INCLUDING NATURE CONSERVATION PLANTINGS AND SUSTAINABLE PLANTATIONS, WITH AN EMPHASIS ON MAXIMISING MULTIPLE BENEFITS SUCH AS SALINITY MITIGATION AND BIODIVERSITY ENHANCEMENT.

Growing vegetation acts as a carbon sink due to its sequestration of CO₂ during photosynthesis. Soils also contain significant amounts of stored carbon, and have the potential to act as carbon sinks – particularly where their capacity to store carbon can be increased by modified management practices. On a global scale, soils and vegetation absorb about 40% of CO₂ emissions.

The amount of carbon sequestered by standing vegetation (eg. plantations, regenerating forests and revegetated stands of native bush) changes over their lifecycle – increasing slowly early in life, accelerating as trees increase in size, and ultimately reaching an equilibrium. Approximately 50% of the dry weight of a forest's biomass is carbon that is converted from atmospheric CO₂ by photosynthesis.

CO₂ is released when vegetation is cleared or soil is disturbed. Land clearing is a significant source of greenhouse gas emissions in Australia, contributing around 12% of the nation's total emissions. However, Victoria's Native Vegetation Retention Controls (Action 8.1), which were introduced in 1989, have drastically reduced clearing in this State from an average of 10,700 hectares per annum in the 1970s and 80s to 2,450 hectares per annum in the 1990s. Consequently, greenhouse gas emissions from this source contribute only around 2% of Victoria's total emissions.

There is potential to increase CO₂ sequestration by changing agricultural and forestry practices and to reduce emissions from land clearing and soil disturbance – but the potential is not unlimited.

The Kyoto Protocol recognises that carbon sinks and the reduction of emissions from land clearing are legitimate means by which a country can pur-

sue its emissions abatement target under the Protocol. The rules for establishing Kyoto compliant sinks are now clear and the outcome of international climate negotiations during 2001 highlighted the important role that sinks are likely to play as part of the achievement of the Kyoto target by Australia and other countries. In particular, as a result of these negotiations, countries:

- will not have limits imposed on the extent to which carbon sinks from reforestation can be counted as contributing towards the achievement of their emissions target
- will be able to choose from a range of additional activities that enhance carbon sinks – such as grazing and crop land management (enhancing soil carbon storage), and revegetation that would not be defined as a ‘forest’ under the Kyoto Protocol
- will be able to trade credits gained from sinks activities (but not ‘bank’ them to help meet targets in future commitment periods).

While these developments are important, the Victorian Government recognises that sink enhancement is only one part of a comprehensive greenhouse response, and not an alternative to taking action to reduce greenhouse gas emissions ‘at source’.

The establishment of greenhouse sinks through plantation forestry and the expansion of native vegetation generates a range of other benefits, including the tackling of salinity and land degradation. The re-establishment of native vegetation also promotes biodiversity through habitat enhancement and the establishment of habitat links, and has the potential to increase the resilience of our natural systems to adapt in the face of climate change. The establishment of greenhouse sinks may, however, result in adverse impacts on water availability in some locations as a result of the higher water use of forests and plantations. These impacts will need to be considered when decisions are made regarding the location of new plantings.





Our Forests Our Future - Victorian Government Policy Statement on Forests

Sound and sustainable management of our native forests is a pre-requisite for ensuring that they continue to play an ongoing role as a net absorber of carbon from the atmosphere. The Government has recently announced significant reform in the management of native forests that will return the level of logging in Victorian forests to a sustainable level. The reforms recognise the many roles our forests play - in protecting biodiversity; as water catchments; as sources of timber and non-timber products; as the generator of employment in many rural communities; in nature conservation, recreation and eco-tourism; and as carbon sinks.

The Government, following exhaustive reviews, has identified that:

- sawlog supply levels are unsustainable and must be reduced by around 31% across the State
- industry must be assisted to be more innovative and dynamic
- management of our forests must be more open, transparent and responsive
- regional communities must be engaged.

In response, the Government will establish a Ministerial Taskforce to oversee the direction of funds from Government programs to areas affected by forestry restructuring, and support communities through programs for developing and growing small businesses, funding community infrastructure projects, supporting community events and developing community leadership skills.

The Government will ensure that forests are sustainably managed into the future by:

- establishing a new forest management entity to separate the commercial from the regulatory functions of Government
- improving resource collection and monitoring, and forestry practices
- achieving greater transparency through activities such as community audits
- developing new ways of engaging the community in managing our forests.

Victoria's Draft Native Vegetation Management Framework

This important framework, which is currently being finalised following public consultation on the draft document, sets the following Vision for native vegetation management in Victoria:

- *Management of native vegetation will provide a sustainable landscape and protect the long-term productive capacity and environmental values of our land and water resources.*
- *The unique beauty and diversity of Victoria's landscapes and the importance of the underlying complex ecosystems will be recognised internationally.*

The Framework indicates that this Vision will be achieved by:

- *Our land managers understanding and actively promoting improved native vegetation practices that provide real benefits for their businesses and the community.*
- *State and Local Governments and Catchment Management Authorities driving a comprehensive and scientifically-based native vegetation management program that provides certainty to land managers and investors.*

The Framework establishes the primary goal of **"a reversal, across the entire landscape, of the long-term decline in the extent and quality of native vegetation, leading to a 'Net Gain'"**.

