

National Climate Change and Commercial Forestry Action Plan 2009-2012

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Foreword

This document has been drafted in fulfilment of a commitment by the Council of Australian Governments (COAG) to establish Climate Change Action Plans for critical sectors of the economy.

COAG's *Plan of Collaborative Action on Climate Change* (2006) outlined the future agenda of collaboration between governments to address key demands from business and the community for targeted information on climate change impacts, and to fill critical knowledge gaps which currently inhibit effective adaptation. A key focus of the *Plan for Collaborative Action* was to support decision-makers in understanding and incorporating climate change into policy and operational decisions at all scales and across all vulnerable sectors including commercial forestry.

In 2006, the Forestry sector had an annual turnover of around \$19 billion, and 120,000 people were employed in businesses that relied on the growing and use of timber.

This Action Plan is intended to guide action by industry with the support of governments over the next three years. Governments have consulted with stakeholders to develop practical strategies and actions to manage the risks, and take advantage of opportunities, brought about by climate change impacts and policy responses.

All governments recognise that adaptation is a long-term agenda and that it will take time to quantify risks of climate change impacts and to build capacity to minimise costs and to take advantage of any benefits.

The Natural Resource Management and Primary Industries Ministerial Councils are pleased to endorse the National Climate Change and Commercial Forestry Action Plan which is a strategic future-oriented framework that will assist the forest industries in relation to its business decision making and fosters a culture of innovation and responsiveness in the face of the challenges imposed by climate change.

Introduction

Climate change represents significant challenges and opportunities for Australia's forestry sector. The ability of forests and wood products to provide long term carbon storage means that forestry has an important role to play in Australia's efforts to address climate change.

Resources have begun to be directed at examining the effects a changing climate will have on the forest and wood products industry and further information is required. This knowledge is of critical value to the industry for the development of tools, processes and new methodologies to adapt to, and mitigate, the impacts of climate change. This requires a nationally coordinated approach by the forest and wood products industry, with assistance where necessary from Commonwealth, State and Territory Governments.

The purpose of the *National Climate Change and Commercial Forestry Action Plan* is to address these issues, including identifying knowledge gaps, and areas of further development (such as management, policy and research needs) to assist the industry to respond to climate change.

The *National Climate Change and Commercial Forestry Action Plan* covers the following sectors and activities:

- Tree plantations developed for commercial purposes at all scales. This includes farm forestry, agroforestry, broad-scale plantations, and trees planted for a mixture of commercial and environmental purposes.
- Wood production from native forests (excluding all native forests which are not harvested, e.g. national parks).
- Processing facilities that rely on raw material from production forests, including sawmills, board plants and pulp and paper mills.

This Action Plan covers only those forests intended for commercial production, which currently represent just 12% of Australia's forest cover. In addition to this plan, over the next three years, the Australian, State and Territory Governments will, through the National Climate Change Adaptation Research Facility, undertake a nationwide forest vulnerability assessment to identify particularly vulnerable forest regions from the perspective of resource use and ecosystem services provided by all forests. It is anticipated that this assessment will then help to inform forestry sector adaptation directions beyond 2012.

The ways in which Australians value our public forests are diverse, and will continue to shift over time. Governments and industry may also need to adapt to changing public expectations of how forests should be managed in relation to their role in climate change.

Businesses involved in the forestry industry should be including potential climate change impact risks in their financial models and management activities. As for all business risks, responding with appropriate adaptive management strategies will ensure business continuity. Governments can assist by providing clarity around market rules and ensuring market settings encourage innovation, adaptation and risk management. In addition, through supporting research and development, governments can make available information for effective decision making.

Objective of the National Climate Change and Commercial Forestry Action Plan

The principal objective in developing this Action Plan in collaboration with key stakeholders has been to assist the forestry sector to respond to climate change through adaptation and mitigation, underpinned by research and development and communication.

Outcomes sought through the Action Plan

As shown below the strategies outlined in each focus area seek a combination of short and long term outcomes.

- Outcome 1. Forestry sectors that are:
- Ecologically sustainable.
 - Economically viable.
 - Socially acceptable.
 - Resilient, adaptable, innovative.
 - Competitive in the face of climate change.
- Outcome 2. Industry stakeholders have the knowledge and capacity to respond to climate change and make risk-based decisions. Stakeholders are able to:
- Respond to fluctuations in costs and returns.
 - Look for and capture opportunities that may arise.
 - Take responsibility for their future.
 - Work cooperatively to address challenges.
- Outcome 3. Flexible and adaptive regulatory and management frameworks which deal with uncertainty and facilitate industry adaptation to, and mitigation of, climate change, providing:
- Certainty for stakeholders - promoting investment.
 - Cooperative government/industry partnerships.
 - Coordinated approaches to research and development.

Implementation

Implementing the strategies and actions to adapt to and mitigate climate change across the Australian commercial forestry sector as outlined in this Plan is an opportunity for the Australian government, state and territory governments, and the forest industries and communities to work together to achieve these shared goals and outcomes.

The Action Plan provides a framework to coordinate activities within the institutional, legislative and budgetary frameworks that exist in each jurisdiction. The Australian Government, through its 2007 Forest industry election commitment, announced that \$8 million would be available to address knowledge gaps about the impact of climate change on forestry and the vulnerability of forest systems. Where appropriate, the government will seek to leverage these funds by seeking co-investment with states and industry stakeholders in a series of projects addressing actions within the plan.

As this is primarily a plan for the commercial forestry sector the Primary Industries Ministerial Council will oversee the implementation of this Action Plan, ensuring coordination with other Council initiatives.

