SUSTAINABLE LAND MANAGEMENT AND CLIMATE CHANGE

Options for a *Plan of Action*

A public discussion document for those with an interest in New Zealand's forestry and agriculture sectors.

A New Zealand Government Initiative on Sustainability

Information about this consultation and downloadable copies of this publication are available at: www.maf.govt.nz/climatechange

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Ministerial Foreword

Climate change is a serious global problem. As scientific understanding of climate change deepens, the trend is for expected impacts to be more serious, and to happen sooner.

Our biologically based economy is vulnerable to the impacts of climate change. The future of our economy, environment and way of life are threatened. It is in New Zealand's interest that there is a concerted global effort to reduce greenhouse gas emissions.

Here at home, measures to reduce emissions are part of the Government's wider objectives to ensure our economy remains competitive and sustainable into the future.

No matter what happens with the Kyoto Protocol, New Zealand needs to prepare for a world in which a cost is attached to greenhouse gas emissions. This is not a New Zealand Government initiative; it is an international reality. The cost arises from reducing greenhouse gas emissions, whether this is achieved through regulation, legislation or price-based instruments. While action to reduce greenhouse gas emissions will have a moderate cost, the predicted costs and risks of inaction are higher.

We have already announced a large number of practical, everyday measures to reduce greenhouse gas emissions, and we are developing more. Many have other benefits, such as improved air and water quality, reduced erosion and flood risk, lower electricity and transport fuel costs, healthier homes and workplaces, improved energy security, and the protection of our native flora and fauna.

At the same time, we are taking action to prepare New Zealand for the effects of climate change such as rising temperatures and sea levels, and more frequent and severe weather including both floods and droughts.

In the short term, actions to reduce emissions will be specific to each sector and include a combination of voluntary, price-based and regulatory measures to encourage efficiency and low-emissions technology.

In the longer term, action is needed across the economy. Although it is true that some sectors can and should reduce their emissions more than others, we all can play our part in some way.

The Government wishes to build comprehensive and durable policies for the land management sectors, and this consultation is an important part of the process. We look forward to receiving your views on how we can work together, now and in the future, to respond to the challenges and opportunities of climate change.

Hon Jim Anderton

Minister of Agriculture and Forestry

Hon David Parker

Minister Responsible for Climate Change Issues

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EXECUTIVE SUMMARY

Climate change is widely recognised as a serious global problem that needs to be addressed with long-term vision, enduring policies and initiatives that protect our economy and our way of life.

New Zealand's land management sectors – agriculture, horticulture and forestry – are most vulnerable to the extremes of weather that are the long-term predicted impacts of climate change. A significant portion of New Zealand's economy is based on the way our land is managed; we need to develop policies that reduce our greenhouse gas emissions and so position us well internationally to protect our economic and trade interests.

The UK Treasury's Stern Review 2006 *(see page 17)* concluded that the less the world does now to reduce greenhouse gas emissions, the higher the future cost of adapting to climate change and cutting back emissions. Taking strong action now is an investment in our future; not taking action poses significant risk.

This discussion document, *Sustainable Land Management and Climate Change*, proposes policies for the agriculture and forestry sectors, to be developed and implemented through a single, collaborative *Plan of Action*.

It is proposed that the *Plan of Action* would contain a set of goals to guide actions on climate change and identify those that could be taken with immediate effect. It would also show how the Government and sectors could work together to create solutions for the long term.

Feedback on goals proposed for the *Plan of Action* is sought in Questions 1 to 4 of the submissions form at the back of this document.

A wide number of options are canvassed as part of the *Plan of Action*, including measures to help the land management sectors adapt to the impacts of climate change, reduce emissions, create carbon sinks and capitalise on possible business opportunities. In all these areas, the Government wants to build a lasting and constructive relationship with the agriculture and forestry sectors, to jointly manage the economic and environmental risks of climate change over the decades to come.

Four key policy pillars form the structure of both this discussion document and the proposed *Plan of Action*.

Pillar 1: Adapting to climate change

Resilient land management practices and upgraded infrastructure can assist New Zealand to avoid, or significantly reduce, the potential costs of the physical impacts of climate change. Adaptation to these new conditions would involve identifying and implementing a range of actions to help land managers understand more about the expected impacts of climate change on their sector, and manage the risks. Ideas are sought on what could be included in a package of initiatives to adapt to climate change – see Questions 5 to 10 in the submissions form.

Pillar 2: Reducing emissions and creating carbon sinks

Specific policy options to reduce emissions and enhance carbon sinks are proposed in this pillar. The Government is looking to create a package of options that balances cost-based and incentive-based measures to achieve tangible emissions reductions for both agriculture and forestry. Following consultation, preferred policies will be determined by the Government. Feedback on the discussion document will guide the development of the preferred policies.

The options for managing agricultural emissions are:

Research, technology transfer and voluntary reporting

1. Increased research funded by the Government and farming sector based on a new and broader research strategy
2. Technology transfer
3. Voluntary reporting of emissions

Any or all of these could run alongside any other options outlined under Pillar 2.

Government pricing mechanisms

4. A financial incentive to encourage the use of nitrification inhibitors, linked to:
5. A charge on nitrogen fertiliser

If implemented, the Government envisages options 4 and 5 working together – any inhibitor could be balanced with a charge, and vice versa.

Options 4 and 5 could also be replaced by any of the options 6, 7 and 8 below

Market-based mechanisms

6. Tradeable permit regime to reduce agriculture emissions
7. A scheme to offset agriculture emissions, by making emissions reductions elsewhere

Regulation

8. Resource Management Act (RMA) standards to control agricultural greenhouse gas emissions
9. RMA standards to control the greenhouse gas and environmental effects of land use change from forestry to agriculture

Government pricing mechanism

10. A flat charge imposed on agricultural emissions when land use is changed from forestry to agriculture.

See Questions 17 to 21 in the submissions form

The options for the forestry sector are:

Afforestation

1. Afforestation grant scheme (AGS)
2. Choice between AGS and devolved Kyoto credits with associated liabilities

See questions 22 to 25

Deforestation

1. Centrally determine deforestation levels; that is, set a national deforestation limit
2. Tradeable permit regime: the Government allocates tradeable deforestation permits. Forest owners who deforest are liable for emissions above the level of permits they hold
3. A flat deforestation charge imposed on land use change from forestry to another use
4. RMA controls on the environmental effects of deforestation (including greenhouse gases).

See questions 26 to 29

Pillar 3: Capitalising on business opportunities arising from climate change

Finding solutions to climate change problems could create tremendous business opportunities. New Zealand already has considerable expertise and world-leading research capability in agriculture and forestry. Feedback is sought from the agriculture and forestry sectors on ways the Government and sectors could work together to identify opportunities, reduce barriers to development, and facilitate the creation of markets for emission reducing technologies in an ongoing work programme. A number of possibilities are canvassed. *See questions 11 to 14*

Pillar 4: Working together

Some of the actions being proposed to deal with the impacts of climate change need to be enduring. So too does the Government's relationship with the sectors. The consultation outlined in this discussion document is just the beginning of a long process of engagement. The issues are complex and time consuming, and will require a significant commitment of resources over a sustained period of time. The Government wants to establish a durable and constructive way of working both with sectors and local government. This means making linkages between the *Plan of Action* and other government and industry-led initiatives. Ideas are sought on how the Government, local government and sectors could work together. *See questions 15 and 16*

Consultation

The Government is committed to widespread consultation and is expecting the debate to be lively and challenging. It is important that as many people as possible have a say. The Ministry of Agriculture and Forestry will be holding consultation meetings around the country early next year. Details of dates, time and venues will be released shortly via the Sustainable Land Management and Climate Change website. Submissions on this discussion document close 30 March 2007. Following consultation, the Government will consider a preferred package of sustainable land management policies.

Terms used in this document

This discussion document makes frequent reference to the following terms. Further terms are defined in the glossary.

Climate change

A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

Greenhouse gases and global warming

Greenhouse gases, both natural and human-induced, absorb and re-emit infrared radiation, leading to what is commonly known as the 'greenhouse' effect which in turn causes a heating of the earth's atmosphere (commonly referred to as 'global warming'). *See Annex 4 for a fuller description.*

The greenhouse gases covered by the emission limitation commitments of the international Kyoto Protocol are:

- Carbon dioxide (CO_2) created from the burning of fossil fuels, burning and/or breakdown of plant matter, and some industrial processes
- Methane (CH_4) from farm animals, rice paddies and waste
- Nitrous oxide (N_2O) emitted from soils enhanced by clovers and nitrogen fertiliser
- Synthetic gases used in some industrial processes; these include hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6)

Almost 50 percent of New Zealand's greenhouse gas emissions are made up of methane and nitrous oxide, the two gases most closely associated with farming. As a greenhouse gas, methane is 21 times more powerful than carbon dioxide. Nitrous oxide is 310 times more powerful as a greenhouse gas than carbon dioxide.

Kyoto Protocol

The Kyoto Protocol is an international agreement under the United Nations Framework Convention on Climate Change (UNFCCC). The Protocol sets legally binding targets for greenhouse gas emissions for all countries that have ratified the agreement and are listed in its Annex B. Each country has agreed to a target for greenhouse gas reductions averaged over the five years of the Protocol's first Commitment Period, from 2008-12. New Zealand's target is to return to the level of greenhouse gas emissions it was producing in 1990, or take responsibility for any excess emissions.

Land management/land management sectors

This discussion document deals specifically with how the land is managed on-farm and in-forests. It does not deal with transport and manufacturing operations in the agricultural and forestry sectors. Land management sectors include pastoral and arable farming, horticulture and forestry.

SECTION A: OVERVIEW

INTRODUCTION

New Zealand's climate is changing, largely because of the build-up in the earth's atmosphere of 'greenhouse gases', particularly carbon dioxide, methane and nitrous oxide, that trap heat.

This phenomenon, known as the greenhouse effect leading to global warming, is accepted by the vast majority of climate scientists, and its effects are already being felt.

A significant portion of the New Zealand economy is based on agriculture[1] and forestry. These land-based sectors are the most vulnerable to changes in climate, both environmentally and economically. New Zealanders cannot afford to ignore climate change.

Around the world, governments and consumers are beginning to act to address climate change. New Zealand also needs to act – and to adapt to its effects.

The policy options in this document set out ways in which the land management sectors can act to reduce greenhouse gas emissions and the impacts of climate change, and assist New Zealand in meeting its international commitments.

In taking action to reduce its greenhouse gas emissions, New Zealand will play its part in the world movement to minimise the worst effects of climate change. Such action will also secure a more sustainable future for New Zealand's land-based businesses and communities, and protect our economic and trade interests, keeping faith with our international obligations and with the expectations of our trading partners.

Sustainability in our agriculture and forestry sectors, and across our whole economy, will be a priceless asset for New Zealand in the future.

Inside this publication

In this discussion document, the Government proposes developing and implementing sustainable land management and climate change policies for the agriculture and forestry sectors through a single *Plan of Action*.