Victoria is moving towards a comprehensive planning framework for native vegetation management, with Regional Native Vegetation Plans being developed to support achievement of this goal.

The Native Vegetation Management Framework, Regional Native Vegetation Plans, and information at the local landscape scale, will guide revegetation activities under the Victorian Greenhouse Strategy.

Carbon Property Rights

The Government enacted legislation in May 2001 that allows for ownership of property rights to carbon separately from trees. This legislation introduced amendments to the *Forestry Rights Act*, and has the underlying intention of encouraging investment in reforestation and revegetation for the purposes of establishing carbon sinks.

While the legislation provides for carbon property rights and allows them to be assigned separately under a Carbon Rights Agreement that is notified (via a Forest Property Agreement) on land title, it does not establish a framework for carbon accounting or emissions trading, nor does it create carbon credits.

In the event that emissions trading is introduced at some point in the future, the legislation would need to be updated or replaced with nationally consistent legislation that supports an emissions trading scheme and the creation of carbon credits.

Programs to enhance Victoria's greenhouse sinks

The Government will continue the Growing Victoria's Greenhouse Sinks program, with \$3 million in funding to be provided for a further three years (Action 8.2). Multiple benefits will be realised as part of this program by applying new criteria to guide the selection of projects, and by ensuring that the program is delivered in cooperation with Catchment Management Authorities (CMAs). New techniques to identify and quantify multiple benefits in an integrated way will be developed and utilised through this program.

CMAs are uniquely placed to maximise the synergies in their related programs and responsibilities like salinity mitigation, native vegetation protection and enhancement, regional vegetation planning, and water quality management. CMAs are also well placed to ensure that any potential adverse impacts of the expansion of forest cover on the availability of water resources are minimised.

In addition to its commitment to reduce emissions from its vehicle fleet by 10% (Action 1.3), the Government will offset the residual greenhouse gas emissions from the fleet by subscribing to *Greenfleet* (Action 8.3). *Greenfleet*, which was founded in 1997 as a project of The Foster Foundation and has now been established as a 'not-for-profit' organisation in its own right, funds the planting of native trees to act as a sink to help offset the CO₂ emissions from motor vehicles.

The Government will also promote private investment in carbon sinks (Action 8.4). This action will complement recent changes to the *Forestry Rights Act* (see Box) which provide for separate ownership of the carbon sequestered in trees.

Improving carbon accounting

In order to support activities and investment in carbon sequestration, there is a need to better understand and quantify terrestrial carbon sinks. The Victorian Government will provide funding to support the work of the Cooperative Research Centre for Greenhouse Accounting (Action 8.5). The Centre is contributing to efforts to ensure national consistency in carbon accounting and carbon tracking work. Victoria's participation in the Centre will enhance the collaborative nature of work in this field.

The Government will also fund new work in the Forest Science Centre that will:

- establish a complete and up-to-date database of Victoria's plantation areas and their rates of carbon sequestration
- verify carbon sequestration with benchmark sites in eucalypt and pine plantations





- develop models to predict future carbon storage in plantations, farm forests and remnant vegetation.

This work by the Forest Science Centre will contribute to Victoria's support for the activities of the Cooperative Research Centre for Greenhouse Accounting.

These initiatives will provide auditable Victorian information to complement national work in this field.

Carbon Accounting

Access to accurate information about the amount of carbon stored in vegetation and soils is important for two main reasons:

1. To understand greenhouse gas balances – in this case the amount of CO₂ that is being taken out of the atmosphere by growing forests – so that we can more accurately know our net greenhouse gas emissions and determine ways to reduce them.
2. To provide the basis for creating, verifying and trading in carbon credits.

In Australia, the National Carbon Accounting System (NCAS) and the Cooperative Research Centre for Greenhouse Accounting are working on research and system development to deal with both of these priorities. The major areas of information being pursued through this work are:

- the rate and extent of land clearing and subsequent land use/management
- biomass growth and decay rates
- effects of land management practices on soil carbon.

While limited to date, carbon accounting work in Victoria has focussed on obtaining better information about land clearing rates and revegetation at a scale suitable to Victoria. Victorian carbon accounting work will be enhanced by new action under the Victorian Greenhouse Strategy (Action 8.5).