Summary of Actions

Adaptation

- Action 1 Collaborate with the climate community to understand the impacts of recent climate variability and change on forestry and develop regional level climate projections in forested areas to establish where intervention is critical and necessary.
- Action 2 Assess all forest regions, forest types and forest values to determine the risks from climate change.
- Action 3 Develop diagnostic tools and techniques to determine when (and what) specific management intervention is required to respond to the threats and opportunities of climate change.
- Action 4 Develop methods to identify risks to infrastructure and processing facilities.
- Action 5 Develop, provide and facilitate integrated regional scale tree planting and sustainable forest management options which can be used in the business models of other land use sectors as a means of adaptation, while enhancing and protecting land, water and biodiversity outcomes.

Mitigation

- Action 6 Encourage greenhouse mitigation through:
- promoting investment in reforestation and bioenergy systems.
 - strengthening datasets underpinning the fate of carbon in harvested wood products.
 - preparing emissions reduction pathways for existing facilities.
 - determining workable methods for greenhouse gas accounting in native forests.
- Action 7 Industry to engage with international colleagues in identifying industry needs and assist in the development of a more rigorous, cost-effective and holistic international treatment of greenhouse gas accounting in the forestry sector.
- Action 8 Lower the emissions intensity of the forest and wood products industry.
- Action 9 Ensure that all programs with an objective of addressing climate change use consistent and rigorous approaches to assessing the greenhouse footprint of the forest and wood products industry.
- Action 10 Develop measures to identify and address critical bottlenecks to greater use of recycled wood and paper products.
- Action 11 Develop and promote a generic marketing campaign for wood products based on their low greenhouse footprint.

Bioenergy

- Action 12 Promote the development and deployment of sustainable bioenergy generation on a commercial scale in response to policy and market signals.
- Action 13 Identify required resources to realise the opportunities presented by bioenergy.
- Action 14 Encourage a consistent framework and methodology for assessing the sustainability of all woody feedstocks.

Supporting Actions

- Action 15 Enhance and add value to the existing body of forest industry data and monitoring so that better quantitative analysis to support climate change responses can be undertaken in the future.
- Action 16 Facilitate changes in forest management to lower risk and identify new forest growing opportunities by disseminating information on forestry and climate change.
- Action 17 Ensure actions within the forestry industries promote sustainable responses to climate change and encourage similar actions within all land use sectors.

Background

The need for a forestry climate change action plan was identified in the National Climate Change Adaptation Framework (the Framework). This was endorsed by COAG in April 2007 as the basis for government action on adaptation over the next 5 to 7 years. The Framework includes possible actions to assist the most vulnerable ecosystem components, sectors and regions adapt to climate change, and to enhance the knowledge base underpinning climate change adaptation.

The Framework recognises that climate change, resulting from higher atmospheric carbon dioxide (CO₂) levels could have a range of significant impacts on Australia's forest resources, including changes in water availability, higher temperatures, more frequent and severe bushfires and greater pest and disease incursions. The Framework also noted that these impacts could compromise the productive capacity of forests, effectively restricting timber supply to capital intensive processing industries with consequences that last for many years. To assist the forest industry to remain competitive and sustainable in the face of climate change, the Framework recommended the development of a Climate Change and Forestry Action Plan under both the Primary Industries and Natural Resource Management Ministerial Councils.

The *National Climate Change and Commercial Forestry Action Plan* has been developed with a solid groundwork of information and processes, including:

- The development of climate change policy initiatives coordinated through the Natural Resources Management and Primary Industries Ministerial Councils, and COAG.
- The National Agriculture and Climate Change Action Plan¹.
- Commonwealth, state and territory climate change strategies.
- The fourth assessment report from the Intergovernmental Panel on Climate Change (IPCC).
- The Climate Change Research Strategy for Primary Industries².
- *Climate Change in Australia* (2007), a report prepared by CSIRO and the Bureau of Meteorology for the Australian Climate Change Science Program³.
- The *Garnaut Climate Change Review* interim and final reports.
- The *Carbon Pollution Reduction Scheme White Paper*.
- *Forest Research Strategic Directions 2008-2011* prepared by the Research Priorities and Co-ordination Committee of the Forestry and Forest Products Committee.

The *National Climate Change and Commercial Forestry Action Plan*: identifies knowledge gaps in the area of forestry and climate change; pinpoints potential obstacles that industry may face in its efforts to respond to climate change; identifies areas which require attention; and provides a series of actions classifying areas of work which are fundamental in the context of addressing the impacts of climate change.

In an effort to capture the views of the forest and wood products industry, this project has included stakeholder consultation, both at a broad level, and also in detail on specific areas. The Steering Committee for the *National Climate Change and Commercial Forestry Action Plan* comprises the Forests and Climate Change Committee (which exists under the Sustainable Forest Management Committee within the purview of the Primary Industries Ministerial Council), research providers, and a range of industry representatives.

Background information regarding the forestry industry, climate change, their interaction, and the principles under which this Action Plan were developed have been provided as appendices.

¹ The National Agriculture and Climate Change Action Plan is available from www.daff.gov.au/__data/assets/pdf_file/0006/33981/climate-change-action-plan-2006-09.pdf.

² <http://www.ccrspi.com.au>

³ www.climatechangeinaustralia.gov.au/index.php

Plan Focus, Strategies and Actions

The Action Plan has been separated into four sections, outlining three focus areas and a section containing supporting actions. These sections contain strategies aimed at addressing the challenges and opportunities that climate change presents to forest and the wood products industry. The focus areas address major threats and opportunities to the industry from changes in climate and the introduction of a carbon cost. Actions have been developed under each strategy of this Plan.