This would provide a framework for the Government and land management sector to work together to:

- Manage the economic, social and environmental risks of climate change
- Implement practical, balanced and cost effective actions that address the key climate change issues
- Support economic growth.

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1 Agriculture includes pastoral and arable farming and horticulture.

The proposed *Plan of Action*

The proposed *Plan of Action* would:

- Contain a set of goals to guide action on climate change in the land management sectors (suggested goals are outlined on pages 24 and 25)
- Identify immediate actions that can be taken
- Show how the Government and different sectors can work together to create solutions for the long term.

The *Plan of Action* would also recognise that different parts of our economy can move towards effective action on climate change at different rates, but that each sector will be expected to play its part.

The proposed *Plan of Action* would be structured around four key policy pillars (areas of action on climate change). These pillars also form the structure of this discussion document. They are:

1. Adapting to climate change

Actions that will help land managers adapt to the environmental and economic effects of climate change.

2. Reducing emissions and creating carbon sinks

Measures to reduce greenhouse gas emissions from agriculture and deforestation and to create new forests.

3. Capitalising on business opportunities arising from climate change

Actions to help land-based businesses take advantage of new business opportunities.

4. Working together

Ways that the land management sector and the Government can work together, now and in the future, to respond to the challenges and opportunities of climate change.

Sustainable land management

A common theme throughout this discussion document is that action on climate change needs to be seen as part of wider sustainable land management. Many actions to reduce the effects of climate change also have other benefits – for example for water quality, managing flood risk, and increased farm productivity.

How you can help

We are asking you to provide:

- Creative thinking towards future solutions for climate change, especially around ideas and options discussed in *Pillar 1: Adapting to climate change,* and *Pillar 3: Capitalising on business opportunities*.
- Specific feedback on your preferred policy options under *Pillar 2: Reducing emissions and creating carbon sinks*. The Government is looking to identify a preferred package of land management policies for Cabinet consideration.
- Indications of your commitment to, interest in, and creative ideas about the issues and questions discussed under *Pillar 4: Working together*.

Considering options

A summary table identifying all the options being put forward for discussion and feedback is on pages 26 and 27.

We would like to know which of the options presented throughout this document you prefer, and how they might work together in a balanced package of sustainable land management initiatives as part of the proposed *Plan of Action*.

Some of the options in *Pillar 2: Reducing emissions and creating carbon sinks* are 'either/or' choices. Others are proposals that could be introduced together with one or more of the other proposals. This is signalled clearly in the text.

The Government recognises that aspects of climate change can be difficult and controversial. It wants to put in place a way of working that welcomes different views and accepts that people have a right to disagree with proposals that may be made. We are looking for a durable and constructive relationship between the different groups and interests involved.

Submissions made as part of the consultation process will be considered before decisions on future policy are made.

Consultation meetings

The Ministry of Agriculture and Forestry (MAF) will be holding consultation meetings around the country in February/March 2007. You are welcome to attend to find out more about sustainable land management and climate change issues, and about possible courses of action in the farming and forestry sectors.

Making a submission

Details of how to make a submission and a submission form are set out in Section D of this document.

The closing date for submissions is 30 March 2007.

More information about climate change and the land management sectors, and the consultation process, can be found on the MAF website: www.maf.govt.nz/climatechange.

What else is the Government doing about climate change?

This discussion document deals specifically with on-farm and in-forest issues. It does not deal with transport and manufacturing operations in the agricultural and forestry sectors. While these are important, actions in those areas are covered by other government consultations. These include consultation on:

- *Powering our Future: the Draft New Zealand Energy Strategy to 2050* and its companion action plan
- The draft replacement *National Energy Efficiency and Conservation Strategy*
- *Transitional Measures: Options to Move Towards Low-emissions Electricity and Stationary Energy Supply, and to Facilitate a Transition to Greenhouse Gas Pricing in the Future*
- *Measures to Reduce Greenhouse Gas Emissions in New Zealand post-2012* (measures across the economy to reduce emissions and increase sinks).

The Government has a number of principles to help guide the development of all its climate change policies. These are outlined in the box on page 16.

What happens after 2012?

The first Commitment Period of the Kyoto Protocol ends in 2012. No one yet knows what international climate change obligations will exist beyond then. However, it is reasonable to expect that there will be increased international efforts to reduce greenhouse gas emissions. The Government believes that these will, directly or indirectly, impose a moderate economic cost on New Zealand.

The purpose of the *Sustainable Land Management and Climate Change Plan of Action* is to begin preparing for a more demanding future in New Zealand; one in which there will be a cost on greenhouse gas emissions. The Government expects different sectors may require different pathways towards increasingly stringent emission constraints. This will need to be reflected in the *Plan of Action* through the balance and timing of actions to reduce emissions.

Figure I: Government climate change principles and strategic direction

In developing its climate change policies, the Government has agreed on a number of guiding principles. Climate change policies will:

- Be long-term and strategic
- Balance durable efforts to reduce emissions with preparations for the effects of a more variable climate
- Engage with the wider public, industry and business to inspire their willing, effective and long-term involvement
- Focus on international engagement that advances New Zealand's national interest.

Strategic direction

In addition, the Government has agreed a strategic direction for its climate change policies:

- Faced with sufficient consensus on climate change science, the Government must act to address the risks for New Zealand's vulnerable environment, economy and way of life. While action to reduce greenhouse gas emissions over the long term will have a moderate cost, the predicted costs and risks of inaction are expected to be unacceptably high.
- Effective international action is needed to reduce global greenhouse gas emissions. To support and encourage international action, New Zealand needs to play its part in reducing emissions, as well as in encouraging other countries, especially the major emitters, to act.
- New Zealand's response should maximise the economic advantages of using energy and resources more efficiently. New and newly economic technologies will play a crucial role. Policy should facilitate New Zealand involvement in the development or adaptation of low-emissions technologies relevant to our needs.
- Our policy response should start with the most achievable options and seek least-cost solutions. A combination of sectoral and economy-wide measures, including voluntary, price-based and regulatory measures, is likely to be needed. Short-term measures should be consistent with likely long-term solutions and should, at the very least, curb increases in emissions.
- All sectors of the economy should play an equitable part in the national response to climate change, reflecting the fact that some sectors will be able to achieve emissions reductions more easily than others. An important policy consideration is the competitiveness of sectors in which there are no low-emissions technologies available at moderate cost.
- Policy should maximise the wider benefits of climate change action in relation to economic transformation, improved sustainable land and water management, enhanced public health, reduced energy wastage, enhanced energy security, improved air quality and the conservation of biodiversity.
- Any response to climate change must include policies to help New Zealand adapt effectively to the impacts of climate change.
- The pace and stringency of New Zealand's response needs to align with our national interests. In particular, it should be in step with what major emitters (including our major trading partners) are doing. This is in line with the long-term position taken by other developed countries. Acknowledging this reality is important in building consensus among key sectors for a durable domestic climate change response.

Why climate change is important to New Zealand

New Zealand is a small trading nation with a strong land management sector as its base. Climate change is going to affect New Zealand's environment and economy. We will all have to adjust to these changes.

While New Zealand's greenhouse gas emissions in a global context are small (0.2 percent of the world's greenhouse gas emissions), on a per-person basis our level of emissions ranks us 12th in the world.

Climate change can be fully addressed only through meaningful international action. If New Zealand is to influence international action and protect its own economic, trade and environmental interests, it needs to be seen to be doing its share in responding to climate change.

Economic impacts

In his report on the economics of climate change to the UK Treasury[2] in October 2006, former World Bank economist Sir Nicholas Stern said climate change risks for the global economy were as great as those "associated with the great wars and the economic depression of the first half of the 20th century". Any impact of this nature would clearly have huge implications for New Zealand's markets and the profitability of its businesses.

It is unlikely that a small country like New Zealand can stand outside international efforts to reduce greenhouse gas emissions. Already there is talk in Europe of border taxes for goods from countries that have not ratified the Kyoto Protocol. These types of pressures are likely to increase. It is in our economic interest for New Zealand to be part of the global response to climate change.

The costs of inaction on climate change are far higher than the costs of taking action. New Zealand needs to protect its interests, and it will be important for all sectors to play a part.

2 *The Stern Review on the Economics of Climate Change,* commissioned by the UN Treasury and published by the Cambridge University Press. The Review was led by Sir Nicholas Stern, Head of the UK Government Economic Service and former World Bank Chief Economist.

Physical impacts

According to projections from the National Institute of Water and Atmospheric Research,[3,4] climate change will have environmental effects throughout the country:

- The risk of drought is expected to increase in already drought-prone areas, such as inland and north Otago, eastern Canterbury and Marlborough, parts of Wairarapa, Hawke's Bay, the Bay of Plenty, the Coromandel and Northland
- The frequency of severe droughts is expected to increase across many eastern parts of New Zealand by 2080. For example, in a 'low-medium' scenario, Marlborough could experience a one-in-20-year drought event every three to five years by 2080
- Droughts may happen in spring and autumn, not just summer
- Very heavy rainfall events may increase in many parts of New Zealand, even in those areas where the average annual rainfall decreases
- It is expected to be wetter in the west and drier in the east
- Temperatures are expected to increase, with greater increases in the winter, and in the north of New Zealand
- Frost risk is expected to decrease, while the risk of very high temperatures will increase
- Westerly winds are expected to increase in strength and frequency
- There is expected to be an increased risk of forest fires
- The sea level is expected to rise.

The cost of physical impacts

The costs of climate change could be significant for New Zealand and its land management sectors. Estimated costs of past natural disasters provide insights into the level of costs we are likely to face:

- Drought costs in 1997/98 were estimated at $1 billion
- The cost of the Lower North Island floods in 2004 was estimated at over $300 million. In addition, thousands of people were evacuated from flooded areas, some farms lost 30 percent of their grazing land, and 20,000 hectares of land were affected by landslips.

The land-based sectors will bear most of the risks, impacts and costs of the physical effects of climate change. They also stand to benefit the most from a successful climate change *Plan of Action*.

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3 *Changes in Drought Risk with Climate Change 2005.* National Institute of Water and Atmospheric Research. A report for the NZ Climate Change Office, Ministry for the Environment and the Ministry of Agriculture and Forestry.

4 *Climate Change Effects and Impact Assessment 2004.* National Institute of Water and Atmospheric Research. A report for the NZ Climate Change Office, Ministry for the Environment

Agriculture and climate change

The agricultural sector currently contributes 52 percent of the value of our exports and 10 percent of our GDP.[5] Its GDP contribution is expected to rise from $7.6 billion at March 2006 to $8.7 billion by March 2008. The dairy sector in particular has been a major driver in agricultural sector productivity growth, and aims to continue growing at three percent per year[6]. The continued health and vitality of the agricultural sector is vital to the continued growth of the New Zealand economy.

