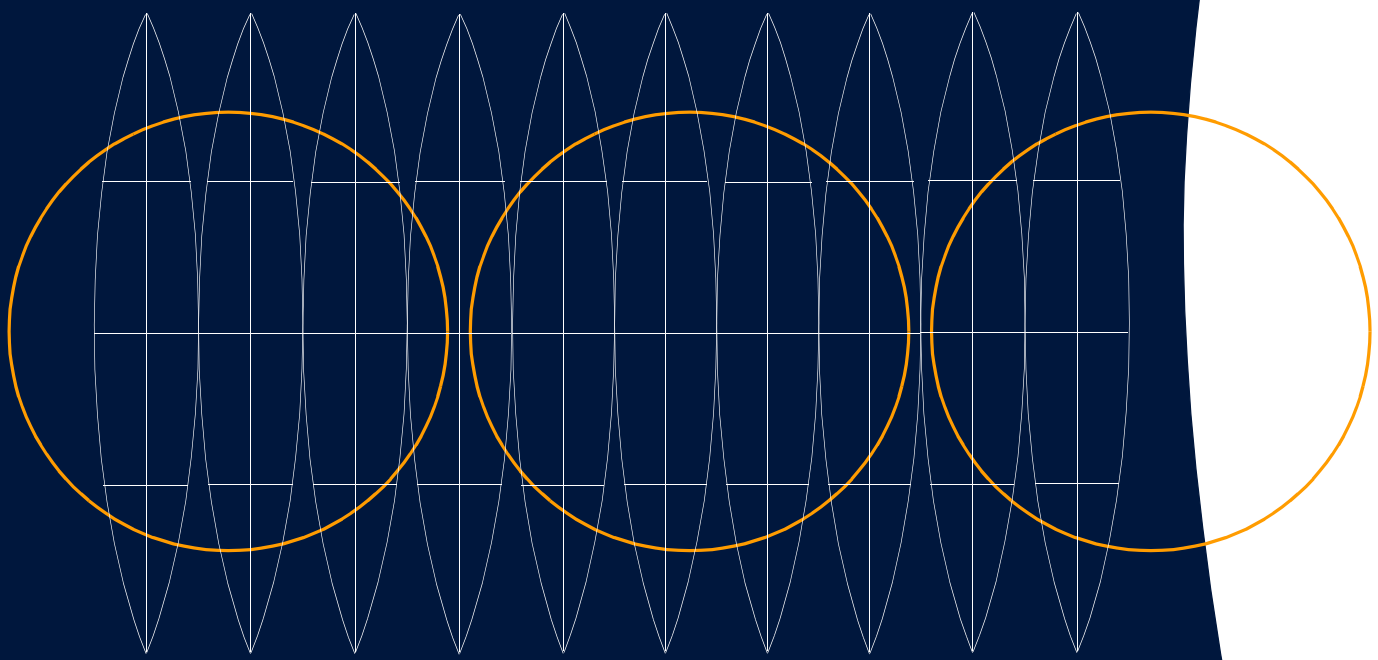
The National **Greenhouse** Strategy



Strategic Framework for Advancing
Australia's Greenhouse Response

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Foreword

Climate change caused by the enhanced greenhouse effect is an important issue for all Australians.

The potential environmental, economic and social impacts of climate change motivate Australia's commitment to participating effectively in international action to address the threat of climate change.

Australia is a party to the United Nations Framework Convention on Climate Change, and took an active part in negotiating the Kyoto Protocol to that Convention which Australia has subsequently signed. If ratified, the Protocol will commit Australia to a legally binding limit on its future greenhouse gas emissions.

The National Greenhouse Strategy is the primary mechanism through which our international commitments will be met. The Strategy extends the program of action launched by all Australian Governments through the 1992 National Greenhouse Response Strategy.

The National Greenhouse Strategy has been developed by the Commonwealth and all State and Territory Governments. The Australian Local Government Association, and industry and community consultations also have made an important contribution.

The Strategy maintains a comprehensive approach to tackling greenhouse issues. The range of actions it encompasses reflects the wide-ranging causes of the enhanced greenhouse effect and the pervasive nature of its potential impacts on all aspects of Australian life and the economy.

The Strategy focuses action on three fronts: improving our awareness and understanding of greenhouse issues; limiting the growth of greenhouse emissions and enhancing greenhouse sink capacity; and developing adaptation responses. The limitation of Australia's net greenhouse gas emissions, consistent with the Kyoto Protocol, has been identified by governments as the most important area for action.

The Strategy details both existing actions and additional measures, and includes the package of measures announced by the Prime Minister in November 1997. Some of the additional measures are already being implemented by some governments, or will be implemented by means of adjustment to existing government programs. Others will require additional funding. In pursuing all measures, governments will determine funding and timing within the context of their overall budget strategies.

Reflecting Australia's regional diversity, the Strategy contains measures that different governments will pursue using different policy approaches. Implementation of these measures will take account of variations across Australia in environmental, social and economic conditions. Some are not relevant or applicable to all jurisdictions and these will be pursued only where appropriate. Jurisdictions will prepare implementation plans, reflecting these circumstances. These plans may take the form of either State or Territory strategies or action plans, or nationally coordinated plans for specific measures.

The Strategy provides for monitoring of progress, especially in relation to the Kyoto emission target, and for review in the light of that monitoring and other changes in circumstances. The first review will be conducted during 2002, or earlier if necessitated by developments relating to the Framework Convention on Climate Change and the Kyoto Protocol.

Implementation of the Strategy will forge major reductions in Australia's projected emissions growth, consistent with meeting our international commitments. The Strategy demonstrates the commitment of governments to ensure that Australia carries its fair share of the burden in world-wide efforts to combat global climate change, while recognising that our national interest lies in protecting jobs and maintaining the competitiveness of Australian industry.

In endorsing this Strategy, the Commonwealth, States and Territories demonstrate the commitment of governments to an effective national greenhouse response.

Contents

Executive Summary

The National Greenhouse Strategy (NGS) extends the program of action launched by all governments in Australia through the 1992 National Greenhouse Response Strategy (NGRS).

In developing the National Greenhouse Strategy, governments have taken account of factors that have emerged and evolved since 1992. These include the strengthening of greenhouse science, new greenhouse gas inventory and projections statistics, and the Kyoto Protocol (yet to be ratified), which Australia signed on 29 April 1998.

Context for action

The world's climate scientists have provided a clear message – that the balance of evidence suggests humans are having a discernible influence on global climate. Australian Governments recognise the importance of climate change as a major global issue, and are committed to playing an effective part in international efforts to respond to the environmental threat it poses.

Although Australia only contributes just over 1% of total greenhouse gas emissions, our per capita emissions are among the highest in the world, reflecting our particular national circumstances.

Substantial growth in our emissions is projected. Without targeted and effective response action our emissions, based on a comprehensive approach excluding land use change, were expected to grow by around 28% from 1990 to 2010. Emissions from the energy sector alone were expected to grow by some 40%.

In 1992 Australian Governments agreed to the NGRS as a basis for working together on greenhouse issues and, in particular, meeting Australia's international obligations under the Framework Convention on Climate Change. To date, Australia has played a key role in responding to the enhanced greenhouse effect. Australia ratified the United Nations Framework Convention on Climate Change (FCCC) in December 1992.

The Convention entered into force in March 1994 and more than 150 countries are now signatories to it. The ultimate objective of the Convention is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic or human-induced interference with the climate system.

The 1992 NGRS, on which the NGS is based, was built on a comprehensive approach to address all sources and sinks of all greenhouse gases across all sectors of the economy. It led to a wide range of actions by Commonwealth, State, Territory and Local Governments.

Work on the NGS commenced in late 1996 and arose out of a review of the NGRS. It recognises that existing initiatives by the Commonwealth, and individual State, Territory and Local Governments to reduce greenhouse gas emissions form a substantial part of Australia's overall effort. Significant examples include:

- energy sector reform, which is expected to promote increased energy efficiency and the increased use of natural gas with consequent significant savings in greenhouse gas emissions;
- the establishment of the NSW Sustainable Energy Development Authority (SEDA) which supports the development, commercialisation, promotion and use of sustainable energy;
- the Victorian Government's Energy Smart Business program, which has more than 300 companies as members, all committed to implementing energy management strategies within their business operations;
- the Commonwealth Government is embarking on a major expansion of revegetation and protection of existing vegetation activities, and is continuing the encouragement and promotion of sustainable land management practices. (This effort is primarily focused through the $1.25 billion Natural Heritage Trust);
- the establishment of the joint United Nations/ Commonwealth/Western Australian Government International Centre for the Application of Solar Energy; and
- Local Government action, such as the application of energy efficiency standards to all new homes and major renovations by Leichhardt City Council.

Mission

Australia will actively contribute to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system and within a time frame sufficient to:

- allow ecosystems to adapt naturally to climate change;
- ensure that food production is not threatened;
- enable economic development to proceed in a sustainable way.

Principles

The principles which have guided the development of the NGS and which will guide governments as they proceed with implementation are:

- the need for Australia to have a strategic and comprehensive greenhouse response which is tailored to address our particular national interests and circumstances;
- the need to integrate greenhouse considerations with other government commitments;
- the pursuit of greenhouse action consistent with equity and cost-effectiveness and with multiple benefits;
- recognition of the importance of partnerships between governments, industry and the community in delivering an effective greenhouse response;
- the need for action to be informed by research.

Goals

The goals of the NGS are:

1. To limit net greenhouse gas emissions, in particular, to meet our international commitments.
2. To foster knowledge and understanding of greenhouse issues.
3. To lay the foundations for adaptation to climate change.

To achieve these goals, the NGS includes ongoing measures, many arising from the 1992 NGRS, and new measures announced by the Prime Minister in November 1997. It also integrates greenhouse into other major policy initiatives, such as the Natural Heritage Trust, and launches new measures to increase greenhouse emission reduction activities across the Australian community. This document provides the strategic framework for an effective greenhouse response and for meeting current and future international commitments. It will provide a fresh impetus for action by governments, stakeholder groups and the broader community and set directions for that action into the next century.

Framework for effective implementation

The National Greenhouse Strategy provides a broad menu of actions some of which will be implemented by governments acting individually, some by joint intergovernmental initiatives and some through partnerships between government, various stakeholders and the community.

All governments will participate in arrangements designed to facilitate implementation, monitoring and reporting of outcomes, as well as the review and ongoing development of Australia's NGS.

Institutional and advisory mechanisms

A High Level Group of senior officials from the Commonwealth, States and Territories is responsible for managing the ongoing monitoring, review and further development of the NGS. This Group will report to the Council of Australian Governments (COAG).

An advisory committee comprising key scientific, forestry, rural, industrial, and conservation interests will be established to provide advice on the implementation of the NGS.

Implementation planning

Some information pertaining to implementation is included in the NGS, notably the jurisdictions to be responsible for pursuing the measures and the indicative timeframe for action. Detailed implementation plans are to be developed and will take the form of State or Territory greenhouse strategies or subsidiary documents to the NGS.

Monitoring and reporting

Reports on progress in implementing the NGS will be prepared biennially, with a first report to be produced in the second half of 2000 and tabled in the Commonwealth Parliament.

Performance indicators will be employed to contribute to assessments of the effectiveness of the NGS.

Review and further development of the National Greenhouse Strategy

In order to ensure Australia's greenhouse response remains fully integrated and consistent, the NGS will be subject to periodic comprehensive review. The first review will be conducted during 2002, or earlier, if necessitated by developments relating to the FCCC and the Kyoto Protocol.

The further development of the NGS will be underpinned by research into the opportunities and constraints relating to greenhouse policy, and the benefits and costs of policy response and adaptation options.

Sectoral greenhouse initiatives

The measures in the NGS can be grouped into three main areas:

- fostering knowledge and understanding of greenhouse issues;
- limiting greenhouse gas emissions; and
- laying the foundations for adaptation for climate change.

1. Fostering knowledge and understanding of greenhouse issues

The NGS has a strong commitment to enhancing our knowledge of greenhouse sources and sinks and continuing research into climate change science and abatement and adaptation strategies. Australia plays a critical role in providing a southern hemisphere contribution to global research efforts. The NGS provides measures to increase community understanding of climate change so that individuals and communities can be part of national greenhouse response actions.

There is considerable uncertainty about data on vegetation and land use change and a National Carbon Accounting System will be developed to improve our understanding of this important issue.

The following modules outline the existing and new measures concerned with fostering knowledge and understanding of greenhouse issues:

module 1: Profiling Australia's greenhouse gas emissions;

module 2: Understanding and communicating climate change and its impacts.

2. Limiting greenhouse gas emissions

The NGS focuses on cost-effective ways to reduce net greenhouse gas emissions in particular through 'no regrets' actions. The actions will deliver substantial non-greenhouse benefits to Australia. These include reduced energy costs (which will enhance our international competitiveness and standard of living) and the promotion of ecologically sustainable agricultural and forestry systems.

While action by Australian governments is a cornerstone of the NGS, action by governments alone can never be sufficient. The cooperation of industry and the broader community is essential to reduce greenhouse gas emissions.

The NGS encourages active partnerships across all segments of the community. Partnerships with Local Governments and the residential sector will be enhanced. The Greenhouse Challenge program, which encourages industry to develop and implement innovative, best practice approaches to reducing emissions, will be expanded.

The largest single source of Australia's greenhouse gas emissions is the production and consumption of energy. Stationary (i.e. non-transport) energy contributed 55% of Australia's net greenhouse gas emissions in 1996. A major focus of the NGS therefore, is the pursuit of efficient and sustainable energy use and supply.

Energy market reforms will be accelerated to improve the economic efficiency of energy supply and use. The energy performance of codes and standards relating to domestic and industrial equipment, and residential and commercial buildings, will be increased. Targets will be developed for efficiency standards for fossil fuel electricity generation and the use of renewable energy in the electricity market. The NGS provides support for the development of renewable energy technologies and manufacturing.

The transport sector contributed 17% of Australia's net greenhouse gas emissions in 1996. The NGS takes an integrated approach looking at land use, transport planning, demand management, encouraging public transport, cycling and walking and improving vehicle fuel efficiencies.

A priority action is the development of an Environmental Strategy for the Motor Vehicle Industry. This will make a significant contribution to reducing greenhouse gas emissions by introducing a 15 % fuel efficiency improvement target by 2010, mandatory fuel efficiency labelling and bringing forward the phasing out of leaded fuel.

Vegetation clearance for agriculture and agricultural production activities both contribute significantly to Australia's greenhouse gas emissions. Agricultural production (excluding land clearing) contributed approximately 20% to Australia's net emissions in 1996. On the other hand, the Forestry and Other subsector including; forestry and other managed forests, pasture improvement and vegetation regrowth on some cleared land, removed carbon dioxide from the atmosphere, equivalent to around 5% of national net emissions.

The NGS includes action to enhance greenhouse sinks, encourage sustainable forestry and vegetation management and reduce greenhouse gas emissions from agricultural production.

Greenhouse emissions from waste were responsible for 4% of Australia's net emissions in 1996. Industrial processes (excluding emissions resulting from the consumption of energy) contributed 2% of Australia's net greenhouse gas emissions in 1996. Best practice in industrial processes and waste management, pursued through partnerships and the

encouragement of cleaner production and innovation, is an important component of the NGS.

The following modules outline existing and new measures concerned with limiting greenhouse gas emissions:

module 3: Partnerships for greenhouse action: governments, industry and the community;

module 4: Efficient and sustainable energy use and supply;

module 5: Efficient transport and sustainable urban planning;

module 6: Greenhouse sinks and sustainable land management; and

module 7: Greenhouse best practice in industrial processes and waste management.

3. Laying the foundations for adaption to climate change

Regardless of how effectively Australia and other countries limit their greenhouse gas emissions, global concentrations of greenhouse gases are certain to increase over coming decades, making some degree of climate change inevitable. The NGS lays the institutional foundations for forward planning in response to climate change.

The following module outlines the existing and new measures concerned with laying the foundation for adaptation to climate change:

module 8: Adaptation to climate change.

Strategic Framework for Advancing Australia's Greenhouse Response

The National Greenhouse Strategy extends the program of action launched by all governments in Australia through the 1992 National Greenhouse Response Strategy.

In developing the National Greenhouse Strategy, governments have taken account of factors that have emerged and evolved since 1992. The following issues and considerations have been of particular importance in determining how Australia's greenhouse response should be advanced:

- the strengthening of international knowledge and consensus on greenhouse science;
- the growing body of information on Australian sources of greenhouse gas emissions and forward projections of emissions trends;
- the growing understanding of the opportunities and constraints influencing Australia's greenhouse response and the evolution of various Australian government policies with direct or indirect bearing on greenhouse;
- developments in relation to the United Nations Framework Convention on Climate Change (FCCC) to which Australia is a party, especially the terms of the Kyoto Protocol negotiated in December 1997;
- the consideration of approaches such as emissions trading that will help Australia to achieve its Kyoto target in the least cost way to the national economy.

These factors are discussed briefly below and in more detail in Appendix A.

The context for action – national and international dimensions

The world's climate scientists have provided us with a clear message – that the balance of evidence suggests a discernible human influence on global climate. Scientists have further reported that climate is expected to change in the future as concentrations of greenhouse gases in the atmosphere increase, and that for many regions the effects are likely to be adverse.

These findings, outlined in 1995 by the Intergovernmental Panel on Climate Change, the most authoritative international source of scientific, technical and economic advice on climate change, have been accepted and endorsed by Australia. They present Australia and other countries with a considerable challenge – one that is vital to address.

Although Australia only contributes just over 1% of total greenhouse gas emissions, our per capita emissions are among the highest in the world. Australia's emissions reflect our particular national circumstances. Fossil fuels supply most of our energy needs; many of our industries are energy intensive and we are a major exporter of energy intensive goods and products; our population growth rate is high relative to other developed countries; and our transport use is high due to our widely separated and decentralised cities.

These national circumstances underpin Australia's greenhouse gas emissions profile. In 1996 the energy category of the National Greenhouse Gas Inventory, which includes stationary sources and transport energy, accounted for 79% of total national emissions. Vegetation clearance for agriculture and agricultural production activities both contribute significantly to Australia's greenhouse gas emissions. Agricultural production alone (excluding land clearing) contributed approximately 20% to Australia's net emissions in 1996. Further detail on our emissions profile is in Appendix A.

Substantial growth in our emissions is projected. Without targeted and effective response action our emissions, based on all sectors excluding land use change, were expected to grow by around 28% from 1990 to 2010. Emissions from the energy sector alone were expected to grow by some 40%.

Our geographic and environmental circumstances mean that Australia is vulnerable to the potential impacts of climate change. With over 80% of our population living near the coast, the impact of climate change on coastal areas could be considerable. Other potentially significant impacts include those on our agricultural productivity; threats to human health; and the imposition of further survival pressures on a range of native plants and animals.

To date, Australia has played a key role in responding to the enhanced greenhouse effect. Australia ratified the United Nations Framework Convention on Climate Change in December 1992. The Convention entered into force in March 1994 and more than 150 countries are now signatories to it.

The ultimate objective of the Convention is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system. A brief summary of Australia's commitments under the Convention is in Appendix B.

In 1992 Australian Governments also agreed to a National Greenhouse Response Strategy (NGRS) as a basis for working together on greenhouse issues and, in particular, to meet Australia's international obligations under the FCCC. The NGRS outlined a range of objectives and sectoral strategies to address greenhouse issues.

As noted above, significant changes have occurred nationally and internationally since the NGRS was adopted in 1992. Of particular significance is the negotiation of the Kyoto Protocol, which was developed in response to the assessment by the international community that insufficient progress was being made in reducing greenhouse gas emissions.

The Kyoto Protocol

The first Conference of Parties of the FCCC in 1995 set in train negotiations to establish a protocol (subsidiary treaty) which would:

- strengthen the commitments of developed countries for the post-2000 period; and
- advance the implementation by all countries of their commitments under the FCCC.

These negotiations were successfully concluded at the third Conference of Parties in December 1997, where agreement was reached on the text of the Kyoto Protocol. Australia signed the Protocol on 29 April 1998.

As a result of the Kyoto Protocol, developed countries, as a whole, will strive to reduce their greenhouse gas emissions from 1990 levels by at least five per cent by 2008–2012. In recognition of the fact that developed countries have different economic circumstances and differing capacities and costs in making emissions reductions, each developed country has a specific, differentiated target. Australia's requirement is to limit our greenhouse gas emissions in the target period to no more than eight per cent above 1990 levels.

The targets under the Kyoto Protocol encompass all the major greenhouse gases and the range of sources and significant sinks. The Protocol therefore allows Australia to include emissions from land clearing in the calculation of its target. This arrangement provides scope for cost-effective mitigation action by ensuring that all avenues for reducing emissions can be pursued.

The Kyoto Protocol contains a number of other features that allow for flexible approaches to reducing our greenhouse gas emissions, in particular through international emissions trading (though this and several other features of the Protocol are subject to rules yet to be negotiated). A more detailed summary of the main provisions of the Protocol is in Appendix B.

The target set for each country becomes legally binding when the Protocol has entered into force and that country has itself ratified the Protocol.

Governments have recognised that there is a need for an enhanced, strengthened and more broadly based national greenhouse strategy. In response to this, the development of the National Greenhouse Strategy commenced in late 1996. It also led to the announcement by the Prime Minister in November 1997 of a substantial package of greenhouse response measures for inclusion in the Strategy. In announcing that package of measures, the Prime Minister stated that Australia's national interests lie both in protecting Australian jobs and Australian industry while ensuring that Australia plays her part in the world wide effort to reduce greenhouse gas emissions.

The National Greenhouse Strategy has been developed by Australian Governments to provide the strategic framework for an effective greenhouse response and for meeting current and future international commitments. It will provide a fresh impetus for action by governments, stakeholder groups and the broader community and set directions for that action into the next century.

The need to integrate greenhouse and other policy objectives has been a key consideration in developing the National Greenhouse Strategy. In addition to the range of new and additional greenhouse measures outlined in the Strategy, greenhouse policy must also be integrated with that addressing other community concerns, particularly economic and trade policies, micro-economic reform agendas, competition policy reforms and the review of Commonwealth/State environmental roles and responsibilities.

Mission

Australia will actively contribute to the global effort to stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system and within a time frame sufficient to:

- allow ecosystems to adapt naturally to climate change;
- ensure that food production is not threatened; and
- enable economic development to proceed in a sustainable way.

Goals

The three goals of the National Greenhouse Strategy are:

1. To limit net greenhouse gas emissions, in particular to meet our international commitments.
2. To foster knowledge and understanding of greenhouse issues.
3. To lay the foundations for adaptation to climate change.

Principles

The strategic framework agreed by governments as the basis for the National Greenhouse Strategy includes principles which will guide the further development and implementation of the Strategy. These are:

1. A comprehensive greenhouse response that recognises Australia's national interests and circumstances

- establish a comprehensive suite of actions relating to both greenhouse gases and sinks, and to all sectors relevant to greenhouse, which is tailored to address our particular national circumstances;
- recognise both the opportunities for, and constraints on, an effective response to climate change by Australia;
- recognise the regional diversity existing within Australia and the need for greenhouse response measures to be tailored to match that diversity.

2. Integration with other government commitments

- be consistent with the principles of ecologically sustainable development;
- seek the integration of greenhouse policy with broader economic, environmental and social policies:
  - to ensure the Strategy takes account of competing or complementary goals, policies and priorities; and
  - to promote the need for greenhouse goals and policies to be recognised in the development of other government policies.

3. Pursuit of greenhouse action, consistent with equity and cost effectiveness, and with multiple benefits

- focus on approaches which have financial, social and environmental benefits to the community. These measures will reduce greenhouse gas emissions and over time outweigh the direct and indirect costs associated with their implementation. Within this framework benefits and costs are considered:
  - from a community rather than an individual perspective, although individual impacts need to be recognised and equity considerations addressed;
  - over all time frames, including the short, medium and long terms;
- recognise the need for equity by ensuring that any undue burden of adjustment potentially borne by a particular sector or region is taken into account in the development and implementation of measures;
- recognise the importance of cost-effectiveness and ensure that measures are implemented using the most cost-effective means wherever possible;
- recognise that Australia should achieve compliance with the Kyoto Protocol in the least cost way to the national economy and with the least effect on competitiveness.

4. Partnerships between governments, industry and the community

- recognise the important role which partnerships between governments, industry and the community play in an effective national response to climate change;
- provide opportunities for key stakeholders and the broader community to participate in the implementation of the Strategy and any formal review of its substance.

5. Action to be informed by research

- respond to and foster relevant scientific, technological and socio-economic research and support the development of innovative operating practices and technologies.

A framework for effective implementation

The National Greenhouse Strategy contains a broad set of actions, some of which will be implemented by governments acting individually; some by intergovernmental initiatives; and some through partnerships between government, stakeholders and the community.

All governments will participate in arrangements to facilitate implementation of the Strategy, monitoring and reporting of its outcomes, and the review and ongoing development of Australia's national greenhouse response. In this context, the implementation and further development of the Strategy should focus on outcomes not processes and emphasise market based solutions, wherever possible, to the identified problems.

These arrangements reflect the expectations of the Australian and international communities regarding Australia's accountability for action on climate change issues, as well as the need to ensure that actions are delivered efficiently and without duplication of established processes.

Institutional and advisory mechanisms

A High Level Group of senior officials from the Commonwealth, States and Territories, chaired by the Secretary of the Commonwealth Department of the Environment, is responsible for managing the ongoing monitoring, review and further development of the National Greenhouse Strategy. In performing this work, the High Level Group will be responsible to the Council of Australian Governments (COAG). An implementation planning group will be established under the High Level Group to develop detailed implementation plans for the NGS during the latter half of 1998.

The National Greenhouse Advisory Panel (NGAP) was established under the 1992 National Greenhouse Response Strategy as a broadly based body comprising representatives of scientific, forestry, rural, industrial, conservation and administrative interests. NGAP has been an important source of advice to government on greenhouse issues, including progress with implementation, review and ongoing development of national greenhouse measures.

An advisory committee, comprising key stakeholders, will be established to provide advice to governments on the implementation of the NGS.

Implementation planning

Detailed implementation plans (including updated timetables) to facilitate the implementation of these measures are to be developed and will take the form of State or Territory greenhouse strategies or nationally coordinated measure-specific plans.

The National Greenhouse Strategy provides a strategic framework for greenhouse response action. Some information pertaining to implementation is included in the Strategy, notably the jurisdictions to be involved in pursuing the measures and indicative timetables. These implementation plans will also provide the basis for ongoing monitoring and reporting of progress on the Strategy.

Factors to be considered in the development of implementation plans include:

- the means by which greenhouse considerations can be more closely integrated in government policy;
- the extent to which the measures can be delivered by adapting existing programs or whether new programs need to be established;
- the means by which the partnerships that are critical to the success of individual measures are to be fostered and implementation partners actively engaged;
- funding needs and arrangements.

Each government's implementation plans for new greenhouse measures will be integrated with government budget cycles and, where appropriate, will be the subject of consultations with industry and the broader community.

Some of the measures in the National Greenhouse Strategy are already being implemented by governments or will be implemented by means of adjustment to existing government programs. Others will require additional funding and will be considered by governments in the context of their overall budget strategies.

The strategic framework and the measures contained in the National Greenhouse Strategy will position Australia to achieve our international commitments under the Kyoto Protocol. Implementation planning will need to be responsive to the outcomes of further international negotiations under the Protocol.

Monitoring and reporting

Reports on progress in implementing the National Greenhouse Strategy will be prepared biennially, with a first report to be produced in the second half of 2000 and tabled in the Commonwealth Parliament.

The reports will include assessments of:

- Australia's progress towards its target under the Kyoto Protocol;
- progress in implementing measures contained in the Strategy. This will involve a uniform approach to the identification of the implementation status of measures;

- the effectiveness of measures in addressing the Strategy's goals to limit greenhouse gas emissions and protect and enhance greenhouse sinks.

Performance indicators will be employed to contribute to assessments of the effectiveness of the Strategy. An important source of information for this will be the annual compilation of the National Greenhouse Gas Inventory (NGGI). To support NGGI requirements, and provide the basis for carbon sequestration and emission trading activities outlined in the Kyoto Protocol, a carbon accounting system for land based sources and sinks is being developed.

An initial set of primary indicators at the macro and sectoral levels, developed for the 1992 National Greenhouse Response Strategy, has been adopted and is in Appendix C. The final set of performance indicators, including secondary and diagnostic indicators, will be developed in 1998/99 to complement the macro and sectoral indicators. Tertiary indicators relating to individual groups of measures will be developed where possible.

Review and further development of the National Greenhouse Strategy

In order to ensure Australia's greenhouse response remains fully integrated and consistent, the National Greenhouse Strategy will be subject to periodic comprehensive review. The first review will be conducted during 2002, or earlier, if necessitated by developments relating to the Framework Convention on Climate Change and the Kyoto Protocol.

Key factors to be considered will include:

- analyses of trends in emissions as indicated by the National Greenhouse Gas Inventory and projections of future emissions, especially in comparison to Australia's target under the Kyoto Protocol;
- developments in relation to the Framework Convention on Climate Change and the Kyoto Protocol;
- the biennial assessments of progress and effectiveness in implementing the National Greenhouse Strategy;
- findings from research into opportunities and constraints relating to greenhouse policy and the benefits and costs of policy response options;
- developments in greenhouse science;
- advice from the stakeholder advisory committee;
- the views of the community as identified through a call for public submissions.

As a result of the review, the High Level Group will make recommendations to the Council of Australian Governments regarding the refinements and further development of the National Greenhouse Strategy required to ensure that Australia's national greenhouse response remains current, effective, and on-track to achieving Australia's target under the Kyoto Protocol.

The further development of the National Greenhouse Strategy will be underpinned by research into the opportunities and constraints relating to greenhouse policy, and the benefits and costs of policy response and adaptation options. In particular, the Commonwealth Government in consultation with State and Territory Governments, will ensure that research is conducted regarding:

- the benefits, costs and associated trade-offs of greenhouse mitigation policies and measures. This research will draw on a range of assessment approaches to ensure that alternative scenarios are considered;
- the potential for market-based instruments to be part of Australia's national greenhouse response, including how such instruments might interface with possible similar international approaches.

Research will also be conducted to assess the likely costs and benefits for Australia of greenhouse responses by other nations.

Overview of modules and key measures

The goals of the National Greenhouse Strategy will be pursued through action on three fronts: fostering knowledge and understanding of greenhouse issues; limiting greenhouse gas emissions and enhancing sinks; and laying the foundations for adaptation to climate change.

While the National Greenhouse Strategy encompasses a comprehensive greenhouse response, the major focus is on those modules dealing with the limitation of net greenhouse gas emissions.

The Strategy includes eight modules which contain targeted packages of measures to address specific issues and seek particular outcomes. These packages include key existing measures which will continue to be pursued as part of Australia's national greenhouse response, and additional measures to strengthen that response. Responsibilities and indicative timeframes are presented for these additional measures.