National Climate Change and Commercial Forestry Action Plan Focus Areas

- **Focus Area One: Adaptation**
Encompasses strategies to ensure that the forest and wood products industry has the necessary resources to adapt and remain viable in the face of climate change.
- **Focus Area Two: Mitigation**
Addresses the opportunities for the industry to contribute to mitigation while maintaining healthy economic growth through a number of strategies.
- **Focus Area Three: Bioenergy**
Examines the new market opportunities for electricity and liquid fuel from wood-derived biomass, and proposes strategies for new and pre-commercial technologies to be developed and deployed.
- **Supporting Actions**
Ensures there is a solid basis of information on the forest and wood products industry in order to undertake quantitative analysis on future responses to climate change.

Focus Area One: Adaptation

Ensure the forest and wood products industry has the information, tools and expertise to adapt to a changing climate, and play its role in adaptation of the Australian rural landscape and economy.

Adaptation by industry should ideally be autonomous. To support industry action, policy and management frameworks should allow forest managers to respond in a timely manner and remove impediments to adaptation without jeopardising the long term sustainability of the industry. These frameworks should encourage foresters to minimise risks and capitalise on opportunities for industry expansion, as forestry can make a positive contribution towards mitigating climate change. Actions taken to adapt to climate change, resulting in industry expansion, will help mitigate future climate change.

Strategies for adaptation will be required for the forest growing sector, the processing sector, and also for other sectors of the economy seeking adaptation options.

Strategy 1.1: Ensure forest managers have the information, tools and expertise to profitably manage their forest assets in a changing climate.

When assessing the tools that will be required for the task of adaptation, researchers acknowledge that comparatively little is known about the impact of climate change on forest systems. There is definite scope for increasing knowledge about the impact of changing weather patterns, temperature and water flows on forests. This is an essential area of work which will underpin other adaptive measures by providing information about the forest systems requiring new management regimes. Forests need to be managed to deal pre-emptively (or at least promptly) with risks and challenges not faced before. An important early step is to realise that traditional management methods may not work in the future.

The development of efficient adaptive management tools must be supported by thorough research. Among the highest research priorities for adaptation is the development of tools to assist in forest observation and change detection in areas such as tree health, pest incursions, water utilisation and fire risk. It will be crucial to be able to pre-emptively implement management regimes in anticipation of events. Evolving remote sensing tools may play a critical role in adaptive management in the near future, and significantly reduce the costs of forest monitoring.

Other areas where research could be usefully applied to the adaptation task is in understanding and predicting the effects of increased atmospheric carbon dioxide, water availability and changing soil nutrition on tree growth and timber quality. Given that Australia has seen significant changes in climate since the 1950s it is important, in the context of future impacts, to understand how these changes have impacted on forestry. Expected increases in the severity of droughts and flooding will have an impact on the water cycle, and increased forest coverage and productivity in some areas may change the quality and quantity of water that flows into rivers, streams and dams. Research into altered hydrology and landuse impacts on catchments in general, is required. In addition the impacts of more frequent and intense fires, the impact of pests and other stress factors should be established. Such information will be beneficial when devising future management regimes for production native forests, and determining the areas most suited to plantation expansion and investment. This information may inform the development of state and local government land use planning tools in relation to plantation establishment.

Those changes in climate and associated risks which can be foreseen will require active and adaptive management to cope with the new conditions in which the forestry sector operates. Variables such as species mix, new genetics, location, fire management and silviculture will be important considerations for the establishment of new forests especially, and also for the management of existing production forests. Developing tools to promote tree survival, water efficiency, overcoming pest attacks and other hazards, is essential to promote the sustainable development of the commercial forest resource and associated carbon stores in all existing forests as well as new plantations.

- *Action One* - Collaborate with the climate community to understand the impacts of recent climate variability and change on forestry and develop regional level climate projections in forested areas to establish where intervention is critical and necessary.
- *Action Two* - Assess all forest regions, forest types and forest values to determine the risks from climate change.
- *Action Three* - Develop diagnostic tools and techniques to determine when (and what) specific management intervention is required to respond to the threats and opportunities of climate change.

Strategy 1.2: Develop the capacity for the forest processing sector to adapt to challenges resulting from climate change.

The processing sector's main adaptation challenges are related to infrastructure. Areas that may require specific attention include roading (e.g., creek crossings), fire fighting resources, potential changes to supply volumes as a result of large bushfires, and processing infrastructure that is a significant user of available natural resources (e.g. water use by pulp and paper mills).

Similar to the situation that exists for forests, a proportion of the existing processing industry infrastructure may be affected by anticipated climate change. It is necessary to review the current infrastructure in light of predictions or scenarios of climate change to identify those aspects that will require remedial management intervention.

- *Action Four* - Develop methods to identify risks to infrastructure and processing facilities..

Strategy 1.3: Assess the extent to which tree plantations are a viable adaptation tool for land-based industries such as agriculture, and how this land use change may enhance biodiversity, natural resource and water management.

The adaptation tools which need to be developed for the forestry sector could also have application in other industries, especially land-use sectors such as agriculture. Integrated tree plantings can provide benefits ranging from carbon sequestration and dryland salinity mitigation to shelter for livestock, windbreaks, enhancement of water quality and biomass for renewable energy and fuel. In order for other land users to examine and access the environmental and economic potential of planting trees in their business models, they need to be presented with a series of options and tools to ensure the success of such adaptation methods.