The agricultural sector has become more diverse over the past few decades, and has also intensified. Productivity gains have been driven by increases in the use of nitrogen fertiliser, improved animal genetics and other on-farm technologies. Increasingly, the environmental effects of decades of fertiliser use and animal-intensive farm production are becoming apparent in our waterways, ground water and lakes.

The agricultural sector has strategies to improve the long-term sustainability of farming. They include making more effective use of technologies and management practices, and seeking continual improvement of these. This approach allows the sector to achieve higher levels of production while addressing negative environmental effects.

Globally, only 14 percent of greenhouse gas emissions come from agriculture.[7] However, New Zealand has a unique greenhouse gas emissions' profile, with 49 percent of emissions coming from the agricultural sector. The emissions consist of methane from livestock, and nitrous oxide from animal waste and nitrogen fertiliser use. New Zealand's agricultural emissions have grown by one percent per year since 1990, and are predicted to continue to grow at this rate over the medium term. However, productivity gains through farming animals more efficiently have led to lower emissions per unit.[8]

Excess agricultural emissions are projected to be 38.5 million tonnes above 1990 levels for the first commitment period of the Kyoto Protocol from 2008-12.

Agriculture is the biggest land user in New Zealand.[9] Changing land management practices will have an important role in helping New Zealand adapt to climate change, reduce emissions and, potentially, increase carbon storage. These goals can be achieved through better integration of trees on farms, better use of fertilisers, development of crops for biofuels, increasing the amount of soil carbon and reducing methane emissions.

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5 As for the year ending March 2006
6 *Dairy Industry Strategy for Sustainable Environmental Management,* March 2006
7 The average for the agricultural sectors of Annex One countries to the Kyoto Protocol was just 7.4 percent (based on 2003 data), and 24.7 percent for non Annex One countries (based on the latest available data)
8 For dairying, in 1990 the production of a kilogram of milk solids produced emissions of approximately 8.5kg of carbon dioxide equivalent, whereas in 2004 a kilogram of milk solids only produced approximately 7.5kg
9 54 percent of New Zealand land area is in grassland; 2.4 percent in grain, seed and fodder crops; and 0.8 percent in horticulture. Statistics New Zealand (2005), *Agricultural Production Statistics (Final) June 2004*

Forestry and climate change

The forestry sector makes a major contribution to New Zealand's economy and environment. It is also critical to New Zealand's response to the challenge of climate change.

New Zealand forestry must compete in an international marketplace.

This country exports wood products to more than 30 countries. Total export earnings for the year to June 2006 were $3.2 billion, or 10.4 percent of New Zealand's merchandise exports. The industry contributes about three percent of New Zealand's GDP and directly employs around 22,500 people. It also has substantial potential for export growth; up to a third more wood than is available now will be ready for harvest over the next few years.

Forestry delivers many environmental benefits and these can help us both build a more sustainable economy and adapt to climate change. Forests can reduce flood peaks during major storms, and rates of erosion by up to 90 percent on hill country land under pasture. In terms of water quality, forests can reduce harmful micro-organisms, sediment, nutrient runoff and high temperatures. Forests can be used to help land managers adapt to climate change.

Forests and forestry also have a major role to play in reducing greenhouse gas emissions. As trees grow, they absorb carbon dioxide from the atmosphere and store it as wood. When they are harvested, much of this carbon is released back into the atmosphere. This process is recognised under the Kyoto Protocol, which allows new forests (those planted after 1990) to be recognised as forest sinks. These generate forest sink credits and associated harvesting liabilities. Over the first commitment period of the Protocol, New Zealand will generate around 78 million tonnes of sink credits, which can be used to offset greenhouse gas emissions in other sectors. The forestry sector also produces renewable, 'climate change-friendly' wood products that can displace more greenhouse gas and energy-intensive alternatives such as concrete, steel and aluminium, particularly in countries that use fossil fuels to generate electricity.

However, when forests are harvested and not replanted, the carbon they once stored is released back into the atmosphere. Globally, about 20 percent of carbon dioxide equivalent emissions into the atmosphere come from deforestation. In New Zealand, deforestation of plantation forests has increased rapidly in recent years, and this is expected to continue unless measures are introduced to actively manage the process.

Māori and climate change

Māori have a special relationship with the land, waterways and other natural resources. This is expressed through kaitiakitanga.

Māori also have significant interests in land management through their ownership and management interests in large areas of pastoral farmland, and exotic and indigenous forests. Their ownership of rural land is expected to increase as Treaty of Waitangi claims are progressively settled, especially in the Central North Island.

Climate change presents considerable challenges to all landowners and managers, but particularly to Māori. Many areas of Māori land are steep and in regions vulnerable to storms and erosion; these lands will be even more exposed and vulnerable with the predicted arrival of more frequent and severe storms, and more frequent droughts in the east of New Zealand. Taking action to adapt to climate change is therefore critical.

This discussion document proposes some options to help land managers and land owners adapt to a changing climate and reduce agricultural emissions. It also proposes options for encouraging the planting of more forests to act as carbon sinks, and to discourage deforestation (defined as the conversion of a forested area to another land use).

The various proposals outlined for consideration under each of the four pillars are offered as options. Feedback is sought on which of the many options proposed might work best for Māori in meeting the challenges that lie ahead.

In agriculture, some of the options outlined could have significant financial implications for Māori land owners, while others would have relatively little direct effect on farming operations – or could even improve farming productivity and assist to further reduce the impacts of farming on the environment. The options include ideas for building a knowledge base for landowners and managers about effective ways to deal with the impacts of climate change.

In forestry, any measures to reduce deforestation will inevitably affect landowners' flexibility to change the way their land is used. This is particularly important given the restrictions Māori face on the sale of multiply-owned land and the desire, by at least some landowners, to intensify existing agricultural production.

In terms of options to encourage the creation of more forest sinks, Māori potentially may be significant beneficiaries. In areas of marginal hill country, extra returns available for forest planting could assist Māori landowners to attract external investment or fund forest establishment themselves.

Māori may also be interested in exploiting the many business opportunities presented by climate change. The Government wishes to look at ways the land management sectors and government can work together to achieve this.

A key platform supporting all the possible options is the Government's suggestion that a new kind of working relationship be established between central government, local government and people and organisations in the land management sectors. Māori have unique knowledge and experience to bring to this relationship.

Finally, all the proposals in this document have the potential to deliver multiple benefits in support of sustainable land management outcomes, as well as climate change outcomes.

Such benefits could include improved water quality, and better management of flood and erosion risks.

The Government will be conducting a series of hui on its proposed climate changes policies in February-March 2007. A range of climate change policy proposals – covering not only land management, but also energy and long-term climate change actions to reduce emissions – will be presented for discussion. Details of hui times, dates and venues will be published in the new year on government websites, and will also be available through a range of Māori iwi and hapū groups and organisations.

SECTION B:

A PLAN OF ACTION FOR THE LAND MANAGEMENT SECTORS

Goals for a *Plan of Action*

The Government wants to develop and implement sustainable land management and climate change policies for the agriculture and forestry sectors through a single *Plan of Action*. This would include goals, actions and some agreed ways of working together.

The Government:

- *Recognises that the New Zealand economy must be internationally competitive.*

  Investment decisions should be based on the real costs and returns available to investors. Land use flexibility, accurate price signals and low compliance costs are important considerations.

- *Acknowledges that the agricultural sector faces particular challenges in responding to climate change.*

  Research has not yet found practical, cost-effective means by which farmers can reduce livestock methane emissions, except by reducing stock numbers or production levels. The Government accepts that any reduction in emissions by the agricultural sector may not be as great as those in other sectors, at least in the short-term.

- *Recognises the roles that forests and plant products can play in addressing climate change.*

  Plant products can replace many of the non-renewable and energy intensive resources we use today, including oil-based plastics, concrete, steel, aluminium, petrol, gas, and coal. Forests can protect soil and water, thereby reducing flood risks and diversifying rural incomes. They can also help mitigate climate change by removing carbon dioxide from the atmosphere.

Specific goals for agriculture and forestry are proposed below.

Goals for the agricultural sector

Possible goals the Government and the agricultural sector could discuss are to:

- Develop safe, cost-effective greenhouse gas abatement technologies that will lower total New Zealand ruminant animal methane and nitrous oxide emissions by at least 20 percent (compared with 'business as usual' emissions levels) by the end of the Kyoto Protocol's First Commitment Period (2012) and beyond[10]
- Ensure New Zealand farmers have access to cost-effective technologies and management practices that have the potential to substantially reduce greenhouse gas intensity per unit of production
- Make New Zealand a recognised world leader in research into ruminant animal greenhouse gas mitigation and measurement
- Ensure that the New Zealand agricultural sector is positioned to take advantage of the economic opportunities arising from new technologies and management practices developed at least partly as a result of climate change (eg. production of biofuels, carbon farming, renewable energy).

10 This is the current goal of the Pastoral Greenhouse Gas Research Consortium (PGGRC), which is currently being reviewed

Goals for the forestry sector

Possible goals for the Government and forestry sector to discuss are to ensure that:

- Forests are fully integrated into New Zealand's land use patterns to deliver sustainable land management
- Forests and forest products are widely used in adapting to and reducing the impacts of climate change
- Land use flexibility is maintained, taking into account the environmental costs of land use decisions
- The forestry sector is internationally competitive and profitable.

Pillar 4 (*see pages 38-40*) sets out further ideas on how the Government and land management sectors can work together.

Questions: Goals for a *Plan of Action*

Please record your answers in the submissions pages at the back of this publication, or you can file online at www.maf.govt.nz/climatechange.

1. Are there any other goals you consider should be included?
2. Agricultural Goals

   How do you rate the proposed goals for agriculture in this section?
3. Forestry Goals

   How do you rate proposed goals for forestry outlined in this section?
4. If you wish to make any comment on the goals and the reasons for your choices, please do so.

Figure II: Overview of the four pillars and options for consultation in the land management sectors

Pillar 1

Adapting to climate change

We are looking for:

Your ideas on what could be included in a package of initiatives to adapt to climate change.

Our ideas include:

Ongoing sharing of information on climate change effects

Research into farm and forestry practices to reduce vulnerability to effects of climate change

Maintaining systems to manage changing biosecurity risks

Technology transfer (demonstration farms, training and advisers)

Proactive and reactive management of market risks and opportunities from climate change

Joint Government/land management sector communications strategy to promote new adaptation initiatives for the sectors

Improving irrigation efficiency (water and energy use)

Water storage as a means to respond to increased drought, particularly in eastern regions

The use of forest planting to reduce the on-farm and downstream risks of future extreme events

Ensuring flood risk management takes account of increased frequencies of extreme events.

Pillar 2

Reducing emissions and creating carbon sinks

We are looking for:

Your feedback on specific policy options to reduce emissions and enhance sinks.