| No. Action | Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|---|---|-------------------------------|---------------------------------|
| 8.1 Land clearing controls | <p>Victorian planning schemes protect remaining areas of native vegetation from broad-scale clearing. Following finalisation of Victoria's Native Vegetation Management Framework, the Government will review the Native Vegetation provisions, based on the strategic directions in the Framework, and the comments received on a discussion paper to be prepared by the Department of Infrastructure and the Department of Natural Resources and Environment.</p> | Infrastructure, and Natural Resources and Environment | Ongoing | |
| 8.2 Growing Victoria's Greenhouse Sinks | <p>The Growing Victoria's Greenhouse Sinks program will create and enhance corridors linking remnant vegetation to deliver a range of benefits including carbon sequestration, improvement to the extent and quality of native vegetation, and the creation of habitat corridors to facilitate adaptive opportunities for species in response to climate change.</p> <p>All areas of the State will benefit from the Program – in particular the North East, East Gippsland and West Gippsland Catchment Management Authority regions, and areas covered by the Port Phillip Catchment and Land Protection Board.</p> | Natural Resources and Environment | 3 year program from 2002-2004 | \$3 million |
| 8.3 Funding for Greenfleet | <p>The Government will take out a subscription to Greenfleet for all passenger vehicles in the Government fleet. The Government will work with managers of the Greenfleet program to ensure that funding provided by the Government's subscription is directed to planting that complements the Growing Victoria's Greenhouse Sinks program (Action 8.2), and demonstrates clear biodiversity benefits as well as auditable carbon sequestration.</p> | Natural Resources and Environment | 3 year program from 2002-2004 | \$420,000 |
| 8.4 Promoting private investment in carbon sinks | <p>Building on amendments in 2001 to the <i>Forestry Rights Act</i>, the Government will:</p> <ul style="list-style-type: none"> - provide continued funding for the Plantations for Greenhouse program – this program provides funding for small-scale forestry investments in exchange for the assignment of carbon rights to the Government - develop packages of investment opportunities in permanent conservation plantings – this will involve a ready-packaged prospectus of projects complete with information on carbon sequestration potential and other ancillary benefits. | Natural Resources and Environment | 3 year program from 2002-2004 | \$2.25 million |

| No. | Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|-----|---|-----------------------------------|-------------------------------|---------------------------------|
| 8.5 | <p>Carbon and greenhouse accounting</p> <p>Research into carbon/greenhouse accounting issues of specific relevance to Victoria, in a manner that is complementary to the work of the NCAS, will be supported through a partnership with the Cooperative Research Centre for Greenhouse Accounting. Key areas of research will include:</p> <ul style="list-style-type: none"> - tools for project-scale carbon accounting for forests and native vegetation restoration - Victorian-specific information for agriculture including more accurate data on agricultural methane emissions, improved understanding of nitrous oxide emissions, agricultural soil carbon fluxes - measurement of tree cover and native vegetation changes in Victoria (including extent and quality) and related carbon sequestration and storage - remote-sensed carbon accounting at a meaningful spatial scale - improved understanding of carbon densities in a range of representative native vegetation types and timber plantations. <p><i>Supporting programs:</i></p> <p>Development of consistent inventories of plantation and farm forestry activities in Victoria.</p> | Natural Resources and Environment | 3 year program from 2002-2004 | \$2.05 million |



9

SUPPORTING GREENHOUSE BEST PRACTICE IN AGRICULTURE

THE GOVERNMENT WILL SUPPORT THE ACHIEVEMENT OF GREENHOUSE BEST PRACTICE IN AGRICULTURE WHILE WORKING TO BETTER UNDERSTAND THE NATURE OF EMISSIONS FROM AGRICULTURAL ACTIVITIES AND THE IMPACTS OF CLIMATE CHANGE.

Agriculture and associated food industries play a vital role in Victoria's social and economic development. The sector is critically important to the Victorian economy. From paddock to plate, the sector is responsible for 11% of Victoria's Gross State Product, and 33% of all State exports. The production, processing and marketing of food employs 205,000 people, or 9.7% of total Victorian employment, not including people employed in a number of related industries, such as restaurants and hotels. In rural and regional Victoria, the sector accounts for 21% of all jobs.

The food and agriculture sector is growing strongly. The value of agricultural production increased from \$5.2 billion in 1990 to \$6.8 billion in 2000. Over the same period exports rose from \$3 billion to \$7.6 billion at an average growth rate of 9.9%.

Victoria is the leading State in Australia for food production, producing 23% of the Australia's agricultural commodities from just 3% of the nation's agricultural land. Food processing is the largest manufacturing sector in the State. Victoria produces 30% of Australia's food products, valued at \$15.5 billion at the retail level. The Government is seeking to promote growth in the sector, and has set a target of \$12 billion in food and fibre exports by 2010.

The challenge for Victoria's agricultural sector over the coming 20 years will be to increase levels of productivity while using less land and water, and reducing greenhouse gas emissions. The agricultural sector is a significant source of greenhouse gas emissions, contributing around 13% of Victoria's total emissions in 1999. These emissions come from a wide variety of sources and involve a number of different greenhouse gases. The two major agricultural emissions – methane and nitrous oxide – have a Global Warming



Potential 21 times and 310 times that of CO₂ respectively. Many agricultural businesses are also significant users of energy, particularly of electricity and diesel fuel.

Agricultural systems also have the potential to act as carbon sinks. Modifying agricultural practices can increase this sink capacity – although the potential for this varies and is limited by the maximum feasible carbon content of soils.

Work has been carried out at the national level to establish a better understanding of greenhouse issues in Australian agriculture. Building on this work, a program of research, development and extension is to be conducted nationally to ensure that the highest priority areas are dealt with. This program – which is being led by the Commonwealth – will ensure that stakeholders are engaged as part of the process of finding the most effective ways to minimise emissions.

In Victoria, while we have a general understanding of the sources of agricultural emissions (see Box), little is known about how these emissions are distributed across different farming practices, land types and enterprises. There is also little knowledge of the nature of the relationships between altered management practices and emissions or carbon storage. Significant effort is required to better understand greenhouse gas emissions from Victorian agriculture so that effective emissions reduction measures can be put in place. Good quality information on emissions is also vital for monitoring and reporting on the success of these reduction measures over time.