The National Greenhouse Strategy provides flexibility for jurisdictions to pursue action through different approaches. In implementing measures, governments will give full consideration to variations in environmental, social and economic conditions across Australia. This will ensure that regional differences and jurisdictional circumstances are taken into account, and will contribute to the efficiency and effectiveness of action. Some measures are not relevant or applicable to all jurisdictions and will be implemented only in certain jurisdictions.

Some of the additional measures in the Strategy are already being implemented by some governments or will be implemented by means of adjustment to existing programs. Other measures will require additional funding. Funding considerations will be dealt with in the context of the overall budget strategies of each government.

The following is a summary of the focus of each of the modules, with a brief description of the key measures within the module.

Fostering knowledge and understanding of greenhouse issues

The National Greenhouse Strategy is based on a strong commitment to enhancing our knowledge of greenhouse sources and sinks; continuing research into climate change science and abatement and adaptation strategies; and communicating this information to policy-makers and the community.

module 1: Profiling Australia's greenhouse gas emissions

Information on national greenhouse gas emissions is essential for monitoring progress with our greenhouse response and for the ongoing development and refinement of response actions.

Key measures are:

- Reducing uncertainties in the land use change and forestry sector (measure 1.4) will seek to reduce the uncertainty of land use change and forestry data in the National Greenhouse Gas Inventory. With the inclusion of emissions from the land use change and forestry sector in calculations for Australia's target under the Kyoto Protocol it is essential that current levels of uncertainty are reduced.
- National Carbon Accounting System for land based sources and sinks (measure 1.5) is concerned with improving knowledge about the carbon storage capacity of vegetation. The development of the National Carbon Accounting System will provide the comprehensive framework and scientific services necessary to account for greenhouse gas emission reduction and sink enhancement programs.

module 2: Understanding and communicating climate change and its impacts

A key driver of international and Australian greenhouse responses is the growing scientific understanding of the mechanisms and potential scale and impacts of climate change. Australia plays a critical role in providing a southern hemisphere contribution to global research efforts. Ongoing research is needed both to better understand the global climate system and to assess the potential impacts of climate change on Australia.

Community understanding of the implications of climate change for Australia and the context within which governments are pursuing action, is a prerequisite for gaining community acceptance of the Strategy and for engaging individuals and communities in national greenhouse response actions.

Limiting greenhouse gas emissions

These modules represent the core of Australia's greenhouse response and are central to meeting our commitments under the Framework Convention on Climate Change (FCCC). Measures to limit net greenhouse gas emissions have been developed in the context of the opportunities and constraints for Australia. In particular, the measures reflect the systemic nature of the greenhouse issue and the need for a comprehensive approach which addresses all greenhouse gases, sources and sinks, and all sectors of the economy.

The measures also seek the most cost-effective ways to reduce net greenhouse gas emissions. As well as being a significant step forward in our national greenhouse response, the actions deliver substantial non-greenhouse benefits to Australia. These include reduced energy costs (which will enhance our international competitiveness and standard of living) and the promotion of ecologically sustainable agricultural and forestry systems.

module 3: Partnerships for greenhouse action: governments, industry and the community

While action by, and cooperation between, all governments in Australia is a cornerstone of the National Greenhouse Strategy, it is recognised that action by governments alone can never be sufficient. The cooperation of industry and the broader community is fundamental to the Strategy's success. Module 3 gives particular impetus to the partnerships theme by encouraging active partnerships across all segments of the community.

Key measures are:

- Reducing greenhouse emissions from government operations (measure 3.1) will see governments leading by example and reducing greenhouse gas emissions from their own operations.
- Local Government and greenhouse (measure 3.4) will assist local councils to quantify their greenhouse emissions and develop local government and community wide action plans.
- Extension and expansion of the Greenhouse Challenge program (measure 3.5) will increase the number of large and medium size companies in the program, and to engage small businesses through a Greenhouse Allies program.
- Household Greenhouse Action (measure 3.7) will bring together the various spheres of government, key industries, the community and professional organisations in a consortium to develop integrated, consistent and effective strategies addressing residential greenhouse emissions.

module 4: Efficient and sustainable energy use and supply

The largest single source of Australia's greenhouse gas emissions is the production and consumption of energy. Stationary (i.e. non-transport) energy contributed 55% of Australia's net greenhouse gas emissions in 1996. A major focus of the Strategy, therefore, is the pursuit of efficient and sustainable energy use and supply. Energy market reforms will be accelerated to improve the economic efficiency of energy supply. Energy performance codes and standards relating to domestic and industrial equipment, and residential and commercial buildings will be enhanced and increased.

Stimulation of the renewable energy sector with a major focus on the commercialisation of renewable energy technologies is a key feature of the Strategy. In addition, the Strategy specifically targets an additional 2% of electricity use from renewable and specified waste product energy sources.

Key measures are:

- Accelerating and monitoring energy market reform (measure 4.1) will provide for an expansion and invigoration of micro-economic reform of the energy market to promote the delivery of environmental as well as economic benefits.
- Efficiency standards for power generation (in measure 4.2) will provide for improved efficiency in the use of different fossil fuels so as to deliver reductions in the greenhouse gas intensity of energy supply.
- Strategic development of renewable energy (measure 4.6) will be enabled through programs which will support the commercialisation and application of renewable energy technologies. The proportion of electricity from renewable or specified waste-product sources will be increased.
- Energy efficiency standards for residential and commercial building, and energy performance codes for domestic appliances and commercial and industrial equipment (measures 4.9 and 4.10) will be expanded and strengthened.

module 5: Efficient transport and sustainable urban planning

The transport sector contributed 17% of Australia's net greenhouse gas emissions in 1996. Energy-efficient transport and sustainable urban planning are a key component of Australia's strategy for long-term greenhouse gas mitigation.

The measures in Module 5 simultaneously deliver greenhouse benefits, improve local air quality, reduce congestion, improve access to public transport and facilities, and reduce infrastructure costs.

Key measures are:

- Traffic management (measure 5.6) will aim to optimise greenhouse outcomes by introducing guidelines and management systems, and incorporating greenhouse considerations in air quality and congestion management strategies.
- Environmental Strategy for the Motor Vehicle Industry (measure 5.10) will make a significant contribution to reducing greenhouse gas emissions by, among other actions, introducing a 15 % fuel efficiency improvement target by 2010, mandatory fuel efficiency labelling and bringing forward the phasing out of leaded fuel.

module 6: Greenhouse sinks and sustainable land management

Vegetation clearance for agriculture and agricultural production activities both contribute significantly to Australia's greenhouse gas emissions. Agricultural production (excluding land clearing) contributed approximately 20% to Australia's net emissions in 1996. On the other hand, the Forestry and Other subsector including; forestry and other managed forests, pasture improvement and vegetation regrowth on some cleared land, removed carbon dioxide from the atmosphere, equivalent to around 5% of national net emissions.

Sustainable land management in forestry, vegetation management and agriculture, together with cleaner production in agricultural activity, provide important opportunities for emissions reduction and greenhouse gas sink enhancement. In addition to their greenhouse gas mitigation benefits, these practices generate other environmental, economic and social benefits. These include improved natural resource management and quality such as soil stability, reduced salinity and greater productivity, as well as more efficient production with reduced resource inputs and wastes.

Key measures are:

- Plantations for Australia: The 2020 Vision (measure 6.1) aims to treble the nations plantation estate by the year 2020, and will work to remove impediments and enhance investment and profitability in plantation-based industries.
- National principles for sustainable management of native vegetation and retention (measure 6.4) will be developed and agreed, particularly for native woody vegetation.
- Giving effect to national principles for sustainable native vegetation management and retention (measure 6.5) will involve the development and implementation of guidelines and policies at a regional level.

module 7: Greenhouse best practice: industrial processes and waste management

Key manufacturing, petroleum, minerals and minerals-processing industries are significant emitters of greenhouse gases from industrial processes, in addition to being major consumers of energy. Excluding emissions resulting from the consumption of energy (which are addressed in Module 4), industrial processes contributed 2% of Australia's net greenhouse gas emissions in 1996. Greenhouse emissions from waste were responsible for 4% of Australia's net emissions in that year.

Greenhouse best practice in industrial processes and waste management, pursued through partnerships and the encouragement of cleaner production and innovation, is an important component of the Strategy. These areas provide important opportunities to address non-CO_2 greenhouse gas emissions – other opportunities occur in agriculture (see Module 6).

Key measures are:

- Environmental management strategies for the synthetic gases (measure 7.2) will be developed with industry strategies for HFCs, PFCs and SF_6, the three synthetic gases included in the Kyoto Protocol.
- Methane emissions from landfill and wastewater (measures 7.4 and 7.5) will work to minimise organic waste at landfill sites, and increase capture and utilisation of landfill and wastewater methane emissions.

Laying the foundations for adaptation to climate change

Regardless of how effectively Australia and other countries limit their greenhouse gas emissions, global concentrations of greenhouse gases are certain to increase over coming decades, making some degree of climate change inevitable. Adaptation to climate change is, therefore, an essential part of our national greenhouse response.

module 8: Adaptation to climate change

This module lays the foundations for forward planning in response to climate change. In particular, this will involve the review of current planning processes and strategies, and further work to develop sectoral adaptation requirements and plans.

Module

1

The National Greenhouse Stategy

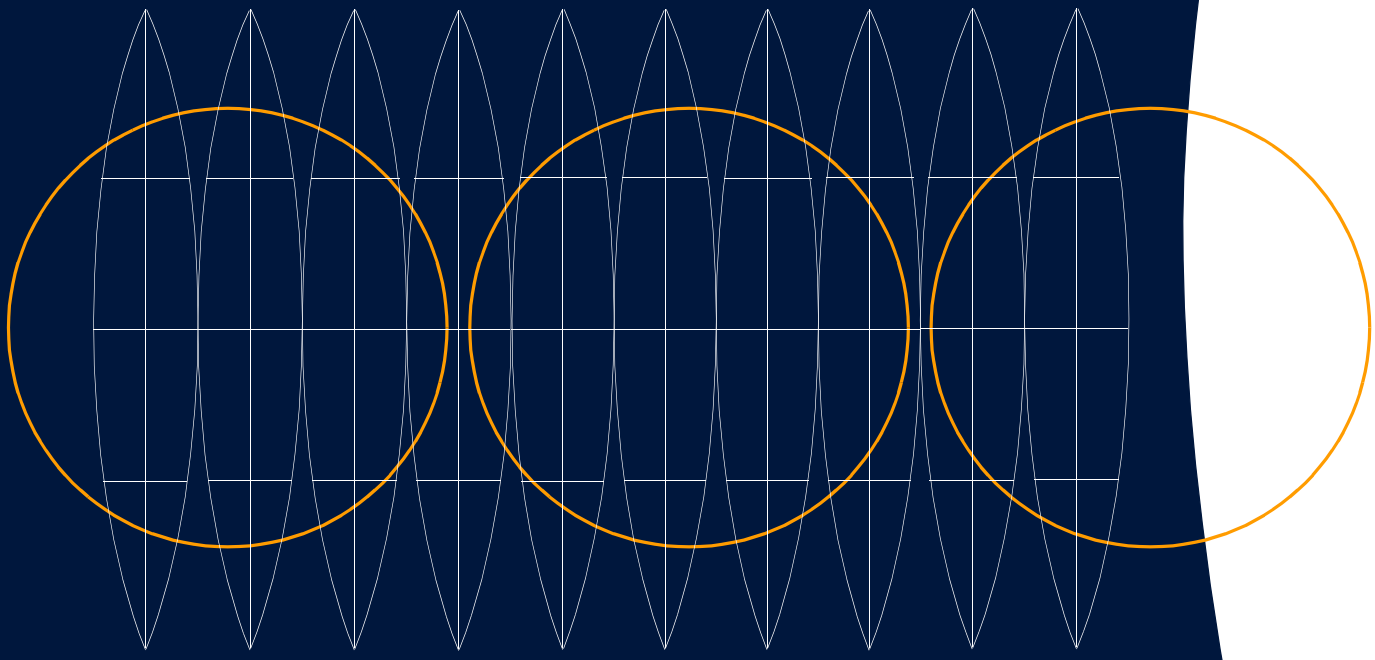
Profiling Australia's Greenhouse Gas Emissions

Introduction

Preparing and improving Greenhouse inventories

Providing community access to inventory information

Projecting future emissions



Module 1

Profiling Australia's Greenhouse Gas Emissions

Introduction

Scope

This module addresses the international requirement under the Framework Convention on Climate Change (FCCC) and the Kyoto Protocol for Australia to have the ability to properly calculate its greenhouse gas emissions annually from 1990 onwards, and to make projections of future emissions.

Context

As a signatory to the FCCC, Australia is committed to the preparation of an annual inventory of national greenhouse gas emissions according to international guidelines. Under the recent Kyoto Protocol, Australia will now need to further develop its inventory and forecasting capacity. In so doing it will contribute to the development of internationally acceptable guidelines on carbon accounting.

Assessment and analyses of national, as well as State and Territory, greenhouse gas inventories provides an important foundation for the development of greenhouse response measures and, in particular, for the identification of priorities for action. It also enhances community access to environmental information.

Action by Australia

This module outlines action on:

- preparing and improving national and State and Territory greenhouse gas inventories, including developing a National Carbon Accounting System;
- providing community access to inventory information;
- projecting future emissions.

Preparing and improving greenhouse inventories

The National Greenhouse Gas Inventory (NGGI) will play a critical role in plotting Australia's path towards limiting its greenhouse gas emissions consistent with the Kyoto Protocol, and in the development of greenhouse policy for that purpose. It will do this through:

- establishing emissions patterns and trends;
- providing a starting point for the compilation of emission projections;
- providing essential information for the development of sectoral greenhouse gas mitigation measures, identifying potential sinks as offsets for emissions from other sectors, and highlighting sectors requiring particular attention;
- providing information to assist in assessing the effectiveness of mitigation measures and the derivation of performance indicators;
- providing information to assist Australia compare its performance on greenhouse gas emissions against its international commitments.

Preparation of State and Territory greenhouse gas inventories will provide a basis for guiding and assessing greenhouse actions at the regional level.

To ensure that national, State and Territory inventories provide authoritative information, it is important they are regularly reviewed and there is a continuing effort to improve data inputs and methods. Currently, special attention is being given to reducing uncertainty in the land use change and forestry sector of the NGGI.

Increased focus is required to support estimating both emissions and carbon absorption at a project level to underpin implementation of specific measures, such as carbon offsets through vegetation establishment and plantation development, joint implementation between countries, and emissions trading arrangements.

Existing measures

The National Greenhouse Gas Inventory

The National Greenhouse Gas Inventory Committee (NGGIC) comprises representatives of the Commonwealth, State and Territory Governments. It has compiled and published inventories for the years 1988 to 1996 using an Australian methodology developed by Inventory Methodology Working Groups with the assistance of specialist researchers. The methodology takes account of Australian conditions while following international guidelines in its construction and development.

Additional measures

1.1 Compiling and refining the NGGI

The annual NGGI will be compiled consistent with international guidelines established under the FCCC, and reviewed and refined as necessary to incorporate methodology guideline changes and reporting requirements under the FCCC and Kyoto Protocol, to address areas of uncertainty, and to reflect specific Australian conditions.

In particular, the following actions will be taken:

- the cooperation and commitment of the Australian Bureau of Statistics and other data centres as well as the industry sector will be sought to ensure that essential data is collected and made available in a timely manner for inventory compilation;
- compilation of the NGGI will reflect emissions and sinks individually (e.g. in the land use change and forestry sector it is necessary to clearly distinguish between emissions from land use change and removals by changes in forest and other woody biomass, and pasture improvement);
- Australia will continue to participate in the development of international guidelines for the compilation of greenhouse gas inventories.

Reducing uncertainties in specific areas of the NGGI is covered in measures 1.3 and 1.4.

Responsibilities – to be led by the Australian Greenhouse Office (AGO) working in conjunction with other Commonwealth agencies and pursued under the auspices of the NGGIC.

Indicative timeframes – to be pursued as an ongoing commitment.

1.2 Compiling State and Territory inventories

State and Territory inventories, based on the national inventory, will be compiled regularly.

It is intended that the frequency of preparation of State and Territory inventories will move progressively to an annual basis.

Responsibilities – to be pursued cooperatively by the AGO working in conjunction with other Commonwealth agencies, and all States/Territories under the auspices of the NGGIC.

Indicative timeframes – to be pursued as an ongoing commitment.

1.3 Reducing uncertainties in the NGGI

Improving the accuracy of estimated emissions and removals by sinks in the NGGI will be addressed by:

- first establishing the levels of uncertainty associated with emissions and sinks estimates in each sector;
- researching and developing methods to guide the interpretation and application of inventory information for those areas of greatest uncertainty, including land use change, forestry and agriculture;
- undertaking research to fill information gaps in inventory data;
- improving biosphere science and providing more accurate input data related to inventory compilation.

An area of high uncertainty in Australia is the land use change and forestry sector. This is specifically addressed in measure 1.4.

Responsibilities – to be led by the AGO working in conjunction with other Commonwealth agencies and pursued under the auspices of the NGGIC.

Indicative timeframes – action from 1998/99.

1.4 Reducing uncertainties in the land use change and forestry sector

The level of uncertainty applicable to greenhouse gas emissions presented in the NGGI will be reduced through research and data gathering undertaken with expert assistance. The main aims will be to develop improved methodologies and to accurately determine carbon sequestration rates for key commercial and revegetation species, carbon stocks (above and below ground), changes in emissions from land clearing and other changes in land use.

Particular activities will focus on:

- establishing the rate and location of clearing;
- determining the size of the above and below ground carbon pool, particularly in the intensive land use zone;
- determining variation in the above and below ground carbon pool resulting from changes in management activities and practices.

These activities will be undertaken through mapping vegetation cover and vegetation cover change; field work to establish key species, groups of species cover and species cleared; soil analysis in selected areas; developing methods to establish biomass and carbon content; measurement of carbon loss from soil; modelling to measure/estimate carbon losses resulting from below ground disturbance, biomass of vegetation and growth rates; and developing methods to determine total carbon above and below ground to feed into a carbon accounting system.

A number of these activities will support measure 1.5.

The aspects of carbon sequestration arising from vegetation thickening and pastoral management will also be investigated.

Responsibilities – to be pursued by the Commonwealth Government, in collaboration with State and Territory Governments where applicable. Coordinating mechanisms such as the NGGIC, ANZECC, ARMCANZ, MCFFA and Greenhouse Science Advisory Committee (GSAC) to be engaged as necessary. Action to be pursued in conjunction with research bodies including CSIRO, Bureau of Resource Sciences and the Australian National University.

Indicative timeframes – results to be provided in three to five years, with soil carbon profiles requiring the longer timeframe. Preliminary data sets are expected by the end of 1998, with fuller sets by 2000. Priorities for implementation to be established by December 1998. Models and estimates to be available by 2000.

1.5 A national carbon accounting system for land based sources and sinks

This measure will establish a national carbon accounting system using NGGI and other data to deliver a consolidated package, providing the comprehensive framework and scientific services necessary to account for the nation's land based carbon to an internationally credible standard. The system will be based on a spatial database.

The measure will also establish a national framework and associated scientific methodology to properly capture the carbon sequestration capacity of current NHT programs such as Farm Forestry, Bushcare and other measures such as Plantations 2020 Vision and Bush for Greenhouse.

Key activities and outputs include:

- development of the strategic framework and plan;
- development of spatial carbon data bases including mapping of land use;
- definition of carbon measurement methodologies and protocols;
- enhancement of Australia's inventory capacity including improvement to the methodology and data input to the NGGI;
- further limited and targeted research and development to address knowledge and information gaps addressing the variability of soil carbon;
- provision of the tools required for vegetation carbon offsets and a potential future carbon credit trading system;
- investigation to ascertain carbon budgets for various forest and plantation management, development and harvesting scenarios including changes in forest carbon density due to fire and changing age class distributions.

Responsibilities – to be pursued by the AGO working in conjunction with other Commonwealth agencies and the States and Territories and with advice from a high level steering committee.

Indicative timeframes – to be initiated in 1998/99.

Providing community access to inventory information

Improving the understanding of the contribution of different greenhouse sources and sinks to Australia's net greenhouse gas emissions will assist in promoting community action on greenhouse. This improved understanding will be helped by developing user friendly and readily accessible national and State and Territory greenhouse gas inventories.

Existing measures

Publication of inventory trends and use of the Internet

The NGGI includes a widely distributed summary of trends. Detailed documentation is made available on the Internet.

Additional measures

1.6 Building community understanding of inventory information

Subsidiary information derived from the NGGI will be prepared and regularly updated to inform policy makers, stakeholders and the community. This will include greenhouse emissions by end-use and by specific industry/ activity; the major factors influencing greenhouse emissions or absorption; and greenhouse gases embodied in internationally traded commodities.

The NGGI will be made more user friendly by:

- developing an electronic public interface application to disseminate NGGI information to the wider community (see measure 2.10);
- publishing a 'popular' version of the inventory, and information sheets, highlights and key features documents;
- regularly updating and publishing a trends document which describes emission patterns in terms of the contributions made by different sectors and individual gases;
- preparation of a cross sectoral analysis of emissions;
- publishing a worked example booklet to illustrate how to prepare an inventory for specific operations;
- publishing emission factors contained in the inventory;
- establishing mechanisms for liaison with users to provide opportunities for regular dialogue and feedback (e.g. conducting periodic users' surveys and/or users' workshops to identify whether the range of NGGI-related information is meeting needs and to identify areas for improvement).

Responsibilities – to be pursued by the AGO under the auspices of the NGGIC.

I**ndicative timeframes** – action from 1998/99.

Projecting future emissions

Emissions projections play an important role in identifying the need for, and the likely effectiveness of, greenhouse response measures. They are critical to the ongoing monitoring, review and further development of the National Greenhouse Strategy and are one of the reporting requirements established by the FCCC and the Kyoto Protocol.

The development of emissions projections across a wide range of sectors involves considerable uncertainty. While this is well-recognised, it is nonetheless important to invest in improved methods to project future emissions levels.

Existing measures

Emissions projections

Considerable work has been undertaken to develop and improve projections of national greenhouse gas emissions. The Commonwealth Government has established emissions projection working groups to facilitate this work.

Additional measures

1.7 Emissions projections

An ad hoc Commonwealth, State and Territory working group will coordinate the preparation of greenhouse gas emission projections to meet international reporting requirements and to inform domestic policy development.

The Commonwealth will maintain expert emissions projections working groups and will access specialist advice from government, private research organisations and industry, taking into account detailed State, Territory and regional information. Activity will include continuing development of analytical tools, methodologies and data required to prepare sound projections of future levels of national emissions of greenhouse gases.

The expert groups will also assess and monitor the accuracy of emissions projections by comparing actual emissions (as indicated by the NGGI) with previous projections. This monitoring process will be used to identify necessary modifications to projections methods in order to improve the accuracy of projections.

Responsibilities – to be led by the AGO working in conjunction with other Commonwealth agencies and the States and Territories, and in consultation with industry and private research organisations.

Indicative timeframes – action is underway and will be ongoing.

Module 2

The National Greenhouse Stategy

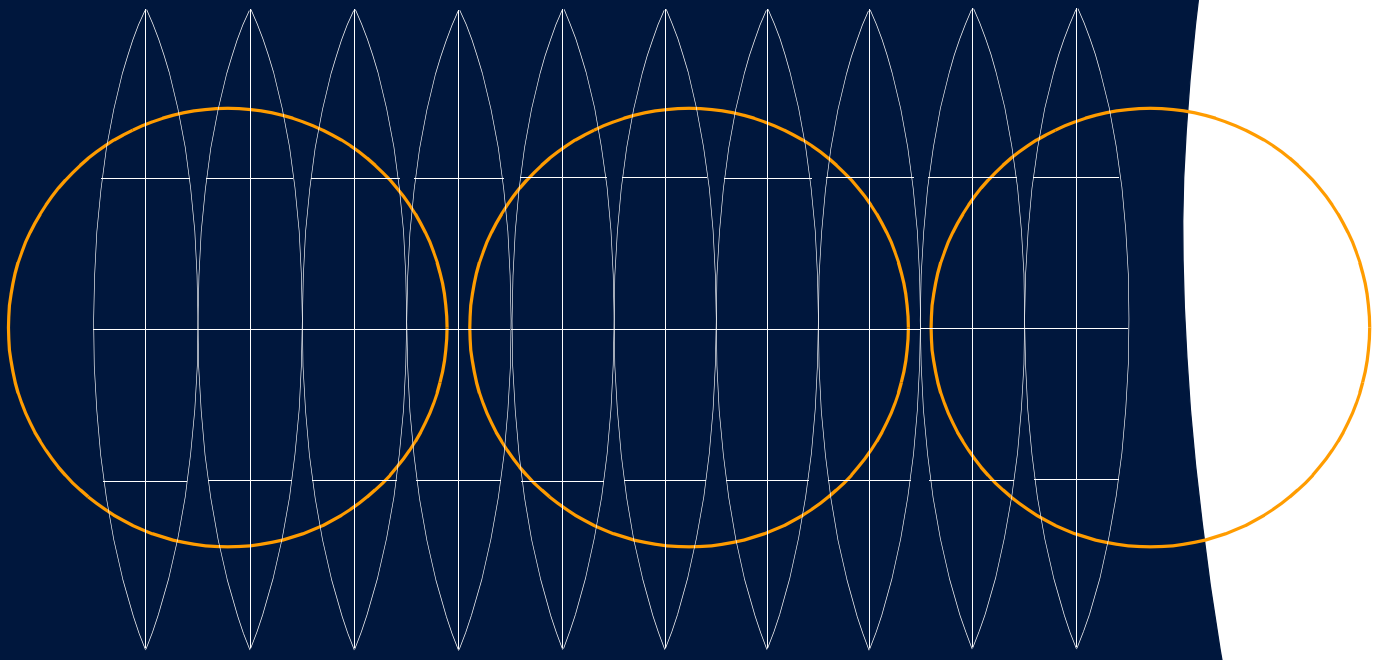
Understanding and Communicating Climate Change and Its Impacts

Introduction

Improving our understanding of climate change

Identifying climate change impacts

Climate change communication and education



Module 2

Understanding and Communicating Climate Change and Its Impacts

Introduction

Scope

This module addresses:

- improving our understanding of climate change through support for Australian and international scientific research, reducing the uncertainties in projections of global and regional climate changes through improved climate modelling, and developing knowledge about the potential impacts of climate change, particularly on Australia and its region, as a basis for developing adaptation strategies; and
- developing community understanding of climate change through nationally coordinated information programs, and the formal education sector.

Targeted information and education programs aimed at individual, community and industry sector practices are also contained in various sectoral modules.

Context

Active participation in scientific research into climate change and an improved understanding of its impacts relative to Australia is essential to an effective national greenhouse strategy as well as being a requirement under the FCCC.

This is because Australian research provides a southern hemisphere focused complement to the primarily northern hemisphere focused research done elsewhere. Australia has an important role in contributing to the Intergovernmental Panel on Climate Change (IPCC) assessments of climate change which provide the foundation for international and national climate change policy development including the development of adaptation strategies at the sectoral level (see Module 8).

Information and education programs, including those within all tiers of the formal education system, complement scientific research and can foster broad community understanding of climate change issues. This understanding is a prerequisite for informed community and individual action to reduce greenhouse gas emissions and adapt to climate change, as well as building community support for actions initiated by governments.

Action by Australia

This module outlines action on:

- improving understanding of climate change;
- identifying climate change impacts, to facilitate the development and implementation of adequate adaptive response measures;
- communicating climate change to the community.

Improving our understanding of climate change

Ongoing investigation is needed to improve scientific understanding of the climate system and to enhance our ability to predict the nature, timing and patterns of climatic changes, and associated climate change impacts.

Involvement in international scientific efforts brings international expertise to bear on the problems important to Australia while also ensuring that the Australian perspective, including the unique aspects of Australia's climate, is brought to the international science community. For these reasons, it is important that Australia continues to support international climate change research and related activities.

Existing measures

International assessments

Australian experts have made a major contribution to the improved understanding of the science of climate change through the World Climate Research Programme (WCRP) and the International Geosphere Biosphere Programme (IGBP). They have also contributed substantially to the ongoing assessments of the state of knowledge of climate change through the IPCC.

National greenhouse research

The National Greenhouse Research Program (NGRP) on climate change, funded by the Commonwealth Government with some State support, commenced in 1989. The main focus of the NGRP is the support of research to deliver understanding of regional climate change; monitoring of the climate system to identify specific regional characteristics; establishing and maintaining sea-level monitoring stations; and examining the response of vegetation to climate change.

The CSIRO conducts significant research on climate change beyond the scope of the NGRP through its climate change research program. This research includes monitoring and understanding the changing chemical composition of the atmosphere, investigating processes that control sources and sinks of greenhouse gases, the oceans role in climate change, the dynamics of the climate system and advanced modelling relating to predictions of climate change and variability. CSIRO also investigates the impacts of climate change.

The Bureau of Meteorology maintains the official nationwide climate observing networks for the monitoring of climate and the detection of possible climate change. The Bureau of Meteorology Research Centre is carrying out an extensive program of climate research including greenhouse modelling. Universities and Cooperative Research Centres also contribute to the overall national research effort.

The Commonwealth Government has established the Greenhouse Science Advisory Committee to provide independent advice on greenhouse science issues.

Research by States/Territories

A number of jurisdictions have funded studies of climate change and its impacts specific to them. Studies have included coastal vulnerability assessments, socio-economic impacts for key regions and the development of improved scenarios of climate change for the specific State/Territory.

Additional measures

2.1 Investigation of climate systems

Support will be continued for research investigating the fundamental biogeochemical and physical processes that operate within the climate system. This includes particularly those processes which play a major role in Australia's climate and how these processes may be altered as a result of human activity, including the identification of opportunities to sequester carbon.

Responsibilities – research to be undertaken by the Bureau of Meteorology, CSIRO, cooperative research centres and tertiary education institutes.

Indicative timeframe – to be pursued through ongoing action.

2.2 Improving climate change models

Development and refinement of climate change models as the tools used to determine the regional patterns, timing and magnitude of climate change will be continued.

Responsibilities – the Bureau of Meteorology and CSIRO with the support of the Commonwealth Government through the Australian Greenhouse Office (AGO).

Indicative timeframe – to be pursued through ongoing action.

2.3 Detecting regional climate change

A coordinated national plan will be developed and implementation to enhance monitoring and assessment of the regional oceans, atmosphere and biosphere to enable detection of regional climate changes, and to provide an improved basis for developing and evaluating predictions.

This national plan should link to relevant international programs such as the Global Climate Observing System, Global Ocean Observing System and Global Terrestrial Observing System.

Responsibilities – to be pursued by the AGO, the Bureau of Meteorology, CSIRO and other relevant institutions including the National Tidal Facility, universities and relevant scientific committees through the Learned Academies. Consultation to occur with State and Territory Governments.

Indicative timeframe – implementation to commence by mid 1999.

2.4 Review of Australian climate change research

Australia's climate change research activities will be reviewed periodically to ensure that these activities contribute effectively to Australia's greenhouse response.

Responsibilities – reviews to be the responsibility of the Commonwealth Government, primarily through the AGO, in consultation with States and Territories, research bodies, relevant existing climate research coordination and review mechanisms and key stakeholders.