The options are:

Agriculture

Increased research funded by Government and sector, based on new and broader research strategy

Technology transfer (demonstration farms, training and advisers)

Voluntary reporting of emissions (by farm)

Nitrogen inhibitor incentive

Nitrogen fertiliser charge

Tradeable permit regime to reduce agriculture emissions

A scheme to offset agriculture emissions eg. through tree planting

Flat charge on land use change from forestry to agriculture

RMA controls on greenhouse gases

RMA controls on greenhouse gases after deforestation.

Forestry

Afforestation grant scheme (AGS)

Landowners choose between AGS and devolved Kyoto credits plus associated liabilities

Change of land use flat charge

National deforestation cap

Tradeable permits regime to address deforestation

RMA controls on deforestation.

Pillar 3

Capitalising on business opportunities

We are looking for:

Your ideas on what could be included in an ongoing work programme to capitalise on business opportunities.

Our ideas include:

Identifying and facilitating specific business opportunities

Identifying and removing barriers to business development

Creating markets to recognise the value of carbon

Prioritising investment in research and development

Helping to commercialise technologies eg. biofuels

Raising awareness and public promotion of new technologies and low carbon options eg. wood products

Considering how regulation and procurement policy might be used to promote new technologies and low carbon options eg. wood-based products

Proactive and reactive management of market risks and opportunities from climate change.

Pillar 4

Working together

We are looking for:

Your ideas on how the Government and sectors could work together on climate change issues.

Our ideas include:

Cooperation and collaboration on adaptation initiatives

Consultation on emission reduction and sink enhancing initiatives

Cooperation and collaboration on a business opportunities work programme

Establishing a process for sectors to provide strategic climate change advice to the Government

Establishing a process for sector input to post-2012 negotiations.

Four Pillars underpinning the *Plan of Action*

The Government's proposed *Plan of Action* is supported by four policy 'pillars'.

Not all actions outlined in the pillars would be put in place at once. The Government wants to act immediately in some areas where it is possible to do so. However, in areas where no immediate solutions are obvious, the Government will look to develop workable policies in partnership with the agriculture and forestry sectors. We welcome ideas on how this can be done.

It is important to note that there is a difference in the nature and extent of the information presented under the different pillars, and in the type of feedback the Government is seeking.

- Actions and policy options presented under *Pillar 2 – Reducing emissions and creating carbon sinks* are more developed and quite specific. The Government is seeking specific feedback on the options, and how they are designed, to assist it in identifying a final policy package.
- Actions and policy options discussed under Pillars 1, 3 and 4 are less well developed. The Government is hoping to provoke some original and creative thinking in response to the ideas and objectives it has suggested.

The four pillars are outlined in more detail in the following pages.

Pillar 1: Adapting to climate change

The Government wants to work in partnership with the land management sectors and local government to identify and implement actions for adapting to climate change. These would position New Zealand for a future where:

- There is more detailed information available on the expected effects of climate change on agriculture and forestry
- Land managers and decision-makers understand the implications of increased climate variability and include these risks in their decision-making
- Farmers, forest owners, their advisers and organisations have increased capacity to manage the risks associated with climate change impacts already occurring as well as with future climate variability.

To achieve this, the *Plan of Action* would include actions to:

- Help fill knowledge gaps about the effects of climate change
- Disseminate information in a form that is useful for land managers and planners
- Engage with land managers to increase awareness, motivate action and strengthen their ability to act
- Support infrastructure to adapt to the effects of a changing climate.

Information

For New Zealand to successfully adapt to climate change, the basic research and science supporting global climate projections needs to be further refined. We will need to continue research investment to ensure information is kept up-to-date. To improve awareness and to support decision-making, we need better and more accessible information about future climate scenarios for New Zealand. A major effort will be required to translate this information into technical performance requirements, design standards, planning information, and financial and risk management tools.

Information needs to be promoted and available to professional advisers and decision-makers through training, professional development and best-practice guidance. We also need better information about the likely spread of existing plant and animal pests, and the likely arrival of new pests as they adapt to a changing climate.

There is a need for better coordination and information-sharing among government agencies and with the farming and forestry sectors.

Ideas for adaptation

The Government wants to build on and integrate existing initiatives,[11] both government and private sector, that facilitate and promote adaptation to climate change. Key government initiatives include:

- Sustainable Water Programme of Action
- Flood Risk Management Review
- Sustainable Land Management Programme
- Adverse Events Planning and Recovery
- Sustainable Farming Fund initiatives
- Permanent Forest Sink Initiative
- East Coast Forestry Project.

These initiatives will provide useful flood protection, erosion control, water quality and biodiversity benefits, but more could be done.

Further actions to be considered could include:

- Developing a 'big picture' approach through adaptation practices that reflect whole catchments, as well as land use, community and infrastructure needs within these
- Sharing information about how New Zealand's climate is expected to change, and what impact this will have on different regions and landscapes of New Zealand
- Conducting research into farm and forestry practices that can reduce New Zealand's vulnerability to the effects of climate change
- Ensuring systems recognise and manage changing biosecurity risks

11 See page 38, 'Linkages to other initiatives'

- Transferring technology and new farm management practices through established channels such as farm advisers, discussion groups and demonstration farms. The latter are a tried and effective mechanism for:
    - » Testing and demonstrating the results of research
    - » Developing and testing technologies and management practices that farmers can use when making decisions that address climate change
    - » Assessing and exploiting business opportunities (covered further in Pillar 3).
- Training farm advisers and farming leaders so they can build climate change mitigation and adaptation into their own respective practices
- Establishing farming systems that can manage the market risks and exploit opportunities arising from climate change
- Developing a joint land management sector and government communications strategy on climate change, with adaptation initiatives tailored for the different parts of the sectors
- Integrating forests into land management systems. This would be assisted by the afforestation proposals contained under Pillar 2.

Questions: Adaptation

Please record your answers in the submissions pages at the back of this publication, or file online at www.maf.govt.nz/climatechange.

5. Do you have any comments on the ideas for adaptation discussed in Pillar 1?
6. Are there any other actions you consider might be useful in helping the land management sectors adapt to climate change?
7. How important is it that the proposed *Plan of Action* includes an ongoing process to adapt to climate change?
8. How strongly do you agree or disagree that the adaptation actions outlined are heading in the right direction?
9. If you agree, who do you think should lead the process to adapt to climate change: the Government, sectors, or a government-sector partnership?
10. If you wish to make any comment on the reasons for your choice, please do so.

Pillar 2: Reducing emissions and creating carbon sinks

NOTE: Pillar 2 raises some complex issues and presents a range of possible policy options for consideration. This section summarises the policy options proposed. There is more detail on the Pillar 2 options and related consultation questions in Section C.

Feedback on the policy option in Pillar 2

The Government is looking for specific feedback on the policy options put forward under this pillar. Feedback is sought on the advantages and disadvantages of the options outlined. You may also wish to comment on how they might potentially be implemented.

From a total of 16 possible options (10 in agriculture and six in forestry), the Government will select a preferred policy package soon after this consultation concludes. Your feedback will help guide the development of that package.

In making your submission you may 'mix and match' the options presented in Pillar 2. The Government is looking for a mix of actions and policies that would combine to form a balanced and workable package of measures and economic instruments. This basket of measures would need to reflect the Government's identified principles and strategic directions for managing climate change. *(See page 16)*

Pillar 2 overview

The Government believes all sectors of the economy must take some action to address climate change.

Farming and forestry bear most of the risks from changes in climate and increased adverse weather events, which means they are also likely to be the greatest beneficiaries of successful climate change policy. These sectors also stand to benefit in marketing terms from strong climate change policies. It is clear that consumers, especially in premium markets, are beginning to seriously consider whether the products they buy have had a detrimental effect on climate change.

The risk of severe climate change in the future can be reduced only through concerted global action. For New Zealand to influence that action, we must participate in international arrangements and meet our obligations under those arrangements. This includes the Kyoto Protocol.

The projected excess agricultural emissions (above 1990 levels) in the first Commitment Period of the Kyoto Protocol (2008-12) pose a significant cost. This is estimated at $600 million based on today's international price of greenhouse gas emissions. The cost of deforestation emissions is estimated at a further $600 million over the same period, if we take no action to address the issue. Under existing policy, all these potential costs will be borne by New Zealand taxpayers. On the other side of the ledger, there are many environmental and economic benefits associated with afforestation, but these are not always recognised and generally go unrewarded.

The range of policies for submitters to consider under Pillar 2 moves land managers towards sharing more of the environmental and economic costs (and benefits) of their land management decisions.

Climate change is a key part of sustainable land management. Many actions taken by farmers

to reduce emissions will bring additional environmental and economic benefits, including greater efficiency of production, better water quality, improved flood protection and reduced soil erosion.

The Government is looking for a package of measures that includes cost-based and incentive-based measures for both agriculture and forestry. When taken together, the elements which make up the final policy package will need to achieve tangible reductions in emissions and increases in sinks, both now and in the future.

The principle underpinning all these policies is to allocate costs and benefits to those who make land management decisions. However, in some situations it may be more efficient to allocate the costs and benefits to an intermediary body.

This paper identifies some advantages and disadvantages of various options. These include some economic impacts. Further analysis of the economic impacts of components likely to be included in a preferred policy package will follow as part of the decision-making process. Economic analysis will be included in the next stage of consultation.

Further detail on all the options discussed in Pillar 2 is provided in Section C of this document, along with consultation questions.

Reducing agricultural emissions

The Government is looking for a balanced package of policies that will help move the agriculture sector towards lowering its greenhouse gas emissions, and prepare it for a future environment (post-2012) where there is a cost on emissions.