The Government will take steps to address these knowledge needs through the development and implementation of a greenhouse strategy for Victorian agriculture (Action 9.1), and through the development of best practice guidelines for nitrous oxide and methane emissions from agriculture (Action 9.2). These initiatives will build on and complement work being carried out at the national level.

A number of food additive and drug options for reducing methane production in ruminant animals are either available or under development, although practical and economic hurdles remain. One option currently being researched by CSIRO is a vaccine to reduce methane production in sheep and cattle. If successful, this technology could reduce livestock methane emissions by around 20%.

The agriculture and food processing sectors are not only major contributors to economic activity in Victoria, but also major users of energy. The Government will facilitate the adoption of improved energy management on farms and in food processing (Action 9.3).

Greenhouse Gas Emissions from the Victorian Agriculture sector

Agricultural sources contribute around 13% of the Victoria's total greenhouse gas emissions. Methane from sheep and cattle is the dominant component of these emissions, making up over three quarters of the total. The other significant contributors are methane from manure management and nitrous oxide emissions from agricultural soils. Emissions from the burning of stubble make up only 0.1% of Victoria's emissions from agriculture.

It is important to note that the estimated level of emissions from agriculture have a relatively high level of uncertainty. Emissions of both methane and nitrous oxide originate from a wide range of locations with different characteristics. Estimates are typically based on extrapolation from a limited number of field studies and are subject to a wide margin for error.

The level of uncertainty associated with emissions from the agriculture sector is high. The National Greenhouse Gas Inventory reports uncertainty ranges of 0 to 17.3% for methane emissions from livestock; -3.5 to 17.7% for methane emissions from manure management; -7.6 to 22.8% for N₂O emissions from manure management; and -91 to 340% for greenhouse emissions from agricultural soils. Work under Action 8.5 – Carbon & Greenhouse Accounting – will contribute to a reduction in this uncertainty.

In addition to direct emissions of greenhouse gases from agricultural sources, agricultural enterprises are significant users of energy derived from fossil fuels. The food-processing sector is generally a high energy user as well.

Reducing methane emissions from livestock



Sheep wearing methane monitors.

Researchers at CSIRO Livestock Industries are working to develop a vaccine that will reduce greenhouse gas emissions from livestock and improve productivity.

Methane is a very potent greenhouse gas - with a Global Warming Potential 21 times that of carbon dioxide. Methane is produced by sheep and cattle as part of the normal processes of fermentation of feed in the rumen of the animal by small micro-organisms called *methanogenic archae* or methanogens.

Methane production accounts for between 2 and 12% of an animal's gross energy intake. It therefore seems reasonable to expect that productivity increases would occur if methane production were reduced.

For the last 10 years, CSIRO has researched a number of approaches to reducing methane production in sheep and cattle, and holds several world wide patents on a range of technologies. The most promising approach to date is vaccinating animals so that they produce antibodies to methanogenic organisms.

In the last three years of research using a number of experimental vaccine preparations given to sheep, researchers have observed a reduction in methane production of between 11 and 23%. No long or short-term adverse effects on the sheep have been found.

CSIRO researchers now believe they know what the components of the first commercial sheep vaccine should be. The next task is to undertake development work in cattle. In Australia, cattle contribute about 70% of the total methane produced by livestock industries.

Source: www.csiro.gov.au. Image © CSIRO.

Nitrous Oxide emissions from agriculture

Current figures suggest that nitrous oxide may contribute about 17.5% of the total greenhouse gas emissions from Australian agriculture. Irrigated cropping systems are estimated to emit approximately five times the nitrous oxide of rain-fed agricultural systems. Irrigated dairy pastures may emit at even higher rates. There are no estimates available for horticulture. It seems that it is the combination of temperature, soil moisture status, and rich nitrogen sources (such as fertiliser and urine patches) that gives rise to such high rates of nitrous oxide emissions from irrigation farms.

It is generally recognised that methods for estimating emissions from these sources are inadequate. Much of the nitrous oxide emissions from dairy farms derive from animal sources, which are not taken into account in greenhouse gas inventory estimates. Factors such as stocking rates, animal nutrition, cycling of soil moisture from saturated to dry, irrigation practices and fertiliser application are all potential influences, which, with better information, could be manipulated to significantly reduce emissions.



Climate change impacts

The agriculture sector is likely to be one of the first sectors of the economy to be affected by the impacts of climate change. Potential impacts on agriculture result from:

- higher temperatures and increasing evaporation
- decreasing rainfall and surface water availability
- higher rainfall intensity leading to greater potential for erosion
- an increasing drought frequency
- decreased winter chill for horticulture, reducing flowering and fruit set
- changes in host-parasite relations
- increased CO₂ levels leading to higher growth rates, but often lower quality feed or grain.

These primary effects will have flow on effects in our agricultural systems. For example, the IPCC predicts that surface flows in the Murray Darling Basin, upon which much of agriculture in the north of the State relies, will be reduced by 12 to 35% by 2050.

Agriculture, therefore, is one of the highest priority areas for research into climate change impacts and adaptation under a partnership established between the Victorian Government and CSIRO (Action 10.1). The Government will also begin a program to map changes in land suitability for agricultural activities, taking into account the potential impacts of climate change.