Indicative timeframe – reviews to occur three-yearly or immediately preceding any major review of the National Greenhouse Strategy. First review to commence by the end of 1999.

2.5 Support for international climate change science activity

Support will continue to be provided to Australian scientists playing a significant role in key international assessments of climate change science, especially the Intergovernmental Panel on Climate Change, and to assist their collaboration in international research programs and internationally coordinated activities such as the International Geosphere-Biosphere Programme, the World Climate Research Programme and the underpinning Global Climate Observing System.

Responsibilities – to be pursued by the Commonwealth Government through the AGO, the Bureau of Meteorology, CSIRO and other relevant organisations.

Indicative timeframe – to be pursued through ongoing action.

Identifying climate change impacts

While knowledge of the likely nature, patterns and timing of climate change is fundamental, it is an understanding of the potential impacts of climate change on natural, economic and social systems which is particularly important for decision-makers in both the public and private sectors. An understanding of these potential impacts is also necessary for making informed decisions about the development of strategies to adapt to climate change (see Module 8).

Reflecting the partnership approach of the National Greenhouse Strategy, there is a need to encourage increased involvement by the private sector to support activities to improve understanding of climate change and its impacts in relevant areas.

Existing measures

Investigation of potential climate change impacts

Australian experts are actively involved in a wide range of climate change impact studies based on scenarios of future climate and covering agriculture, forests, natural ecosystems, extreme weather, hydrology and water resources, coastlines and human health.

Additional measures

2.6 National forum to establish information needs and priorities

A national forum/conference will be conducted to assist in establishing scientific and other information needs and priorities in relation to the impacts of climate change. The forum, involving relevant policy/decision makers from the government, private sector, public interests and the scientific community will address climate change impacts across a wide spectrum of sectors/issues and identify priority areas.

Responsibilities – forum to be conducted under the auspices of the AGO in consultation with the Bureau of Meteorology and State, Territory and Local Governments.

Indicative timeframe – forum to be conducted during 1998/99.

2.7 National program of impacts assessment

Institutional arrangements will be established to ensure climate change impacts assessment in Australia is appropriately coordinated; is closely linked to policy needs including promoting an understanding of the costs of climate change impacts and the need for adaptation strategies (see Module 8); and takes into account existing strategies to deal with climate variability, other drivers of change such as land use, population change and socio-economic changes. This work will directly build on the outcomes of the National Forum (measure 2.6). Attention will be paid to:

- further identifying research needs and priorities in relation to climate change impacts from both a sectoral and regional perspective;
- implementing an integrated approach to the assessment of climate change impacts (and possible adaptation strategies) for priority areas including:
  - agriculture (e.g. establish thresholds of physiological change, identify practical response actions for breeding, water management and opportunities for new crops);
  - management of forests and other woody vegetation (e.g. identify impacts on species selection of forest trees in managed forests and plantations);
  - human health (e.g. identify adverse impacts on health and changes in the distribution of vector borne diseases);
  - biodiversity (e.g. identify impacts on habitat boundaries and species distributions and implications for land management including the design of reserves and protected lands);
  - coastal planning (e.g. establish vulnerability assessment methods and response mechanisms for diverse coastal environments, socio-economic systems and cultural contexts);
  - water resources; and
  - integrated environmental and socio-economic assessments of climate change impacts for key regions in Australia (e.g. Murray-Darling Basin).
- coordinating the development of a national toolkit of models to promote streamlined and effective impacts research and assessment using common methodologies;
- developing and implementing a strategy to disseminate information on the findings of impacts research and assessment – particularly to those public and private sector groups/organisations whose activities are likely to be affected as a consequence of the anticipated impacts (also see measure 2.10).

Responsibilities – the Commonwealth Government to play a key role in developing coordinating arrangements. Support for assessments to be provided by the Commonwealth Government in collaboration with all States and Territories. Consultation to occur with relevant bodies such as CSIRO; Bureau of Meteorology; Queensland Climate Applications Centre; other government agencies; Universities; and the Academy of Science.

Indicative timeframe – to be pursued through ongoing action from 1998/99.

2.8 Private sector support for climate change research

Mechanisms for obtaining increased private sector support for the program of research into climate change science (and research into climate change impacts, adaptation and other response measures) will be investigated and established.

Responsibilities – to be pursued by the Commonwealth Government in collaboration with business/industry.

Indicative timeframe – to be pursued from 1998/99.

Climate change communication and education

The effectiveness of government information programs can be optimised by ensuring they are:

- based on surveys of community attitudes and behaviour;
- targeted;
- where appropriate, coordinated between governments; and
- rely on use of existing materials, programs and organisational structures to avoid duplication.

Community understanding and action will be supported and sustained by providing information on Australia's performance including greenhouse gas emissions and progress with implementation of the National Greenhouse Strategy.

Government formal education activities will be strategically developed, based on the relevant national, State and Territory school curricula, and coordinated to avoid duplication.

Existing measures

Community information

Information material has been produced and continues to be available for use by target audiences. Noteworthy among this material are published guides for households and the business sector on the contributions they make to greenhouse emissions and the opportunities available to them to reduce emissions. A number of publications explaining climate change science for use by schools and the general public have also been produced.

Formal education

A variety of materials focusing on climate change issues have been produced for use within schools. However, with the advances in climate change science, and the fragmented nature of the preparation of materials, there is need for a review of climate change materials and activities, and the State and Territory curriculum structures, to evaluate opportunities for the better delivery of climate change information and education in schools.

Additional measures

2.9 Greenhouse communications strategy

A greenhouse communications strategy will be developed to raise community awareness of the National Greenhouse Strategy and to provide a coordinated national approach to the ongoing community information programs on greenhouse issues. The aims of the communications strategy and ongoing coordinated national communication efforts will be to reduce duplication within and across governments; to strengthen the linkages between programs; and to enhance the effectiveness and efficiency of delivery of greenhouse community information and education by all spheres of government – including improved marketing of existing information products; and encouraging community action.

Specific issues to be addressed by the communications strategy include:

- evaluation of the effectiveness of existing greenhouse information programs and examination of mechanisms for ongoing monitoring of their effectiveness;
- regular assessment of community attitudes, level of understanding and behavioural responses to climate change issues;
- identification of community information needs and the appropriate vehicle(s) for information (e.g. newspapers, radio/TV and the Internet) and associated materials and programs;
- identification of target audiences and priority market segments which should be serviced through the provision of specific materials and promotional campaigns;
- identification of opportunities for promotional/communications partnerships with local government, industry peak bodies, community networks, and peak community organisations and other appropriate bodies;
- assessment of the need for development of community information programs with national application;
- assessment of the need for intergovernmental mechanisms to provide ongoing coordination of greenhouse community information programs.

Development and review of the communications strategy will be a nationally coordinated initiative, closely integrated with the implementation of the National Greenhouse Strategy.

Responsibilities – to be pursued by the Commonwealth, all States and Territories, and the Australian Local Government Association. Consultation to occur with local governments, industries and industry peak bodies, scientific institutions, and peak community organisations.

Indicative timeframe – to be initiated from 1998/99.

2.10 National greenhouse information service

A national greenhouse information service will be established providing broad community access to regular, authoritative and transparent bulletins/reports on the following issues:

- initiatives in the National Greenhouse Strategy and reports on progress with implementation of the measures;
- status of greenhouse related climate and atmospheric monitoring and climate change detection;
- Australia's greenhouse gas emission performance, highlighting the links between activities and greenhouse outcomes:
  - in accordance with the greenhouse communications strategy (measure 2.9) and linked to information under the National Greenhouse Gas Inventory (measure 1.6), targeted materials will be prepared to provide key sectors and groups with information on their current greenhouse performance including consumption and activity patterns and the greenhouse gas emission factors related to them;
- key developments in greenhouse science (e.g. reports by the Intergovernmental Panel on Climate Change and CSIRO);
- survey reports on community activities and attitudes to greenhouse;
- research on regional climate change impacts and adaptation strategies;
- key international developments in greenhouse policy;
- Australia's national reports submitted under the FCCC;
- information about initiatives being undertaken across the community.

This information would be accessible to the Australian community through a suitable Internet site with links to sources of material by collaborating institutions. There would also be regularly updated hard copy reports on various issues, possibly in the format of a regularly published greenhouse newsletter or magazine. The particular information needs of different groups will also be catered for as required, through the provision of targeted information and communications programs.

Responsibilities – to be pursued by the Commonwealth Government primarily through the AGO with the Bureau of Meteorology and CSIRO, and in collaboration with all States and Territories and the Australian Local Government Association.

Indicative timeframe – arrangements to be determined by end 1998/99.

2.11 School-based greenhouse education

A review of relevant national and State and Territory primary and secondary school curricula and the relevant components of tertiary teacher training courses will be conducted in order to:

- identify where greenhouse education fits within all State and Territory curriculum structures, and relevant cross-curricula greenhouse education opportunities;
- assess the adequacy of existing greenhouse information and education programs;
- identify best-practice programs whether in schools, teacher training institutions or by other providers of curricula;
- identify and evaluate further opportunities for the delivery of climate change information and education in schools and improving learning outcomes and environmental competencies.

In light of the outcomes of the review:

- greenhouse issues will be included, as necessary, as part of teacher training and in-service professional development for teachers;
- a program will be established to build on existing material and, where necessary, develop new or improved curriculum resources including printed materials, teaching strategies, teaching aids and equipment suitable for classroom use for schools, tertiary courses and for in-service training for teachers across Australia. Identified best practice programs will be promoted as the basis for training, professional development and the development of curriculum materials.

Responsibilities – to be considered by the Commonwealth and all State and Territories through the Ministerial Council for Education Employment Training and Youth Affairs (MCEETYA) in conjunction with ANZECC. Actions resulting from the review to be pursued, as appropriate, by State and Territory Government and non-government education authorities, curriculum and training authorities, higher education institutions and professional teaching associations in partnership with national and state professional teaching associations.

Indicative timeframe – review to be completed during 1998/99, with action responding to the findings of the review to be implemented from 1999/00.

2.12 Training for key professions/occupations

Relevant tertiary curricula and training resources related to vocational training (TAFE and industry training programs) and professional training (e.g. engineering, planning, architecture, agricultural science) will be reviewed, either separately or as part of ongoing curricular examination, and opportunities identified to augment existing course structures and materials so as to:

- enhance consideration of greenhouse implications of various activities;
- exploit opportunities for new avenues of activity/work relating to greenhouse.

Responsibilities – to be pursued by the Commonwealth and all States and Territories through MCEETYA, TAFE systems, the Australian National Training Authority, industry training boards, higher education institutions, industry and professional associations.

Indicative Timeframe – review to be completed by end 1999/00.

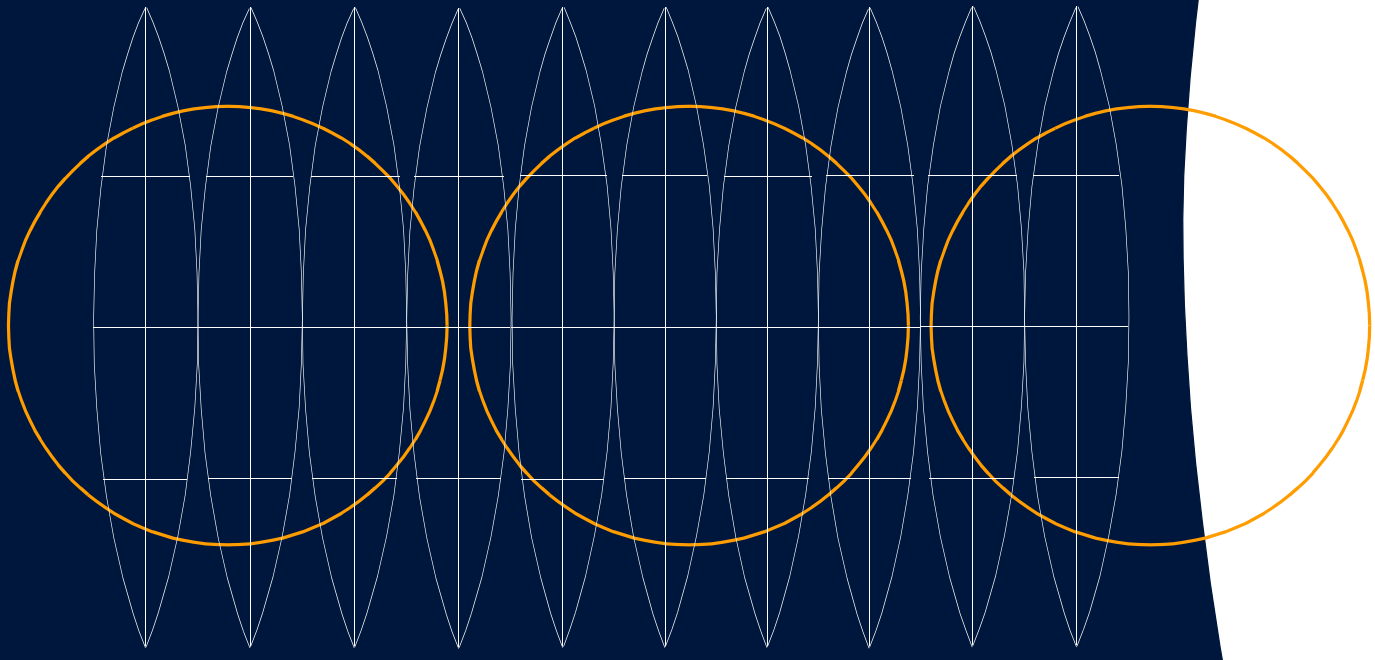
Module

3

The National Greenhouse Stategy

Partnerships for Greenhouse Action: Governments, Industries and the Community

Introduction
Governments leading by example
Working with the private sector
Fostering community engagement
Promoting international partnerships
Emissions trading



Module 3

Partnerships for Greenhouse Action: Governments, Industry and the Community

Introduction

Scope

This module addresses the development of partnerships between all spheres of government, industry and the community to achieve the goals of the National Greenhouse Strategy. Reflecting the nature of the Strategy as endorsed by governments, this module includes governments leading by example in greenhouse abatement action. International partnerships which can provide a cost effective addition to domestic mitigation activities, particularly those provided for by the Kyoto Protocol, are also addressed. The module also includes a measure on a possible domestic emissions trading system for Australia.

Context

An effective National Greenhouse Strategy requires the active cooperation of all sectors of industry and the whole of the Australian community. Such cooperation can be fostered through partnerships between governments, industry, non-government organisations and the community. The importance of the partnership-based approach is reflected in the measures in this module.

Action by Australia

This module outlines action on:

- governments leading by example;
- working with the private sector;
- fostering community engagement;
- promoting international partnerships; and
- emissions trading.

Governments leading by example

It is important that governments demonstrate their commitment to the national partnership for greenhouse action in showing the way with action to reduce the greenhouse gas emissions associated with their own operations.

Existing measures

Energy efficiency of government operations

The Commonwealth Government has made a strong commitment to lead by example in ensuring that its own procurement and operations maximise energy efficiency. A key aspect of the Commonwealth approach is that heads of departments and agencies are held responsible to their Ministers for energy performance. New energy intensity targets and a simplified monitoring and reporting mechanism have been introduced.

State and Territory Governments are also implementing action to reduce their consumption of energy. For example, South Australia has established an Energy Action initiative, in which public sector agencies improve the management of their energy use to achieve greenhouse gas targets. A pilot to the program achieved a measured reduction of 17% in general power and lighting use.

Action by local government

A number of local councils are undertaking greenhouse issues in the preparation and implementation of environment management plans, local conservation strategies, in Local Agenda 21 processes and their council policies.

For example, Leichhardt City Council is applying energy efficiency standards to all new homes and major renovations. Also, Manningham City Council has appointed a Greenhouse Officer, whose salary has already been substantially offset by the $35,000 per annum that the Council has saved as a result of energy efficiency actions undertaken by the officer.

During 1997/98, a pilot Cities for Climate Protection (CCP) program operated in Australia. This program facilitates local government action to reduce greenhouse gas emissions in their own operations and those of their community. Thirty Councils joined CCP.

The NSW Energy Smart Homes Program provides to targeted councils a 'turn key' policy package, including training, information, resource material, media coverage and private industry involvement and support.

Additional measures

3.1 Reducing greenhouse emissions from government operations

Governments will reduce greenhouse emissions from their operations by:

- developing an inventory of greenhouse emissions;
- developing and implementing an action plan to reduce emissions;
- arranging for independent verification of performance under the action plan;
- regularly monitoring and publicly reporting on performance.

The objective is to improve energy efficiency and reduce the greenhouse emissions associated with government buildings, new facilities, equipment and materials, vehicles and other transport uses. Governments will take action possibly including the following:

- the setting of mandatory targets for government agencies;
- use of energy performance contracting (which enable energy efficiency capital improvements to be funded and paid back through consequent guaranteed savings in energy costs) within the public sector. This will involve providing guidelines and supporting information to public sector agencies and identifying and removing any potential barriers to energy performance contracts with third parties;
- development of minimum energy performance standards for new and refurbished government buildings, appliances and equipment;
- introduction of a requirement for utilisation of solar and other renewable energy technologies where relevant and cost effective;
- government purchasing guidelines to incorporate energy efficiency objectives and standards which take account of operating energy costs as well as capital cost for assessment and selection of tendered goods and services;
- consideration of environmental issues including fuel economy and greenhouse emissions when deciding which vehicles to purchase or lease for their fleets (including public transport vehicles), while recognising the current policy of purchasing Australian-made vehicles where applicable (also see measure 5.10);
- introduction of changes to government salary packages to give the option of cashing out the value of a car and petrol;
- encouragement of development and commercialisation of new technologies which could result in significant improvements in fuel economy (such as direct fuel injection motors, use of lightweight metals, fuel switching or hybrid vehicles) by supporting trials in government fleets of new technologies which potentially are commercially viable.

Responsibilities – to be pursued through independent action by the Commonwealth, ACT, Queensland, NSW and SA. Elements of the measure to be pursued by WA, Tasmania, Victoria and NT. To avoid duplication of effort and facilitate the exchange of information and expertise between governments, ANZMEC will provide a mechanism for intergovernmental liaison and coordination where appropriate.

Indicative timeframe – ongoing action from 1998/99.

3.2 Integrated policy review and development

Governments will incorporate greenhouse issues in planning and decision making, including:

- utilising, where feasible, a life cycle approach to decisions concerning development projects, particularly where the project is long term or involves high environmental risk;
- assessing the application of policy instruments for integrated decision making, including the cost-effectiveness, feasibility and likely operation in practice of market-oriented mechanisms;
- adopting an integrated approach including greenhouse assessment in sectoral review activities;
- improved analysis and modelling tools which consider economic, social and environmental impacts/outcomes.

Responsibilities – to be pursued by the Commonwealth and all States and Territories.

Indicative timeframe – ongoing from 1998/99.

3.3 Environmental impact assessment

Governments will ensure that significant potential greenhouse gas emissions emitted from proposed projects are adequately addressed through their environmental impact assessment processes. This will include recognition of greenhouse as an environmental factor for this purpose.

Responsibilities – to be pursued by all jurisdictions .

I**ndicative timefram**e – EIA processes to be reviewed and amended as appropriate by end 1998/99.

3.4 Local government and greenhouse

The Cities for Climate Protection™ Australia (CCP) program provides a strategic framework for action on greenhouse by local government. Cities for Climate Protection™ Australia is an International Council for Local Environmental Initiatives (ICLEI) program in collaboration with the Australian Greenhouse Office. The CCP™ Australia program will assist local councils to quantify their greenhouse emissions and then develop local government and community wide action plans.

Participation in the CCP™ will involve achieving five key milestones:

- compilation of an emissions inventory and forecast for the council and the community;
- establishing an emissions reduction target;
- developing a local action plan;
- implementing policies and measures;
- monitoring and reporting.

Local Greenhouse Action Modules will be developed to enable councils to quickly pick up the most effective initiatives to reduce local greenhouse emissions. Such initiatives could include: actions promoting energy efficiency in buildings; identification and removal of barriers to energy performance contracts with third parties; alternative energy generation; efficient vehicle fleet management; waste management and methane capture; protection and enhancement of greenhouse sinks; policies for sustainable land management; measures regarding urban planning and building design; and appropriate information resources and training.

The Australian Local Government Association, local government bodies and other greenhouse service providers to local government will be invited to advise on the strategic direction of the CCP™ Australia program and the Local Greenhouse Action Modules.

The CCP™ Australia program will actively encourage partnerships between local governments and industry and communities at the local level and at program level with programs such as Greenhouse Challenge, Household Greenhouse Action, Bush for Greenhouse and State and Territory Government programs.

Responsibilities –to be pursued by the AGO in consultation with major stakeholders.

Indicative timeframe – to commence 1998/99.

Working with the private sector

The engagement of industry through partnerships is a vital component of the National Greenhouse Strategy. Programs fostering a dialogue between government and industry, and industry and the community, will be encouraged. Cooperative approaches involving all spheres of government, industry, business and the wider community can take many forms and need to be tailored to reflect the circumstances, needs and capacities of the parties to the partnership.

Existing measures

Greenhouse Challenge program

The Greenhouse Challenge is a program of cooperative agreements between industry and government whereby companies undertake action to abate their greenhouse gas emissions through energy efficiency and other measures. The program includes regular monitoring and public reporting and independent verification. The program commenced in 1995. In November 1997 the Commonwealth Government doubled the budget for the program. Total funding between 1995 and 2003 is $36 million.

At June 1998, more than 265 Australian enterprises had joined the Greenhouse Challenge, and 106 companies and industry associations had finalised agreements. These agreements cover industries which contribute more than 45% of Australia's total emissions from the resource, mining, manufacturing, transport and services sectors and more than 90% of emissions from the electricity generation sector. Actions to be implemented through the agreements are estimated to reduce aggregate greenhouse gas emissions by over 21 million tonnes of CO_2 equivalent in the year 2000 compared with the level they would otherwise have reached. Company actions range across energy and process efficiency, major research and development projects, reducing landfill waste, tree planting, renewable energy and fuel switching.

State-based cooperative programs

A number of states are pursuing cooperative approaches to energy efficiency and greenhouse gas emissions reduction by industry. For example, in NSW the Sustainable Energy Development Authority (SEDA) is implementing industry and commercial cooperative agreements to promote energy efficiency, renewables and cogeneration. In Victoria the Energy Smart Business Program involves a corporate commitment program providing acknowledgments and rewards to participants.

Additional measures

3.5 Extension and expansion of the Greenhouse Challenge program

The Greenhouse Challenge program will be expanded to increase the number of large and medium size companies involved in the program, and extended to engage small businesses through an innovative Greenhouse Allies program.

Responsibilities – to be pursued by the Greenhouse Challenge Office in consultation with relevant industries and key stakeholders.

Indicative timeframe – the number of large and medium size companies participating in the program will be expanded to 500 by the year 2000, and 1,000 by the year 2005.

Fostering community engagement

Active engagement of the broader community is essential to the success of the National Greenhouse Strategy. Community involvement will underpin the success of greenhouse response action and will be integral to many measures in the National Greenhouse Strategy. Targeted information programs are an important means of encouraging individuals, industry groups and communities to contribute to achieving greenhouse emission reductions. Governments and industry can also support community initiatives to address greenhouse objectives at a local level.

Existing measures

Local government initiatives

Local councils are often the first point of contact for community groups and individuals requiring advice and information, and they play an important educative role in promoting environmentally sound practices in the community. Many councils provide in-kind support, materials, specialist equipment and/or offer grants to community groups. Local councils also are increasingly becoming involved in guiding local industry towards sustainability through community programs.

Bushcare and Landcare

Bushcare and the National Landcare Program support community revegetation and sustainable management activities which contribute to enhancing Australia's carbon sink capacity and reducing emissions (also see Module 6).

Greenfleet

Greenfleet is a Victorian initiative under which motorists pay a voluntary annual subscription to fund the planting of trees to offset the carbon dioxide from their motor vehicle use. Each subscription funds the planting of seven fast growing trees. Expansion of the scheme to other states is under consideration.

Waste management

Most States and Territories have waste management strategies which contribute significantly to the reduction of greenhouse gas emissions – both by reductions in the amount of embodied energy sacrificed through waste and reductions in the level of organic waste in landfills. Engagement of the community in reducing waste and recycling is a central element of the strategies. Further information relating to waste management action is presented in Module 7.

Consumer purchasing

Through the purchase of products and services, individuals have a key role to play in reducing greenhouse gas emissions. Governments support informed consumer choice through energy efficiency labelling and rating schemes (see measure 4.10), and fuel efficiency labelling for motor vehicles will now be introduced (see measure 5.10).

Additional measures

3.6 Partnerships with community action programs

Review community action programs which address issues complementary to the climate change agenda, e.g. National Landcare Program, Bushcare, Green Corps:

- to identify those groups in which it would be appropriate to encourage a greater level of knowledge about climate change; and
- to identify and evaluate opportunities within the programs for increasing the delivery of climate change information and education. Case studies of methods of increasing awareness will be documented.

Following the review, processes will be negotiated and established to ensure that climate change information is included into these programs. This may be in the form of new or improved printed materials, workshops for staff, workshops for client groups or other appropriate linkages.

Responsibilities – to be pursued through independent action by the Commonwealth and all States and Territories in consultation with local governments, relevant industry and key stakeholders.

Indicative timeframe – examination of programs to be completed and necessary changes introduced from 1999/00.

3.7 Household Greenhouse Action

The Household Greenhouse Action program aims to maximise the reduction of greenhouse gas emissions in the residential sector through the development of integrated, consistent and effective strategies. The establishment of a Household Greenhouse Action Network will bring together representatives from community, industry, professional associations and all levels of government to foster participation, build relationships and promote the program to potential project partners within their respective sectors.

Initial projects will focus on stationary energy specifically addressing:

- product design;
- use and management;
- installation;
- affordability; and
- availability and marketing.

Expansion of the program into the areas of transport, waste, renewable energy and sinks is under consideration.

The program will enhance links between various programs and measures such as; Energy Efficiency Standards for Residential and Commercial Buildings (measure 4.9), Cities for Climate Protection (measure 3.4), the Environment Strategy for the Motor Vehicle Industry (measure 5.10) and Greenhouse Challenge (measure 3.5).

Responsibilities – to be administered by the AGO. The Household Greenhouse Action Network will inform the development and implementation of the program and foster participation across all sectors in consultation with States and Territories.

Indicative timeframe – to commence in 1998/99.

Promoting international partnerships

International partnerships are an important part of the National Greenhouse Strategy, providing a cost effective addition to Australia's domestic mitigation activities.

The Kyoto Protocol, negotiated in December 1997, has significantly advanced the scope for joint cooperative activities by introducing a Clean Development Mechanism to recognise developing/industrialised country cooperation in reducing greenhouse gas emissions. The Protocol also provides for Joint Implementation involving cooperation between industrialised countries for the purpose of meeting target commitments.

Existing measures

AusAID

Australia's overseas aid program is funding programs and projects that help to abate greenhouse gas emissions and facilitate adaptation to climate change, while simultaneously assisting developing countries to reduce poverty. At November 1997, these programs and projects had a total value of approximately $154 million. They include contributions to the climate change activities implemented by the Global Environment Facility (GEF) and support for a wide range of projects for better environmental management in sectors such as energy, forests, and land resources.

International Greenhouse Partnerships Program

Australia has established an International Greenhouse Partnerships Program, developed through a joint industry/government taskforce, with objectives to:

- facilitate agreement on international arrangements for Joint Implementation and the Clean Development Mechanism;
- facilitate cost effective greenhouse gas emissions abatement projects, especially in the Asia-Pacific region;
- enhance Australia's trade and investment links in environmental technology and service areas;
- facilitate cooperation with developing countries and economies in transition to address climate change;
- encourage investment in capital, technologies and know-how in cooperating countries; and
- facilitate cooperation between Australia and other industrialised countries.

AUSTENERGY

The Australian Energy Systems Exporters Group Ltd. (AUSTENERGY) is a joint initiative of the Australian Government and industry and is a vehicle for channelling Australian expertise in clean energy systems to international markets.

International Centre for Application of Solar Energy (CASE)

CASE is a joint initiative of the Western Australian and Commonwealth Governments under the patronage of the United Nations Industrial Development Organisation (UNIDO). It promotes and facilitates the sustainable application of solar and renewable energy in developing countries.

Programs relating to coal technology and training

The Commonwealth Government, in cooperation with coal and energy supply industries, has used its coal export facilitation activities to support the transfer of technical skills and technology to improve the greenhouse performance of coal use in developing countries. Activities include:

- training programs and workshops on the clean and efficient use of coal. The workshops are aimed at addressing the broad range of technical and managerial skills needed to use coal efficiently and cleanly;
- various demonstration projects including a power station improvement study in China and elsewhere. The study will demonstrate how the greenhouse performance of similar power stations can be improved.

Additional measures

3.8 Promoting international greenhouse partnerships

The International Greenhouse Partnerships Office will promote participation by Australian industry in Joint Implementation and Clean Development Mechanism (and the pilot phase of Activities Implemented Jointly). The Office will focus its activities in the Asia Pacific and Eastern European countries. The emphasis will be on facilitating agreement on international arrangements for these mechanisms, implementing projects that contribute to real and measurable greenhouse gas reductions, and capacity building and institutional strengthening within project host countries for the estimation, monitoring and verification of greenhouse gas reductions.

The Commonwealth Government has provided $6 million over three years to facilitate the establishment of commercially-driven projects. This assistance is to help cover the additional transaction costs incurred by business in undertaking such projects and reduce the risks associated with entering new markets. Industry involvement in International Greenhouse Partnerships will also be promoted through workshops, and business introductions through missions where possible.

Responsibilities – to be pursued by through the International Greenhouse Partnerships Office.

Indicative timeframe – The International Greenhouse Partnerships Office is to continue operating under current arrangements to 2000/01.

Emissions trading

Emissions trading between countries is provided for in the Kyoto Protocol because it offers the possibility for a more cost-effective and flexible international greenhouse response.

The possibility of a domestic emission trading scheme is attracting considerable interest, and a number of relevant private sector initiatives have commenced. More broadly, the Industry Commission is investigating the issues associated with a domestic emission trading scheme, and the House of Representatives Standing Committee on Environment, Recreation and the Arts is carrying out an inquiry into regulatory arrangements for trading in greenhouse gas emissions.

Additional measures

3.9 Emissions trading

Assess options for establishing an emissions trading system in Australia with a view to deciding on responsibilities and timeframe for a scheme. The integration of the system with an eventual international emissions trading system is to be allowed for.

Note – to take advantage of the considerable investments in vegetation and forestry made by the Government (Natural Heritage Trust, Bush For Greenhouse and Plantations for Australia: the 2020 Vision) and to enhance Australia's carbon sink potential, the development of an emissions trading system will need to consider linking vegetation and forestry programs through a credit purchasing system.

Responsibilities – to be pursued by the AGO, State and Territory Governments, in consultation with key stakeholders and relevant Ministerial Councils.

Indicative timeframe – ongoing action.