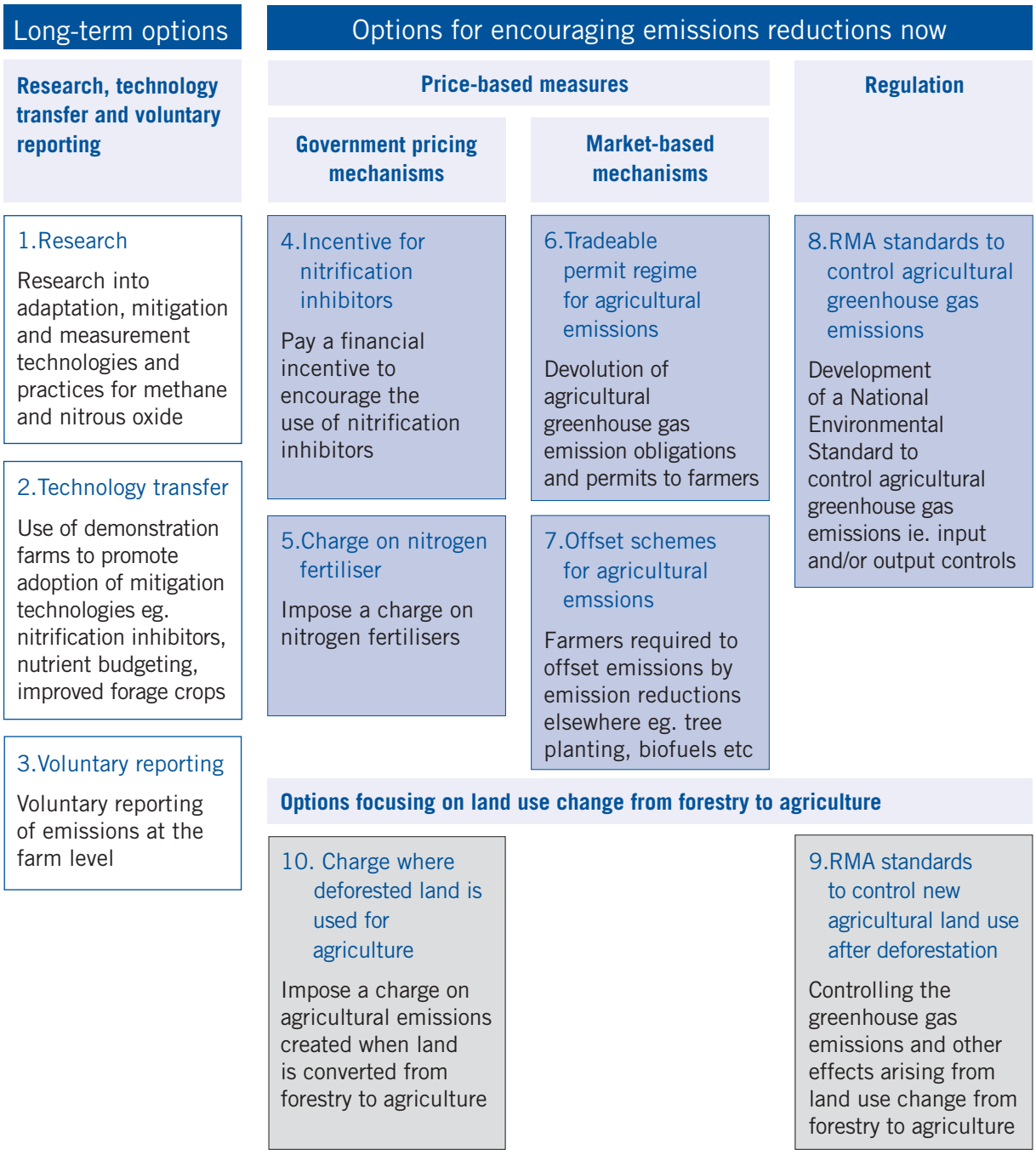
Ideally, a package would:

- Identify and establish policies and measures that would work towards reducing greenhouse gas emissions
- Encourage action by farmers to reduce emissions now, where the technology and tools to do so already exist
- Wherever possible, ensure that policy options to reduce greenhouse gases also strengthen agricultural productivity and sustainability.

At this stage in the sustainable land management and climate change policy development process, options to reduce agricultural emissions focus primarily on nitrous oxide – not on methane produced by farm animals. This is because practical and cost-effective means of reducing methane emissions from livestock (other than by reducing stock numbers and/or production) have not yet been found.

Options do exist, however, for better management of nitrogen to reduce emissions, and this is an area that can be influenced by government policy. Improvements in this area also offer the prospect of wider economic and environmental benefits, such as improvements in production efficiency and water quality.

Figure III: Overview of possible options for managing agricultural emissions



A range of voluntary, price-based and regulatory options for reducing agriculture sector emissions is set out in Figure III above.

The three long-term options (clear boxes on the left) focus on future solutions to emissions reductions. Any of these three long-term options could run alongside any of the other options put forward for consideration under Pillar 2. They could be implemented individually, or together as part of a complete package of measures.

The other seven options (in the blue and grey boxes on the right) focus on encouraging farmers to take action now to reduce emissions. Of these, the five options highlighted in the

darker blue provide a range of possible price-based and/or regulatory options for reducing agriculture emissions across the whole agriculture sector. The Government would want to enact one or more of these options to manage emissions growth.

If implemented, the Government envisages Options 4 and 5 would work together – that is, any nitrification inhibitor incentive would be balanced with a charge on nitrogen fertiliser, and vice versa.

Options 4 and 5 could also be replaced by any of the Options 6, 7 or 8.

The two options highlighted in the grey boxes could be put in place together with other measures to control deforestation (discussed further in the next section). They would put a cost on the increase in greenhouse gas emissions caused by converting forestry land to agriculture.

Reducing forestry emissions and encouraging carbon sinks

Forestry can lead to both the absorption and emission of carbon dioxide.

The Government wants to put a balanced package of policies in place that simultaneously reduces emissions from deforestation and increases absorption through forest sinks.

Figure IV (opposite) sets out a range of measures for afforestation and deforestation that we would like submitters to consider. These are discussed more fully in Part C.

The Government is seeking to enact one afforestation and one deforestation option. We would be interested to know your preferred option in each of these areas.

Two options (white boxes, left column) are identified for encouraging greater levels of afforestation. Either of these would work alongside the Government's new Permanent Forest Sink Initiative or PFSI (described in Annex 3). The four options in the three right-hand columns (grey boxes) show ways in which the Government might control levels of deforestation.

The Government intends to introduce measures on afforestation and deforestation as quickly as possible, preferably before the onset of the first Commitment Period of the Kyoto Protocol in 2008. This may require legislation in 2007.

Figure IV: Overview of possible forestry options

Afforestation options	Deforestation options		
Incentives	Government pricing mechanisms	Market-based mechanisms	Regulation
Afforestation Grant Scheme (AGS) Pay grants to growers who plant new post-2007 forests	1. Flat charge on land use change from forestry to another use Impose flat charge on deforestation of non-Kyoto forests	2. Tradeable permit regime Government allocates tradeable deforestation permits; forest owners who deforest non-Kyoto forests are liable for emissions above the level of permits they hold	3. Centrally determine deforestation levels Pass new legislation to limit rates of deforestation of non-Kyoto forests (national deforestation limit)
Choice between AGS and devolution of sinks credits and liabilities Give each grower the choice to receive the relevant sink credits and liabilities or seek a grant under the AGS			4. RMA controls on deforestation Use RMA to control deforestation

Questions: Pillar 2

Questions on Pillar 2 are in Section C of the document: *Pillar 2 in detail*. Please record your answers in the submissions pages at the back of this publication, or you can file online at www.maf.govt.nz/climatechange.

Pillar 3: Capitalising on business opportunities

Governments and businesses around the world are investing heavily in finding solutions to climate change problems. This creates tremendous opportunities to develop and commercialise new technologies, ideas and systems to both reduce greenhouse gas emissions and better manage the effects of climate change.

Agriculture and forestry are two areas where New Zealand has technical expertise and world-leading research capability. In agriculture particularly, New Zealand has powerful incentives to develop new ways to reduce greenhouse gas emissions. Some of the possibilities now being researched include new types of grass, new management regimes, feed and soil additives, and animal breeding.

If such technologies can be developed successfully, they may find ready markets in countries with strong pastorally-based agricultural sectors – for instance, Australia, Ireland, Brazil, Argentina, and parts of Africa.

Some other possible business opportunities include:

- Bioenergy from agriculture and forestry crops, residues and wastes
- New technologies and management regimes to enhance carbon sequestration in soils
- International carbon markets creating demand for mitigation technologies in both forestry and agriculture
- Generation of carbon credits as a primary or additional income stream
- Development of energy efficient systems and products
- Distribution of renewable energy technologies for primary industry businesses to reduce costs and greenhouse gas impact, and enhance energy security
- Leasing of land for renewable energy production, including wind farms
- Development of sustainable, low-energy alternatives to high-energy products such as concrete, steel, and aluminium. These could include new wood products, polymers and other biomaterials[12]
- Provision of advisory services to land managers, both in New Zealand and around the world, on mitigating and adapting to climate change
- Promotion and development of initiatives such as carbon-neutral products
- Marketing our export dairy, meat and horticultural products on the basis of their low through-life net greenhouse gas impact.

Researching, developing, commercialising and marketing new ways to address climate change requires an integrated and managed approach. Some investors will keep this process in-house, reflecting both their internal capability and the competitive advantage they hope to gain from any new technologies. However, there may be areas where a more collaborative approach is required, including government-sector collaboration.

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12 The rules of the Kyoto Protocol currently do not recognise the climate change value of storing carbon in the form of wood products. New Zealand is engaged in an international negotiation process to address this issue.

With this in mind, the *Plan of Action* could include agreed ways for the Government and sectors to work together in areas such as:

- Identifying specific initiatives to create business opportunities. For example, the Permanent Forest Sink Initiative has been put in place to provide owners of marginal farm land with the opportunity to 'farm carbon' as an alternative commercial land use
- Identifying and overcoming barriers to the development of business opportunities, and agreeing strategies to remove barriers such as domestic and international regulatory approval requirements
- Facilitating the creation of markets for emission-reducing technologies, so that the private sector can derive commercial benefit from investment in them
- Identifying where resources are needed for the research and development of technologies, and agreeing on ways to prioritise and fund such activities
- Raising public awareness of the advantages and importance of adopting new technologies
- Considering where regulation and procurement policies might be used to aid the adoption of emission reduction technologies.

Questions: Business opportunities

Please record your answers in the submissions pages at the back of this publication, or you can file online at www.maf.govt.nz/climatechange.

11. Are there any other ideas you would like to put forward regarding potential business opportunities?
12. How important do you think it is that the proposed *Plan of Action* includes actions to capitalise on business opportunities?
13. If you think this is important, who do you think should lead the process of identifying and developing new business opportunities: the Government, sectors, or a Government-sector partnership?
14. Are there any other comments you would like to make on any of the business opportunities outlined in Pillar 3, or any other ideas you would like to raise?

Pillar 4: Working together

The Government recognises that aspects of climate change can be difficult and controversial. It wants to put in place a way of working that welcomes different views, and accepts that people have a right to disagree with proposals that may be made. We are looking for a durable and constructive relationship between the different groups and interests involved. Good relationships will help all concerned to identify key issues, create better solutions, make the most of opportunities and ensure informed decision-making.

Pillar 4 sets out how the agriculture and forestry sectors, and central and local government, can work together to develop, implement, monitor and review initiatives under the *Plan of Action*.

The Government is keen to establish active engagement between central government, local government and the land management sectors, not only under the pillars in the *Plan of Action*, but in other areas too, to achieve the best possible outcomes for New Zealand and the sectors. This could be done by:

- Making links between the *Plan of Action* and other initiatives with connections to climate change (discussed in the 'Linkages' sub-section below)
- Developing and negotiating an international climate change framework for post-2012
- The land management sectors providing the Government with strategic advice on climate change issues, and what these mean for the sectors and New Zealand's export trade.

Linkages to other initiatives

The *Plan of Action* will have important links with a number of other central government programmes aimed at addressing broader environmental issues, including water quality, water allocation, flood protection, soil erosion and industry development. Similarly, many of the actions taken under these other programmes have the potential to deliver climate change benefits. A summary of these government programmes is set out in Annex 1.