If tree planting options are tailored for integrated outcomes, consistent with regional biodiversity and water management plans, other sectors will be better able to use this adaptation tool and make possible changes in their enterprises. Farmers may be able to plant trees for both carbon sequestration and additional revenue (be it direct revenue from timber, carbon storage, biomass for energy, or indirectly via enhanced productivity through improvements in soil, or better water quality). Farmers with existing native forests should be encouraged to manage these forests to minimise exposure to higher fire risks (in some regions).

- *Action Five* - Develop, provide and facilitate integrated regional scale tree planting and sustainable forest management options which can be used in the business models of other land use sectors as a means of adaptation, while enhancing and protecting land, water and biodiversity outcomes.

Focus Area Two: Mitigation

Identify, facilitate, and act on, opportunities for Australia's forest and wood products industry to contribute to a reduction in national net emissions combined with healthy economic growth.

In addition to adaptation, addressing climate change requires action to reduce the emissions of greenhouse gases to the atmosphere, and to augment the storage of carbon. This is a central policy priority for the governments of most developed countries, which involves applying a cost on greenhouse gas emissions (i.e. a carbon price). Commonly this occurs through the implementation of an emissions trading scheme, as is currently proposed for Australia.

Australia's Carbon Pollution Reduction Scheme (CPRS) is scheduled to commence in 2011. The Government's White Paper, released on 15 December 2008, outlines the intended design of the scheme. A summary relating to the forestry industry is included in Box C on page 19.

Forest Industries and Emissions Trading

Sub-sectors of the forest and wood products industry face different impacts and opportunities from climate change and governmental responses, including the introduction of a carbon price signal and consequent increases in energy prices.

- The forest growing sector manages significant carbon sinks. An expanding plantations sector is contributing to Australia's performance against our Kyoto target, and there is potential for increased activity through appropriate market responses to climate change.
- The wood processing sector is an energy user and a potential producer of renewable energy from residues. The pulp and paper sector is a significant user of energy, particularly in mechanical pulping processes, and is faced with strong competition from imported product from countries such as China, Brazil, Indonesia and Korea.

The two sectors are strongly linked through supplier-customer relationships, corporate structures and market arrangements. Positive and negative impacts on one sector inevitably flow through the supply chain to other.

The forest and wood products industry, as a sequesterer of carbon, has opportunities to make contributions to climate change mitigation. Growing forests and producing wood products results in long-term carbon storage and there is existing technology, infrastructure, skills and expertise for the industry to increase levels of carbon storage as one of a range of mitigation options. These will provide net environmental benefits where they enhance and do not detract from land, water and biodiversity values.

The forest and wood products industry can provide mitigation opportunities through energy efficiency measures, altering management practices, plantation expansion, and carbon sequestration and storage in growing forests and harvested wood products.

The production and supply of biomass for electricity and fuel production may also contribute to mitigating greenhouse gas accumulation in the atmosphere. Lignocellulosic (wood) biomass for electricity and fuel has some advantages, including being a significant source of energy. The existence of a carbon price will have major implications for viability and demand. These and other issues relating to bioenergy are explored in *Focus Area Three: Bioenergy*.

Potential Impacts of Emissions Trading

Potential impacts of emissions trading on the forest and wood products industry are wide-ranging and may include the following:

- Forests store carbon - this may provide financial incentives for resource development (new forests).
- Timber stores carbon and requires less energy to produce than other building products - this should enable increased competitiveness of forest products against more greenhouse-intensive alternatives.
- Components of pulp and paper manufacturing are energy (and emissions) intensive. These activities are also critical components of the forest supply chain (as markets for lower quality logs) and the recycling supply chain (as users of recovered paper). The introduction of an Australian carbon cost may reduce the competitiveness of Australian production against imports from countries with no carbon cost, thereby affecting both the forest and recycling supply chains.
- The Australian Government will establish an Emissions Intensive Trade Exposed (EITE) assistance program. This assistance is designed to reduce the potential that firms engaged in EITE activities may choose to leave Australia or avoid expansion following the introduction of the Scheme.
- Sustainably managing existing native and plantation forests maintains carbon cycles - these are conservatively considered neutral in the Kyoto Protocol framework (not recognising carbon stored in wood products). With greater refinement of measurement protocols, they may be more accurately tracked. Changes in management may also result in improved carbon storage.

Strategy 2.1: Ensure the forest and wood products industry plays its role in reducing Australia's emissions profile through participation in Australia's CPRS.

The various activities carried out by the forest and wood products industry can be either greenhouse gas sources or sinks.

1. *Afforestation/reforestation and forest management*: carbon dioxide sequestered and stored in new and existing forests.
2. *Harvested wood products*: carbon stored in long term timber products during use and after disposal, delaying emissions until burning or decay.
3. *Operations*: greenhouse gas emissions associated with forest establishment, management, harvesting and transport.
4. *Processing*: greenhouse gas emissions associated with product processing.

Some activities will be directly impacted by the government's CPRS, while others will be impacted indirectly through higher expected fuel and energy costs. Owners of Kyoto-compliant forests may voluntarily opt into the scheme in order to receive Australian emission units for increases in net greenhouse removals.

While the carbon stored in harvested wood products is not currently counted under Kyoto Protocol accounting rules, the concept is increasingly accepted by policy makers, and countries are now able to include carbon in wood products in their UNFCCC national inventories. The possible inclusion of accounting for harvested wood products is being considered as part of international negotiations for a

post-2012 international climate change agreement. Its treatment internationally will then be considered for its applicability and inclusion in Australia's CPRS.

- *Action Six* - Encourage greenhouse mitigation through:
 - promoting investment in reforestation and bioenergy systems.
 - strengthening datasets underpinning the fate of carbon in harvested wood products.
 - preparing emissions reduction pathways for existing facilities.
 - determining workable methods for greenhouse gas accounting in native forests.