Module

4

The National Greenhouse Stategy

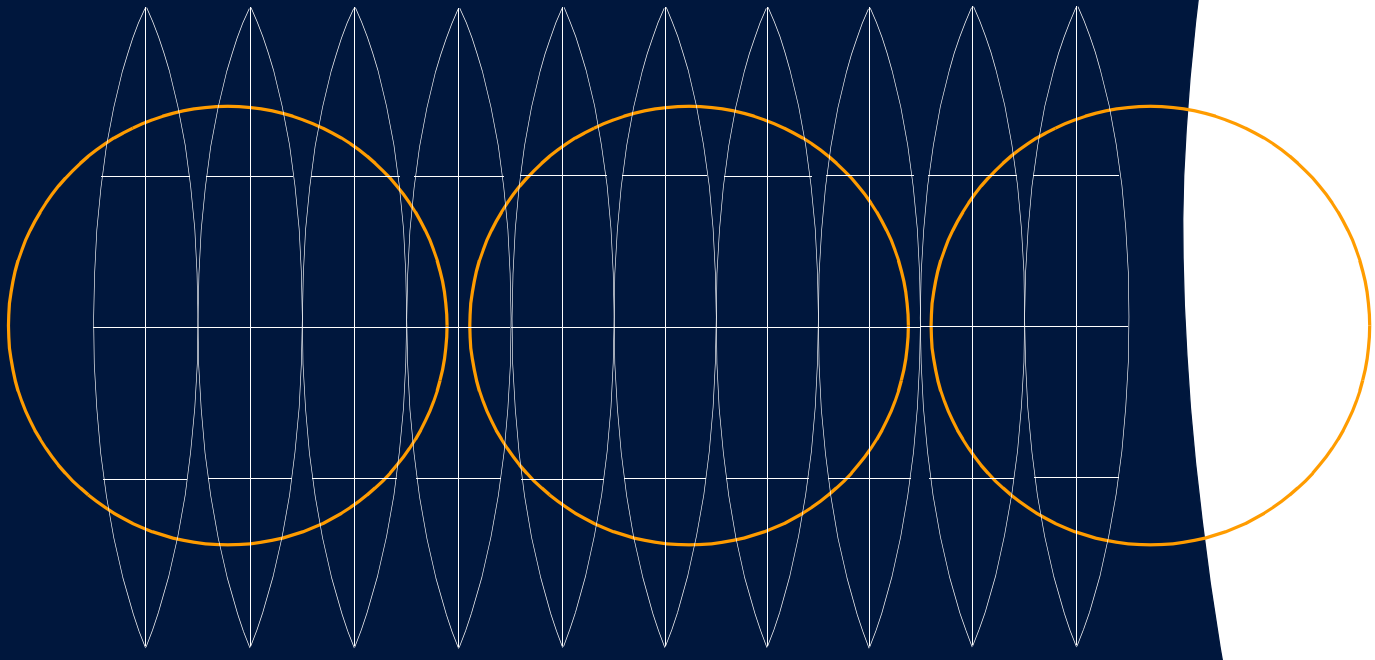
Efficient and Sustainable Energy Use and Supply

Introduction

Reducing the greenhouse intensity of energy supply

Harnessing renewable energy

Improving end-use energy efficiency



Module

4

Efficient and Sustainable Energy Use and Supply

Introduction

Scope

This module addresses non-transport energy-related activities including conventional and renewable forms of energy supply, and energy use by the industrial, commercial and residential sectors.

Context

In 1996, greenhouse gas emissions from non-transport energy use were 231.1 Mt (CO_2 equivalent) or 55% of national net greenhouse gas emissions (National Greenhouse Gas Inventory 1996). Between 1990 and 1996, greenhouse gas emissions from non-transport energy use increased by 13%.

Action in the energy sector is identified as a national priority, essential for achieving the goal of limiting net greenhouse gas emissions.

Major changes to the electricity supply industry resulting from micro-economic reforms currently underway nationally, and in a number of jurisdictions, aim to remove barriers to competition and introduce a national electricity market. The Council of Australian Governments (COAG) also has agreed to the implementation of free and fair trade in natural gas.

Australia has seen steady growth in the use of natural gas in the energy sector, for electricity generation and for direct use. As a result of micro-economic reforms in the electricity and gas markets, this trend is expected to continue, resulting in a lowering of the average greenhouse gas intensity of energy.

In the context of pursuing sustainable energy and energy market reform, regional differences in the means of generating electricity are important to consider. In Tasmania, for example, where hydro-electricity is the predominant source of power, certain measures in this module will be less relevant and either not be pursued or will be pursued only in part in that State. In the case of Western Australia, not only does it have a small energy market and widely dispersed energy systems, the State is not interconnected to the National Electricity Market and has no interstate gas pipeline. As such, certain measures and timetables in this module will also be less relevant and may not apply.

The Greenhouse Challenge is a program of cooperative agreements between industry and government by which industry commits to identify and implement cost-effective and innovative approaches to the abatement of greenhouse gas emissions. Many members of the energy supply industries and a range of small and large energy users are involved as program participants. Details relating to the program are presented in Module 3 (measure 3.5).

Action by Australia

This module outlines action on:

- reducing the greenhouse intensity of energy supply;
- harnessing renewable energy; and
- improving end-use energy efficiency.

Reducing the greenhouse intensity of energy supply

The National Greenhouse Strategy recognises the need for measures which reduce the greenhouse intensity of Australia's energy supply. Opportunities to achieve this need to be pursued, wherever practicable, by all segments of the energy industry, including gas suppliers and electricity generators, retailers and distributors.

Micro-economic reforms and competition policy have the potential to further improve the economic efficiency of the energy sector. However, it is important to ensure that these reforms lead to outcomes consistent with the goals of this Strategy. An important prerequisite is the monitoring of market trends and the review, where necessary, of the operation of the market.

Existing measures

Micro-economic reform

Electricity supply industry reform measures are being progressed by the COAG. Progressive restructuring of the electricity supply industry has been taking place over the last decade, leading to the introduction in 1997 of the first stage of a competitive electricity market in southern and eastern Australia.

A similar process of reform is taking place in the gas industry. Australian governments are committed to enhancing competition in the natural gas sector. Reducing the cost of gas will increase its competitiveness against other fossil fuels with higher greenhouse emission intensities.

Periodic reviews of national energy market trends

As a result of agreement by COAG in 1995/96 to recommendations of the National Grid Management Council, the Australian and New Zealand Minerals and Energy Council (ANZMEC) will conduct a periodic review of trends in the national energy market against the criterion of achieving cost-effective and competitive delivery of energy services.

Review of transmission and distribution pricing

A review of transmission and distribution pricing under the national electricity code is being carried out by the National Electricity Code Administrator (NECA). The review is expected to be completed in early 1999.

Environmental regulatory changes in the NSW electricity industry

Under the ***NSW Electricity Supply Act 1995,*** electricity retail licensees are required to develop greenhouse gas emission reduction strategy plans, and electricity distributor licensees are required to investigate demand management options prior to expanding, or increasing the capacity of their distribution systems.

NSW energy pricing regulation

The NSW Independent Pricing and Regulatory Tribunal (IPART), which regulates monopoly electricity services, is required by legislation to use appropriate pricing policies to protect the environment. The Tribunal is also required to have regard to consumer protection, economic efficiency, financial stability and environmental and other standards.

Strategic Industry Research Foundation

The Victorian Government, through the Strategic Industry Research Foundation, funds research into improving energy efficiency, and reducing greenhouse gas emissions, in power generation. Commitments to date include funding for new technologies for Ceramic Fuel Cells Limited which has brought the development of ceramic fuel cell technology to the pre-commercialisation stage.

Additional measures

4.1 Accelerating and monitoring energy market reform

A. Energy market reforms will be expanded and invigorated to promote the delivery of greenhouse abatement as well as economic benefits. Specific measures to be pursued, working with industry and others, include:

(i) invigorate existing energy market reform processes, including removal of derogations as quickly as feasible, efficient and equitable locational signals, unbundling of transmission charges, pass through of net benefit/cost embedded projects which deliver network cost reductions/increases, competitive sourcing of ancillary services and mutually compatible regulation of gas and electricity markets;

(ii) expand the focus of the energy reform program to deliver consistent and compatible national frameworks for gas and electricity, with efficient new investment signals, transparent funding of network cross-pricing subsidies and enhanced upstream competition;

(iii) develop and implement means to identify the greenhouse emissions intensity of energy sources in energy market trading pools;

(iv) ensure that technical and safety requirements for grid connection of small scale electricity generation such as small cogeneration, photovoltaic arrays and wind turbines are consistent, appropriate and equitable;

(v) ensure that there are no regulatory impediments to energy service providers delivering a complete energy service to customers by supplying stand-alone power systems based on renewable resources, wherever it is economic to do so;

(vi) identify and address any structural, legislative or regulatory barriers to cogeneration consistent with the principle of neutrality of treatment of energy sources;

(vii) identify and address any structural, legislative or regulatory barriers to renewable energy and energy efficiency, including removal of legislative barriers to pricing approaches which encourage energy efficiency and renewable energy, consistent with efficient operation of the market.

B. The operation of the competitive energy market will be monitored and reviewed and its further development fostered through the following actions:

(i) monitoring operation of the market in relation to trends in national energy production and use and the development of an energy services industry to assess its impact on greenhouse gas emissions. Public assessment will include publication of a range of indicators and analysis of trends, which will provide a basis for reviewing policy, programs and regulation;

(ii) reviewing energy markets to identify and address structural, market, legislative and regulatory barriers to sustainable energy supply and demand side options;

(iii) periodic reviews of the operation of the National Electricity Code and National Gas Access Code to ensure that they do not present barriers to sustainable energy supply and demand side options, taking into account reports of the National Electricity Code Administrator and any relevant reports by gas regulatory bodies.

Governments capacity to regulate in relation to greenhouse outcomes from the energy sector should be maintained notwithstanding ownership arrangements.

Responsibilities – to be pursued through COAG processes, through the Greenhouse Energy Group and the Energy Market Group, through jurisdictional involvement in relevant processes such as the NECA review of transmission pricing, and ANZMEC.

Indicative timeframe – A(i) by June 2001. Timeframe for WA to be determined. For gas by 1 July 2002 except for derogations and transitional arrangements as agreed by the parties to the Natural Gas Pipelines Access Agreement.

A(ii) national frameworks for gas and electricity by 2002. Timeframe for WA to be determined.

A(iii) by June 2001. Timeframe for WA subject to development of an electricity trading pool in WA.

A(iv–vii) by June 2000. Timeframe for WA to be determined.

B(i) first assessment and report to be completed by July 2000.

B(ii) jurisdictions to complete reviews by July 2000 and report to COAG. Where feasible, barriers to be addressed by December 2001.

B(iii) reviews to be conducted under the relevant Code arrangements.

4.2 Strategies for energy industries to abate greenhouse gas emissions

Governments will work with industry to pursue strategies to achieve best practice in the efficiency of electricity generation and to abate greenhouse gas emissions from operations of the energy supply industry.

(i) The Commonwealth working with the States, Territories and industry will pursue these outcomes through the development of efficiency standards, for different fossil fuel classes to be applied to new electricity projects, significant refurbishments and existing generation, so as to deliver reductions in the greenhouse gas intensity of energy supply. Options for the application of such standards are the subject of public consultation and government examination.

(ii) To complement these standards, Governments may also pursue outcomes through one or more of the following measures:

- encouraging energy supply businesses through cooperative agreements to take action;
- licensing requirements;
- legislation;
- support for research and analysis of options.

Working with the electricity supply industry, strategies to be promoted with the industry will include:

- electricity generators improving operating efficiency of sent-out power by measures such as adopting technologies and techniques to improve the thermal efficiency of fuel and steam usage, carrying out energy audits of their own operations, and implementing cost-effective demand management and energy efficiency actions to improve those operations;

- electricity generators working with industry to identify opportunities to establish energy parks in the environs of power stations to use steam, heat and electricity from the power station;
- network operators investigating options to reduce losses in electricity transmission and distribution;
- electricity retailers improving energy billing systems to provide information to enable consumers to better manage their energy use, and offering metering systems which promote energy management in the commercial and industrial sectors;
- electricity retailers offering innovative pricing mechanisms such as net billing (giving credit for electricity fed into the grid from the customer's site) and green pricing (premiums paid for electricity sourced from renewables);
- investigating the use of stand-alone power systems and demand management options prior to expanding or increasing the capacity of their distribution system;
- providing and promoting small-scale alternative energy systems for supply to customer loads remote from electricity supply networks;
- considering the progressive replacement of uneconomic power lines with stand-alone power systems.

Working with the gas supply industry and others, strategies to be promoted will include:

- developing and implementing strategies to expedite the reduction in gas leakage from gas reticulation systems in metropolitan areas;
- developing and undertaking effective energy efficiency promotion programs;
- improving billing systems to provide information to enable consumers to better manage their energy use.

  Responsibilities – (i) to be pursued through the Efficiency Standards Working Group under the Greenhouse Energy Group.

  (ii) to be pursued by the Commonwealth, ACT, NSW, NT, Queensland, SA, Victoria and WA working with the energy industry and relevant industry associations.

  Measure not applicable in Tasmania.

  Indicative timeframe – (i) standards for new power generation to be in place from 2000.

  (ii) to be pursued through ongoing action.

4.3 Greenhouse strategies for energy retailers

Retail energy suppliers will be encouraged to develop strategies for reducing greenhouse gas emissions. This could include environmental conditions on retail licences or cooperative programs between companies and governments. Strategies would be negotiated with State and Territory Governments before being finalised, and would encourage retailers to:

- develop plans for energy efficiency, demand management and sustainable energy sourcing; and
- report annually in relation to implementation of demand management strategies, principal greenhouse gas emissions arising from electricity production and sources of electricity supply (see measure 4.4).

  Responsibilities – to be pursued by the ACT, NSW, NT, Queensland, SA, Tasmania, Victoria and WA.

  Indicative timeframe – strategies to be finalised by July 2000.

4.4 Emissions reporting

Greenhouse gas emissions from energy production, including electricity generation and gas supply, will be monitored and reported annually in a manner suitable for input into national and state greenhouse gas inventories and other required international reporting mechanisms, avoiding duplication in reporting arrangements and integrating with existing licensing/reporting requirements where possible.

All electricity generators with aggregate installed capacity above a threshold level to be determined will report by site for each site over a certain installed capacity to be determined or, otherwise aggregate data for all sites, (including through the annual national compilation of statistics by the Electricity Supply Association of Australia (ESAA)) on quantities of primary fuels consumed; internal usage of energy; kWh of electricity sent out; average annual emissions of CO_2 per kWh sent out; annual average conversion efficiencies – thermal and electrical; and annual emissions of other greenhouse gases (CH_4, N_2O).

Electricity network businesses will report transmissions and distribution losses for each system over a certain nominal installed capacity to be determined.

Gas pipeline operators will report on compressor station emissions of average CO_2 for gigajoule (GJ) of gas delivered and on annual emissions of other greenhouse gases from gas transmission and distribution systems.

Gas producers will report on average annual emissions of CO_2 per GJ of gas delivered and on annual emissions of other greenhouse gases arising from venting, flaring and processing.

The oil industry will report on greenhouse gas emissions from venting, flaring and processing in production and refining; and transportation, transfer and storage.

The coal industry will report on methane emissions from coal mining, processing, storage and transport to point of sale.

The electricity and gas distributors and retailers will report on programs directed at demand management and energy efficiency including: types of programs and expenditure; assessment of the success of programs; and total and average consumption figures by customer class (residential, commercial, industrial, public lighting).

Reporting will include information on trends in these data. As far as possible, consistent with commercial-in-confidence requirements, all reported information will be made publicly available.

Responsibilities – to be pursued by all States and Territories in collaboration with electricity and gas suppliers, Electricity Supply Association of Australia, Australian Gas Association, Australian Coal Association, Australian Institute of Petroleum, Australian Pipeline Industry Association and Australian Petroleum Production and Exploration Association. The Commonwealth will support action through cooperative agreements and industry association coordination and arrange for auditing of reports.

Indicative timeframe – arrangements to be in place to enable reporting on operations relating to 1999/00.

4.5 Cogeneration

Cogeneration will be promoted through:

- identification of market opportunities;
- building investment in smaller-scale cogeneration projects of up to about 30 megawatts (MW) by providing information to potential markets, disseminating case study results and conducting practical workshops.

These initiatives will complement existing efforts by commercial energy service enterprises to identify potential cogeneration applications.

Note – local air quality considerations will need to be taken into account in the promotion of cogeneration in urban areas.

Responsibilities – to be pursued by the Commonwealth, ACT, NSW, NT, Queensland, SA, Victoria, WA and industry. ANZMEC to facilitate inter-governmental cooperation where necessary.

Measure not applicable in Tasmania.

Indicative timeframe – to be pursued through ongoing action.

Harnessing renewable energy

Australia has an abundance of renewable energy resources and a strong research base with a record of world-class achievements. The further development and commercialism of renewable energy technologies and the growth of manufacturing in Australia provides an opportunity for substantial greenhouse gas reductions as well as significant economic gains through increased demand for renewable energy and the development of domestic and export markets.

Existing measures

Support for the commercialisation of renewable energy

A Sustainable Energy Development Authority (SEDA) has been established by the NSW Government with discretionary funding of $39 million over 1996–99 to support the development, commercialisation and use of sustainable energy technologies, including those for renewable energy.

Stand-alone power supply systems are widely used in rural and remote areas. Many thousands of individual telecommunications systems, large numbers of household power supply systems and a small but growing number of rural communities rely on renewable energy for power. Solar hot water systems are currently installed on around 350,000 homes – exemption from sales tax is provided for the solar collector component of solar energy systems.

Renewable energy infrastructure

Thirteen hydro-electricity schemes with combined output of 131 MW have been built recently or are under construction on existing water storage dams throughout Australia. Over 30 MW of electricity is now generated using gas from municipal landfills.

Support for R&D

Research and development (R&D) into renewable energy is supported through Cooperative Research Centres and the provision of government funding for research, particularly related to solar energy/photovoltaic cell technology.

Additional measures

4.6 Strategic development of renewable energy

The strategic development of renewable energy will be pursued through the following programs:

(i) an action agenda will be developed for the renewable energy industry, including:

- analysis of current industry performance, including exports, research and development, profitability, employment and market growth;
- identification of impediments to growth, including information failures, education and training, labour market and market access issues and business input costs; and
- development of priorities for action, including priorities for market access negotiations and reform of sector specific regulation.

(ii) direct support to the industry will be provided through:

- *Renewable Energy Equity Fund* (REEF) – to facilitate the commercialisation and application of renewable energy technologies, Government funding will be provided through licences to a REEF fund manager on a competitive basis and invested along with private sector funding on a 2:1 basis consistent with the existing Innovation Investment Fund arrangements;
- *Renewable Energy Commercialisation Program* – this will provide support for, and promotion of, strategically important renewable energy initiatives that have strong commercial potential. This program incorporates the former Renewable Energy Industry Program;
- *Renewable Energy Showcase* – leading edge 'showcase' projects will be selected via competitive tender for seed funding and/or promotion. These could include projects which are becoming close to commercial.
- *Renewable Energy Technology Internet Site* – a sophisticated and up-to-date Internet site on renewable technologies will be developed to provide information on technologies, examples of their application and available government assistance.

(iii) energy industry standards and training will be strengthened by the introduction of training and accreditation schemes for service providers in the industry and the development of standards for renewable energy equipment and systems to promote customer acceptance and export market development;

(iv) data on the renewable energy services industry and renewable energy equipment production and use will be collected and disseminated to assist industry and governments to monitor growth and the effectiveness of programs.

Responsibilities – (i) to be pursued by the Commonwealth, as described in Industry Policy Statement of December 1997.

(ii) and (iv) to be pursued by the Commonwealth.

(iii) all jurisdictions through ANZMEC.

Indicative timeframe – (i) agenda development process commenced mid 1998.

(ii) measures commenced July 1998.

(iii) measures to commence from December 1998.

(iv) data to be collated by December 1999 with biennial updates.

4.7 Mandatory targets for the uptake of renewable energy in power supplies

The Commonwealth intends that electricity retailers and other large electricity buyers will be legally required to source an additional 2% of their electricity from renewable or specified waste-product energy sources by 2010 (including through direct investment in alternative renewable energy sources such as solar water heaters). A variety of implementation options are being considered in public consultations and negotiations with the States and Territories.

This measure is aimed at accelerating the uptake of renewable energy in grid-based power applications, and provide an ongoing base for commercially competitive renewable energy. The program may also contribute to the development of internationally competitive industries.

Responsibilities – to be pursued through Renewables Targets Working Group of the Greenhouse Energy Group.

Indicative timeframe – requirements to be phased in from 2000.

4.8 Extension of green power schemes

Governments will encourage the provision of green power schemes across Australia. This is to be underpinned by a nationally agreed definition of green power, and nationally consistent accreditation systems.

Note: The definition of green power is to be developed through the Greenhouse Energy Group.

Responsibilities – to be pursued by the Commonwealth and all States and Territories.

Indicative timeframe – work of the Greenhouse Energy Group to be finalised by December 1998. Support to be ongoing.

Improving end-use energy efficiency

Energy consumed by equipment and appliances is a major source of greenhouse gas emissions attributable to the industrial, commercial and residential sectors. While changes in behaviour can play a part in reducing energy use in these sectors, improvements in the energy efficiency of equipment and appliances also have an important role.

Government support can provide an important stimulus to the development of close-to-commercial energy efficiency and renewable energy technologies and services. This also can provide economic benefits through industry development and exploitation of export market potential.

Improvements to the design of commercial and residential buildings have the potential to make an important contribution to limiting Australia's greenhouse gas emissions. Building design has to be considered in its broadest sense – relating both to the architectural design of the building itself and to the wider building envelope and aspects of subdivision design which impact on energy efficiency.

Some appliances and equipment are responsible for significant greenhouse gas emissions, namely hot water heaters and electric motors. To this end, measures that target these particular appliances are included (see 4.11, 4.14, 4.15).

Access to information required for informed decision-making is a prerequisite for the efficient operation of any market.

Existing measures

Appliance labelling

Energy labelling for major domestic appliances has been in place in most Australian states for several years.

Minimum energy performance of appliances

Governments are committed to introducing minimum energy performance standards for domestic electrical appliances. Standards have been developed in consultation with industry and will take full effect from October 1999.

Energy utility initiatives

Demand management initiatives by electricity utilities are an integral part of reforms in the electricity sector and are leading to the growth of energy service companies.

International benchmarking

Databases are being developed for benchmarking Australian performance in energy efficiency in the residential, commercial and industrial sectors against available international data. Australia also is participating in

international cooperative efforts to improve comparative data. This work will be complemented by analyses, in specific sectors, of the technical and economic options for improvement of Australian performance against these benchmarks.

Energy information programs

Programs in a number of jurisdictions provide information and advice with the aim of encouraging the adoption of cost-effective energy efficiency and renewable energy technologies in the residential, business and government sectors. Programs include provision of information, raising awareness of the benefits of energy efficiency coupled with initiatives to encourage and facilitate actions that lead to improved energy efficiency.

Government support is provided for the Australian operation of the Centre for the Analysis and Dissemination of Demonstrated Energy Technology (CADDET) – an International Energy Agency initiative which provides international access to, and exchange of, information on demonstrated high efficiency, best-practice technologies in energy management and renewables.

Additional measures

4.9 Energy efficiency standards for residential and commercial buildings

(i) Residential buildings – develop a minimum energy performance requirement for new houses and major extensions taking into account, as appropriate, opportunities offered by existing performance measures, or ratings, such as the Nationwide House Energy Rating Scheme (NatHERS).

(ii) Commercial buildings – The Commonwealth will work with the States, Territories and key industry stakeholders to develop voluntary minimum energy performance standards for new and substantially refurbished commercial buildings. If by the end of 1998 the voluntary approach is not achieving acceptable progress towards higher standards of energy efficiency, governments will work with industry to implement mandatory standards through amendment of the Building Code of Australia.

Responsibilities – ANZMEC will work with key industry stakeholders including the Australian Building Codes Board.

Indicative timeframe – To be determined.

4.10 Energy performance codes and standards for domestic appliances and commercial and industrial equipment

Improvements in the energy efficiency of domestic appliances and commercial and industrial equipment will be promoted by extending and enhancing the effectiveness of existing energy labelling and minimum energy performance standards programs. This will be pursued by:

- developing minimum energy performance standards for a broader range of new appliances and equipment;
- regulating or developing codes of practice to ensure the adoption of energy performance standards;
- revising the technical framework of the labelling program to keep pace with improvements in product efficiencies including 'super efficient' appliances;
- working with industry to improve gas appliance minimum energy performance standards (MEPS) and labelling programs;
- ensuring consistency of approach between Australia and New Zealand wherever possible.

Responsibilities – to be pursued by the Commonwealth and all States and Territories through ANZMEC, in consultation with relevant industry and key stakeholders.

Indicative timeframe – appliance labelling framework to be revised by July 1999. Extension to MEPS to be agreed by July 1999. Introduction of agreed industrial and commercial equipment labelling/MEPS program by July 1999.

4.11 Electric motors

A program will be developed and implemented aimed at improving energy efficiency in electric motors and drive systems. A targeted industry promotion campaign will emphasise the financial and environmental benefits of developing and adopting high-efficiency motors, variable speed drives and improvements in end-use efficiency to reduce drive requirements.

Responsibilities – to be pursued by the Commonwealth and all States and Territories through ANZMEC, in consultation and collaboration with industry.

Indicative timetable – implementation from 1998/99 in conjunction with introduction of labelling/MEPS program for electric motor drives.

4.12 Development of energy efficiency technologies and services

The development of close-to-commercial energy efficiency technologies and services which are appropriate to the circumstances of each jurisdiction will be encouraged. Possible mechanisms to pursue this could include:

- case studies;
- demonstration programs;
- a technology procurement program to provide an incentive for manufacturers to accelerate the commercialisation of high-efficiency appliances in Australia (for example see measure 4.14);
- strategic investments in technologies;
- financing guarantees and loan and grant schemes for technology commercialisation.

Responsibilities – to be pursued through independent action by NSW, ACT, Queensland, SA, Tasmania, Victoria and WA. ANZMEC to facilitate, where necessary, and monitor progress.

Measure not applicable in the NT.

Indicative timeframe – ongoing action.

4.13 Consumer uptake of sustainable energy technologies

Programs which are appropriate to each jurisdiction will be developed, in collaboration with the energy, finance industries and other relevant industries, aimed at end-users, retailers and marketers, to overcome financial barriers to increased market penetration of newly commercialised technologies and services. They could include:

- facilitating performance contracting;
- rebates for installation of energy-efficient or renewable energy technologies, appliances and equipment;
- bidding programs in which customers competitively bid for funding to help offset the cost of implementing energy efficiency and renewable energy projects, selected in order of cost-effectiveness;
- shared saving schemes where loan funding for energy savings is repaid progressively out of the financial savings achieved;
- credit schemes to provide funds to end-users for the purchase of particular appliances and equipment;
- an energy planning incentives program to provide funding to assist business to develop comprehensive three-to-five-year energy plans.

Responsibilities – to be pursued through independent action by NSW, Queensland, SA and WA, in collaboration with the energy and finance industries. Where jurisdictions wish to pursue joint cooperative programs this could be facilitated through ANZMEC. Commonwealth to pursue action through the Household Greenhouse Action program (measure 3.7) and the Strategic Development of Renewable Energy (measure 4.6).

Indicative timeframe – programs to be developed and implemented from 1998/99.

4.14 Manufacture and marketing of water heaters

The production and market penetration of low greenhouse gas emission hot water systems will be promoted, including solar water heaters, high efficiency natural gas water heaters, heat pump water heating systems and hybrid systems.

In addition, attention will be paid to improving the design and efficiency of operation of smaller hot water systems.

(i) The introduction of mandatory targets for renewable energy to be applied to electricity retailers (measure 4.7) will drive and support the achievement of these outcomes.

(ii) Other mechanisms may include:

- cooperative purchasing schemes;
- innovative financing options;
- shared savings schemes;
- direct financial assistance;
- development of promotional campaigns.

Industry, Local Government and other organisations are to be invited to submit proposals to meet the aims of this measure and incorporate the above (or other) mechanisms. Criteria for assessing the proposals will include greenhouse benefits and potential for market transformation (especially through a significant sustainable reduction in costs).

Responsibilities – (i) to be pursued through the Renewables Target Working Group of the Greenhouse Energy Group (see measure 4.7).

Measure not applicable to Tasmania.

(ii) To be facilitated/coordinated through ANZMEC.

Indicative timeframe – (i) requirements to be phased in from 2000.

(ii) Ongoing.

4.15 Efficient use of hot water

The installation of energy efficient water heaters and the more efficient use of hot water will be promoted by encouraging consumers and, where appropriate, builders and tradespeople to purchase energy efficient dishwashers, washing machines and hot water systems, improve the insulation of hot water storage systems and pipework, adjust thermostats to optimal levels and use low flow shower heads and low flow faucet aerators.

Action will be pursued by an Australia-wide program including a combination of one or more of the following:

- cooperative agreements with relevant companies/industry associations;
- development and application of codes of practice or best practice guidelines;
- provision of information to the industry and consumers to support the purchase and appropriate use and maintenance of energy-efficient water heating equipment and hot water using appliances;
- equipment and appliance labelling (see 4.10).

Responsibilities – to be pursued by the Commonwealth, ACT, NSW, Queensland, SA, Tasmania, Victoria and WA through ANZMEC. As appropriate, action to be pursued in partnership with relevant industries/industry associations and local government.

Indicative timeframe – to be implemented from 1998/99.

4.16 Efficiency benchmarking and best practice

Governments will work together with industry associations to promote industry energy efficiency and best practice. The energy characteristics of a range of industry sectors will be identified and the data collected will be used to establish a profile of energy performance and to benchmark best practice. Opportunities to improve energy efficiency will be identified and good practice will be promoted and publicised. The industrial data (including mining and minerals processing) collected through the Energy Efficiency Best Practice Program will contribute towards the enhancement of a national energy end-use database.

Key industrial technologies such as high-efficiency electric motors and low-temperature heat processes would be promoted through this program.

As a priority under this initiative, governments will work with industry to improve energy efficiency in the wholesale and retail sector, which has become the largest and fastest growing component of commercial sector energy use. A Wholesale/ Retail Energy Efficiency Program (WREEP) will be established to encourage equipment manufacturers, operators of shops and owners of retail buildings to manufacture, design and adopt more efficient technologies and practices. Initial focus will be on retail chains; shopping centre management; major franchise operations; and industry and trade associations.

Responsibilities – the Energy Efficiency Best Practice Program is being implemented by Commonwealth in partnership with participating industry associations and other relevant stakeholders. WREEP to be developed and implemented through coordinated intergovernmental action involving Commonwealth and all States and Territories in cooperation with industry. To be implemented in consultation with industry, industry associations and other relevant stakeholders.

Indicative timeframe – to be operational from 1998/99.