It is not only central government programmes that are relevant to the *Plan of Action*. Some sector groups are also developing and implementing their own major initiatives, such as the Dairying and Clean Streams Accord, the Pastoral Greenhouse Gas Research Consortium, the Dairy Industry Strategy for Sustainable Environmental Management and the Forest Industry Development Agenda. These, too, need to be considered in any *Plan of Action*. A more detailed list of sector initiatives is set out in Annex 2.

It is important that all parties remain informed on the actions and initiatives being undertaken. Equally, it is important that people working in each of these areas are informed about what is being done under the *Plan of Action*. This should minimise overlaps and help secure maximum shared benefits.

The Government does not believe other government and private sector initiatives are substitutes for a specific *Plan of Action* for the land management sectors. Rather, they are complementary.

A further point is that Resource Management Act-based measures relating to water use and management are being explored as part of the Water Programme of Action. Officials will report to Cabinet on this in March 2007. Their report will include specific analysis of National

Policy Statements and National Environmental Standards covering the effects of agricultural production on water quality, including conversion of forests to farms.

Local authorities are also likely to continue assessing how their own rules may be developed to avoid or mitigate the undesirable environmental effects of land management activities, and how regulations could be used to complement land management incentives.

Developments under other programmes could have implications for climate change policies, and it will be important to develop and review the *Plan of Action* bearing all new measures in mind.

Joint engagement

The nature of engagement between the Government and sectors will depend on the circumstances and the actions being taken.

Some initiatives will require highly collaborative and more formalised engagement, perhaps to the extent of joint governance and funding of actions. The current research programme undertaken by the Pastoral Greenhouse Gas Research Consortium is one such example.

Other examples of where the Government would like to explore collaborative arrangements with the sector include:

- Rolling out new practices and technologies to land managers
- Demonstration farms
- Communication to stakeholders and the public
- Identifying barriers to business opportunities

In other areas, engagement may take the form of consultation on proposals rather than full collaboration. Initiatives in this category might include:

- Measures to address deforestation
- Afforestation measures
- Possible price-based or regulatory measures to reduce agricultural emissions.

Participation

Working together on climate change issues is complex and multifaceted. It also requires a degree of institutional knowledge and time commitment if it is to progress successfully. Parties who engage in the *Plan of Action* will need to be prepared to commit significant human resources over a sustained period of time.

Those who may not be in a position to commit such resources will continue to be consulted when key initiatives are developed.

What we are seeking from you

Indications of your commitment to, interest in, and creative ideas for the issues and questions discussed under *Pillar 4: Working together.*

Questions: Working together

Please record your answers in the submissions pages at the back of this publication, or you can file online at www.maf.govt.nz/climatechange.

15. Do you have any comments on the proposals and ideas about the Government, local government and sectors working together on the proposed *Plan of Action*? Your answer could include any different ideas you might have.

16. How supportive are you of the land management sectors working together with local and central government under the proposed *Plan of Action*?

SECTION C:
PILLAR 2 IN DETAIL

Introduction

This section contains a full description of options to reduce emissions and increase forest sinks, and considers the advantages, disadvantages and implementation issues for each option.

At present, many environmental costs associated with agriculture and deforestation are borne by communities and the environment itself, rather than by the agriculture and forestry sectors. These costs include greenhouse gas emissions, reduction of water quality and sedimentation of riverbeds due to erosion.

Similarly, many environmental benefits associated with good, sustainable land management practice and afforestation currently go unrewarded.

The Government would like to see land managers take responsibility for more of the environmental costs and benefits of their land management decisions. Pillar 2 puts forward some options on how this might be done, with a focus on greenhouse gas issues.

Beyond 2012, emissions are likely to face an increasing cost in the global economy. The wide range of options in Pillar 2 is designed to help prepare the agriculture and forestry sectors for such a future.

They include initiatives that:

- Are complementary and could be implemented *together*
- Could be implemented *by themselves*
- Involve a clear *choice* between options.

The Government is looking to develop a package that balances cost-based and incentive-based measures, and will allow the agriculture and forestry industries to achieve tangible reductions in emissions – now and into the future.

Reducing agricultural emissions

The Government has identified 10 possible options for reducing agriculture sector emissions. The first three focus on research, demonstration and voluntary reporting. These options could be implemented individually or alongside any of the other options. The other seven options focus on encouraging farmers to take action now to reduce agriculture emissions. They cover a range of government pricing, market-based and regulatory mechanisms, as set out in Figure V on the opposite page.

Figure V: Overview of possible options for managing agricultural emissions

Long-term options

Research, technology transfer and voluntary reporting

1.Research

Research into adaptation, mitigation and measurement technologies and practices for methane and nitrous oxide

2.Technology transfer

Use of demonstration farms to promote adoption of mitigation technologies eg. nitrification inhibitors, nutrient budgeting, improved forage crops

3.Voluntary reporting

Voluntary reporting of emissions at the farm level

Options for encouraging emissions reductions now

Price-based measures

Government pricing mechanisms

4. Incentive for nitrification inhibitors

Pay a financial incentive to encourage the use of nitrification inhibitors

5. Charge on nitrogen fertiliser

Impose a charge on nitrogen fertilisers

Market-based mechanisms

6. Tradeable permit regime for agricultural emissions

Devolution of agricultural greenhouse gas emission obligations and permits to farmers

7. Offset schemes for agricultural emissions

Farmers required to offset emissions by emission reductions elsewhere eg. tree planting, biofuels etc

Regulation

8. RMA standards to control agricultural greenhouse gas emissions

Development of a National Environmental Standard to control agricultural greenhouse gas emissions ie. input and/or output controls

Options focusing on land use change from forestry to agriculture

10. Charge where deforested land is used for agriculture

Impose a charge on agricultural emissions created when land is converted from forestry to agriculture

9. RMA standards to control new agricultural land use after deforestation

Controlling the greenhouse gas emissions and other effects arising from land use change from forestry to agriculture

Questions

Please refer to pages 56 and 78-80 for questions on agriculture policy options.

Agriculture: Long-term options

Any or all of the three long-term options on the following four pages (Options 1, 2, and 3 covering further research, technology transfer and voluntary reporting) could complement and run alongside any of the other options outlined under Pillar 2.

Agricultural Option 1: Research

Description

This option involves both the Government and the agriculture sector increasing their levels of investment in research to improve animal efficiency, reduce methane and nitrous oxide emissions, and increase farm productivity through:

- Better understanding of rumen physiology and genetics, animal variation and genetics, new feed types and new supplement products
- Better understanding and improvement of the nitrogen use and efficiency of animals, plants and soils
- Emissions measurement at farm and national level to ensure that emission improvements can be recognised and rewarded
- Better understanding of impacts and adaptation
- Development of tools to speed up the adoption of new practices and technologies.

This option would involve the development of a new and broader research strategy than the existing research programme agreed between the Government and the agricultural sector, and implemented by the Pastoral Greenhouse Gas Research Consortium (PGGRC).

It would require either the re-negotiation of the current Memorandum of Understanding[13] when it ends in June 2007, or could form part of a wider sector agreement as part of the *Plan of Action*.

Advantages

This option would enable a step-up in efforts to find cost-effective ways to reduce greenhouse gas emissions and measure their reduction, and allow tools to be adapted in response to climate change. The current joint partnership would continue and would have sector- and New Zealand-wide benefits.

Research has the potential to improve efficiency of animal production and resource use in New Zealand while lowering future emissions. It may also result in future business opportunities internationally – for example, in measurement and abatement technologies.

Research would give New Zealand international credibility, strengthen this country's position in future international negotiations, and contribute to current international research partnerships with the USA, Australia and other countries.

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13 The Memorandum of Understanding was signed by sector representatives from AgResearch Ltd, Dairy Insight, DEEResearch, the Fertiliser Manufacturers' Research Association, Fonterra, Meat and Wool New Zealand and PGG Wrightson Ltd.

Disadvantages

There are some risks in relying on research alone for reducing greenhouse gas emissions, as feasible technologies may not emerge, take too long, or not be cost-effective.

Implementation issues

- A joint research strategy will need to be developed and funded that will enable technologies and land use management practices to be developed and emissions to be measured
- Scientific validation of emission reductions from new tools developed from research will be needed to ensure that such technologies and practices are recognised and rewarded as part of our climate change commitments now and in the future[14]
- Combining this option with wider initiatives in the *Plan of Action*.

Agricultural Option 2: Technology transfer

Description

This would involve collective action to improve the rate at which farmers adopt emission reduction technologies and practices.

The transfer of knowledge, skills and technology could be carried out via demonstration farms, training, and associated discussion groups and advisers.

Implementation would be subject to sector agreement to the rapid rollout of current and future technologies. Research results and new initiatives and practices (eg. nitrification inhibitors, best farm practices) would be demonstrated on farms.

Technology transfer would include technologies and management practices that are already in existence including: stand-off pads, nutrient management budgets and good drainage.

Advantages

This option would build on the large nationwide network of demonstration, monitor and research farms that already exists for most farm types in New Zealand, and that have proven to be effective in transferring new technologies and practices.

It would also demonstrate the value and practicality of technologies and new practices, and result in quicker adoption and wider environmental and production benefits. This would encourage the adoption of methane emission reduction technologies when they emerge.

This option would enable farmers to practically and progressively assess emission reduction measures so they could be integrated into their own farm management systems.

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14 Mitigation technologies and management practices are only counted when incorporated into the National Greenhouse Gas Inventory, where it is required to meet stringent UNFCCC review processes and conform to the IPCC methodologies for good inventory reporting practice and approved by the UNFCCC.

Disadvantages

Scientific validation of new technologies would be needed before the emission-reducing value of the technologies could be counted internationally against New Zealand's climate change liabilities. Currently, only national estimates are available for reporting. New methods of measuring on-farm emissions will need to be developed and implemented so that any reductions in emissions resulting from the use of new technologies and practices at the individual farm level can be verified. These may take some time to develop and become accepted by authorities internationally.

There may also be limitations in some sectors' current technology transfer capability to rapidly disseminate new technologies and practices.

Implementation issues

This option would require:

- Development of a process for the rapid rollout of current and future technologies by the sector
- Ensuring there is sufficient capacity in the sector to undertake technology transfer
- Identification of regulatory and market issues around the use of new technologies
- International agreement to measurement and reporting methodologies
- Combining with wider initiatives in the *Plan of Action*.

Agricultural Option 3: Voluntary reporting

Description

This option would involve establishing a Voluntary Greenhouse Gas Reporting (VGGR) system by which farmers could estimate their greenhouse gas emissions and report them to a central registry according to a prescribed and standard format. This would require the development of a standard reporting format consistent with the UNFCCC rules, a methodology to measure emissions on the farm and a validation process for the emissions.

Such a system would provide a tool for farmers to identify and track greenhouse gas emissions for their farm or business unit. It could include baseline identification and registration of key sources of emissions, consistent measuring and reporting techniques, and recognition of farmers' steps to voluntarily reduce emissions. Farmers would be able to record and verify emission reduction activities against 'business as usual' or other benchmarks.