Strategy 2.2: Support the development of a more rigorous, robust and comprehensive treatment of forestry carbon cycles in international processes, such as the Kyoto Protocol rule-set.

Australia is among the countries accepting binding targets under the Kyoto Protocol, which provides an international foundation for national-level policy. These obligations provide a context within which the Government is setting emissions reduction targets and introducing climate change measures "at home".

The first commitment period under the Kyoto Protocol includes a set of rules for the treatment of land use, land use change and forestry (LULUCF). These rules have helped inform the development of approaches for coverage of reforestation under Australia's CPRS. Efforts are now required to gain support for the development of a more rigorous, cost-effective and holistic international greenhouse gas emissions accounting rule set for forests. These could then be incorporated into the CPRS where appropriate.

- *Action Seven* - Industry to engage with international colleagues in identifying industry needs and assist in the development of a more rigorous, cost-effective and holistic international treatment of greenhouse gas accounting in the forestry sector.

Strategy 2.3: Promote clear market signals to allow the forest and wood products industry to make confident commercial decisions on mitigative action.

Government and industry will implement an appropriate range of policies and systems in addition to the market forces empowered by an emissions trading scheme, consistent with mitigation targets. Examples may include:

- Building codes that specify energy efficiency or guide material use, including energy used in production, and the energy efficiency associated with use.
- Policies in the area of waste management, particularly cost-recovery.
- Purchasing policies in the public and private sector.
- Initiatives based on sustainability, including sustainability reporting and certification of sustainable forest management.
- "True" comparative greenhouse impact assessment of competing products (from full life cycle inventory analyses).

Other policies and systems may have similar aims, but unintentionally could lead to some initiatives creating opposing market signals. To avoid this, industry and government may need to consider and monitor initiatives aiming to address the same or similar issues, with a view to aligning market signals. In addition, industry can receive the market signals from each initiative and make efficient and rational decisions that balance the competing priorities.

There may be scope for reducing the emissions intensity of certain activities and increasing energy efficiency in plantations and commercial native forests. These opportunities include reduced fertiliser use, changed fire management regimes, minimised soil disturbance and avoiding landfill emissions through recycling.

The recycling of timber products after initial use has the potential to reduce greenhouse gas emissions by prolonging the storage of carbon in the timber and reducing the energy used in the manufacture of timber products. One option for use of recycled timber may be the direct production of energy through combustion.

Recycling of used paper has the potential to reduce greenhouse emissions. Recycling used paper also reduces greenhouse gas emissions from landfill. Australia currently has high rates of paper recycling (more than 50%) and recovered paper is a valued resource with a robust and competitive market. Higher rates of recycling are inhibited by the costs of recovery and aggregation and specific bottlenecks in the recovery chain.

These bottlenecks principally relate to the recovery of paper from office buildings.

- *Action Eight* - Lower the emissions intensity of the forest and wood products industry.
- *Action Nine* - Ensure that all programs with an objective of addressing climate change use consistent and rigorous approaches to assessing the greenhouse footprint of the forest and wood products industry.
- *Action Ten* - Develop measures to identify and address critical bottlenecks to greater use of recycled wood and paper products.
- *Action Eleven* - Develop and promote a generic marketing campaign for wood products based on their low greenhouse footprint.

Focus Area Three: Bioenergy

Bioenergy is a form of renewable energy that is derived from organic fuels. The advantages of bioenergy can include:

- The displacement of fossil fuel based energy.
- Regional and rural employment potential.
- Renewable and decentralised energy production systems.
- Sustainable environmental footprint.
- Co-benefits such as salinity mitigation, water quality improvement, erosion control, weed management, flora and fauna habitat protection and improved plantation profitability.

While biofuels and bioenergy can play an important role in expanding the range of energy sources available in Australia, they do not necessarily deliver clear and unambiguous climate or environmental benefits in all situations.

To be beneficial to the environment and society more broadly, the production of biofuels, and critically the feedstock used, needs to be sustainable. If forest resources are to play a role in the Australian energy sector we need to carefully consider the overall environmental performance of different feedstocks and production processes.

In recognition of the need to develop the next generation of biofuels, the Australian Government has developed the \$15 million Second Generation Biofuels Research and Development Program. A joint internal government review of the biofuels industry is being conducted by the Department of Resources, Energy and Tourism and the Department of Agriculture, Fisheries and Forestry, and is due to report in the second half of 2009.

Bioenergy currently contributes just 0.5% to Australia's total electricity supply, with energy generation from wood related waste and residue material occurring on a very small scale. The Australian biofuels industry is also small, supplying less than 0.5% of Australia's transport fuel.

Currently, biofuel feedstocks are drawn from waste wheat starch, molasses and by-products of food production. In terms of the "food vs. fuel" debate and concerns over global food security, the

Australian biofuels industry has a limited effect on domestic or global food prices. Nevertheless, it is recognised that first generation biofuel production from food crop feedstocks can affect world feed grain and food prices. The Government is supportive of research and development of second generation bioenergy technologies, including the production of ethanol from plant waste-sourced cellulose and biodiesel from algae.

Biofuels in Australia - Issues and Prospects (RIRDC 07/071, 2007) reports that 140% of current petrol demand, and 40% of current diesel demand, could be supplied by second generation technologies from Australian domestic feedstocks, including forest-derived material.

As a base-load source, bioenergy in general may have the capacity to provide equivalent energy security to non-renewable sources. Forests tolerate climate extremes, late and early rotation harvests, and limited growth inputs. Forests may also grow on marginal land unsuitable for other crops. Biomass is generally a low value commodity, and costs associated with harvesting and transport may be major issues. Much can be learned from mature wood-based bioenergy sectors in other parts of the world - notably Sweden, Finland and North America.