4.17 Life cycle energy analysis

Life cycle energy issues will be pursued through the following actions:

(i) governments, in consultation with industry, will develop a database and nationally accepted methodology for life cycle energy analysis. Life cycle analyses will be conducted initially of materials and products identified as contributing to high energy use over whole product life cycles, or significant life cycle stages, including sourcing of materials, manufacture or construction, product use and product disposal. This analysis will be undertaken to determine cost-effective opportunities for achieving net greenhouse emission reductions, including:

- substitution of materials lower in embodied energy for equivalent use;
- substitution of manufacturing processes lower in energy use;
- design or product operation considerations leading to lower energy consumption during product use;
- disposal considerations including recycling and recovery of embodied energies;
- whole-of-life-cycle approaches which lead to net energy reductions over the whole life cycle of a product.

Note – Work by the RMIT Centre for Design in the Ecoredesign program provides an important foundation for extension of lifecycle analysis into practical application in product development.

(ii) based on these life cycle analyses, policies/programs will be developed and implemented to encourage producer responsibility for sourcing of materials, product design and manufacture, product operating efficiencies and product disposal, as a means of improving greenhouse outcomes. To be pursued by actions such as:

- cooperative agreements with industry;
- information and education;
- best practice guidelines;
- codes of practice;
- promotion through award schemes etc;
- legislation, regulation and standards, where appropriate.

Note – Products include vehicles, buildings and household or commercial appliances.

Responsibilities – to be pursued by the Commonwealth, ACT, NSW, Queensland, SA, Tasmania and Victoria as a joint initiative of ANZMEC and ANZECC. Industry, waste and environmental management associations, conservation groups and consumer groups will be consulted in the development and implementation of the measure.

Indicative timeframe – database, methodology and analyses to be conducted by December 1999. Policies and programs stemming from analyses to be implemented from July 2000.

4.18 Energy information services

The effective delivery of energy information to consumers will be pursued by actions such as:

- support for independent energy information services;
- development of information resource materials including a home energy audit kit (covering topics such as weatherisation, insulation, low-flow shower fittings, window treatments and appliance tips) and curriculum material for schools;
- provision of toll free automated phone advisory services and mail outs;
- further development of the existing Internet-based national energy efficiency information site Net Energy for household, commercial, industrial and government end-users.

Responsibilities – to be pursued by the Commonwealth through ANZMEC with all States and Territories and in consultation with local government.

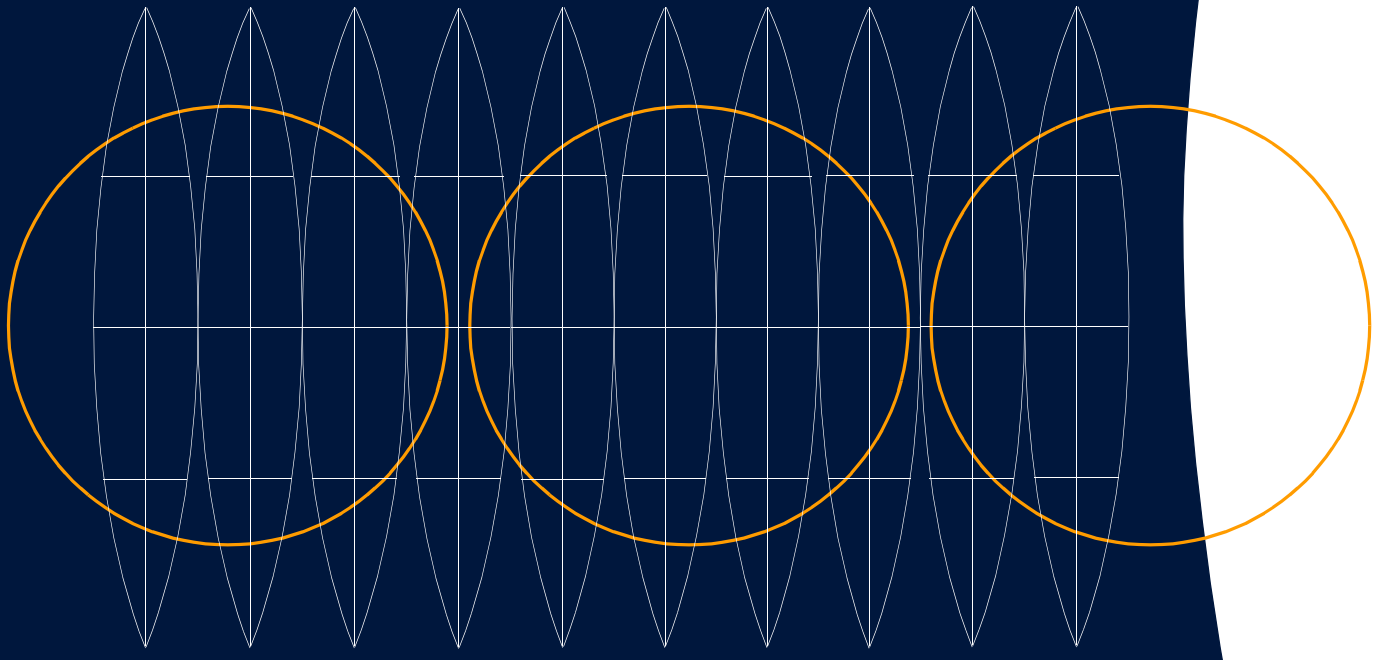
Indicative timeframe – to be established by 1999/00.

Module

5

The National Greenhouse Stategy

Efficient Transport and Sustainable Urban Planning



Module 5

Efficient Transport and Sustainable Urban Planning

Introduction

Scope

This module addresses reducing greenhouse gas emissions from passenger and freight transportation. It encompasses a range of measures including vehicle and transport system technologies; urban planning which reduces the need for motorised travel and encourages public transport use; and action to influence the behaviour of transport users.

Context

Transport was responsible for 17% of Australia's net greenhouse gas emissions and 24% of emissions produced through activities involving the use of energy in 1996 (National Greenhouse Gas Inventory 1996). Cars were responsible for 56% of these emissions.

National Greenhouse Gas Inventory data indicates that, from 1990 to 1996, national transport emissions grew by 15% – the fastest growth of any sector. Work by the Bureau of Transport Economics projects that, in the absence of further measures to limit greenhouse emissions, domestic transport emissions will increase by 42%, on 1994 levels, by the year 2015. This increase includes a doubling of emissions from road freight and domestic aviation, trebling of international aviation emissions (from a small base) and stable emissions from shipping.

Measures to reduce greenhouse gas emissions in the transport sector can contribute to the achievement of other government environmental, economic and social policy objectives. These include reducing business costs (e.g. through reduction in traffic congestion, reduced fuel costs), more efficient use of infrastructure (both existing and planned), improvements in urban air quality, improved access for all members of the community to public transport and community facilities and more sustainable land use (e.g. at the urban fringe and, particularly, in coastal areas).

The Commonwealth Department of Transport and Regional Development is currently developing a national policy on transport and sustainable development. The policy will provide a framework for all spheres of government, the transport industry and the community to work in partnership on a strategic approach to transport. This will place considerable emphasis on the benefits to business and the community of more efficient transport services, improved utilisation of infrastructure and more efficient resource use, while acknowledging environmental responsibility.

Various factors operating outside the context of the National Greenhouse Strategy also influence transport greenhouse gas emissions. For example, business has incentives to improve fuel efficiency where fuel costs are a significant proportion of operating costs and developments in technology can improve fuel efficiency.

While a number of measures in this module will be pursued through cooperation between jurisdictions, transport and urban planning generally are a State and Territory and Local Government responsibility, and individual jurisdictions will adopt different approaches to a number of actions in these areas, reflecting their different circumstances.

Action by Australia

This module outlines action on:

- integrating land use and transport planning;
- travel demand and traffic management;
- encouraging greater use of public transport, walking and cycling;
- improving vehicle fuel efficiency and fuel technologies;
- freight and logistics systems.

In addition the module includes an overarching measure (5.1) which recognises that the existence of incentives or disincentives has the potential to impact on measures across the module.

Additional measure

5.1 Economic instruments and transport

Economic policy instruments relating to transport (both incentives and disincentives) will be examined to ensure they are consistent with fiscal, economic and environmental policy, including greenhouse objectives.

Responsibilities – to be pursued by the Commonwealth in cooperation with all States and Territories (possibly via a single inquiry under the auspices of the Australian Transport Council (ATC)) and in consultation with key stakeholders.

Indicative timeframe – to be completed in 1999/00.

Integrating land use and transport planning

The integration of urban land use and transport planning offers significant long-term potential for greenhouse gas emission reductions. The Intergovernmental Panel on Climate Change concluded that:

> *changes in urban and transport infrastructure to reduce the need for motorised transport and shift demand to less energy-intensive transport modes, may be among the most important elements of a long-term strategy for greenhouse gas mitigation in the transport sector. In some circumstances, the resulting traffic reductions can result in greenhouse gas emission reductions of 10% or more by 2020, while obtaining broad social and environmental benefits.*
>
> (1996 Report on Technologies, Policies and Measures for Mitigating Climate Change)

Existing measures

Urban planning and design

To reduce urban fringe growth governments have been implementing design principles for new urban neighbourhoods and residential developments which contribute to urban consolidation and reduce motor vehicle dependence. The Australian Model Code for Residential Development (AMCORD) or equivalent state-based codes are important tools. A national model code for higher housing density also has been developed.

Integrated transport planning

A number of States and Territories are currently implementing integrated transport strategies. While the objectives and actions of the strategies vary across jurisdictions, they commonly seek to promote environmental sustainability, and to promote integrated land use and transport planning which recognises travel demand management as a means to reduce environmental impacts. They also seek to encourage non-motorised forms of transport.

Additional measures

5.2 Integrating urban land use and transport planning

The integration of urban land use and transport planning will be pursued by:

(i) preparing and implementing integrated land use and transport strategies for current or emerging major urban regions through planning, zoning and other program management systems. A major objective of the strategies will include a reduction in greenhouse gas emissions. The strategies will encourage:

- promotion of development near public transport systems which incorporates higher residential and commercial densities and appropriate mixed uses (including residential, commercial, retail and other employment activities);
- the development of regional retailing and office centres and other substantial trip-attracting land uses such as educational institutions and hospitals, as part of an appropriate mixed use environment located on major public transport routes.

(ii) promoting the application of subdivision design features which support a reduction in car dependence of new residential developments (greenfield sites and redevelopment sites in established urban areas). The use of an appropriate residential design code such as AMCORD, or a comparable code or guideline developed for a State or Territory, will provide the foundations for this measure. Use of the design codes will be promoted by one or more of the following actions:

- introduction of a statutory basis for AMCORD or a similar local code;
- promotion of the code to local government and developers;
- training for local government officers and the development industry in use of the code;
- demonstration projects/programs based on application of the code.

(iii) working with local governments in their jurisdictions to pursue strategies which encourage increased population density in appropriate areas within their municipality. Possible approaches to promote this outcome could include one or more of the following:

- identification of areas where it is appropriate for medium-density housing to be encouraged, especially near public transport and major commercial, retailing or employment locations;
- promotion of choice (mix) in housing types and mode of transport;
- establishment of targets for population growth within existing urban areas.

Planning schemes will be amended as necessary to support these approaches.

In pursuing integrated land use and transport planning, due regard will be given to the aspects of best practice developed through measure 5.3.

Responsibilities – (i) to be pursued by all States and Territories in consultation with relevant stakeholders and the broader community.

(ii) to be pursued by ACT, NSW, Queensland, SA, Tasmania, Victoria and WA in consultation with the residential development industry and local government.

(iii) to be pursued by the ACT, NSW, Queensland, SA, Tasmania, Victoria and WA in collaboration with local government.

The outcomes of this measure may also be pursued by Local Governments participating in local government greenhouse response (see measure 3.4).

Measures (ii) and (iii) not applicable to the NT.

Indicative timeframe – (i) to be applied to all urban areas, commencing with larger cities, and extending progressively to other urban areas with application to smaller urban areas at the discretion of States and Territories. Strategies to be initiated by December 1999 for all urban centres with a population of more than 200,000 and for other urban centres from 2000/01.

(ii) and (iii) ongoing action.

5.3 Promoting best practice in transport and land use planning

Best practice in integrated urban land use and transport planning will be promoted by a national initiative to develop measures including:

- policy guidelines for integrated urban land use and transport planning;
- a Good Practice Guide on integrated urban land use and transport planning;
- against objectives and to facilitate inter-urban comparisons;
- an integrated investment assessment framework for funding of urban transport;

- a research program on potential policy responses to support more efficient outcomes from decisions on urban land development;
- an educational and awareness program on the outcomes of this research program.

Consistent with the guiding principles of the National Greenhouse Strategy, consideration will be given to economic, social and environmental factors in pursuing the various components of this measure.

Note – the Annex to this module provides further information on this measure.

Responsibilities – to be pursued by the Commonwealth and all States and Territories through the establishment of a National Taskforce. The Taskforce will include representation from government planning agencies, the ATC, AustRoads, ANZECC, the Australian Local Government Association and the Royal Australian Planning Institute. Process to be initiated by the ATC through its Standing Committee on Transport.

Indicative timeframe –Taskforce to report to High Level Group on Greenhouse on potential guidelines, good practice guide, performance indicators and investment assessment framework by July 2000. Governments to consider Taskforce report by December 2000 and institute appropriate policy changes by July 2001.

5.4 Integrated transport investment framework

To complement integrated land use and transport strategies, governments responsible for planning and management of urban regions will consider and implement as appropriate in their jurisdictions:

(i) applying an 'integrated investment assessment framework' to their funding of urban transport – all transport infrastructure proposals (including public transport, road and cycling infrastructure) will be evaluated on a consistent basis, with consideration given to their economic, social and environmental benefits and costs, as well as their impacts on greenhouse emissions;

(ii) managing transport expenditures on the basis of a 'package' approach – whereby the outcomes sought from the expenditure are to be met through an appropriate combination of measures such as expenditure on roads, improvements in public transport and in facilities for non-motorised modes, and travel demand management initiatives, rather than through a single modal solution;

(iii) requiring proponents of individual urban commercial, industrial and residential infrastructure projects, where public funding is sought, to demonstrate in their proposals that attention has been paid to limiting greenhouse gas emissions from transport, particularly in the operational phase of those projects. (See also measure 3.2.)

Responsibilities – (i) and (ii) to be pursued by all States and Territories and the Commonwealth where applicable.

(iii) to be pursued by the ACT, NSW, Queensland, SA, Tasmania, Victoria and WA.

WA to investigate the potential greenhouse benefits of the measure. Measure not applicable to the Commonwealth or the NT.

Indicative timeframe – (i) and (ii) to be applied to all larger urban centres and extended to smaller centres at the discretion of States and Territories. Action to be initiated by December 1999 for all urban centres with a population of more than 200,000 and for other urban centres from 2000/01.

(iii) project proposals to be framed this way from January 2000.

Travel demand and traffic management

Reducing the demand for travel and facilitating smoother traffic flows are key elements in limiting greenhouse gas emissions from transport. These initiatives have major application in urban areas and provide a range of complementary benefits in terms of improvements in local air quality and traffic congestion.

An example of the potential for such programs was the Travel Smart program conducted in Adelaide between April and July 1997. This program encouraged people to identify and modify their travel behaviour, saw car use reduced by 11–20% overall for the sample population and led to ongoing behavioural change – particularly by changing trips. A follow up sample survey five months after the pilot ascertained that a further 8% reduction overall in car travel in the sample population had occurred.

Existing measures

Travel demand management

Demand management initiatives are being pursued by governments as an integral part of integrated land use and transport plans (see earlier section of this module – Integrating land use and transport planning). Most State and Territory Governments have introduced park and ride programs and are investigating and implementing demand management techniques such as car pooling and parking policies.

Additional measures

5.5 Telecommuting and ride sharing

(i) Telework/telecommuting and other electronic systems for access to information and services will be promoted through:

- review of regulations relating to work conditions, insurance and other matters;
- review of town planning and other regulations;
- support for demonstration projects involving selected industry/ employer/employee groups, including the public sector.

(ii) Car-pooling/ride-sharing, particularly in locations not well served by public transport, will be promoted through:

- review of regulations relating to insurance, liability and other matters to remove impediments;
- support for car-pool and ride-share demonstration projects;
- use of high-occupancy vehicle lanes to promote multiple occupancy of cars and taxis (also see measures 5.6 and 5.7).

Responsibilities – (i) to be pursued by the Commonwealth, ACT, NSW, Queensland, SA, Victoria and WA and local governments.

(ii) to be pursued by the Commonwealth, ACT, NSW, NT, Queensland, SA, Victoria and WA and local governments.

Information on impacts of alternative approaches to be shared through a Working Group on Travel Demand Management under the ATC. Consultation to occur with major employers and trade unions. Operators of major events could be consulted to exploit opportunities to promote ride sharing.

(i) not applicable in the NT.

Indicative timeframe – (i) and (ii) to be initiated in 1999/00.

5.6 Traffic management

Governments will work to optimise greenhouse outcomes in traffic management, travel demand and vehicle emissions by introducing guidelines and management systems and incorporating greenhouse considerations in air quality and congestion management strategies.

Implementation mechanisms to include one or more of the following:

- reduce the extent of all-day commuter parking in major centres which experience congested approach roads and with accessible public transport;
- promote preferential parking locations, fees and conditions for high-occupancy vehicles;
- examine application of commuter parking fees to reduce travel demand and complement other actions such as congestion pricing and improving public transport;
- undertake feasibility studies regarding the introduction of congestion pricing, for example, based on electronic charge collection systems, and implement recommendations for urban centres/areas with major traffic congestion where this is found to be appropriate;
- introduce traffic management techniques using intelligent electronic systems with an aim of reducing emissions from motor vehicles by achieving travel at more consistent speeds, especially for high-volume routes. The need for development of standards for nationally compatible electronic traffic management and tolling systems will be assessed.

Responsibilities – to be pursued by all governments with specific mechanisms to be determined by them in response to local air quality, road congestion and greenhouse emission conditions . Victoria does not support congestion pricing beyond current commitments. Taking into account jurisdictional circumstances would mean that congestion pricing, for example, would not be pursued at this time by all States and Territories. The development of national standards, guidelines and management systems will be pursued and oversighted by the ATC in consultation with bodies such as the Planning Officials Forum. Consultation to also occur with the private sector and relevant industry or professional organisations such as Intelligent Transport Systems Australia and the parking industry.

Indicative timeframe – ongoing action.

Encouraging greater use of public transport, walking and cycling

The substitution of public transport, walking or cycling for car-based travel significantly limits greenhouse gas emissions, particularly in urban areas. These actions also improve local air quality and reduce traffic congestion.

Existing measures

Improving the efficiency of public transport

The 1992 National Greenhouse Response Strategy included a commitment by governments to improve the efficiency of urban public transport. Action is continuing across jurisdictions to this end, including a variety of improvements and upgrades to rail and road-based public transport services, the creation of high occupancy vehicle lanes on roadways, and market reforms to increase the efficiency and competitiveness of public transport.

National Bicycle Strategy

The National Bicycle Strategy, endorsed by Australian governments in October 1992, aimed to integrate cycling into the transport network. State, Territory and Local Governments are principally responsible for implementing the strategy, including for the funding and provision of cycling infrastructure. The Commonwealth Government supports cycling infrastructure included in the planning and design of federally-funded road projects.

In April 1998, the ATC agreed to a revision of the National Bicycle Strategy by AustRoads in consultation with the National Bicycle Council. A revised strategy will be considered by Ministers at the November 1998 meeting of the ATC, with a view to launching the strategy in February 1999.

Additional measures

5.7 Improving public transport services

Public transport service quality and network upgrades (recognising that governments can set minimum service standards to be met by operators as part of their service delivery contracts), as well as information and promotional elements will be addressed through the development of integrated public transport plans. In developing these plans:

- attention will be given to developing efficient public transport systems which are responsive to customer demands, particularly through improvements to service reliability, comfort and personal safety; service frequencies; vehicle mixes tailored to demands; fare payment options; and provision of clear and accurate customer information;

- while recognising the range of objectives in road space provision, consideration will be given to improving public transport service by allocating existing and future or modified road capacity to provide priority lanes for public transport (and shared high occupancy vehicles).

  Responsibilities – to be pursued by all States and Territories in consultation with public transport service operators, in both the public and private sectors, and the community. Measure not applicable to the Commonwealth.

  Indicative timeframe – Plans to be initiated by 1999/00 for urban centres (existing and emerging) with populations of 200,000 and above. Ongoing action for improvements to public transport services.

5.8 New public transport modes and technologies

A forum will be established to investigate new public transport modes and technologies and evaluate best practice options applicable to various Australian urban conditions. The forum will disseminate the results of investigations to all participating governments. Modes/systems to be considered could include light rail, monorails, ferries/water taxis, mass transit systems and share/rental systems for cars and bicycles.

Responsibilities – to be pursued by the Commonwealth, ACT, NSW, Queensland, SA, Tasmania and WA. A working group under the ATC may be suitable as a forum, with provision made for inputs from the private sector and appropriate research organisations.

Indicative timeframe – forum to be established by July 1999 and continue from that date.

5.9 Support for walking and cycling

Walking and cycling will be promoted through:

(i) action to improve facilities and promote the benefits of walking and cycling, including:

- reviewing standards and systems for public transport to facilitate bicycle access;
- improving facilities and the environment for walking and cycling by:
  - providing accessible route networks both on and off road;
  - providing for safety and personal security improvements particularly targeted to areas of higher risk;
  - revising planning and building regulations to require provision of cycle parking and storage facilities at appropriate destinations (e.g. commercial developments) and the provision of end-of-trip facilities such as showers and lockers;
  - establishing an integrated network of pedestrian and cycle routes to education facilities in existing built up areas;
- highlighting the financial and health benefits of walking and cycling as part of education and promotion programs;
- providing training for the transport planning professions and Local Government as appropriate.

(ii) reviewing, and where necessary amending, relevant strategic plans, laws and regulations, local area traffic management standards and guides to address barriers to walking and cycling;

(iii) considering a range of speed limits for motor vehicles within residential and selected retail and commercial areas with the aim of improving safety and amenity for cyclists and pedestrians in harmony with local area plans;

(iv) reviewing and where appropriate updating the National Bicycle Strategy consistent with the above.

Responsibilities – (i) to be pursued by all States and Territories.

(ii) to be pursued by all States, Territories and the Commonwealth in collaboration with Local Government.

(iii) to be pursued by ACT, NSW, NT, Queensland, SA, Tasmania and WA in consultation with Local Government, transport planning professions, relevant community groups and stakeholder interests.

(iv) to be pursued by governments through the ATC.

Indicative timeframe – (i) & (ii) implementation from 1999/00.

(iii) review existing speed limits and introduce revised limits from 1999/00.

(iv) to be completed by 1999/00.

Improving vehicle fuel efficiency and fuel technologies

Improving the fuel efficiency of vehicles using conventional fuels, encouraging consumer preferences toward vehicles of greater fuel efficiency, and promoting the use of alternative fuels of relatively low greenhouse intensity are important actions to limit greenhouse gas emissions from transport.

Existing measures

Vehicle fuel efficiency

The 1992 National Greenhouse Response Strategy announced the development of a national average fuel consumption (NAFC) target for new passenger vehicles. A NAFC target of 8.2 litres per 100 km by 2000 is now in place. The pursuit of improvements in fuel efficiency will be carried forward as part of the Environmental Strategy for the Motor Vehicle Industry announced by the Prime Minister in November 1997.

Reduction of NAFC also is pursued through the publication of the Fuel Consumption Guide.

Vehicle testing and maintenance

A number of States and Territories have in place programs to promote improvements in vehicle fuel economy and reductions in vehicle emissions through vehicle maintenance. Approaches to vehicle testing to identify vehicle maintenance needs are also under consideration in a number of jurisdictions.

Alternative fuels

Alternative fuels such as liquefied petroleum gas (LPG), compressed natural gas (CNG), liquefied natural gas (LNG) and ethanol produced from biomass, which are less greenhouse intensive than petrol and diesel, are exempt from Commonwealth excise duty (a loss to revenue of over $600m a year). In any future reviews of fuel charges and taxes, governments have agreed to take account that this exemption is an important factor in industry decisions to use these fuels. Equipment to convert vehicles to LPG or natural gas is sales tax exempt.

Buses fuelled by CNG are operating in a number of States and Territories. In addition, governments are fostering alternative fuels in some classes of government vehicles where economic and practicable, and are also preparing for demonstrations in government fleets of CNG and blended alcohol fuels.

Additional measures

5.10 Environmental Strategy for the Motor Vehicle Industry

The Environmental Strategy for the Motor Vehicle Industry will be implemented involving:

- negotiation with the automotive industry and companies to secure a 15% improvement in NAFC for new passenger vehicles by 2010 compared with business-as-usual (recognising that the scope for model and design change will increase progressively from 2003);
- extension of the NAFC framework to include light commercial and four wheel drive vehicles to 3.5 tonnes;
- mandatory model specific fuel efficiency labelling through Australian Design Rules;
- development of partnerships with consumer groups (such as motor organisations and fleet operators) to engage their support in promoting fuel efficiency objectives to motorists;
- bringing forward the phasing out of leaded fuel (taking equity considerations into account);
- consultations with the petroleum and automotive industries on the accelerated introduction of higher octane fuel (see also measure 5.11 below);
- progressive tightening of noxious emissions standards with a view to harmonisation with international standards by 2006;
- the development of options for challenging but realistic fuel efficiency targets from 2003, and the use of alternative fuels, for government car fleets (also see measure 3.1).

Responsibilities – to be pursued by the Commonwealth and the motor vehicle industry, in consultation with States and Territories through the Motor Vehicle Environment Committee (MVEC) and other stakeholders (including the fuel industry and motoring organisations) where appropriate.

Indicative timeframe – final details of the strategy, including fuel consumption targets for 2005 and 2010, will be released during 1998/99.

5.11 Fuel quality and vehicle emissions

(i) National studies will be conducted in consultation with relevant industries into establishment of fuel quality standards generally and including the optimal octane rating of petrol. Greenhouse gas emission implications will be considered as part of these studies.

(ii) Programs will be developed and implemented to improve the maintenance of in-service vehicles to reduce fuel consumption. These programs may include vehicle testing, inspection and maintenance (I&M) programs or other means of encouraging motorists to have their vehicles properly serviced. These programs will focus on identifying and improving vehicles currently responsible for a disproportionate quantity of both greenhouse and other emissions.

Responsibilities – (i) to be pursued by the Commonwealth and the motor vehicle industry, in consultation with States and Territories through MVEC and other stakeholders (including the fuel industry and motoring organisations) where appropriate.

(ii) to be pursued by all States and Territories where local air quality and congestion issues have been identified as a priority for action.

Indicative timeframe – (i) studies to commence from 1998/99.

(ii) ongoing action.

5.12 Increasing the use of alternative fuels

(i) A distribution network of service stations for CNG will be established to facilitate a switch to the use of natural gas in light commercial vehicles. The aim will be to establish a minimum refuelling network in a number of major urban centres;

(ii) Those alternative fuels and their conditions of use which are less greenhouse intensive on a full fuel cycle basis will be identified. The use of those fuels that are commercially viable and less greenhouse intensive will be promoted by means such as:

- demonstrating alternative-fuelled vehicles in government, public transport and business fleets;
- brokering meetings between potential alternative fuel suppliers and distributors, vehicle producers, and government and corporate fleet managers to develop pilot programs which provide a sufficient number of vehicles to justify development of a distribution network for viable alternative fuels;
- making it easier for government, public transport and corporate enterprises with alternative fuel distribution points to open these outlets for general access, initially by reviewing regulation which restricts them;
- developing strategies that support the use of alternative fuels and alternative fuel technologies for motor vehicles in conjunction with relevant air quality action such as the Clean the Air initiative.

Note: promotion of alternative fuels will need to take into account any detrimental environmental impacts such as on air quality.

(iii) An ethanol pilot plant will be built to demonstrate new Australian technologies for the production of ethanol from wood fibres.

Responsibilities – (i) to be pursued by the Commonwealth and relevant States in collaboration with stakeholders such as natural gas companies and Local Government authorities.

(ii) to be pursued by the Commonwealth, ACT, NSW, NT, Queensland, SA, Victoria and WA.

(iii) to be pursued by the Commonwealth in consultation with relevant stakeholders including private sector companies with large transport operations or vehicle fleets, and oil and alternative fuel suppliers.

Indicative timeframe – (i) to commence from 1998/99.

(ii) ongoing action as fuels, or strategies to promote fuels or technologies, are developed.

(iii) to be advanced from 1998/99.

5.13 Information programs on efficient vehicle use

Information will be provided to transport users on the financial, social and environmental impacts of transport use and of alternative transport modes, including:

- the financial costs of operating cars, including fixed and variable costs and depreciation;
- the potential fuel savings, financial benefits and reductions in environmental impacts from appropriate driver behaviour and vehicle/mode choices;
- the fuel use and environmental benefits of vehicle tuning and maintenance;
- the relative environmental effects and cost advantages of alternative fuels and public transport;
- air conditioners and fuel use, and minimising losses of fluorocarbon refrigerants.

This is to be a continuing program with the key purpose of achieving attitudinal and lifestyle change, and increased awareness of the alternatives to travel generally and to car travel (especially that based on sole occupancy). Possible media targets could include learner driver and licence and registration renewal material.

Responsibilities – to be pursued by the Commonwealth and all States and Territories. A coordinated approach to the development of material to be pursued where this will add value and provide the most cost-effective approach. The ATC could provide the forum for such coordination. Programs to be developed in consultation and collaboration with key community and transport/motoring organisations.

Indicative timeframe – approaches to be developed and commenced by July 1999.

Freight and logistics systems

The Bureau of Transport Economics projects that greenhouse emissions from road freight vehicles will more than double between 1994 and 2015. This projected growth creates an imperative for action in this area.

Existing measures

Rail and shipping reforms

Commonwealth, State and Territory Governments are undertaking a reform program to rejuvenate rail services with the aim to increase private sector involvement and reduce the role of government. The resultant competitive environment is expected to increase rail's share of the freight market and reduce average greenhouse gas emissions per unit of freight carried.

In 1997, Ministers from the Commonwealth and all mainland States agreed to changes for interstate rail freight. A national track access authority – the Australian Rail Track Corporation – forms the centrepiece of this. It will provide seamless interstate access and pursue uniform operating standards and conditions across an interstate network. The Commonwealth is to make $250 million available over four years from 1998/99 to upgrade this network.

Shipping reform is aimed at encouraging the most competitive possible coastal shipping services. To the extent that a more competitive coastal shipping industry produces an increase in shipping's share of the freight market there will be reductions in the average greenhouse gas emissions per unit of freight carried.

National transport policy development

The ATC leads the development of national policy to ensure that the transport system more effectively underpins the nation's economic, social and environmental goals. The transport reform agenda includes the following strategies which will increase efficiency and lead to fuel saving and reduced greenhouse emissions. For example:

- a national rail access code, which private sector train operators can use to negotiate access to the interstate rail network;
- studies of competition in road works tendering and in urban bus markets to promote further reforms in these areas.

Heavy trucks

Road transport legislation has been amended to permit the operation of B-double semi-trailers (extra long) along designated routes across Australia.