An extension service could provide technical support to help farmers identify ways to reduce their emissions, and also help farmers share information. It could also assist with productivity gains and cost savings through technology transfer and implementation of new practices.

Given the complexities of such systems, there may be real benefits in trialling a voluntary scheme. The co-benefits could include encouragement of the use of nutrient management models that reduce the loss of nutrients to ground and surface waters.

Advantages

A voluntary emissions reporting scheme would provide a consistent baseline against which emissions reductions could be verified and recognised, if options for emissions trading or an offset scheme were adopted in the future *(see Agriculture Options 6 and 7)*. Such a scheme would also enable the sector and individual farmers to measure their progress in reducing emissions, and enable benchmarking against best practice to demonstrate their emissions' efficiency internationally. This could help forestall the potential threat of future trade barriers.

This option would also enable clear and consistent public reporting of agriculture's efforts on climate change mitigation.

Disadvantages

A voluntary reporting system would rely heavily on uptake by farmers. The feasibility of such a system has yet to be determined and there are a number of implementation issues to be resolved.

Implementation issues

These would include:

- The feasibility of developing a robust emissions measurement system
- The feasibility and uptake by farmers of a voluntary emissions reporting system
- The ability of New Zealand to have agriculture sector actions recognised internationally, so that our unique emissions profile could be taken into account in any new international commitments.

Agriculture: encouraging emission reductions now

If implemented, Options 4 and 5 below could work together as a mixture of incentive- and cost-based policies that could encourage reductions in nitrous oxide emissions.

Options 4 and 5 could collectively be replaced by any of Options 6, 7 or 8 (pages 50-53).

Agricultural Option 4: Incentive for nitrification inhibitors

Description

Nitrification inhibitors are applied either with nitrogen fertiliser or sprayed directly onto pasture. Their use can lead to significant reductions in nitrous oxide emissions from animal waste and fertiliser, and reduction in losses of nitrates from soils thereby reducing impact on water quality. Manufacturers claim that reductions in nitrous oxide emissions of 50-70 percent are possible, depending on the conditions. Nitrification inhibitors also increase the efficiency of nitrogen fertilisers. Average increases in pasture production of up to 15 percent have been recorded.

Under this option, the Government would provide an incentive to reduce the cost of

nitrification inhibitors. To ease administration and minimise compliance costs, the incentive could be paid to the limited number of fertiliser companies that sell approved inhibitors. However, the objective of the incentive would be to lower the purchase cost facing farmers and thus reduce cost as a barrier to uptake.

The incentive per unit of inhibitor sold would be set at a level that reflected the reductions in emissions estimated to result from its application (adjusting for the effectiveness of different inhibitors if necessary), and the estimated international price of greenhouse gas emissions[15]. This could be up to 25 percent of the current product cost.

Advantages

The potential for emission reductions under this option would be determined by the rate of uptake by farmers. Adoption rates are hard to predict. However, a 50 percent increase in the use of inhibitors each year from 2006 to 2012 would result in 26 percent of dairy farms using inhibitors by the end of 2012. This could result in a reduction of nitrous oxide emissions of up to one million tonnes of carbon dioxide equivalent over this period.

This option would benefit farmers because nitrification inhibitors not only reduce emissions but also increase pasture production. Broader environmental benefits would also result from decreased nitrate leaching.

Disadvantages

Establishing an incentive of this nature would require new administrative, monitoring and compliance systems. These would take some time to design and introduce.

It might be difficult to justify an incentive in the absence of other measures taken by the sector to reduce agricultural emissions.

This option would also require scientific validation to meet the UNFCCC National Greenhouse Gas Inventory requirements before emission reductions could be credited against New Zealand's emissions' liability. A case is being developed by the Ministry of Agriculture and Forestry and the Ministry for the Environment.

Implementation issues

If the Government were to proceed with this option, it would need to address some key issues:

- How to ensure that the benefit of the incentive was passed on to farmers
- How to design the administrative arrangements
- At what level the incentive should be set
- How to verify ongoing levels of emissions reduction
- How to combine this option with wider initiatives in the *Plan of Action*.

15 The international price of greenhouse gas emissions is estimated by Treasury to be NZ$15.92 per tonne of carbon dioxide equivalent as at June 2006 (see page 94).

Agricultural Option 5: Charge on nitrogen fertiliser

Description

This option would involve placing an excise tax or legislated charge on nitrogen fertiliser. The charge could be set at the Kyoto cost of the emissions estimated to be produced by the fertiliser's use. It could be imposed on companies selling fertiliser, but the costs would probably be transferred through to farmers.

The charge could be used with or without the nitrification inhibitor incentive, and could be used to fund the incentive option.

The charge would increase the price of nitrogen fertiliser by about 10 percent, if set at the June 2006 international price of greenhouse gas emissions, and might reduce fertiliser nitrogen use by up to 10 percent.

Advantages

By signalling the associated greenhouse gas emission costs, this option would help to ensure that fertiliser use was kept at appropriate levels. To the extent that it resulted in a reduction in fertiliser use, this option would also provide environmental co-benefits through improved water quality. It would also provide revenue that could be recycled to fund the cost of other agricultural climate change initiatives.

This option would target all purchases of nitrogen fertiliser, creating emission reductions of up to 1.25 million tonnes of carbon dioxide equivalent between 2008 and 2012. While this level of reduction in emission appears modest, it could be increased by a reduction in nitrogen fertiliser use through the widespread adoption of nutrient management programmes. These have been shown to reduce farm fertiliser expenditure by $5,000-$10,000 per year.

Disadvantages

A charge on nitrogen fertiliser may have only a modest impact on the total level of agriculture emissions over the longer term. Only six percent of agricultural emissions come from nitrogen fertiliser. Actual reductions in nitrous oxide emissions from nitrogen fertiliser use may be less than 10 percent, because farmers can substitute supplementary feed for nitrogen fertiliser to maintain their animal feed levels. The impact on the overall level of agricultural emissions could be small compared to the savings made if there were high levels of adoption of the nitrification inhibitor.

Implementation issues

If the Government were to proceed with this option it would need to address the following issues:

- Whether to introduce a charge on nitrogen fertiliser by itself; or in conjunction with an incentive for nitrification inhibitors
- What administrative arrangements would be used to collect the charge
- Whether to 'recycle' revenue earned to other agricultural climate change initiatives.

Options 4 and 5, the incentive and charge, can be replaced by any of Options 6, 7 or 8 in a policy package.

Agricultural Option 6: Tradeable permit regime for agricultural emissions

Description

The Government would allocate a number of permits to existing industry members to cover all or some of their current greenhouse gas emissions. This is called a tradeable permit option because farmers would be free to buy or sell emission permits as they needed them.

Under a tradeable permit option, farmers would be required to meet the cost of all excess agricultural emissions estimated to have resulted from their operations. They could, for example, meet that cost by:

- Relinquishing an appropriate number of general (Kyoto compliant) emission units
- Making a cash payment based on the international price of greenhouse gas emissions at the time the payment was made
- Relinquishing an appropriate number of New Zealand agriculture-specific emission permits.

This option could be applied to all agricultural greenhouse gas emissions or just to nitrous oxide.

Advantages

The key advantage of this tradeable permit option is that it would provide a flexible means for farmers to reduce agricultural emissions in the most cost-effective way.

This option also has the benefit of:

- Allowing the Government to more easily specify and control the emission costs it will meet in a given commitment period
- Giving landowners the ability to manage future changes in the price of greenhouse gas emissions by being given or buying permits in advance of their being needed.

Disadvantages

It is difficult to accurately measure agricultural greenhouse gas emissions at the farm level. It is currently possible only to estimate emissions through proxy measures, such as the level of fertiliser use, animal numbers, and productivity. Until more accurate measurement tools are devised from research, there is a risk that a tradeable permit regime would not work as effectively for agricultural emissions as it could elsewhere.

It would be difficult to determine how to allocate emission permits. Previous experience with the allocation of emissions permits indicates that the process could be contentious and time consuming. One possible option in the dairy sector would be to allocate permits to dairy companies, which are owned by farmers.

If permits were allocated to individual farms there would be high transaction costs in estimating the emissions of approximately 40,000 farm businesses. A system of self-reporting, supported by audits, would probably be required.

Because of the time that would be needed to address these complexities, there is a high risk that a tradeable permit scheme for the agriculture sector could not be implemented before the beginning of the first Commitment Period of the Kyoto Protocol in 2008.

Implementation issues

If the Government were to proceed with the tradeable permit option, the key issues would be:

- How to administer, monitor and enforce the regime
- How to measure farm-based emissions or what proxies to use to estimate emissions
- Whether to apply permits to all agricultural greenhouse gas emissions or just to nitrous oxide
- The number of permits to allocate, and how to allocate them.

There are other implementation issues that apply equally to a tradeable permits regime for agriculture and for deforestation. These are set out in Deforestation Option 2. *See page 64*

Agricultural Option 7: Offset schemes for agricultural emissions

Description

Under this option, the Government would allow farmers to meet any obligations arising from growth in emissions by offsetting activities through other means. These could be either on- or off-farm. These reductions, called 'offsets', could include a range of activities such as planting trees, using nitrification inhibitors or improving the energy efficiency of farm operations, thereby reducing emissions from electricity generation. They could also potentially involve the purchase of emission units from other project schemes, such as the Permanent Forest Sink Initiative.

An offset scheme could be mandatory, requiring that any increase in emissions above a specified level be offset. Alternatively, an offset regime could be used in conjunction with another option, such as a tradeable permit regime, and made voluntary. In this situation farmers would be able to meet their obligations under the tradeable permits regime by providing an offset if they chose, instead of by making a cash payment or relinquishing a permit.

The Government would specify the types of activities that could be used to offset farm-based emissions, and whether they had to be undertaken by the farmer or could be sub-contracted.

Any activity to reduce emissions that was claimed as an offset would not be eligible to receive support through any other government scheme. For example, forest planting claimed as an offset would not be eligible to receive funding under, for instance, the Afforestation Grant Scheme.

Advantages

Under an offset scheme, farmers would not necessarily have to reduce their farm-based emissions. Instead, where it was more cost-effective, they could fulfil their obligations by supporting an activity that led to a reduction in emissions elsewhere.

Disadvantages

Under an offset scheme, it is very difficult to determine whether the activity being claimed as an offset is new and additional, or whether it would have occurred anyway.

An offset regime would also require the measurement of farm-based emissions, and the offsetting emission reductions would need to be registered, validated and audited. It would take time to develop suitable measurement and reporting systems.

Mandatory offset schemes are not considered as effective as tradeable permit schemes because they do not give farmers the freedom to choose lowest-cost solutions for emissions reductions.