International Example of Electricity Generation from Wood Waste

In 2007, Finland sourced 20% of its energy from wood fuels (Statistics Finland, 2008). Forest residues were the most rapidly growing form of wood energy and account for about 3% of the wood energy consumed in Finland. In 2004, 2.7 million cubic metres of forest residues were used, over 25% more than in the previous year. A goal of Finland's National Forest Programme is to increase the annual use of forest residues to 5 million cubic metres by 2010. The Finnish forest industry is the largest producer and user of wood sourced bioenergy in Finland, accounting for some 80% of the bioenergy production and consumption in the country (Finnish Forest Industries, 2006).

Heat generation

Australia's forest and wood products industry has been using waste products for bioenergy for many years. Sawmill residues have long been burned on-site to generate heat for direct use and/or to produce electricity. This efficiency measure will continue into the future and the industry will continue to examine opportunities in this area.

Electricity from Biomass

The technology for utilisation of forest material for bioenergy already exists. In some cases, only small alterations to coal-fired power plants would enable the use of forest biomass for co-firing. Europe is an advanced user of bioenergy from wood waste; Finland, for example, produces 22% of its electricity from bioenergy, and operates small scale bioenergy plants based on 100% wood feedstock. Opportunities for generating electricity from biomass warrant ongoing examination in Australia.

Electricity Generation from Biomass

The technology for electricity generation from 100% woody biomass feedstock is already in use in Australia. The integrated wood processing (IWP) plant at Narrogin, WA, is a demonstration facility that uses oil mallee eucalypts to produce activated carbon, eucalyptus oil and renewable electricity. Oil mallees have multiple uses, assisting in the treatment of water and dryland salinity, and are able to be sustainably harvested every 3-5 years (the trees are regrown by coppicing, which avoids the need to replant).

Liquid Fuels from Biomass

There are a number of new projects under development in Australia with first generation ethanol technology using grain, starch and molasses based feedstocks. The existing production capacity by the end of 2008 is estimated to be around 300 million litres per year. This constitutes approximately 15% of requirements for a 10% ethanol substitution in unleaded petrol.

Overcoming Barriers to Commercialisation

The Commonwealth's *Renewable Energy (Electricity) Regulations 2001* set eligibility criteria for the creation of tradable Renewable Energy Certificates from native and plantation forest wood waste under the Renewable Energy Target (RET) scheme. This scheme obliges energy retailers and large users to purchase a portion of their electricity from renewable sources. Eligible sources include plantation wood, wood waste from sawmills and wood processing plants, and some native forest harvesting residues. The RET scheme has encouraged increased use of wood wastes in electricity generation, particularly through co-firing in power stations. Under the RET Scheme the Australian Government committed to ensuring that 20% (approximately 60,000 GWh) of Australia's electricity supply comes from renewable energy sources by 2020.

Within the proposed CPRS bioenergy enjoys a competitive advantage over high-emissions energy because it is not subject to a carbon pollution cost.

Renewable Energy in the Pulp and Paper Sector

The pulp and paper sector is a producer of renewable energy using processing waste. This renewable energy may be used on-site or exported to the grid. The MRET scheme has encouraged more generation of electricity using this renewable energy. The pulp and paper sector used more than 50 000 TJ of energy for manufacturing in 2005-06 with more than 12 000 TJ produced from renewable sources on-site.

Strategy 3.1: Contribute to Australia's greenhouse mitigation efforts by capturing the bioenergy opportunities resulting from a carbon price signal and complementary measures promoting renewable energy.

- *Action Twelve* - Promote the development and deployment of sustainable bioenergy generation on a commercial scale in response to policy and market signals.
- *Action Thirteen* - Identify required resources to realise the opportunities presented by bioenergy.
- *Action Fourteen* - Encourage a consistent framework and methodology for assessing the sustainability of all woody feedstocks.

Supporting Actions

Ensure there is a solid basis to, and extension of, information on the forest and wood products industry in order to ensure effective adaptation and mitigation. This will also allow for quantitative analysis on future responses to climate change.

For the successful accomplishment of the actions developed under this plan, a level of information about the forest and wood products industry is required. The level of information needs to be holistic and integrated across the forest growing and processing sectors, given the inter-linkages and risks and opportunities across the commercial value chain. It is also important to ensure that actions taken to respond to climate change promote sustainability and do not have unexpected negative effects on the environment, the industry or the community. Therefore the supporting actions are:

- *Action Fifteen* - Enhance and add value to the existing body of forest industry data and monitoring so that better quantitative analysis to support climate change responses can be undertaken in the future.
- *Action Sixteen* - Facilitate changes in forest management to lower risk and identify new forest growing opportunities by disseminating information on forestry and climate change.
- *Action Seventeen* - Ensure actions within the forestry industries promote sustainable responses to climate change and encourage similar actions within all land use sectors.