Additional measures

5.14 Study of opportunities to reduce freight transport emissions

Options for reducing greenhouse gas emissions resulting from the transportation of freight will be investigated, including:

- the potential for shifting road freight to rail and sea and identify the range of initiatives (e.g. electronic commerce, load aggregation) required to achieve a significant shift;
- the role land use planning can play in reducing freight trips (number and length);
- the potential for improvements in engine technology, vehicle aerodynamics and driver behaviour;
- allowing larger configurations (e.g. B-doubles, road trains) wider access to transport infrastructure to reduce total kilometres of freight transport and, therefore, greenhouse gas emissions per tonne of freight carried;
- the use of alternative fuels;
- the potential for improvements in freight logistics;
- the potential for intelligent transport systems (e.g. by taxi-style information and control systems for coordination of freight pick up and delivery) to improve management of the light commercial fleet as a means of reducing unnecessary journeys;
- the role of traffic management approaches;
- opportunities for technical and management improvements (e.g. introduction of specialist vessels and realignment of uses of present and future tonnages) to reduce the apparent difference in fuel consumption per tonne kilometre between coastal and international shipping.

An important aspect of the study will be to assess information on different segments of the freight industry (e.g. areas of operation, types of operator, methods of operation) to assist in identifying policy options. Consideration will be given to the impacts of the various options on non-greenhouse emissions and other considerations such as safety.

Responsibilities – to be pursued by the Commonwealth and all States and Territories in consultation with relevant industry stakeholders.

To be part of the work program for a National Taskforce with appropriate expertise established under the ATC (as for measure 5.3) with exception of investigation of the fuel efficiency of coastal shipping which is to be conducted by the Commonwealth, in consultation with the shipping industry.

Indicative timeframe – studies to be completed by July 2000.

5.15 Intermodal integration

Intermodal integration in freight transportation will be enhanced by actions including:

- investigating and introducing ways of attracting investment to establish new intermodal freight terminals with a view to substituting freight journeys using mixed modes for road journeys alone;
- identifying sections of key roads and rail links where improving standards or increasing loading gauge would improve intermodal container movement;
- drawing up and implementing a list of pilot projects for using electronic trading facilities to improve interfaces and identify sources of finance for their implementation.

Responsibilities – to be pursued by the Commonwealth and all States and Territories taking account of activities of the National Transport Council and the ATC. Consultation will occur with the freight transport industry and Intelligent Transport Systems Australia.

Indicative timeframe – study to be conducted during 1999/00.

ANNEX TO MODULE 5

The following is material to be used as guidance for the development of implementation plans for a number of measures in this module.

Facilitating best practice in integrated urban land use and transport planning

A first step for the research program in measure 5.3 will be to assess past studies to ensure the program focuses on adding value to existing knowledge and filling any key gaps.

Developing policy guidelines for integrated urban land use and transport planning

The guidelines will include the major objectives of more sustainable urban form and transport systems (for both passengers and freight), reduced greenhouse emissions and reduced needs for car-based travel.

This will recognise work currently being undertaken by AustRoads to develop integrated road, land use and environmental planning guidelines. A Steering Committee is proposed comprising representatives of the National Taskforce and of AustRoads, to manage development of the guidelines and to carry forward AustRoads work in a manner which addresses both the goals of AustRoads and the National Taskforce.

In developing the guidelines, consultation will need to occur with the community and key stakeholders. Regard should be given to the applicability in Australian circumstances of international approaches that have been adopted, including the *UK Planning Policy Guidance* (particularly PPG 13 and PPG 6), the Dutch ABC program and the *US Intermodal Surface Transportation Efficiency Act* (ISTEA).

Developing a Good Practice Guide

The Good Practice Guide should include case study examples of good practice covering each of the components of the policy guidelines for integrated urban land use and transport planning.

Developing greenhouse performance indicators

Greenhouse performance indicators will be developed for all urban centres with populations of more than 40,000. The indicators will focus on the energy use of and greenhouse emissions from the residential sector, urban systems and urban transport. Key support indicators could be included (e.g. trip numbers and lengths, emissions per kilometre travelled). Possible key indicators are:

- residential – emissions in total and per capita;
- transport – emissions in total and per capita.

Possible support indicators are:

- total kilometres travelled in urban areas; number and average length of trips; average kilometres per capita by mode;
- emissions per kilometre travelled in urban areas; emissions by mode and by fuel type.

Note – cost-effective emissions estimation approaches are available (e.g. through sales and distribution data for transport fuels, electricity and gas). Mechanisms for data collation and reporting will be considered as part of the general processes for performance indicators for the National Greenhouse Strategy.

Developing an integrated investment assessment framework for funding of urban transport

The framework will provide a process by which proposed major transport infrastructure and service investments can be evaluated against common criteria, including financial, environmental and social costs and benefits, and greenhouse emissions impacts. It will enable proposed investments to be weighed against possible alternatives including a 'do nothing' option. It will enable a range of alternative forms of transport (i.e. road, public transport, walking/cycling and travel demand management initiatives) to be considered in all proposals.

In developing the framework, recognition will be given to the particular characteristics of different levels of government to ensure practicability in application.

Coordinating a research program on potential further policy responses

The research program will include the following:

a) a study of the impacts and effectiveness of policies facilitating urban consolidation. The study will:
   - assess the costs and benefits (social, environmental, greenhouse, infrastructure-related, other economic) of consolidation policies under Australian conditions;
   - estimate the extent to which greater concentration of low density employment activities (e.g. warehousing, manufacturing) could support a reduction in greenhouse emissions from passenger and freight transport.

b) a study to investigate the use of pricing and other economic mechanisms to support more efficient outcomes from decisions on urban location (residential and commercial) and related land development. As part of this study:

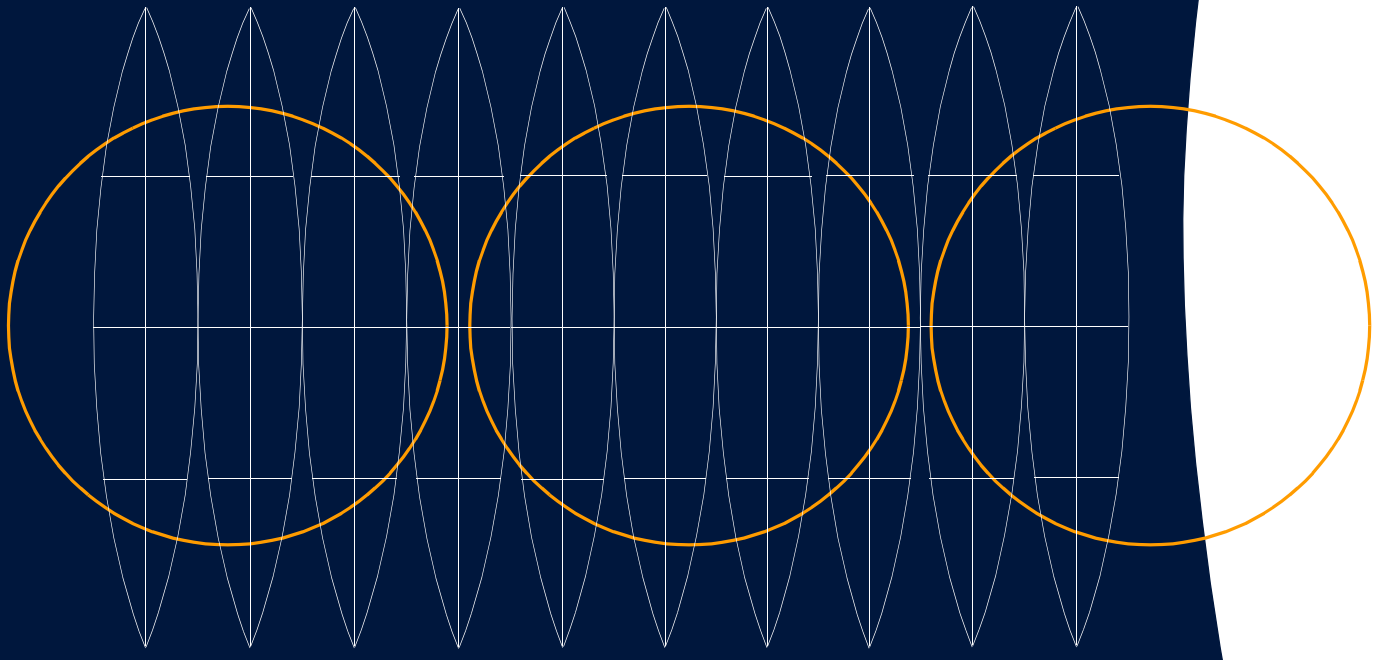
- sectors to be considered will include transport as well as water, sewerage, power supply and other major forms of social infrastructure. An objective will be to ensure that, as far as possible, costs of individual urban location decisions could be made transparent and incorporated into pricing systems;
- mechanisms to be considered would include full and partial developer charges or contributions, as well as combinations of user pays and rates-based systems. Other options would include incentives for developers to increase activity within existing urban areas in a manner consistent with a reduction in the need for car-based travel.

Module

6

The National Greenhouse Stategy

Greenhouse Sinks and Sustainable Land Management



Module 6

Greenhouse Sinks and Sustainable Land Management

Introduction

Scope

This module addresses the expansion and management of greenhouse sinks (related to forests, vegetation and plantations;) and the reduction of gas emissions from agricultural production.

Context

Forestry

In the National Greenhouse Gas Inventory (NGGI), managed forests, vegetation thickening on some cleared land and pasture improvement are the major means of carbon dioxide removal. Increasing the area of production forests, particularly through reforestation and farm forestry, provides an important opportunity for carbon sequestration, especially where there is low initial carbon content in soil and vegetation.

Vegetation

While there is considerable uncertainty in the data, the NGGI indicates that vegetation clearance for agriculture contributes significantly to Australia's greenhouse gas emissions.

Increasing vegetation cover is an important means of enhancing Australia's greenhouse gas sinks. Initiatives include increases in vegetation associated with forestry and those designed to improve the environmental condition of local and regional areas including reserves and protected lands.

While the rate of vegetation clearance varies greatly between jurisdictions, the total rate of clearing likely to occur over the current NGGI period is expected to be greater than the proposed rate of revegetation under all government programs and private initiatives. The Australian and New Zealand Environment and Conservation Council (ANZECC) has resolved that there is a 'need for accelerated action on native vegetation retention'. The sustainable management of remnant native vegetation on private and leasehold land is a prerequisite for pursuing such action.

Agriculture

The agricultural sector (excluding land clearing) contributed around 20% of Australia's net greenhouse gas emissions in 1996, with emissions mainly being methane from the digestive systems of cattle and sheep and nitrous oxide from soils.

Sustainable land management

Sustainable land management practices reduce greenhouse gas emissions and play an important part in achieving the broader objectives of ecologically sustainable development. In agriculture, for example, sustainable farming practices support productivity and the long term viability of agricultural enterprises. The maintenance and enhancement of vegetation cover can play an important role in the control of erosion and salinity.

Action by Australia

This module outlines action on:

- enhancing greenhouse sinks;
- encouraging sustainable forestry and vegetation management; and
- reducing greenhouse gas emissions from agricultural production.

Enhancing greenhouse sinks

The establishment of vegetation, including forests, can provide significant greenhouse benefits through the sequestration of carbon. According to the NGGI, the Forestry and Other subsector provided a net sink equivalent to 5% of national net greenhouse gas emissions in 1996.

Existing measures

Bushcare: the National Vegetation Initiative

The ultimate goal of Bushcare, the National Vegetation Initiative (NVI), is to reverse the long-term decline in the quality and extent of Australia's native vegetation communities in order to conserve biodiversity and contribute to the ecologically sustainable management of natural resources.

The NVI (like other components of the Natural Heritage Trust) is delivered in cooperation between the Commonwealth, States and Territories through partnership agreements. It provides a ten fold increase in on-ground funding for vegetation programs.

Farm Forestry program

The Farm Forestry program seeks to further the development of farm forestry and complementary environmental outcomes. This is achieved by incorporating commercial tree growing and management into farming systems for the purpose of wood and non-wood production, increasing agricultural productivity and sustainable natural resources management.

Plantations for Australia: The 2020 Vision

The strategy Plantations for Australia: The 2020 vision, launched in October 1997, seeks to build internationally competitive, market focused and sustainable plantation growing and processing industries with significant private sector investment. The target is to establish an average of 80,000 hectares of plantation forest a year, or a total of two million hectares by 2020 through concerted Commonwealth Government, State and Territory Government and industry collaboration.

Additional measures

6.1 Plantations and Farm Forestry programs

Reforestation elements of existing initiatives such as the Plantations for Australia: The 2020 Vision, The Farm Forestry program and the National Forest Policy Statement will be facilitated by actions such as the following:

- implementation of the 2020 Vision through removing impediments to Australian commercial plantations, boosting the availability of suitable land, getting the commercial incentives right and improving information flows;
- establishing regional networks and providing information to land holders on all aspects of commercial farm forestry, including best practice management of plantations and private native forests;
- expediting farm forestry through appropriate Commonwealth and State programs and initiatives (eg. Natural Heritage Trust, regional plantation committees) in association with industry;
- supporting the expansion of regional plantation and farm forestry resources on land that has been cleared in the past for other purposes, and timber industries by using structural adjustment packages (e.g. Forest Industry Structural Adjustment Package) and an appropriate facilitation mechanism (e.g. regional planning committees) for the purposes including timber supply, non-wood forest products, and ground water recharge;

Responsibilities – to be pursued by the Commonwealth, ACT, NSW, Queensland, SA, Tasmania, Victoria and WA in collaboration with Local Governments, regional plantation committees, farm forestry networks, forest industry associations, CSIRO, the Forest and Wood Products Research and Development Corporation, the Rural Industries Research and Development Corporation, the Land and Water Resources Research and Development Corporation, grower cooperatives and landholder, community and industry groups. Measure not applicable in the NT.

Indicative timeframe – to be implemented from 1998/99.

6.2 National revegetation programs

Implementation of national revegetation programs including Bushcare – the National Vegetation Initiative, the National Landcare program and extension programs will be accelerated. Packages will be developed, including those which:

- encourage on-farm tree management plans to promote revegetation of cleared land, improved management of existing perennial vegetation (trees and pasture), and an increase in the area of deep-rooted perennials;
- encourage retention and management of native vegetation for benefits including shelter, amenity and groundwater recharge control and, where applicable, for commercial non-timber products;
- support the recognition of carbon sequestration in revegetation activities.

Packages will be targeted, as appropriate, at specific industries and regions.

Responsibilities – to be pursued by the Commonwealth and all States and Territories, in collaboration with local government, landholder, community and industry groups.

Indicative timeframe – ongoing action.

6.3 Bush for Greenhouse

Bush for Greenhouse aims to promote investment into the establishment of greenhouse gas sinks, in particular, by facilitating corporate funding of revegetation projects.

It is envisaged that Bush for Greenhouse will link closely with Bushcare and other Natural Heritage Trust programs and thereby deliver a range of other environmental benefits.

Companies investing in the program will be able to obtain recognition for the carbon sequestered, thus at least notionally offsetting emissions from other activities.

Activities will include:

- promotion and marketing of the program and projects;
- extension, training and education to enhance the skills of industry and the community to manage vegetation for greenhouse outcomes;
- determination of the carbon sequestration performance of projects and improvement of the information base on the biomass of vegetation resources;
- establishment of a register for sequestration activity and a capacity to collect, store and monitor data.

Where appropriate, the program will draw on the work of the National Carbon Accounting System for land based sources and sinks (refer Measure 1.5) and will work closely with the Greenhouse Challenge Office (refer Measure 3.5).

The program will link with and assist the development of an overarching vegetation sinks policy framework, including consideration of the possible development of an emissions trading system (refer Measure 3.9).

Responsibilities – to be pursued by the Commonwealth, in partnership with all States and Territories, industry and the community.

Indicative timeframe – from July 1998 for 5 years.

Encouraging sustainable forestry and vegetation management

The sustainable management of vegetation, including forests, can provide significant greenhouse benefits in addition to supporting the broad objectives of ecologically sustainable development.

Reducing the rate and the extent of vegetation clearance is important for maintaining greenhouse sinks, and for reducing the considerable emissions associated with soil disturbance and vegetation decay.

To support efforts to promote sustainable vegetation and forest management, additional research is required in the areas of soil carbon budget dynamics, and there is a need for development of carbon measurement methodologies and spatial data bases.

Existing measures

The States and Territories have prime responsibility for sustainable vegetation management including controlling or regulating land clearing and protecting remnant vegetation. While the current situation regarding clearance control varies considerably across States and Territories, a number of jurisdictions have mechanisms in place to reduce vegetation clearance.

National Forest Policy Statement

The main mechanism to ensure the sustainable use, conservation and enhancement of forests is the National Forest Policy Statement (1992). Its principal objectives include the maintenance of the native forest estate and the further establishment of forestry plantations on cleared land. It also highlights the need to manage forests to maintain or increase their net carbon sink and storage capacity, and to minimise the emission of greenhouse gases from forest activities.

Criteria and indicators for sustainable forest management

Indicators and criteria for the conservation and sustainable management of temperate and boreal forests, which include the contribution of forests to the global carbon cycle, have been endorsed by Australia, along with 12 other countries, as part of the international Montreal Process (endorsed by countries in the Santiago Declaration). This process provides an international framework and an incentive to all member nations, which represent some 90 per cent of the world's boreal and temperate forests, to improve the management of their forests.

Regional Forest Agreements

Commonwealth and State governments are cooperating to develop regional forest agreements (RFAs). The RFA process is designed to put in place arrangements for ecologically sustainable forest management, to create resource security, and to secure a comprehensive, adequate and representative reserve system to protect native forests with high conservation value. In doing so, the RFAs will also act to conserve and expand the greenhouse sink and storage capacity of Australia's native forests.

Guidelines for rangeland management

Recent research by the Bureau of Resource Sciences estimated that 315 Mt of organic carbon could potentially be stored through the rehabilitation of deteriorated pastures in the northern Australian rangelands. A further 144 Mt of carbon could be sequestered if seriously degraded land is rehabilitated. National principles and guidelines for rangeland management are being developed to promote sustainable use of the rangelands with particular emphasis on natural resource management issues.

Natural Heritage Trust

The Commonwealth Government has established the Natural Heritage Trust, an environment and natural resources management package providing funding of $1.25 billion over five years. The Trust will enable the Commonwealth, State and Territory governments, local government, community groups, and individual landholders and managers to take an integrated, long-term approach to the conservation and sustainable management of Australia's land, water and biodiversity. It will generate significant greenhouse benefits.

Programs to be funded under the Trust include Bushcare, the National Vegetation Initiative; the National Landcare program; Murray–Darling 2001; the National Rivercare program; and the Farm Forestry program. Projects will be funded under the categories of community grants, regional strategies, national partnerships and Commonwealth initiatives.

Guidelines and policies to give effect to national principles for vegetation retention and management are currently being developed as part of ongoing NHT negotiations.

National Landcare program

The National Landcare program supports activities that contribute to the sustainable management of land, water and vegetation resources in line with regional, State and Territory and national strategies. Emphasis is placed on providing assistance to individual resource managers and owners to overcome the impediments to achieving sustainable management, through a cooperative approach involving community groups, local governments, industry and State agencies.

Additional measures

6.4 National principles for sustainable native vegetation management and retention

The goal of the National Vegetation Initiative is to reverse the long term decline in the quality and extent of native vegetation cover. Governments will work collectively to achieve this, based on commitments outlined in their Natural Heritage Trust Partnership Agreements.

National principles consistent with the principles of ecologically sustainable development will be developed and agreed to advance sustainable native vegetation management and retention, particularly with respect to native woody vegetation. These national principles will recognise the need for improved vegetation management, including reduced clearing of native vegetation as identified in the Partnership Agreements. The development and application of these principles will recognise existing State and Territory guidelines and statutory processes and will reflect characteristics that are particular to each State and Territory and to regions within these jurisdictions.

Responsibilities – to be pursued through coordinated intergovernmental action involving the Commonwealth and all States and Territories in consultation with Local Governments and relevant stakeholders.

Indicative timeframe – principles to be agreed during 1998/99.

6.5 Giving effect to national principles for sustainable native vegetation management and retention

Guidelines and policies to give effect to the national principles established through measure 6.4 will be developed and implemented. Such guidelines and policies will be interpreted and implemented at a regional level, recognising existing State and Territory guidelines and statutory processes, and involve the following:

(i) primary producers and landholders in making decisions and/or applications for land clearance will be encouraged to, and government agencies and local governments in assessing development applications will, take account of greenhouse issues as well as land capability, agricultural suitability, biodiversity and other sustainability issues. Assessments would need to consider regional and environmental plans and strategies including catchment and land protection strategies;

(ii) governments will review existing policies and, where necessary, develop new policies, with a view to clarifying and standardising the incentives which are available and most appropriate for use by primary producers and land holders. This may include consideration of:

- support mechanisms for vegetation retention measures, including fencing assistance;
- incentive and land covenant schemes;
- taxation arrangements relating to vegetation retention and land rehabilitation.

(iii) other possible mechanisms will be investigated, including:

- reimbursement of costs incurred for conservation works by landholders;
- voluntary title restrictions and management agreements;
- registration of conservation agreements on titles;
- native vegetation management plans, consistent with catchment/ regional strategies;
- lease conditions;
- encouragement of property management planning, including on leasehold land, and other planning schemes.

(iv) recognition of carbon sequestration in sustainable native vegetation management.

Responsibilities – To be pursued by all the jurisdictions in a nationally coordinated manner in consultation with local government and relevant stakeholders.

Indicative timeframe – to be advanced from July 1999.

6.6 Forest sustainability criteria and indicators

The MCFFA and ANZECC have endorsed *'A framework of regional (sub-national) level criteria and indicators of sustainable forest management in Australia'*, based on the internationally agreed national level Montreal Process criteria and indicators.

Implementation of the sustainable forest management indicators will occur in a phased manner whereby:

- Category A indicators for which current reporting is possible will be implemented immediately;
- Category B indicators for which further methodological development and resource assessment is required will be reviewed over the next 5 years to establish the feasibility of their inclusion in the core set of indicators (Category A);
- Category C indicators first require further research and development work to assess if there is a practical, sensitive and cost effective means of implementation. Following research and development work these indicators will be reviewed to establish the feasibility of their inclusion in the core set (Category A).

  Responsibilities – to be pursued by the Commonwealth and all States and Territories in consultation with relevant stakeholders. MCCFA and ANZECC to have a key role.

  Indicative timeframe – commence implementation of Category A indicators by end 1998, and over time review indicators in categories B and C.

6.7 Sustainable management of private forests

Private forest owners will be encouraged to manage private forests on a sustainable basis through:

(i) basic inventory and monitoring of timber resources, including carbon sequestered, both before and after harvesting;

(ii) the application of Codes of Forest Practice via planning scheme provisions or other mechanisms;

(iii) education and extension programs to fill critical knowledge gaps and to increase greenhouse awareness.

Note – in accordance with the National Forest Policy Statement and the Regional Forest Agreement process, public forests will be managed using systems which promote the ecologically sustainable use of the resource. The Farm Forestry program has a specific objective to promote sustainable management and use of private natural forests and woodland.

Responsibilities – (i) and (ii) to be pursued by the Commonwealth, NSW, NT, Queensland, SA, Tasmania, Victoria, WA and local governments, and in partnership with Australian Forest Growers (AFG) and industry associations/agencies.

(iii) to be pursued by all jurisdictions through the MCFFA and ANZECC and in collaboration with the Australian Forest Growers (AFG), forest industry associations, farm forestry networks and forest industry training centres.

Indicative timeframe – to commence 1998/99.

6.8 Forest products as a carbon store

Long-term storage of sequestered carbon is enhanced if harvested timber is used for long-lived timber products, and when sawmilling and other forest waste is minimised. To increase the utilisation of forests as a carbon store government and industry funded research bodies will:

(i) conduct studies to increase the production of forest products as a carbon store. The studies will include life-cycle analysis of sawn wood, reconstituted wood, pulp and paper products, and their substitutes. Evaluations will include the processes used to produce, and the products, and the uses and combinations of these materials in different products and structures;

(ii) promote/encourage the production of value-added wood fibre products through increased industry participation in, and implementation of, research and development into value-adding processes.

Responsibilities – to be pursued in a nationally coordinated manner by the Commonwealth, ACT, NSW, Queensland, SA, Tasmania, Victoria and WA, in partnership with the Bureau of Resource Sciences, Forest and Wood Products Research and Development Corporation, tertiary education institutions and CSIRO.

Consultation to occur with the timber industry and representatives of industries producing substitutes for wood and paper products.

Measure not applicable in the NT.

Indicative timeframe – to be implemented from 1998/99.

Reducing greenhouse gas emissions from agricultural production

Within the agricultural community there is a growing awareness of the need for integrated management practices which include more sustainable farming systems to enhance productivity and long-term viability. In developing and pursuing greenhouse response measures in the agricultural sector, it is important to build on this development by providing appropriately tailored and targeted information.

Such information should emphasise that cleaner production, through the reduction of wastes and the more judicious selection and use of inputs, can make an important contribution to the reduction of greenhouse gas emissions as well as improving farm productivity and profitability.

Factors such as drought and seasonal decline in terms of trade make it difficult for many farm business managers to maintain viability and profitability. Consequently, in addition to educative approaches, the use of financial and other incentives may be appropriate in some circumstances to promote effective greenhouse responses in the agricultural sector.

Existing measures

Extension programs

Increased efficiency in the production of animal products will reduce methane emissions, especially from sheep and cattle. Specific government measures to promote this include extension programs targeting rangeland systems and new animal waste processing systems for intensive livestock holdings.

Research and extension activity is also being undertaken regarding agricultural residue burning, fertiliser application, minimum tillage and stubble retention practices, and waste management practices and technologies.

Anti-methanogen research

CSIRO has patented an anti-methanogen feed additive which suppresses methane emissions by 100%. However, it results in marginal production gains and has to be fed daily. CSIRO has also patented a methanogen vaccine suitable for both sheep and cattle which is achieving an 18% reduction in emissions with some significant production gains. Further research, development and commercialisation of these products is required. The Commonwealth has provided CSIRO with $1 million to promote the vaccine.

Additional measures

6.9 Incorporating consideration of greenhouse issues into agricultural management practices

Sustainable agricultural management practices, which deliver reductions in net greenhouse gas emissions, will be promoted through the delivery of programs addressing the following issues:

- opportunities for reducing energy use in agricultural production;
- conservation cropping;
- opportunities to improve animal husbandry;
- manure management and the use of biogas and other technologies by intensive animal industries;
- reduction of biomass burning (noting that further research may be required to determine the most appropriate practices in different regions, and that reduced burning is not always an appropriate strategy for all areas in Australia – with burning needed for strategic reasons such as wildfire management).

Methods utilised include extension services, community-based programs such as Landcare, government agriculture department information services, adult learning processes involving producers and rural groups, and producer publications and rural newspapers. These will be used to promote agricultural management practices which deliver reductions in net greenhouse gas emissions.

Specific packages of information for each key industry type and region will be developed, although a core component of each package will be an explanation of the cause, effect and industry contributions to greenhouse emissions and sinks. Each package will provide an indication of the likely size of both productivity and greenhouse gas benefits that could be gained from implementing improved agricultural management practices.

Where appropriate, pilot programs and case studies will be conducted to establish the most effective means of promotional activity. A compendium of existing research, development and education programs that contribute to the reduction of emissions and creation of sinks for greenhouse gases (including information on the cost of these programs and the outcomes they are intended to achieve) will also be prepared.

Note – The annex to this module provides further information on this measure.

Responsibilities – to be pursued by the Commonwealth, NSW, NT, Queensland, SA, Tasmania, Victoria and WA in consultation with producer organisations – noting that the type and distribution of different agricultural activity varies between jurisdictions. Where appropriate, development of information and promotional packages to be coordinated nationally through the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) to achieve economies in development and production of material. Compendium to be pursued by the Commonwealth and all States and Territories through ARMCANZ and in consultation with Local Government and peak bodies of producer organisations.

Indicative timeframe – ongoing action from 1998/99. Compendium of research etc. to be prepared during 1998/99.

6.10 Development of policies for sustainable land management

In reviewing and developing policies for sustainable land management, the findings of the Industry Commission Inquiry on Sustainable Land Management on instruments likely to be the most cost effective for encouraging practices which optimise carbon and nitrogen management and reduce net emissions will be considered. The instruments could include (but not be limited to) taxation incentives, interest reductions, rate relief, financial institutions, cross-compliance, rewards/recognition and penalties/legislation. A program to promote and implement the preferred methods will follow the investigation.

Responsibilities – to be pursued by the Commonwealth in collaboration with the ACT, NSW, NT, Queensland, SA, Tasmania, WA, and the Australian Local Government Association, in consultation with producer organisations.

Indicative timeframe – investigation to be completed by December 2000.

6.11 Rumen modifier research

CSIRO to continue work to develop and make commercially available a vaccine inhibiting the production of methane in the rumen of livestock.

Responsibilities – CSIRO to have lead responsibility for research and development and facilitation of the commercialisation of the product with the assistance of governments.

Indicative timeframe – for action from 1998/99.

ANNEX TO MODULE 6

Particular issues to be encouraged and promoted through measure 6.9 include:

Reducing energy use in agricultural production

Key management practices to be promoted may include:

- expanding the use of minimum tillage and traffic management techniques (precision farming);
- expanding the use of renewable energy on farms, particularly in remote locations;
- introducing farm energy budgets;
- re-using agricultural waste especially for on-farm applications;
- accelerating the replacement of old machinery with newer more energy-efficient equipment;
- enhancing the use of alternative fuels and the use of transport modes with low emissions per tonne-kilometre of freight through existing rural education and extension mechanisms;
- developing packages of information which recognise specific regional circumstances and needs;
- providing appropriate incentives or other such measures.

Conservation cropping

Key management practices to be promoted may include:

- minimum tillage and controlled traffic;
- significant reduction of cultivated/bare fallow;
- direct drilling;
- ley systems and crop rotations;
- stubble retention;
- strategic use of inorganic fertiliser and legumes;
- use of deep-rooting plants.

Improving animal husbandry

Key management practices to be promoted may include:

- improving feed conversion efficiency through breeding and culling programs;
- farm management practices including supplementary feeding, herd health, improved pastures, optimal stocking rates and feedlotting (depending upon net feed conversion efficiency);
- farm management practices which promote stocking rates that minimise the risk of degrading pasture cover, root material and soil carbon;
- consideration of alternative and new animal species for production.

Reduction of biomass burning

Key management practices to be promoted may include:

- adoption of green cane harvesting;
- strategic native pasture management and practices including stocking strategies;
- stubble mulching and conservation tillage practices in cropping industries;
- increased strategic management of woody weeds;
- alternative use of crop residues (e.g. cane trash for mulch etc).

Management practices which enhance soil carbon will be promoted.