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|---|-----------------------------------|-------------------------------|---|
| <p>9.1 Greenhouse strategy for the agricultural sector</p> <p>A greenhouse strategy will be developed for the agriculture sector in partnership with farming organisations and rural communities. Key aspects of the strategy will include:</p> <ul style="list-style-type: none"> - developing more accurate emission profiles for each agricultural industry sector in Victoria - identifying and implementing actions to reduce agricultural greenhouse gas emissions - increasing the precision of our understanding of climate change in rural Victoria — both regionally and locally - identifying impacts of climate change and developing ways to cope with the change - developing greater awareness and understanding of greenhouse issues in the rural community - developing the means to measure progress and success in implementing these actions. <p>As part of the strategy, best-practice guides will be developed and promoted – see Action 9.2.</p> <p><i>Supporting programs:</i></p> <p>Research into carbon/greenhouse accounting issues of specific relevance to Victoria will be supported through a partnership with the Cooperative Research Centre for Greenhouse Accounting (see Action 8.5). Key areas of research will include Victorian-specific information for agriculture including more accurate data on agricultural methane emissions, improved understanding of nitrous oxide emissions, and agricultural soil carbon fluxes.</p> | Natural Resources and Environment | 3 year program from 2002-2004 | \$3.48 million |
| <p>9.2 Best practice guidelines for nitrous oxide and methane emissions</p> <p>Best practice guidelines to minimise nitrous oxide and methane emissions in natural rainfall areas will be developed to complement existing best practice guidelines for nitrogen applicable to irrigation areas in northern Victoria. Research will be undertaken to better quantify emissions and to understand specific emission sources.</p> | Natural Resources and Environment | 3 year program from 2002-2004 | Covered by funding for Action 9.1 |
| <p>9.3 Sustainable energy in agribusiness</p> <p>The adoption of improved energy management on farms is facilitated by working with grower and producer organisations. The initial focus of this program is on dairy farms, horticulture and food processing companies. Initiatives are aimed at the development and implementation of energy management strategies, raising awareness of opportunities for sustainable energy to improve productivity, and providing information on industry best practice technologies and processes.</p> | Sustainable Energy Authority | Ongoing | Funded as part of the Sustainable Energy Authority's core annual budget of \$10.03 million – details of specific initiatives and budgets are available in the Authority's Business Plan |



10

CLIMATE CHANGE IMPACTS AND ADAPTATION

THE GOVERNMENT WILL SUPPORT EFFORTS TO SUBSTANTIALLY INCREASE OUR UNDERSTANDING OF CLIMATE CHANGE IMPACTS, AND OF THE ACTIONS THAT WILL NEED TO BE TAKEN TO ADAPT TO A CHANGING CLIMATE.

While it is critical that we take strong action to minimise greenhouse gas emissions, the IPCC's 2001 Third Assessment Report⁹ makes it clear that human activities are already interfering with the earth's climate, and that human-induced climate change will continue for many centuries.

The Third Assessment Report also concluded that regional climate changes are affecting many physical, biological and human systems, and will continue to do so in the future. For example, the Report suggests that in Australia, there is a likelihood of reduced water availability; changes in agricultural productivity; and adverse impacts on a range of ecosystems.

Climate change modelling cannot tell us with absolute certainty what future weather patterns will be. It can, however, provide us with scenarios of varying degrees of probability, based on key variables such as the levels of carbon dioxide entering the atmosphere. Researchers can use these *primary* atmospheric variables to determine *secondary* climatic variables which are dependent upon them. These secondary variables include rainfall, temperature averages, wind speed and cloud cover. Having determined probable scenarios for these secondary variables, researchers can then identify the probable influence on a wider range of *tertiary* environmental variables, such as transpiration, vegetation cover, water retention, pest and disease occurrence.

The IPCC has, and will continue to provide modelling of climate change scenarios for the whole globe. In Australia, CSIRO has a program of climate change modelling which provides a range of scenarios on an Australia-wide scale ('course resolution modelling').

However, in order to inform planning decisions for specific Victorian regions, industries and activities, policy makers and the community require

⁹ Details of the IPCC's Third Assessment Report can be found at www.ipcc.ch

access to climate change scenarios for specific geographic regions ('fine resolution modelling'). They also require information on the likely impacts of climate change.

While climate change scenarios for Victoria have recently been updated, there has been a lack of research in recent years into potential climate change impacts and vulnerabilities relevant to Victoria. To redress this, the Victorian Government has recently established a three year partnership with CSIRO to identify likely climate change impacts and adaptation requirements in Victoria (Action 10.1).

As a starting point for this work, and to assist in establishing research priorities, a summary of past work in this field has been prepared and its current relevance assessed. This report – "*Climate Change Research Reports Relevant to Victoria*" – can be found at www.greenhouse.vic.gov.au

Climate change research requires a detailed understanding of, and the compilation of extensive data on, a vast range of issues including:

- Victoria's biodiversity and ecosystem processes
- Victoria's industries – particularly those based on natural resources such as agriculture, aquaculture, alpine resorts and forestry
- infrastructure such as water supply, sewerage, gas and electricity supply
- human health – including the potential implications of climate change in relation to heat stress and the spread of vector-borne diseases.