Further Reading and References

- Allen Consulting Group (2005). *Climate Change Risk and Vulnerability: Promoting an Efficient Adaptation Response in Australia*. Final report to the Australian Greenhouse Office, Department of Environment and Heritage, March 2005.
- Booth, T.H., Kirschbaum, M.U.F., and Battaglia, M. (2008). 'Forestry' in Stokes, C.J. and Howden, M. (eds.) An overview of climate change adaptation in the Australian agricultural sector - impacts, options and priorities. Prepared for Land and Water Australia. CSIRO, Canberra. p. 204-225.
- Commonwealth of Australia (2008). Carbon Pollution Reduction Scheme White Paper. Department of Climate Change, Canberra. Available online at: www.climatechange.gov.au/whitepaper.
- CSIRO and Australian Bureau of Meteorology (2007). *Climate Change in Australia: Technical Report 2007*. Available online at: www.climatechangeinaustralia.gov.au/resources.php.
- Finnish Forest Industries (2006). www.forestindustries.fi/JuuriNyt/Uutiset/Pages/Finlandsbioenergyproduction.aspx.
- Garnaut, R. (2008). *Garnaut Climate Change Review Draft Report, June 2008*. Available online at: www.garnautreview.org.au/CA25734E0016A131/pages/draft-report.
- Intergovernmental Panel on Climate Change (2007). *Climate Change 2007: Synthesis Report*. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core writing team: Pachauri, R.K. and Reisinger, A. (eds)]. Intergovernmental Panel on Climate Change, Geneva, Switzerland, 104pp.
- Land and Water Australia (2008). *A National Climate Change Research Strategy for Primary Industries*.
- Statistics Finland (2008). www.stat.fi/tup/suoluk/suoluk_energia_en.html.
- The National Agriculture and Climate Change Action Plan available online at: www.daff.gov.au/__data/assets/pdf_file/0006/33981/nat_ag_clim_chang_action_plan2006.pdf.

Appendix 1 - The Forest Industries and Climate Change

Forestry in Australia

Principles for the ecologically sustainable management of Australia's forests have been agreed by all governments in the 1992 National forest policy statement.

Australia's forests managed for timber production are a net carbon store, meaning there are less greenhouse gases emitted through activities such as harvesting, than the carbon sequestered through the growth of these forests and stored in harvested wood products. Australia has an estimated forest area of 149 million hectares, comprising 147 million hectares of native forests and 1.9 million hectares of plantations. In 2005/06 the annual turnover of Australia's forest product industries was more than \$19 billion.⁴

Box A: *State of the Forests Report (2008)*

According to the State of the Forests Report:

- Australia's forests sequester more greenhouse gases from the atmosphere than they emit and therefore help to offset Australia's contribution to global greenhouse gas emissions.
- Plantations offset about 3.5% and managed native forests about 5.5% of total national greenhouse gas emissions in 2005. Additional storage in wood products offset a further 1% of emissions.
- Extensive wildfires in native forests during the period 2001/02 - 2005/06 released large amounts of greenhouse gases into the atmosphere. Over time, those emissions are expected to be offset by new forest regeneration.
- From 2002 to 2006, an estimated \$902 million was invested in plantation development, while investment in new or improved wood and wood product manufacturing facilities totalled several billion dollars. This in turn positively impacted on revenue, wages and employment in the industry.

The expansion of Australia's production forests is occurring primarily through investment in plantations. The *Plantations 2020 Vision* program is aimed at supporting the expansion of Australia's plantation estate. Under the *Vision* (a strategic partnership between Australian, State and Territory Governments and industry) Australia's plantation estate has increased on average by 73,000 hectares per annum since 1997. The *Vision* has a target of 3 million hectares of plantations nationally by 2020. (More information about the *Plantations 2020 Vision* can be found at www.plantations2020.com.au.)

Australia's production forest resources supply a significant processing industry. This includes the production of solid and reconstituted wood products such as structural timber, decorative timber, plywood and medium density fibreboard. The production and further processing of paper and paperboard is also reliant on the supply of fibre from production forests.

The forest and wood products industry is an important industry in many regions of Australia and provides regional employment opportunities. Total national employment in businesses dependent on growing and using timber in 2006 was estimated to be about 120,000 people.

⁴ Bureau of Rural Sciences (2008). Australia's State of the Forests Report 2008. <http://adl.brs.gov.au/forestsaustralia/publications/sofr2008.html>

Climate Change

There is overwhelming scientific evidence that human-induced climate change is occurring. It is also accepted that a significant policy intervention is required to address greenhouse gas emissions causing climate change.

Box B: Independent Advice: the Garnaut Climate Change Review

The Garnaut Climate Change Review released its Final Report on 30 September 2008, emphasising above all the need for strong and early action by "all major economies" and the cost of inaction. Among its many recommendations, the Report states that forests could play an immediate role as offsets and should be included in an emissions trading scheme as soon as practicable, with harvested wood products to be included when verifiable measurement and accounting rules become internationally acceptable.

The Australian Government has indicated that the proposed Carbon Pollution Reduction Scheme (CPRS) will be a central pillar of its climate change policy response. The Government has also committed to implementing other measures to address market failures not dealt with by an emissions trading scheme.

Box C: The Australian Government's *Carbon Pollution Reduction Scheme White Paper*

With respect to the forest and wood products industry, the Government's White Paper on the CPRS proposes:

- All Kyoto compliant reforestation will be included, on a voluntary basis, from 2010.
- The scheme will cover only domestic emissions sources and sinks that are counted in Australia's Kyoto Protocol national account (i.e. native forests and plantations established prior to 1990 not initially included).
- Also consistent with Kyoto rules, exclusion of carbon in wood products; however the Government commits to increase its efforts for changes in the international climate change framework in ways that reflect Australia's particular circumstances, that are soundly based on science and that provide appropriate incentives to reduce emissions;
- Exclusion of deforestation from the scheme.
- A program of assistance for emissions-intensive trade-exposed sectors.

While mitigative action is necessary, it is believed that a level of unavoidable climate change will occur because of greenhouse gases that have already been emitted into the atmosphere. A growing body of scientific research exists projecting changes which can no longer be avoided by taking action now. In Australia, projections of approximately a 1 degree increase (slightly less in coastal regions and more inland) by 2030 are relatively certain.