Module

7

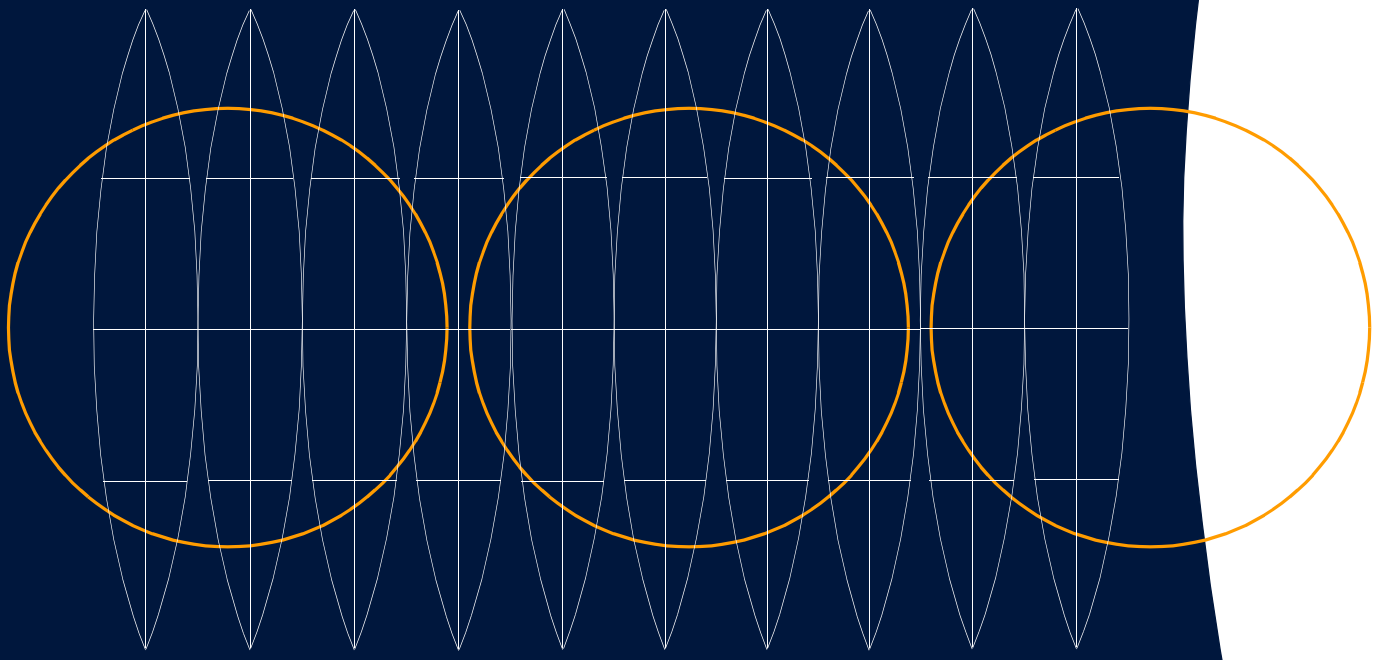
The National Greenhouse Stategy

Greenhouse Best Practice in Industrial Processes and Waste Management

Introduction

Reducing greenhouse gas emissions from industry

Reducing methane emissions from waste treatment and disposal



Module 7

Greenhouse Best Practice in Industrial Processes and Waste Management

Introduction

Scope

This module addresses greenhouse gas emissions from manufacturing, petroleum, mining and minerals processing, methane emissions resulting from the treatment and disposal of green and organic waste and waste water, and opportunities for capturing, using and disposing of CO_2 emissions.

Measures related to greenhouse emissions reduction in industry through partnerships and cooperative agreements and industrial energy efficiency are addressed in Modules 3 and 4 respectively.

Context

Cleaner production – reducing resource inputs and waste outputs in the production process – is an important means of reducing greenhouse gas emissions while generating a range of other environmental and economic benefits. Its pursuit is an integral part of action to reduce greenhouse gas emissions from industry and the management of waste.

Excluding emissions resulting from the consumption of energy, industrial processes contributed 2% of Australia's net greenhouse gas emissions in 1996. The main contributors were cement, aluminium and iron and steel. Continued growth in these industries can be expected to result in an increase in greenhouse gas emissions. However, this may be mitigated by efficiency improvements as new technologies and processes are developed and implemented. For example, between 1990 and 1996, non-energy greenhouse gas emissions from industrial processes fell by 25%.

Waste levels are generally linked to population change. Greenhouse gas emissions from waste, which are dominated by methane, increased by 13% between 1990 to 1996, and were responsible for 4% of Australia's net greenhouse gas emissions in 1996.

Action by Australia

This module outlines action on:

- reducing greenhouse gas emissions from industry; and
- reducing methane emissions from waste treatment and disposal.

Reducing greenhouse gas emissions from industry

By monitoring their greenhouse gas emission level and patterns, industries can establish the information base necessary for identifying cost-effective opportunities for reducing these emissions.

To minimise industry's greenhouse gas emissions, total emissions per unit of production need to be decreased. Steps also can be taken regarding the capture and use/disposal of the fugitive emissions released at specific sites (e.g. petroleum resource developments). Some preliminary investigations have been conducted in this area but further research is required to determine the possible effectiveness of the various options.

The Kyoto Protocol includes three classes of industrial greenhouse gases – perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexaflouride (SF_6). While the use of these gases in Australia is currently fairly limited, their high global warming potentials and the increase in their use, indicate the need for management strategies.

Existing measures

Industry input to the National Greenhouse Gas Inventory

Industry is actively involved in the development and compilation of information needed for the National Greenhouse Gas Inventory – especially in relation to process emissions.

Greenhouse Challenge program

The Greenhouse Challenge is a program of cooperative agreements between industry and government whereby companies enter formal agreements to undertake action to abate their greenhouse gas emissions.

As at June 1998 formal agreements covered industries which contributed about 45% of Australia's total emissions from the industrial sector. Actions to be implemented through the agreements are estimated to reduce aggregate greenhouse gas emissions by over 20 million tonnes of CO_2 equivalent. Company actions range across major research and development projects, reducing landfill waste, tree planting, renewable energy and fuel switching. Further information relating to the Greenhouse Challenge Program is in Module 3.

The National Strategy for Cleaner Production

This Strategy is currently being developed. A key objective is to provide options to assist governments, industry and the community to establish a framework that provides industry with the incentives, the information and the capacity to improve their environmental performance in the design, production and delivery of goods and services to the community. The Strategy will also encourage reductions in the discharge of waste water and organic materials which contribute to greenhouse gas emissions. Cleaner production is a practice that can be applied beyond industrial processes to all sectors of the community, for example, agriculture, construction, hospitality, retail and services. The Strategy is expected to be finalised by December 1998.

Waste reduction, reuse and recycling

Waste reduction, and product reuse and recycling, are encouraged through mechanisms such as national industry waste reduction agreements and the development of a national packaging covenant with industry. Although the particular focus of these programs is on packaging materials, the frameworks being developed will lend themselves to wider application.

Action by specific industries

Aluminium production – perfluorocarbons (PFCs) produced by the Australian aluminium industry are strong greenhouse gases. Industry has reduced these emissions by two thirds since 1990. A fundamental abatement strategy is to reduce the anode effect time of the cells.

Natural gas pipelines – leakage of methane from gas pipelines is being reduced by rehabilitation of low pressure gas reticulation pipelines.

Fugitive emissions from the petroleum industry – fugitive emissions from all stages of oil and gas production are regulated under Commonwealth petroleum legislation related to offshore operations, and State and Territory petroleum and/or environmental legislation for onshore operations. Fugitive emissions that can occur during refinery operations are regulated by the States and Territories. New technology has reduced methane emissions during liquefaction of natural gas. Estimated methane emissions from the North West Shelf Project were 20% lower in 1996 than with the original plant design, with potential for further reduction.

Additional measures

7.1 Industry emissions

(i) Governments will work with industry to reduce greenhouse gas emissions arising from industrial processes, particularly CO_2, N_2O and methane. Key industries include the aluminium, cement, iron and steel, coal mining, oil and gas production, minerals and mineral processing industries. An important aspect will be the pursuit of best practice through the development and implementation of environmental management systems, training, monitoring and reporting.

(ii) The feasibility of systems which could be used for the capture, use and/or disposal of CO_2 at specific site locations where major emissions occur, will be examined.

(iii) In addition, industry will be encouraged to monitor its emissions of greenhouse gases and to report on emissions where arrangements exist for this purpose (e.g. through the Greenhouse Challenge program, State and Territory-based cooperative programs etc).

Note: Emissions from the electricity and gas supply industries are addressed in Module 4. Improvements in the energy efficiency of industry will also be important for achieving greenhouse gas emission reductions – this will be pursued through Modules 3 and 4.

Responsibilities – (i) and (iii) to be pursued by the Commonwealth and all States and Territories in partnership with industry and relevant industry associations

(ii) to be pursued by the Commonwealth through the Bureau of Resource Sciences.

Indicative timeframe – (i) and (iii) ongoing action.

(ii) research to be completed during 1999/00.

7.2 Environmental management strategies for synthetic gases

Governments will work with industry to develop environmental management strategies for each of the synthetic gases included in the Kyoto Protocol – HFCs, PFCs and SF_6. The strategy for HFCs will address the use of HFCs in non-refillable containers.

Responsibilities – to be pursued by governments, through coordinated action, in partnership with industry.

Indicative timeframe – to be advanced during 1998/99.

Reducing methane emissions from waste treatment and disposal

Measures to minimise and improve the disposal of waste can achieve reductions in greenhouse gas emissions, as well as providing a range of other environmental benefits and potential economic gains from greater process efficiencies and waste minimisation and conversion. For example, the capture and conversion to energy of methane from landfill or closed vessel anaerobic treatment can be cost-effective and yield a number of benefits, including lowering greenhouse impacts.

Existing measures

Waste Minimisation and Recycling Strategy

Under the Australian and New Zealand Environment and Conservation Council's (ANZECC) Waste Minimisation and Recycling Strategy, the Commonwealth, States and Territories have agreed to reduce the amount of waste going to landfill by the year 2000 by 50% compared with 1990 per capita levels. Waste management is a State, Territory or Local Government responsibility and most jurisdictions have waste minimisation and re-use strategies.

Green and Organic Waste Management Strategy

The Green and Organic Waste Management Strategy, which was agreed by ANZECC in November 1996 subject to the development of markets for recycled organic products, is fundamental to the success of action to reduce methane emissions from landfill.

Action by Local Government

The majority of local councils in Australia have introduced recycling schemes. A number also recycle green waste and/or have created reuse centres. In addition, many councils have developed and are actively promoting community education programs which encourage good consumer and recycling habits.

Newcastle Council, for example, has initiated methane capture projects from which 140 000 tonnes of carbon dioxide equivalent are expected to be saved. The Council is planning to use this methane to generate electricity to power its own operations.

Additional measures

7.3 Implementation of the Green and Organic Waste Management Strategy

Organic waste (food, garden, industrial organic and unstabilised sewage sludge) going to landfill will be minimised through implementation of the ANZECC Green and Organic Waste Management Strategy where this will contribute to a cost-effective abatement of greenhouse gas emissions.

Responsibilities – to be pursued by the Commonwealth and all States and Territories through ANZECC in partnership with local governments and in consultation with landfill owners/operators and other relevant industries (e.g. food processing, renewable energy generators, hospitality, composting).

Note – Local government is not a signatory to the Green and Organic Waste Management Strategy.

Indicative timeframe – ongoing action.

7.4 Methane emissions from landfill

In addition to reducing methane emissions through waste minimisation, action will be taken to encourage the capture and utilisation of landfill methane emissions by:

(i) addressing the policy, financial and structural barriers which prevent the widespread use of methane capture technology, for example, by encouraging the purchase by the electricity industry of electricity produced from methane capture (e.g. by developing partnerships with the electricity industry at the commencement of landfill development);

(ii) ensuring that new putrescible waste landfills are, where appropriate, equipped with methane capture and conversion facilities – for smaller or remote landfills, methane flaring to be practised where practicable;

(iii) developing and implementing education and training for methane capture at landfills, including demonstration plants, technical guidelines and safety standards.

Responsibilities – to be pursued by the Commonwealth, ACT, NSW, Queensland, SA, Tasmania, Victoria and WA in partnership with local governments and in cooperation with landfill owners/operators and the electricity supply industry.

(i) and (iii) to be pursued in a nationally coordinated manner with input from environment and energy agencies.

Measure not applicable in the NT.

Indicative timeframe – ongoing action.

7.5 Methane emissions from waste water

Methane emissions from waste water will be minimised and, where appropriate, captured and utilised by:

(i) expanding programs for extending sewer mains into unsewered outer metropolitan and regional areas, providing funding for the construction of more efficient waste water treatment systems (which consider minimising greenhouse emissions) and upgrading treatment plants to capture and utilise methane produced;

(ii) waste water authorities encouraging those clients responsible for the generation of bio-degradable wastes to reduce their waste streams;

(iii) promoting best practice in waste water treatment to reduce total methane emissions, including the capture and use of methane (e.g. as an energy source) or , where appropriate, treatment of waste water aerobically. General data and information on best methods for increasing methane recovery will be provided;

(iv) undertaking research and demonstration of energy production from methane emissions from waste water treatment plants and developing voluntary agreements with operators to convert methane to energy.

Responsibilities – to be pursued by the Commonwealth, NSW, Queensland, SA, Victoria and WA in partnership with local government and in consultation and cooperation with the waste water industry.

(iii) and (iv) to be pursued as cooperative initiatives to avoid duplication of effort.

Measure not applicable in the ACT or NT.

Indicative timeframe – (i) and (ii) to be pursued through ongoing action.

(iii) and (iv) to be completed by July 2000.

Module

8

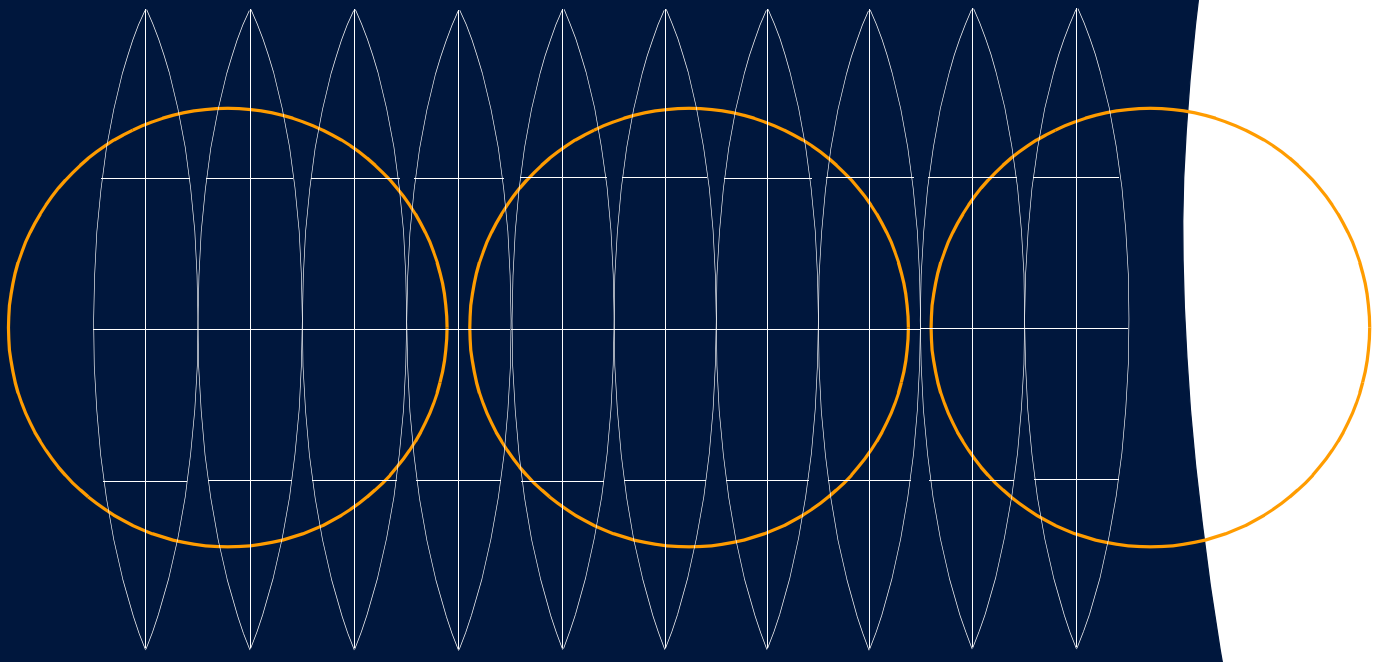
The National Greenhouse Stategy

Adaptation Strategies for Climate Change

Introduction

A national framework for adaptation to climate change

Adaptation strategies for key sectors



Module 8

Adaptation Strategies for Climate Change

Introduction

Scope

This module addresses the development and implementation of a national framework for adaptation to the impacts of climate change. The likelihood that some climate change impacts will occur and must be accommodated in policy formulation is implicitly recognised. The measures include the identification, evaluation and removal of barriers to adaptation; improved research to assist in developmental work; and assessment of the adaptation requirements of several key sectors.

Prioritising action under this module, including judging the adequacy of approaches to ensure timely and effective planning for adaptation, will be dependent on the findings of research envisaged in Module 2.

Context

Adaptation refers to any adjustment that can respond to anticipated or actual consequences associated with climate change. All nations, including Australia, will need to assess options and develop adaptation strategies to assist in mitigating adverse impacts and exploiting potential opportunities arising from climate change. Despite efforts to limit greenhouse gas emissions, some level of climate change is increasingly certain.

The development and implementation of adaptation strategies requires the active involvement of all spheres of government, the private sector and the community. The selection of specific adaptation strategies will need to be based on an integrated assessment of potential impacts and adaptation options, including their benefits and costs to the community as a whole, and their ease of incorporation into existing planning processes.

Difficulties in developing and implementing adaptation strategies arise because:

- uncertainties still exist in climate change science and in projections of possible future climate change at the regional level;
- climate change is one of many changes to which people and ecosystems need to adapt;
- the interactions of climate change with other environmental processes are not fully understood;
- there are a range of institutional and behavioural barriers to adaptation which are only poorly understood;
- the need for adaptive responses to climate change is not widely accepted; and
- there is difficulty in choosing when to adapt and who is responsible for initiating the processes required.

Action by Australia

This module outlines action on:

- a national framework for adaptation to climate change; and
- adaptation strategies for key sectors.

A national framework for adaptation to climate change

An integrated assessment of climate change impacts and sectoral adaptation strategies is required. However, it will be difficult to fully account for all the effects that a change in one sector, resulting from climate change impacts, can have upon another sector.

Within the limitations of our understanding of climate change science, identification of adaptation priorities and levels of investment will depend on the findings of assessments and cost-benefit analyses, and will be considered in light of technological development and activities for emissions mitigation.

A national framework for adaptation will provide a sound information base to assist decision making in assessing options and adopting effective strategies to maintain Australia's natural heritage and economic viability in response to climate change. The framework will evolve over time in light of experience in pursuing these strategies.

Additional measures

8.1 A national framework for adaptation to climate change

A national framework will be developed to assist policy makers and industries plan for and adapt to the potential impacts of climate change in a cost-effective and timely manner.

As an initial step, effort will be directed to defining and seeking agreement among key stakeholders (governments, industries, research bodies) on a set of objectives for adaptation strategies in Australia.

The framework will identify adaptation priorities and options, including for the removal of barriers to implementation, and provide for community information. The framework will evolve over time, reflecting the outcomes of the implementation of the other measures in this module, and drawing on the findings of measures in Module 2 related to research into the impacts of climate change.

Responsibilities – the Commonwealth to play a key role in developing coordinating arrangements and to provide support for research in collaboration with all States and Territories. Consultation to occur with relevant bodies such as CSIRO, Bureau of Meteorology, Queensland Climate Applications Centre, universities, the Australian Academy of Science, and local government.

Indicative timeframe – to be advanced from 1998/99.

8.2 Cross-sectoral implications of adaptation

Cross-sectoral and regional interactions will be investigated to provide an integrated assessment of climate change impacts and adaptation options. These assessments will consider the findings of climate change impact research (see Module 2), the adaptation options identified through measure 8.4, and the results of the initial adaptation actions implemented under measures 8.5 to 8.9.

In undertaking an integrated assessment, consideration will be given to:

- the particular sectoral and regional sensitivities in Australia to climate change;
- the effects that adaptation responses in one sector can have upon another sector;
- the influence of alternative adaptation options on the implementation of mitigation strategies;
- the uncertainties associated with the assessment of impacts and adaptation options.

The program of research will include the dissemination of information on the findings of the integrated assessment to public and private sector groups/organisations.

Responsibilities – to be pursued by the Australian Greenhouse Office in conjunction with other Commonwealth, State and Territory agencies, local government, industry/sectoral stakeholders, universities, and other research bodies.

Indicative timeframe – to be advanced from 1998/99.

8.3 Mechanisms to deliver adaptation strategies

The extent to which current planning processes and strategies (both public and private), which deal with existing climatic variability, can provide a basis for developing climate change adaptation strategies will be investigated. Gaps will be identified and strategies and actions developed where necessary to improve planning processes to support adaptation to climate change.

As part of the investigations, consideration will be given to:

- identifying the means of increasing the flexibility and breadth of issues coverage in existing planning processes to provide for incorporation of potential climate change impacts into planning horizons and arrangements;

- identifying barriers to the implementation of adaptive responses (including lack of adequate information/knowledge and constraints imposed by financial and institutional arrangements) and appropriate solutions to these barriers (including their benefits and costs);
- analysing the risks associated with various options including status quo.

Responsibilities – to be pursued by the Commonwealth, ACT, NSW, Queensland, SA, Tasmania, Victoria and WA in collaboration with local governments. Where appropriate, investigations to be coordinated to achieve added value and efficiency. Consultation to occur with private sector/sectoral interest groups and stakeholders.

Indicative timeframe – to be advanced from 1998/99.

Adaptation strategies for key sectors

In a changing climate, various sectors may experience significant impacts. In sectors such as forests or agricultural production, plant species will be reacting to direct and indirect effects caused by climate change, and by rising atmospheric CO_2 concentrations. These effects will in turn have various impacts on economic viability and environmental values. For example, forests may be affected by changing temperature and rainfall regimes, direct CO_2 effects, and possible changes in competitive relationships between forest and other species including pests. Forest managers will need to develop adaptive strategies which take account of these changes to ensure that management goals (e.g. timber production or maintenance of natural values) are met.

Therefore, adaptation planning for several key sectors or areas which have been identified as sensitive to the direct effects of climate change needs to be undertaken. These sectors include:

- coastal and marine environments and resources;
- agriculture (including agricultural pests and diseases);
- biodiversity;
- forests; and
- human health (e.g. through vector-borne diseases).

There are also secondary impacts which may arise from climate change which will need to be taken into account in developing adaptation strategies (e.g. reduced water availability, as a result of climate change, may have direct impacts on cotton production with possible flow on effects to the textile industry).

Further development of adaptation strategies will occur over time as our understanding of climate change impacts in these and other sectors (such as alpine areas) advances.

Existing measures

Sectoral climate change adaptation assessment

Australian experts are currently undertaking preliminary investigations into the development of adaptation strategies for key sectors of the economy, including agriculture and coasts, to respond to climate change. These assessments have generally been made as part of a limited number of climate change impact/vulnerability studies, and as a consequence only preliminary adaptation options for these sectors have been identified to date.

Some sectors are further advanced in terms of assessing adaptation needs, and specific adaptation measures for those sectors have been outlined. In the longer term, these measures will be updated, and where possible supplemented by other sectoral measures as the state of the knowledge (under development through measure 8.4) allows.

Additional measures

8.4 Assessments to assist the development of sectoral adaptation strategies

As part of the national framework for adaptation to climate change, adaptation strategies will be developed for the following sectors/issues:

- agriculture (e.g. identify new crops or crop cultivars suitable for future use);
- management of forests and other woody vegetation (e.g. identify forest species suitable for long-term planting);
- human health (e.g. identify response actions to deal with changes in the distribution of vector borne diseases);
- biodiversity (e.g. identify strategies for the design and protection of reserve values under future climate conditions);
- coastal planning (e.g. identify response actions for suitable coastal management under climate change);
- alpine regions (e.g. identify management strategies for biodiversity and economic viability);
- water resources (e.g. identify water management strategies suitable for future use);
- integrated assessments for key regions in Australia (e.g. Murray–Darling Basin).

Priorities will be determined by the findings of the national forum on climate change impacts (measure 2.6). Initial research priorities for biodiversity, forests and human health are identified in measures 8.7 to 8.9.

The research plan will include the dissemination of information on the research findings to those public and private sector groups/organisations whose activities may be affected by climate change impacts but could, with adjustments, adapt to climate change.

Responsibilities – the Commonwealth to play a key role in developing coordinating arrangements and to provide support for research in collaboration with all States and Territories. Consultation to occur with research bodies such as CSIRO, Bureau of Meteorology, Queensland Climate Applications Centre and universities, and the Australian Academy of Science.

Indicative timeframe – to be advanced from 1998/99.

8.5 Adaptation strategies in the coastal zone

Implementation of adaptation in the coastal zone will be supported by:

- encouraging adoption of planning strategies which take into account possible climate change impacts, including sea level rise (based on best available climate change and impacts modeling);
- assisting local governments in assessing the vulnerability of local coastal areas to possible climate change impacts and in developing appropriate response strategies;
- encouraging awareness and improved management of potential hazards arising from climate change;
- enhancing the capacity to monitor environmental change in the coastal zone to improve coastal management in response to climate change.

Responsibilities – to be pursued by the Commonwealth, NSW, NT, Queensland, SA, Tasmania, Victoria and WA in collaboration with local governments and in consultation with relevant scientific bodies. Measure not applicable in the ACT.

Indicative timeframe – ongoing action.

8.6 Improving use of climate forecasts and climate change scenarios in agriculture

The use of climate variability and climate change information (seasonal and longer term forecasts of climate variability and scenarios of future climate change) will be increased to aid decision-making on farms and within the agricultural sector. This outcome will be pursued by:

- improving the reliability of existing forecasting services and the capacity to provide specialist forecasts which are suitable for use by farmers;
- promoting the consideration of climate change scenarios and development of suitable adaptation strategies in response to climate change;
- increasing the awareness of available forecasting services through education, extension and information services;
- improving the content and availability of decision support services integrating forecasting capacity with up to date information on optimum requirements of available cultivars and market characteristics.

Responsibilities – to be pursued by the Bureau of Meteorology with CSIRO and with the Commonwealth and all States and Territories in consultation with agricultural producer organisations. Research to improve climate forecasting represents a continuation of existing work but with the objective of improving performance. Awareness program to be coordinated nationally in consultation with the Bureau of Meteorology and CSIRO. Improvements to decision support services to be nationally coordinated.

Indicative timeframe – research and development to be completed by December 2000. Other initiatives to be developed and implemented from 1998/99.

8.7 Adaptation strategies for biodiversity conservation

A framework for progressing adaptation planning for biodiversity conservation will be developed, providing for more detailed plans targeted to components of biodiversity of conservation significance.

Priorities to be addressed within the framework include:

- adaptation requirements of components of biodiversity of national environmental significance such as endangered and vulnerable species and communities, Ramsar listed wetlands, habitat requirements of migratory species identified in bilateral agreements, world heritage properties listed for natural (biodiversity) values;
- assessment of the capacity of protected areas to sustain their biodiversity in the event of climate change and identification of where altitudinal and latitudinal buffer zones or corridors exist (or other appropriate mechanisms to facilitate migration of species) or are required to allow for the movement of organisms;
- adaptation requirements of species or communities whose features, (including range and physiological tolerance) suggest that they are likely to be subject to a change in conservation status as a result of climate change;
- a broad indication, at the regional or ecosystem level, of where climate change may lead to changes in the boundaries of vegetation types, with a particular focus on arid and semi-arid biomes, rangelands, other grasslands, mountains and wetland communities;
- options for addressing the secondary effects of climate change on biodiversity such as altered fire regimes; climatically driven land use changes; conditions that would favour the spread of pathogens or invasive species; and increased vulnerability to desertification and soil degradation processes.

Responsibilities – the Commonwealth to play a key role in developing coordinating arrangements and to provide support for research in collaboration with all States and Territories. Consultation to occur with research bodies and relevant non-government stakeholders.

Indicative timeframe – to be advanced from 1998/99.

8.8 Adaptation strategies for forests

A framework will be developed to progress plans to adapt native and exotic commercial and non-commercial forests, and to ensure continued viability of effective greenhouse sinks and the economic contribution of the sector.
In addition to issues addressed in measure 8.7 priorities will include:

- identifying adaptation requirements for managing existing forests;
- identifying options for enhancement of forests to maintain stocks and conservation values;
- developing adaptation strategies to address secondary effects such as altered exposure to disease and distribution of pests;
- identifying forests that are particularly vulnerable to climate change, either because they are currently growing at the limits of the species environmental tolerance, or because the species may have a narrow range of tolerance;
- identifying species or provenances with broader environmental tolerances that could replace currently used plantation species to reduce vulnerability to climate change.

Responsibilities – the Commonwealth to play a key role in developing the coordinating arrangements and to provide support for research in collaboration with all States and Territories. Consultation to occur with research bodies, the forestry industry and relevant non government stakeholders.

Indicative timeframe – to be advanced from 1998/99.

8.9 Adaptation strategies for human health

A framework will be developed to progress adaptation planning for human health, and provide detailed plans targeted to components clearly related to the consequences of a changing climate such as vector borne and infectious diseases, and extreme event-related morbidity and mortality.

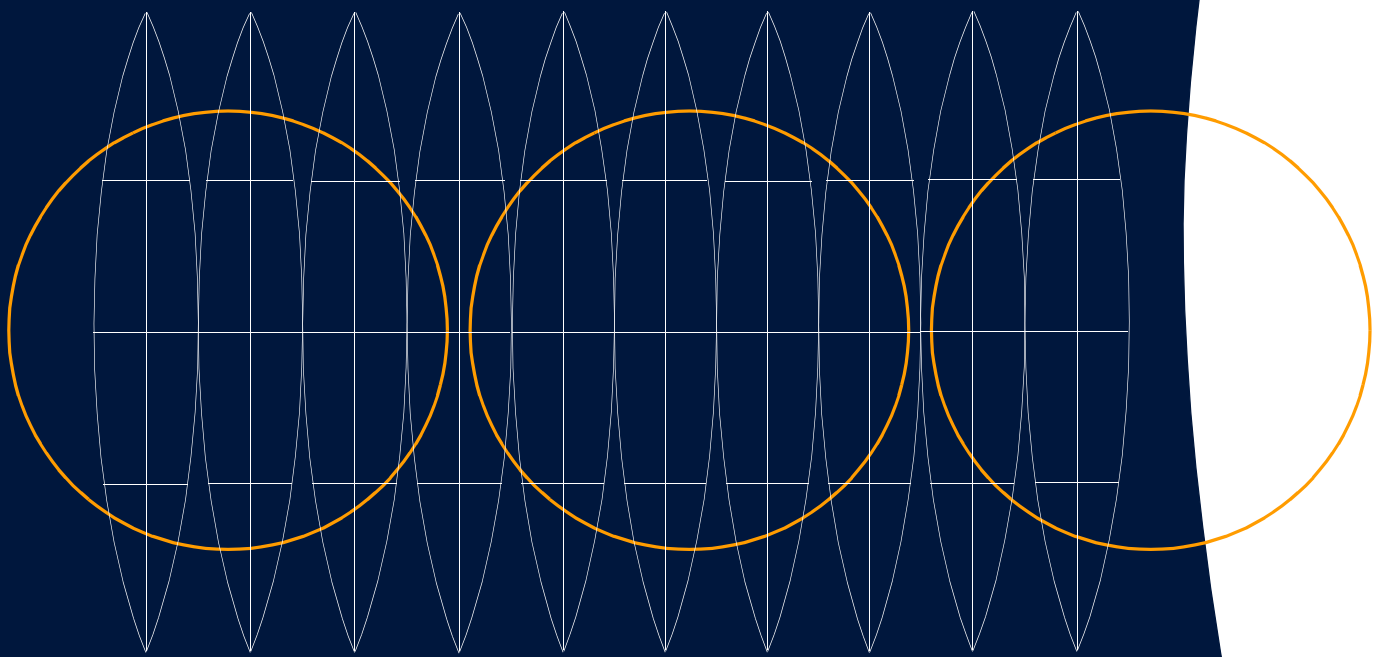
Elements of the framework could include:

- assessing the need for increased public health and control programs;
- improving ecosystem or agriculture management to reduce the potential for invasion by vectors;
- developing and introducing protective technologies;
- improving primary health care of vulnerable populations (e.g. indigenous, young and aged groups, or regionally);
- education campaigns to change high risk behaviour (e.g. encouraging widespread use of insect resistant netting and clothing).