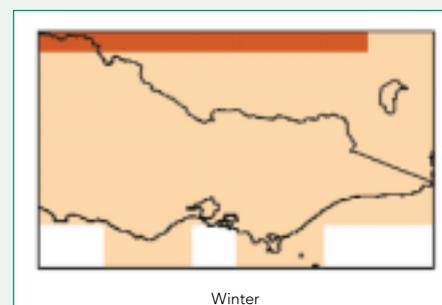
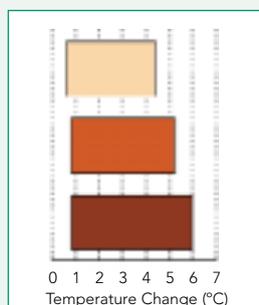
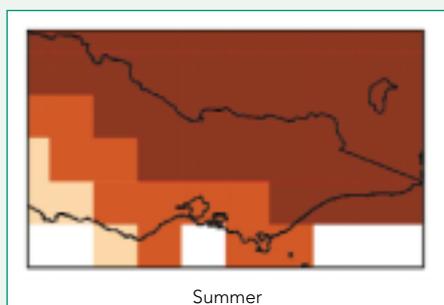
Climate change projections for Victoria

Changes in rainfall and temperature patterns, and in the frequency of extreme weather events (eg. storms), could affect water resources, coastal environments, native flora and fauna, agriculture and forestry. It is important, therefore, that governments and the community have access to the best possible information on likely future climate to help plan for, and adapt to, changed climatic conditions.

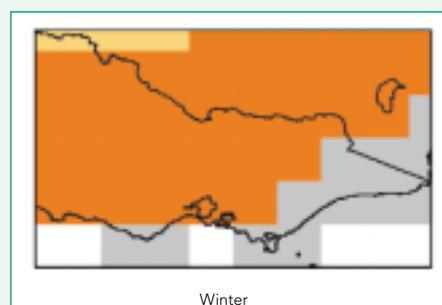
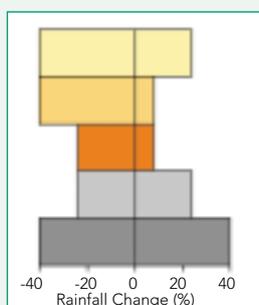
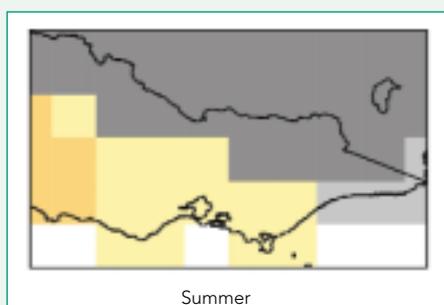
The Victorian Government has supported work by CSIRO Atmospheric Research to develop regional climate change projections for Victoria. The latest findings of this work are summarised below.

By the year 2070:

- Victoria is likely to be 0.7 to 5.0°C warmer than it was in 1990
- the frequency of extreme maximum temperatures will increase, with up to 3.5 times more hot days in some areas of the State
- frosts are likely to decrease in frequency, with much of the State likely to become frost-free at the higher levels of projected temperature increases
- rainfall decreases are likely – in most regions, changes in annual rainfall ranging from -25% to +9% are projected
- projected rainfall decreases are strongest in Spring through most of the State, with dry Springs likely to become more common
- extreme daily rainfall events will become more intense and more frequent in many regions
- warmer conditions will lead to increased evaporation which, combined with reduced rainfall, is likely to increase moisture stress.



Projected changes in summer and winter average temperatures for the year 2070 relative to 1990. The coloured bars show the range of projected temperature increases for areas with corresponding colours in the maps.



Projected percentage changes in summer and winter rainfall for the year 2070 relative to 1990. The coloured bars show the range of projected rainfall changes for areas with corresponding colours in the maps.

For the latest detailed information on climate change projections for Victoria, visit www.greenhouse.vic.gov.au

Research into the impacts of climate change on biodiversity

Serious concern has been raised about the potential effects of global warming upon biodiversity, with most commentators suggesting that climate change is likely to have severe consequences for many species and biological communities. Research has recently commenced at the Department of Natural Resources and Environment's Arthur Rylah Institute for Environmental Research to examine the potential effect of a range of global warming scenarios upon some important Victorian vegetation communities. The work, which is still at an early stage, is using an innovative approach – incorporating both Global and Regional Climate models developed by the IPCC and CSIRO Division of Atmospheric Research – in fine-scale modelling of future climates available for biota. By investigating a wide variety of scenarios, scientists will develop a better understanding of the likelihood of a species or community either declining or benefiting from global warming.

Climate change projections for Victoria and further information on impacts and adaptation to climate change can be found in the *Understanding Climate Change* booklet available at www.greenhouse.vic.gov.au



Adaptation

The development and implementation of strategies to facilitate adaptation to climate change will need to involve all spheres of government, business and the community. It will need to be based on an assessment of the potential effects of adaptation options, their benefits and costs, and the ease with which they can be incorporated into existing planning processes. Some responses and adaptations to climate change will flow naturally from better information, while others will require the formulation of legislation, regulations, planning overlays, codes, standards, incentives and communication strategies to facilitate appropriate responses by the community.