Forestry and Climate Change

Among the highest impacts of climate change on forests will likely be a higher risk of bushfires, new pest and disease incursions, increased forest mortality, increased soil erosion, changes in water quality and quantity, and potential damage from extreme weather events. The biggest impacts on forest growth will be higher levels of CO₂, higher temperatures and changing hydrological regimes influenced by rainfall frequency and intensity. In addition, fire may facilitate a change in the spatial distribution of species (and timber resources) in native forests.

Box D: *Climate Change in Australia (2007)*

Climate Change in Australia (2007), prepared by CSIRO and the Bureau of Meteorology for the Australian Climate Change Science Program, is based on international research including the IPCC's fourth assessment report, and regional data. It outlines some of the changes in climate that we can expect, including:

- More extreme high temperatures, with more days over 35°C, and less frosts.
- Changes in rainfall including increased dryness in the south-west, higher precipitation intensity and a greater number of dry days.
- A drop in soil moisture, especially in the south, and higher potential evaporation. This may lead to increased drought episodes in SA, QLD and NSW.
- Higher fire-weather risk, as a result of drier and warmer conditions.
- An increase in storm surges, the intensity of tropical cyclones and other extreme weather events, as well as increased hail risk on the south-east coast.
- An increase in wind activity in the north and inland.

The *National Climate Change and Commercial Forestry Action Plan* has been developed to allow the industry to address the challenges and opportunities arising from climate change, and to allow the industry to respond to measures which will put a price on carbon emissions in an attempt to influence Australia's emissions pathway. Both climate change and the implementation of measures to address it, will be particularly important in the future of the forestry sector where carbon is sequestered in a resource which is grown over long timeframes, and where competition in product markets may be altered.

The forest and wood products industry recognises the need for tailored adaptation strategies to manage the impact of climate change already locked in by past emissions. The industry needs to ensure it takes an active role in the national mitigation effort. This Action Plan fulfils these needs by identifying the priority areas of work for the industry to ensure adaptation and mitigation strategies to support the ongoing growth of sustainable forest industries.

Box E: A Unique Industry

The forest and wood products industry has a number of interactions with climate change, changing markets and regulatory frameworks. These include:

- Storage of carbon in growing forests.
- Long-lived natural assets.
- Storage of carbon in forest products.
- Use of energy (fuel and electricity) in the processing of forest products.
- Lower greenhouse footprint than competing materials, especially in the building and construction industry.
- High rates of renewable energy production and use.
- High rates of product recycling, particularly in the paper sector.

Appendix 2 - Principles to Guide Plan's Development

The *National Climate Change and Commercial Forestry Action Plan* is underpinned by principles to ensure the actions are of an appropriate scope, ambition and feasibility.

Guiding Principles of the National Climate Change and Commercial Forestry Action Plan

- i. Climate change is one of the greatest challenges that modern society has faced and requires a response of corresponding scale, longevity and vision.*

There is little or no precedent for climate change with respect to its reach through all parts of human activity, the enormity and permanence of potential impacts and therefore, the extent to which measures to address climate change will also impact on all aspects of society.
- ii. Market-based solutions will provide the core of the response to climate change.*

Addressing climate change requires developing different ways to carry out all aspects of daily life, from the production and consumption of energy to the fate of waste products and materials. While it is theoretically feasible to address these through regulatory intervention, it is only practically feasible to achieve the required level of change through market signals that will efficiently and consistently work through all parts of the economy to affect the value of goods and services and change consumer behaviours accordingly.
- iii. Responding to climate change requires focused adaptation strategies.*

Preventing further, and catastrophic, climate change is sufficient justification for immediate action, but even with that intervention there is a degree of climate change already occurring, with further change anticipated. An appropriate response must consequently include adapting to the climate change that is inevitable.
- iv. Climate change and Australia's response is likely to result in changes to society, the natural environment, and the economy. Care should be taken to ensure the alignment and adjustment of policy measures.*

Fundamental changes to the way industries operate is therefore unavoidable, and a desire to maintain current business models or practices cannot be put forward as a sole cause for inaction by industry. To encourage sustainable industry growth and expansion, a timely process of 'fine-tuning' of various policy initiatives may be required.
- v. Responding to climate change requires participation and cooperation within the forest industry and with government.*

A market response to climate change requires major government intervention to create a market that maintains clear and simple market signals. In response to that market, the major actions to address climate change will occur through the processes of competition, reward and innovation that drive industry. A full response to climate change therefore requires close cooperation within the industry and with government.
- vi. The response to climate change, while immediate and significant, must allow flexibility for innovation.*

Climate change requires immediate action; however the underpinning science and technologies that will be employed are not yet fully understood. The response to climate change by the industry must therefore encourage the innovation that rapidly brings in the required new ideas and technologies (and attitudes).

- vii. *Profitable sectors will have a greater capacity to adapt to climate change and undertake mitigation activities.*

Forest managers and processors, and manufacturers of forest products that are able to respond to market signals and maintain strong profitability will be better positioned to adjust to changes in forest growth and market demand. Profitable operators are also more likely to seek new opportunities and innovative means to adjust to changed conditions, meaning their profitability is less likely to be adversely affected by climate change.

- viii. *Adaptation and mitigation will be assisted by building the adaptive capacity of sectors through research and communication strategies.*

One of the key objectives of the *National Climate Change and Commercial Forestry Action Plan* is to identify knowledge gaps which require research and development, and/or communication and awareness strategies to pre-empt key needs for the forest and wood products industry, and to maintain the profitability and therefore adaptive capacity of industry participants.