Responsibilities – the Commonwealth to play a key role in developing coordinating arrangements and to provide support for research in collaboration with all States and Territories. Consultation to occur with research bodies, the Australian Medical Association and relevant non-government stakeholders.

Indicative timeframe – to be advanced from 1998/99.

Appendices



Appendix A – Greenhouse Issues for Australia

The state of greenhouse science

Australia has accepted and endorsed the 1995 findings of the Intergovernmental Panel on Climate Change (IPCC) in its Second Assessment Report[1]. The IPCC is recognised as the most authoritative international source of scientific, technical and socio-economic advice on climate change issues. The Panel's First Assessment Report was completed in August 1990 and served as the basis for negotiating the FCCC.

In its Second Assessment Report, the IPCC reported that:

- climate has changed over the past century;
- the balance of evidence suggests a discernible human influence on global climate;
- climate is expected to continue to change in the future as concentrations of greenhouse gases in the atmosphere increase;
- for many regions and systems, the effects of climate change are likely to be adverse;
- there are still many uncertainties.

These findings were supported in the Ministerial Declaration of the Second Conference of the Parties to the Framework Convention on Climate Change in July 1996, and formed a basis for agreement on the need for more effective action by all countries, including Australia, to address the enhanced greenhouse effect. The IPCC Second Assessment underpinned the conclusion of the Kyoto Protocol.

A third major IPCC Assessment will be completed by 2001.

Australia's greenhouse gas emissions profile

Australia is a relatively small producer of greenhouse gases, accounting for approximately 1.4% of global emissions. However, our emissions per capita rank third amongst industrialised countries. This is due to our particular national circumstances, including an abundance of fossil fuel resources which have influenced the structure of Australia's economy and trade profile, a dispersed population with a consequent high dependence of fossil fuel based transport, and a relatively fast rate of population growth. The implications of this national emissions profile are discussed in the section of this Appendix dealing with Climate change and Australia: potential impacts, constraints and opportunities.

Information on the sources of, and trends in, Australia's greenhouse gas emissions is made available through the National Greenhouse Gas Inventory (NGGI) and related work on sectoral emissions projections. This information provides an important pointer to the areas in which action may best be taken to limit Australia's greenhouse gas emissions.

The NGGI contains detailed information on emissions of all greenhouse gases and the contribution to national emissions of various source categories, as well as the removal of CO_2 from the atmosphere due to the uptake of carbon through forestry, pasture improvement and agricultural practices[2].

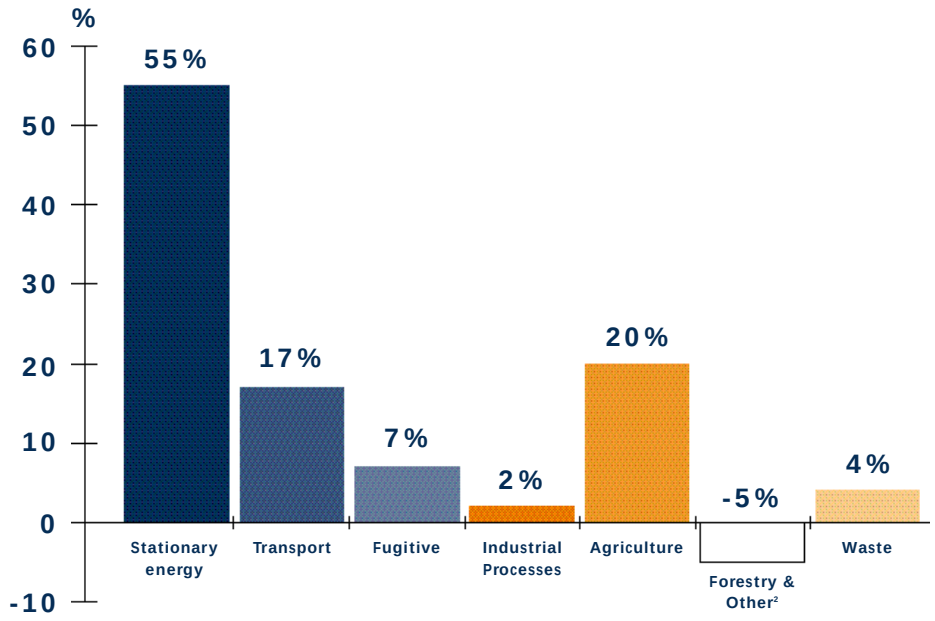
Figure 1 presents information on the source categories of net greenhouse gas emissions, expressed in CO_2 equivalent terms[3], in Australia for 1996 – the latest year for which inventory information is available.

1 *IPCC Second Assessment: Climate Change 1995 – A Report of the Intergovernmental Panel on Climate Change*, United Nations Environment Program and World Meteorological Organisation.

2 The inclusion of CO_2 removals means that the NGGI provides an estimate of net greenhouse gas emissions, ie total emissions minus removals.

3 CO_2 equivalent emissions are calculated by assigning carbon dioxide a global warming potential (GWP) of 1, methane a GWP of 21 (ie. one tonne of methane is equivalent to 21 tonnes of carbon dioxide in terms of its effect on global warming), nitrous oxide a GWP of 310, perfluoromethane a GWP of 6,500 perfluoroethane a GWP of 9200, and sulphur hexaflouride – a GWP of 29,300. GWPs measure the relative global warming potential of the individual greenhouse gases.

Figure 1 Share of Net CO_2 Equivalent Emissions by Source Category – 1996 [1]



Note 1 Fugitive emissions are those which occur, for example, during the storage of fuel; from leaks due to breakages in pipelines etc.

Note 2 Excluding land clearing, but including Forestry and Other subsectors.

Figure 2 Net greenhouse gas emissions by sector, 1990 to 1996 (Mt CO_2-e), excluding land clearing

Sector	1990 Mt CO_2-e	1991 Mt CO_2-e	1992 Mt CO_2-e	1993 Mt CO_2-e	1994 Mt CO_2-e	1995 Mt CO_2-e	1996 Mt CO_2-e	Mt CO_2-e Change 1990–1996	% Change 1990–1996
1 All Energy	296.7	295.5	299.6	301.9	305.6	317.4	331.8	35.1	11.8
Stationary Energy	205.5	208.4	209.5	212.0	213.9	223.0	231.1	25.6	12.5
Transport	61.8	61.3	63.2	64.2	66.0	68.8	71.0	9.2	14.9
Fugitive	29.4	25.8	26.9	25.7	25.7	25.6	29.7	0.3	1.0
2 Industrial Processes	12.1	11.7	10.4	10.2	9.9	9.0	9.2	-2.9	-24.0
3 Solvent & Other Product Use	NA	NA	NA	NA	NA	NA	NA	NA	NA
4 Agriculture	86.9	89.0	87.1	87.3	86.9	87.4	84.3	-2.6	-3.0
5 Forestry and Other (a)	-25.6	-25.2	-25.6	-25.6	-24.3	-23.4	-22.7	2.9	11.3
6 Waste	14.8	15.1	15.4	15.8	16.1	16.4	16.7	1.9	12.8
Total of above	384.9	386.1	386.9	389.6	394.2	406.8	419.3	34.4	8.9

Percentages may not add due to rounding. (a) Excludes emissions from Forest & Grassland Conversion Subsector (land clearing).

Trends and projections of emissions

Energy

Figure 1 shows the dominance of energy as a source of greenhouse gas emissions in Australia. In 1996, the Energy category accounted for 79% of total national emissions, with stationary sources (including power stations) accounting for 55% of national emissions; transport 17%; and fugitive emissions around 7%.

Figure 2 summarises emissions and changes since 1990. The overall picture in the Energy Sector is one of continuing growth in emissions and an increasing share of Australia's total greenhouse emissions. Without effective abatement action, emissions are expected to grow by over 28% (81Mt CO_2-e) between 1990 and 2010. These projections reflect assumptions of continuing growth in GDP, in minerals processing, and in transport and incorporate the main measures expected to reduce emissions – micro-economic reform in the Energy Sector, expansion of the Greenhouse Challenge Program and other measures included in the Prime Minister's November 1997 Greenhouse package. When combined with other measures included here, these are expected to reduce emissions in 2010 by 64Mt compared with the levels they would otherwise have reached. (That is, without these measures emissions could grow by 145Mt between 1990 and 2010.)

Land Clearing and Forestry and Other

Land clearing is a major, but currently declining, source of Australia's greenhouse gas emissions. The major source of emissions in this subsector is from forest and grassland conversion, which contributed approximately 62.9 Mt in 1996.

The Forestry and Other subsector, comprising managed forests and pasture improvement, removed around 5% of Australia's net greenhouse gas emissions in 1996.

Due to the considerable uncertainty remaining with the NGGI estimate of greenhouse gas emissions associated with this category, the 1996 National Greenhouse Gas Inventory reports emissions associated with land clearing separately from the total greenhouse gas emissions. A major Commonwealth/State effort to improve this data is under way, though by their nature these emissions currently can not be as accurately measured as some other sectors.

Inventory data shows that land clearing, primarily for cropping and pastures, has fallen from about 19% of total national emissions in 1990 to about 13% in 1996. It is expected that this assessment will be revised as land clearing emissions estimates are improved.

Historical land clearing data were mostly inferred through modelling, but analysis of satellite imagery is beginning to confirm that the NGGI assessment of recent land clearing rates is reasonably sound. There are uncertainties in estimating the emissions per unit of area of land cleared, especially for the carbon released over many years from soils. Considerable effort is being invested in strengthening the methodology and data inputs used to determine emissions due to land clearing.

Agriculture

Agriculture accounted for about 23% of total national emissions in 1990 and 20% in 1996. The Forestry Subsector provides a sink and contributed approximately a 23 Mt reduction to national net emissions in 1990 and 20 Mt in 1996.

Waste and Industrial Processes

Waste and non energy industrial process emissions accounted respectively for about 4% (15 Mt) and 3% (12 Mt) of total national emissions in 1990. Waste emissions have risen to around 17 Mt from 1990 to 1996 but are projected to return to 1990 levels by 2010. Industrial process emissions have fallen to 9 Mt from 1990 to 1996 but are projected to rise again to 1990 levels by 2010.

Summary

Australia's greenhouse gas emissions, excluding land clearing, were the equivalent of 385Mt of carbon dioxide in 1990 and 419Mt in 1996, an increase of about 9%. Between 1990 and 1996 all sectors were net emitters, except for the Forestry and Other Subsector, a Subsector of the Land Use Change and Forestry Sector, where removals exceeded emissions in every year from 1990 to 1996.

Including all sources and sinks except land clearing emissions, and allowing for the effects of current measures, Australia's total emissions are expected to increase by 18% (71Mt CO_2-e) between 1990 and 2010. In the absence of measures to reduce emissions of greenhouse gases, Australia's emissions would be approximately 552Mt CO_2-e in 2010, a 43% increase from 1990 levels. Australia believes that with the inclusion of the Land Use Change and Forestry sector in estimates of emissions for 2010 together with a range of cooperative implementation mechanisms identified in the Kyoto Protocol, the Kyoto target while challenging, is obtainable.

Climate change and Australia: Potential impacts, constraints and opportunities

The National Greenhouse Strategy is tailored to address Australia's particular circumstances, including the opportunities for, and constraints on, different courses of action.

Potential impacts of climate change

Australian Governments recognise that Australia is vulnerable to a range of potential impacts and costs arising from climate change, and its associated disruption of the environment and human activities. These effects could include: an increase in severe storms, floods and droughts; more intense and longer cyclones; erosion of coasts due to sea level rise; risks for human health; an increase in the range and spread of tropical diseases and pests; and adverse impacts on biodiversity, agricultural industries, manufacturing industry and social infrastructure.

Australia's size, great diversity of environments, and the concentration of population along an extensive coastline, make us vulnerable to a wide range of impacts arising from climate change.

Australia's response to the potential impacts of climate change must be twofold: to limit our contribution to global emissions and support similar action by all other countries; and to lay the foundations for actions to adapt to these impacts, both positive and negative.

Implications of greenhouse abatement for Australia

Australia is vulnerable to potential economic impacts arising from international and national actions to reduce greenhouse gas emissions.

There are a number of reasons for this, including:

- Australia's reliance on long haul transport over a large land area, its widely dispersed natural resources, and remoteness from overseas markets;
- above-OECD average population growth;
- few economically viable alternatives to fossil fuels as its primary energy source, with no nuclear energy and limited hydro-electricity capacity; and
- Australia is the world's leading exporter of coal and has a large supply of fossil fuels which are used to develop export-oriented industries and energy intensive activities such as aluminium smelting and steel-making.

These considerations are intensified as a consequence of Australia's rate of economic growth, geographic size, and population growth, which point to a relatively high rate of emissions growth compared with some OECD countries. In particular, substantial growth is occurring in Australia's mining and minerals processing sector and there is a trend towards downstream processing of raw materials using Australia's abundant fossil fuel energy resources.

These national circumstances have been recognised in the differentiated outcomes of the Kyoto Protocol and in the development of the Strategy. The impacts of proposed measures will be evaluated by the Australian community in a National Interest Analysis (NIA) which is required before Australia ratifies the Kyoto Protocol in its final form.

In developing the Strategy, governments have been mindful that objectives relating to economic growth, social justice, environment protection and conservation are also important concerns of the community. To be effective, greenhouse policy must be integrated with these other policy objectives, particularly economic and trade policies, micro-economic reform agendas (e.g. transport and energy sector reforms), competition policy reforms and the review of Commonwealth/State environmental roles and responsibilities.

Opportunities for non-greenhouse benefits

While acknowledging the particular constraints on Australia's greenhouse response, it also is important to recognise that Australia's geographic and economic situation provides special opportunities for greenhouse action. The pursuit of strategically focused domestic responses to greenhouse will bring economic, social and environmental benefits to Australia, including:

- the scope for improvements in energy efficiency (both in production and use) which can contribute to Australia's international competitiveness through savings in energy costs;
- competitive advantages in renewable energy technologies, such as photovoltaics and biomass energy – development of these technologies for the domestic market can provide a platform for Australia to gain from growth in worldwide demand for renewable energy;
- extensive agricultural activity and natural land resources which provide unique opportunities for Australia to reduce emissions of greenhouse gases and to enhance greenhouse sinks through forestry and revegetation activities.

The modules identify specific areas where government programs are already delivering greenhouse benefits (eg. the Bushcare: National Vegetation Initiative) and new opportunities where complementary programs can be pursued.

Appendix B – The Kyoto Protocol to the United Nations Framework Convention on Climate Change

Australia ratified the United Nations Framework Convention on Climate Change in December 1992. The Convention entered into force on 21 March 1994.

The ultimate objective of the Convention is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (or human induced) interference with the climate system.

Key commitments for all Parties under the Convention include[4]:

- preparing national inventories of greenhouse gas emissions and removals;
- developing, implementing and reporting on national programs to mitigate climate change and develop adaptation strategies;
- cooperation in the development and transfer of technologies, practices and processes that control, reduce or prevent emissions of greenhouse gases;
- promoting sustainable development and promoting and cooperating in the conservation and enhancement of sinks and reservoirs of all greenhouse gases including biomass, forests and oceans;
- taking climate change considerations into account in relevant social, economic and environmental policies and actions;
- promoting and cooperating in research and exchange of information on the implications of climate change and various strategies.

The Convention's principal commitments for Annex 1 Parties (OECD and East European countries) relate to the adoption of policies and measures to reduce greenhouse gas emissions with the aim of restoring their emissions to 1990 levels by the year 2000, subject to a number of relevant provisions. The Convention provides the flexibility to implement these measures jointly and assist others to contribute to the achievement of its objective.

The Convention requires Annex 1 Parties to report to the Conference of the Parties on their policies and measures as well as on projections of future net greenhouse gas emissions (guidelines call for projections to 2010/2020). In response, Australia submitted its first National Communication under the Convention in 1994 and submitted the second National Communication in November 1997.

Annex 1 countries are to provide new and additional financial resources to meet the agreed full costs incurred by developing countries in complying with their inventory and reporting obligations, and the agreed full incremental costs of other commitments under the Convention.

Through the inclusion of review provisions in the FCCC governments recognised that it could be a launching pad for stronger action in the future. The first review of the adequacy of developed country commitments took place in 1995, and lead to negotiations on strengthened commitments resulting in the Kyoto Protocol.

The Kyoto Protocol: summary of major provisions

Australia took an active part in negotiating the Kyoto Protocol to the Framework Convention on Climate Change and subsequently signed the Protocol on 29 April 1998.

Target commitments

Developed (Annex I) countries have collectively agreed to reduce greenhouse gas emissions by at least five per cent below 1990 levels by 2008–2012. Within this target, individual countries have agreed to legally binding differentiated targets ranging from an 8 percent reduction to a ten percent increase above 1990 levels by the first commitment period (2008–2012). Australia's differentiated target is an eight percent increase above 1990 levels.

The six greenhouse gases to be covered by the Kyoto Protocol are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride.

In achieving their reduction commitments, Parties are able to take account of reductions in greenhouse emissions from sources and removals of carbon by sinks (in the case of sinks, activities before 1990 are excluded) and from land clearing.

Cooperative implementation mechanism

Industrialised countries can use a range of mechanisms aimed at providing cost-effective opportunities to meet target commitments. These include emissions trading, joint implementation and emissions banking. The details governing the operation of these cooperative implementation mechanisms are yet to be negotiated.

Greenhouse emission reduction credits generated from joint implementation projects between Annex I Parties can be used to meet emission targets.

4 Interested readers are referred to the *United Nations Framework Convention on Climate Change* for the full text of these provisions.

A Clean Development Mechanism (CDM) is to be established to assist developing countries to reduce emissions through cooperative projects with Annex I countries. Annex I countries can use the certified emissions reductions achieved to meet their own targets. Private sector participation in both CDM and joint implementation is envisaged.

The provision for emissions trading as a mechanism to assist countries in meeting their targets is contained in the Protocol. The principles and guidelines governing the operation of such a regime, however, are yet to be agreed by the Conference of the Parties.

Surplus emission reduction credits achieved in one commitment period may be transferred to a subsequent commitment period. This is known as emissions banking. However, emissions from future periods may not be borrowed to meet commitments in prior periods.

Bubble arrangements

Parties, such as those comprising the European Union, may fulfil their (aggregate) commitments jointly. Even though the Kyoto Protocol text lists each of the EU member states with a uniform target, burden-sharing within the EU bubble will continue. Each individual EU member state will have a differentiated target. In the event of the EU failing to meet its collective target, individual EU member states who have not complied with their individual differentiated target together with the European Commission would be legally liable for non-compliance.

The Protocol provides in principle for the establishment of bubble arrangements between any group of Parties which choose to fulfil their commitments jointly. It also requires transparency in the operation of bubbles.

Non-compliance

Approval of the procedures and mechanisms to determine and address cases of non-compliance, including penalties, are issues for further negotiation and agreement by the Meeting of the Parties to the Protocol. Adoption of any mechanisms entailing binding consequences can only be achieved through an amendment to the Protocol.

Entry into force

The Kyoto Protocol will enter in force 90 days after at least 55 Parties, representing at least 55 per cent of total Annex I CO_2 emissions for 1990, have ratified the Protocol. Ratification by Australia will be considered by the Government only after it has completed a national interest analysis process that involves consultation with all key stakeholders. It appears unlikely that the Protocol will enter into force for several years.

Policies and measures

Annex I Parties will implement policies and measures in accordance with their national circumstances to meet their target commitments. Policies and measures advocated in the Protocol cover a range of areas such as energy efficiency, promotion of sustainable development and agricultural practices, development and increased uptake of new and renewable technologies and encouragement of market reform.

Involvement of developing countries

The establishment of a Clean Development Mechanism will allow industrialised countries to participate in joint projects with developing countries. However, agreement was not reached on the future involvement (or even a process to begin to consider the involvement) of developing countries in taking on binding target commitments to address climate change. This issue will need to be considered in ongoing negotiations. Nonetheless, the provision for establishing a Clean Development Mechanism is an important means of pursuing developing country participation in emission reduction activities.

Appendix C – Performance indicators

A key element in assessing Australia's greenhouse performance will be the use of performance indicators. Australia was one of the first countries in the world to develop a set of key performance indicators (listed below) to evaluate its 1992 National Greenhouse Response Strategy. This key set of performance indicators will form the basis of a comprehensive set of performance indicators to facilitate evaluation the effectiveness of the measures contained in this Strategy.

Australia's key performance indicators include macro indicators to provide a measurement of overall national performance (e.g. emissions and emissions per unit of output); sectoral indicators reflecting sectoral objectives and measures; and diagnostic indicators for strategic industries or policy areas.

The final set of performance indicators, including secondary and diagnostic indicators, will be developed in 1998/99 to complement the macro and sectoral indicators. Tertiary indicators relating to individual groups of measures will be developed where possible.

Macro and sectoral indicators

MACRO INDICATORS	• Total emissions (CO_2 equivalents)
	• Emissions per unit of economic welfare/performance
	• Emissions per capita
SECTORAL INDICATORS	• Total emissions from each sector
	• Emissions per unit of gross product
Energy	• Energy emissions per capita
Energy supply	• Emissions from energy delivered by fuel type
	• Emissions from energy delivered per unit of energy used
Household energy	• Emissions from household energy per capita
Industrial and commercial energy	• Emissions per unit of energy delivered
Transport	• Emissions per passenger-km – total and by mode
	• Emissions per freight tonne-km – total and by mode
Transport and urban planning	• Emissions per km travelled in urban areas by mode
Industry process emissions	• Emissions from the aluminium industry
Agriculture	• Sheep methane equivalents per animal
	• N_2O emissions index
Natural environment	• CO_2 from land use change (NGGI methodology)
Waste	• Methane emissions from landfill per capita

Glossary

Adaptation measures

Action in response to, or anticipation of, climate change to reduce or avoid adverse consequences or to take advantage of beneficial changes.

Alternative Fuels

Fuels which are less greenhouse intensive than petrol and diesel, for example, ethanol.

Anthropogenic

Caused by human activity; in relation to climate change it describes greenhouse gas emissions resulting from human activities.

Australian Greenhouse Office

The Australian Greenhouse Office was announced by the Prime Minister in November 1997. The Office is the key Commonwealth agency on greenhouse matters, and is responsible for both the coordination of domestic climate change policy and for managing the delivery of major new and existing Commonwealth greenhouse programs.

The Office is a tripartite organisation formed from the then Departments of the Environment; Industry, Science and Tourism; and Primary Industries and Energy.

Benchmark

A standard set by the best existing practice, product or service. A standard by which something can be measured or judged. Benchmarking is the process of comparing performance against that of others in an effort to identify areas for improvement.

Biodiversity

The variety of all life forms – the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part.

Cleaner production

The continuous application of an integrated preventative environmental strategy to processes, products and services to increase efficiency and reduce risks to humans and the environment.

Cogeneration

Generation of electricity combined with the production of heat for commercial or industrial use. Excess electricity produced can be fed back into the power grid. Cogeneration is an energy efficient way of using fossil fuels.

Energy efficiency

Ratio of energy output of a conversion process or of a system to its energy input; also known as first law efficiency.

Enhanced greenhouse effect

Changes in the earth's climate as a result of increasing levels of greenhouse gases in the atmosphere due to human activity.

Extension programs

A type of outreach and education program that is often used in the agricultural sector. An extension program provides information and encouragement to people and organisations to adopt new practices.

Fossil fuels

Coal, natural gas, liquefied petroleum gas, and fuels derived from crude oil (including petrol and diesel). They are called fossil fuels because they have been formed over long periods of time from ancient organic matter.

Fugitive emissions

These emissions are not fully controlled, but in most cases are not accidental. Examples of fugitive emissions are leaks from gas pipelines and valves, venting and flaring of gases, methane emissions from coal seams and vapour given off by petroleum stores.

Global warming potential

An index that allows the potency of greenhouse gases to be compared. For example, carbon dioxide has a GWP of one and methane has a GWP of 21, that is methane is 21 times as potent as carbon dioxide.

Green power

Electricity generated from a renewable source. A number of electricity retailers are now offering green power schemes to their customers.

Greenhouse Challenge

A cooperative agreements program established in 1995 to provide the opportunity for Australian industry to work with government to reduce greenhouse gas emissions through continuous improvements in energy efficiency.

Greenhouse gases

Gases that affect the temperature of the earth's surface. They include water vapour (H_2O), tropospheric ozone (O_3), chlorofluorocarbons (CFCs), carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The last three gases are of particular concern in this strategy because they take a long time to be removed from the atmosphere. CFCs are controlled separately by the Montreal Protocol due to their ability to damage the ozone layer in the stratosphere.

Greenhouse intensity

An indication of the quantity or potency of the emissions resulting from a particular activity. It is often used in order to compare activities.

Intelligent electronic systems

Systems of electronic monitoring, tolling, freight logistics/timing and/or driver information systems used to improve transport outcomes for different transport modes in terms of traffic flow, congestion, alternative route options, just in time interconnections and safety.

Intensive land use zone

Cropping and grazing areas excluding the extensive pastoral zones of SA, NT, Queensland and WA.

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 Programme. The Panel carries out internationally coordinated assessments of the magnitude, timing, and potential impacts of climate change, and provides technical assessments of potential measures to mitigate climate change. It does not engage in basic research or policy formulation.

Intermodal integration

The development of interconnections or links between different transport modes (e.g. rail, road, sea etc.) so that transport tasks are completed by the appropriate mode or mix of modes to obtain the optimal environmental, economic and social outcome.

Kyoto Protocol

An international agreement, reached in 1997 in Kyoto, Japan, which extends the commitments of the United Nations Framework Convention on Climate Change. In particular, it sets targets for future emissions by each developed country.

Land use change

Includes land clearing, pasture improvement, and emissions from prescribed burning and bush fires.

Life cycle analysis

Also known as cradle to grave assessment. Life cycle analysis provides a systematic approach to measuring resource consumption and environmental releases (to air, water and soil) associated with products, processes and services.

Megatonne (Mt)

One million tonnes. Greenhouse gas emissions are often measured in megatonnes.

Megawatt (MW)

One million watts. One megawatt is enough power to supply the peak electricity needs of roughly five hundred houses.

Photovoltaics

A method of turning sunlight into electrical energy. These are more popularly known as 'solar cells' or 'solar panels'.

Ramsar Convention

The Convention on Wetlands of International Importance, especially as Waterfowl Habitat.

Renewables

Energy forms that never run out or can be replaced, unlike fossil fuels. This includes solar energy, wind, tidal, geothermal and ocean thermal power, and fuels derived from plants such as wood (if harvested sustainably), and ethanol made from sugar cane.

Rumen

The first stomach of a ruminant animal. Ruminant animals are grazing animals such as sheep and cattle. When these animals digest food in their stomach without oxygen they produce methane emissions.

Sequestration

Removal of greenhouse gases from the atmosphere by plants or technological measures. The Strategy is concerned with carbon sequestration which is defined by the IPCC as the process through which carbon is absorbed by biomass such as trees, soils and crops.

Sink

The processes (or places that encompass particular processes) that remove greenhouse gases from the atmosphere.

Synthetic gases

Manufactured gases, for example perfluorocarbons (PFCs) which are generated largely by aluminium processing, sulphur hexafluoride (SF_6) which is primarily emitted during metals processing and hydrofluorocarbons (HFCs) which are mostly used in the refrigeration industry.

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 no one country can solve this global environmental problem alone. Australia signed the FCCC in June 1992 and ratified it in December 1992.

The ultimate objective of the FCCC is to achieve stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human-induced interference with the climate system. The Convention's principal commitments for Annex I Parties (OECD and East European countries) are to adopt policies and measures to reduce greenhouse gas emissions with the aim of restoring their emissions to 1990 levels by 2000, subject to a number of considerations. The Kyoto Protocol, when it comes into force, will substantially extend these commitments.

Acronyms and Abbreviations

AGO	Australian Greenhouse Office
ALGA	Australian Local Government Association
AMCORD	Australian Model Code for Residential Development
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZMEC	Australian and New Zealand Minerals and Energy Council
ARMCANZ	Agriculture and Resource Management Council of Australian and New Zealand
ATC	Australian Transport Council
AusAID	Australian Agency for International Development
CASE	International Centre for Application of Solar Energy
CCP	Cities for Climate Protection
CH_4	Methane
CNG	Compressed natural gas
CO_2	Carbon dioxide
COAG	Council of Australian Governments
CRC	Cooperative Research Centre
CSIRO	Commonwealth Scientific and Industrial Research Organisation
ESAA	Electricity Supply Association of Australia
FCCC	see UNFCCC below
HFC	Hydrofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
MCEETYA	Ministerial Council for Education Employment Training and Youth Affairs
MCFFA	Ministerial Council on Forestry, Fisheries and Aquaculture
MEPS	Minimum energy performance standards
Mt	Megatonne
MVEC	Motor Vehicle Environment Committee
MW	Megawatt
NAFC	National average fuel consumption
NatHERS	National House Energy Rating Scheme
NECA	National Electricity Code Administrator
NGGI	National Greenhouse Gas Inventory
NGGIC	National Greenhouse Gas Inventory Committee
NGRP	National Greenhouse Research Program
NGRS	National Greenhouse Response Strategy (1992)
NHT	Natural Heritage Trust
N_2O	Nitrous oxide
NVI	Bushcare: National Vegetation Initiative
PFC	Perfluorocarbon
PPG	Planning Policy Guidance
R&D	Research and development
RD&D	Research, development and demonstration
REIIF	Renewable Energy Innovation Investment Fund
RFA	Regional Forest Agreement
RMIT	Royal Melbourne Institute of Technology
SF_6	Sulphur hexafluoride
TAFE	Technical and further education
UNFCCC	United Nations Framework Convention on Climate Change
WREEP	Wholesale/Retail Energy Efficiency Program