The key areas for adaptation strategies include: coastal and marine environments, agriculture, biodiversity, forests and human health. Module 8 of the National Greenhouse Strategy identifies a range of difficulties in developing and implementing such strategies, including:

- uncertainties in projections of climate change and its impact at a regional level
- climate change is only one of the many changes to which people and ecosystems need to adapt
- the interaction between climate and other environmental processes are not fully understood
- institutional and behavioural barriers to adaptation which are only poorly understood
- the need for adaptive changes to climate change is not widely accepted
- difficulty in choosing when to adapt and who is responsible for initiating the processes required.

Given these difficulties, the development and implementation of adaptation strategies will be an incremental and ongoing process. A precautionary, risk-management approach, however, is likely to be justified in a number of areas. For example, planning and management in coastal areas should take account of the possibility of future sea level rise and tidal surges. Similarly, management of native vegetation needs to take account of the maintenance of habitat corridors to facilitate the migration of fauna in the event of climate change.

Action 10.2 signals the commencement of greater efforts relating to adaptation. Planning for adaptation will become an ongoing commitment for Government agencies as our knowledge of climate change and its impacts increases.



CSIRO has identified the following areas of vulnerability and resilience for water resources, agriculture, biodiversity and coastal regions in Victoria

Water and catchments

While there is still uncertainty as to the specific implications of the enhanced greenhouse effect on regional rainfall, it is likely that Victoria will have less water available for a range of uses in the future as a result of changes in rainfall levels and patterns, and increased evaporation. While our water management systems have a high capacity to adapt to climate variability, longer-term, sustained reductions of water supply would place pressure on these systems and on water users. Climate change needs to be factored into the ongoing market reform of water resources, and planning for water quality, river health and environmental flows. The interaction between climate change and salinity is a key issue for catchment management, but is poorly understood.

Agriculture

Year-to-year variability in the weather is a fact of life in agriculture. However, adaptation to long term climate change will require the development of planned responses, particularly for some areas of Victoria and some land uses – for example longer-lived crops near the boundaries of their current climatic limits. The relationships between climate and crop yield and quality are imperfectly known for most agricultural activities, and it is unclear to what extent increases in atmospheric carbon dioxide will increase plant productivity and thus counterbalance the impacts of lowered available moisture. Further work is needed to maximise agricultural performance under such conditions, particularly at higher temperatures. Other issues requiring further research include: impacts on agricultural land systems at the catchment scale, the risks of changes in long-term water availability to irrigated agriculture and the long-term impact on dryland salinity.

Biodiversity

The relationships between biodiversity and climate change are poorly understood at the species level, and largely unknown at the ecological community level. While the resilience of ecosystems to natural climate change can be high, in Victorian landscapes where many systems are fragmented and are subject to weed and pest invasion, ecosystems will be vulnerable to climate change due to the enhanced greenhouse effect. Key issues for further research include: the dynamics between climate and biodiversity, the impact of increased CO₂ on natural systems, the processes of adaptation to climate change in altered landscapes, and options for planned adaptation.

Coasts

IPCC projections are for a rise in sea-level of 9–88 cm by 2100. However, sea-levels are also expected to continue to rise for centuries after stabilisation of greenhouse gas concentrations, creating a very long-term risk to coastal areas. Impacts will also occur as a result of a changes in storms and related surge events, with sea-level rise adding to their severity. Storm patterns may not change greatly, however they may become slightly less frequent but slightly more intense. The most vulnerable coasts are those that are low-lying with very little setback to allow for adaptation. Natural estuarine systems are biologically very important, and adaptive responses that allow ecological processes to continue will be needed.

| No. Action | Responsible Department or Agency | Action Timetable | Government Funding 2002 to 2004 |
|--|---|------------------|---|
| <p>10.1 Research into climate change impacts and adaptation</p> <p>The Government has established a partnership with CSIRO to conduct research into climate change impacts and adaptation relevant to Victoria. Priority areas for research include impacts and adaptation relating to agriculture, natural ecosystems, water resources and coastal processes and systems. The research partnership will result in published reports on climate change impacts affecting these priority areas, and will identify key vulnerabilities and specific strategies for adaptive responses.</p> <p><i>Supporting programs:</i></p> <ul style="list-style-type: none"> • Mapping of land suitability for rural land uses taking into account the potential impacts of climate change. • Assessment of the effect of global warming on selected Victorian vegetation communities. | Natural Resources and Environment | 2002 – 2003 | \$350,000 * * funding of \$150,000 was also provided to CSIRO in 2000/01 |
| <p>10.2 Adaptation</p> <p>The Government will support adaptation actions consistent with a precautionary, risk management approach. The results of the research program into climate change impacts and adaptation (see Action 10.1) will provide the basis for determining adaptation needs and priorities, and for developing and promulgating guidelines for sectors and/or geographic areas of Victoria.</p> <p>Steps to be taken by the Government will include:</p> <ul style="list-style-type: none"> - enhancing corridors linking remnant vegetation – as identified through a bioregional planning process – to create habitat corridors to facilitate adaptive opportunities for species in response to climate change (see Action 8.2) - conducting workshops – under the auspices of the Victorian Coastal Council and the Alpine Resorts Coordinating Council – to increase awareness of potential climate change impacts among coastal foreshore managers and the alpine industry; to assess a range of potential adaptation strategies; and to identify current best practice and guidelines for the development of infrastructure in coastal locations likely to be impacted by sea-level rise or changed storm conditions - preparing a Flora & Fauna Guarantee Action Statement on management actions to reduce threats to Victoria's flora and fauna from climate change - undertaking vulnerability assessments in coastal locations and identify adaptation requirements. | Natural Resources and Environment Infrastructure | Ongoing | Enhancement of remnant vegetation links funded through Action 8.2. |

APPENDIX 1 – LISTING OF ACTIONS BY CROSS-MODULE ‘THEMES’

| | Victorian Greenhouse Strategy Actions |
|--|---|
| Supporting the Development of Renewable Energy | <ul style="list-style-type: none">1.2 Government purchase of Green Power2.1 Renewable Energy Support Fund2.2 Information and guidance to facilitate renewable energy development2.3 Green Power accreditation and promotion3.3 Centre for Energy and Greenhouse Technologies3.4 Support for the uptake of “leading edge” greenhouse gas abatement technologies6.3 Solar hot water rebates |
| Reducing Emissions from Non-Renewable Energy Supply | <ul style="list-style-type: none">2.4 Research into new brown coal technologies2.5 Facilitating the use of Cogeneration3.3 Centre for Energy and Greenhouse Technologies |
| Increasing the Efficiency of Energy Use | <ul style="list-style-type: none">1.1 Government energy consumption reduction target1.6 Energy efficiency in Major Projects3.1 Works approvals and licensing3.2 Supporting the application of sustainable energy technologies and practices in manufacturing3.3 Centre for Energy and Greenhouse Technologies3.4 Support for the uptake of “leading edge” greenhouse gas abatement technologies3.5 Business Sustainability Initiative3.6 Energy efficiency of new commercial developments3.7 Accelerating the application of best practice sustainable energy in commercial buildings3.8 Improving energy management in large commercial buildings5.1 Energy Management in Local Government5.2 Local government purchasing policy5.3 Public lighting initiative5.4 Local energy consumption database6.1 Energy efficiency standards for new housing6.2 Best practice in housing energy efficiency6.4 Appliance and equipment energy efficiency program6.5 Information on sustainable energy6.6 Including greenhouse information on electricity bills6.7 Public housing energy efficiency improvement program6.8 Energy efficiency improvements for low-income households9.3 Sustainable energy in agribusiness |

Reducing Transport Emissions

Victorian Greenhouse Strategy Actions

- 1.3 Greenhouse emissions reduction target for Government vehicles
- 7.1 Integrated Transport Investment Framework
- 7.2 Victorian Travel Behaviour Change program
- 7.3 Market testing of improved bus services
- 7.4 Safe Walking and Cycling Routes to Schools program
- 7.5 Determining Victoria's role in promoting the use of alternative fuels/technologies
- 7.6 Improving 'in-service' vehicle performance
- 7.7 EcoDrive program
- 7.8 TravelSMART – better ways to work
- 7.9 Upgrade of 'SCATS'

Supporting Greenhouse Action in Regional Victoria

- 5.5 Regional Partnerships
- 5.6 Community Action Fund
- 5.7 Greenhouse information and education program
- 6.5 Information on sustainable energy
- 8.2 Growing Victoria's Greenhouse Sinks
- 8.3 Funding for Greenfleet
- 8.4 Promoting private investment in carbon sinks
- 9.1 Greenhouse strategy for the agricultural sector
- 9.2 Best practice guidelines for nitrous oxide and methane emissions
- 9.3 Sustainable energy in agribusiness
- 10.1 Research into climate change impacts and adaptation
- 10.2 Adaptation

Supporting the Efforts of Local Government

- 2.2 Information and guidance to facilitate renewable energy development
- 4.4 Kerbside recycling
- 5.1 Energy Management in Local Government
- 5.2 Local government purchasing policy
- 5.3 Public lighting initiative
- 5.4 Local energy consumption database
- 5.5 Regional Partnerships
- 5.6 Community Action Fund
- 5.7 Greenhouse information and education program
- 8.1 Land clearing controls

Informing the Community

Victorian Greenhouse Strategy Actions

- 1.7 Annual reporting by Government Departments/Agencies
 - 5.5 Regional Partnerships
 - 5.6 Community Action Fund
 - 5.7 Greenhouse information and education program
 - 6.5 Information on sustainable energy
 - 6.6 Including greenhouse information on electricity bills
 - 10.1 Research into climate change impacts and adaptation
-
- 1.5 Consideration of greenhouse issues in Environment Impact Assessment procedures
 - 1.6 Energy efficiency in Major Projects
 - 3.1 Works approvals and licensing
 - 3.6 Energy efficiency of new commercial developments
 - 4.2 Improving the management of methane emissions from landfills
 - 4.3 Improving the management of methane emissions from wastewater
 - 6.1 Energy efficiency standards for new housing
 - 6.4 Appliance and equipment energy efficiency program
 - 6.6 Including greenhouse information on electricity bills
 - 8.1 Land clearing controls

Setting the Regulatory Framework