Implementation issues

If the Government were to proceed with an offset regime for the agricultural sector, the most critical issues to be addressed would be:

- How to administer, monitor and enforce the regime
- How to measure farm-based emissions, and any emission reductions provided through offset activity, in an internationally acceptable and scientifically robust way eg. by using models[16] to estimate greenhouse gas emissions
- What range of activities could be used as offsets
- Whether to require that offset activity be carried out directly by the farmer (instead of contracted out) or on land not owned by the farmer
- Ensuring that forest planting used for an offset had not been established under one of the afforestation options.

Agricultural Option 8: RMA standards to control agricultural greenhouse gas emissions

Description

This option would seek to control agricultural greenhouse gas emissions through the preparation of a national environmental standard (NES).

Under the RMA, local authorities can control a range of land use activities that affect erosion, water quality, etc. However, they are unable to control land use activities for the explicit purpose of managing greenhouse gas emissions unless the Minister for the Environment has developed an NES specifically to do so.

An NES prepared by the Minister for the Environment can prescribe limits for environmental matters, including the control of greenhouse gases. It can also prescribe methods to control discharges, and can permit and prohibit activities.

As with other measures to reduce emissions, an NES could apply to emissions above a certain level and be phased in over a period of time.

16 Such as Overseer – see: http://www.agresearch.co.nz/overseerweb/

This option could:

- Control inputs into farms, such as limiting livestock numbers or the use of fertilisers, and/or by requiring the use of nitrification inhibitors
- Control outputs of greenhouse gases such as methane and nitrous oxide from farms
- Require farmers to offset greenhouse gas emissions by means such as planting trees.

Advantages

This option:

- Increases national compliance as it does not rely on voluntary actions by land users
- Could allow the land user to choose cost-effective practices to comply with a standard based on greenhouse gas emissions
- Could provide certainty to land users if the RMA standard prescribed land management practices
- Need not constrain agricultural production if the standard required offsets
- Would not require additional systems associated with financial incentives or disincentives or tradeable permit regimes
- Might have significant benefits in terms of water quality and soil conservation.

Disadvantages

This option:

- Would involve significant monitoring and enforcement costs. Most of these costs would fall on local government
- Might conflict with existing district and regional plans (which usually allow pastoral farming as a permitted activity) and might be seen to unfairly constrain the use of land
- Could create uncertainty for land users about compliance with greenhouse gas emissions if output-based standards were used
- Might constrain agricultural production if the standard prescribed land use practices
- Would not encourage land managers to make decisions based on accurate price signals.

Implementation issues

The issues that would need to be addressed prior to implementation of both Option 8 or Option 9 include:

- How to administer, monitor and enforce the regime
- The need to weigh up the costs and benefits of other options as required by the RMA
- The selection of an NES to control farm practices, greenhouse gas emissions directly, or by requiring offsets, and whether to include wider environmental impacts
- If an NES was to control greenhouse gases directly, there would be significant issues in measuring farm-based emissions
- The development of clear, effective and enforceable rules
- Communication of legal requirements of the NES to land users and local government
- Arrangements with local government covering monitoring and enforcement.

Options focusing on land use change from forestry to agriculture

Agricultural Option 9: RMA standards to control new agricultural land use after deforestation

Description

This option would seek to prepare an NES covering increased greenhouse gas emissions following land use change from forestry to agriculture. It would apply only to new agricultural land uses following deforestation rather than to existing agricultural land. It could:

- Control increased agricultural greenhouse gas emissions following deforestation (compared to emissions from previous forested land)
- Control all environmental effects associated with agriculture following deforestation, including increased greenhouse gas emissions, water quality etc.

Both the controls above could be implemented by:

- Controlling inputs into farms ie. limiting livestock numbers, limiting the use of nitrogen fertilisers, and/or requiring the use of nitrification inhibitors
- Controlling outputs of greenhouse gases such as methane and nitrous oxide from farms
- Prohibiting certain new agricultural land uses associated with high greenhouse gas emissions.

As with other measures to reduce emissions, an NES could apply to emissions above a certain level and be phased in over time.

Advantages

This option:

- Has similar advantages to Agricultural Option 8. *See page 52*
- Would be clearly understood if it prohibited certain land uses following deforestation
- Would avoid conflicting land use, water quality and climate change policies if it comprehensively addressed all environmental effects.

Disadvantages

This option:

- Has similar disadvantages to those in Agricultural Option 8. *See page 52*
- Would be complex and could interfere with existing district and regional plans if it were to comprehensively address all environmental effects of agriculture
- Could potentially come into conflict with measures in other government programmes, eg. the Sustainable Water Programme of Action.

Implementation issues are discussed under Agricultural Option 8. *See page 53*

Agricultural Option 10: Charge where deforested land is used for agriculture

Description

This option could be used in conjunction with the simple flat charge option for deforestation (*see Deforestation Option 1 page 63*), under which all parties would pay a charge if they deforested. Under this 'add-on' option, an additional charge would be levied to take account of the ongoing agricultural emissions expected to occur if the land was used for agriculture.

The charge would be set at an agreed rate per tonne of carbon dioxide equivalent and levied on the total level of carbon dioxide equivalents expected to be released over an agreed period of time (such as the first Kyoto Commitment Period). The charge would be levied only once: at the time of, or soon after, the date that the land was converted to agricultural use.

Advantages

Landowners would be encouraged to consider the greenhouse gas emissions likely to result from the different possible land uses open to them after deforestation. In doing so, this option would have the benefit of better integrating forest and agriculture sector policies for the pre-2012 period. This is because it would send a signal both on the decision to deforest and on the subsequent decision whether or not to introduce a greenhouse gas-emitting agricultural use.

Disadvantages

There are costs and practical difficulties with measuring the agricultural emissions over the relevant period, meaning the Government would need to estimate the likely emissions over a number of years.

This option would not take into account the greenhouse gas emissions arising from non-agricultural land uses.

Implementation issues

The design issues that would need to be addressed prior to implementation of this option include:

- How to determine the level of charge
- Whether the charge would be a one-off payment, or whether it would be made in instalment, such as annually, or for a set period
- Whether a charge should be implemented after deforestation for *any* emissions-emitting agricultural use (eg. cropping and horticulture), not just animal husbandry.

Questions: Agricultural options

Please record your answers in the submissions pages at the back of this publication, or file online at www.maf.govt.nz/climatechange.

17. Are there other options for addressing agricultural greenhouse gas emissions you would like to put forward?
18. If you had to make **one** choice out of Options 5, 6, 7 and 8, which would be your first preference?
19. If you had to make **one** choice out of Options 9 and 10, which would be your first preference?
20. Please rank the agriculture options presented in terms of your preferences.
21. Additional comments: you may like to comment on the reasons for your choice of options or on the design detail of how the options might best be implemented.

Actions to reduce forestry emissions and increase carbon sinks

Introduction

The Government wants to put in place a balanced package of policies that simultaneously reduces emissions from deforestation and increases carbon dioxide absorption through forest sinks. It is seeking at least one afforestation and one deforestation policy measure. The measures are to be introduced as quickly as possible, preferably before the beginning of the first Commitment Period of the Kyoto Protocol in 2008.

The section below discusses the two key options the Government has identified for encouraging greater levels of afforestation. Either of these would work alongside the Permanent Forest Sink Initiative, which the Government has already announced.

The four options the Government has identified for better managing deforestation are also discussed in this section.

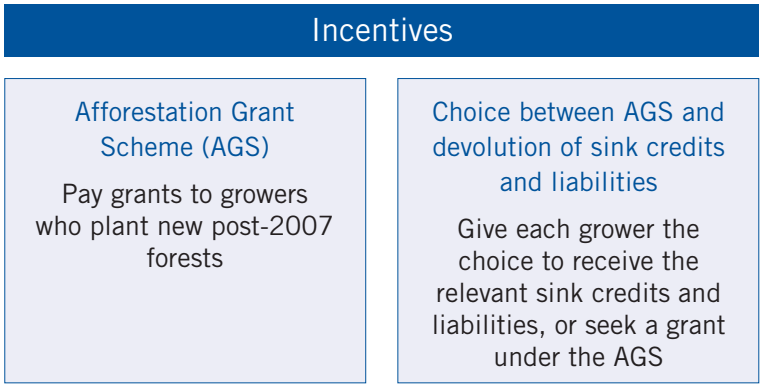
Options are designed to influence the decisions of land managers from now on.

Afforestation options

Over a normal forestry rotation, a hectare of mature radiata pine forest is estimated to absorb and store around 800 tonnes of carbon dioxide. Under the Kyoto Protocol, New Zealand earns sink 'credits' for forests planted after 1990, in recognition of the carbon dioxide stored. These credits can be used to offset emissions elsewhere, or sold.

The Government's proposed afforestation policies aim to encourage greater levels of greenhouse gas absorption by increasing the area of forest sinks. In addition to the existing Permanent Forest Sink Initiative, the Government has identified two possible policies for encouraging greater levels of afforestation.

Figure VI: Overview of possible afforestation options



Questions

Please refer to page 61 and 80-81 for questions relating to the afforestation options.

Afforestation Option 1: Afforestation grant scheme (AGS)

Description

Under this option, parties would be invited to tender for a grant for the establishment of new post-2007 Kyoto-compliant forests.[17] The key features of the option are:

- People would tender for a grant to afforest Kyoto-compliant land[18] from 2007
- The Crown would retain all sink credits and associated harvesting and deforestation liabilities from grant forests
- Grants would generally be allocated based on the highest expected amount of carbon storage for the lowest tender grant rate
- Sites with more co-benefits would be given higher priority in the allocation of grants
- Co-benefits that would be considered for targeting include flood protection, erosion control, water quality improvement and biodiversity
- The payment of the grant could be covered by a contract between the Crown and the applicant. If the forest was deforested within a set period of time, the grant might have to be repaid
- It is possible that third parties, such as regional councils, could have a major role in implementing the scheme
- The programme would run for five years, with a review after four years.

Advantages

- Investors receive payments up front and carry no future liabilities for emissions that arise when the forests are harvested or deforested
- Increased new planting rates
- Would provide sink credits to the Crown in future commitment periods (though its impact in the first Commitment Period is minimal)
- Afforestation could be targeted to bring about the most appropriate response to the effects of climate change. Benefits that could be targeted include flood protection, erosion control, water quality improvement and biodiversity enhancement

17 'Kyoto compliant forest' means forest established by direct human activity on land that was not forest land as at 31 December 1989.
18 'Kyoto compliant land' means land that was non-forest land as at 31 December 1989.

- Relatively low implementation and administration costs
- A relatively efficient price signal would be sent to investors regarding the climate change effects of their behaviour
- The cost of the scheme would be offset by the future sink credits generated and, irrespective of future international arrangements, adaptation benefits would still have been delivered due to targeting
- It could be put in place relatively quickly.

Disadvantages

- International arrangements post-2012 are still unclear. Under this option, risks around whether forest sink credits continued to accrue beyond 2012 would be carried by the Crown, rather than by investors, since the Crown would be making a grant up front
- New large-scale projects might lead to reduced water flows in drier areas of the country, reducing river flows in some catchments. This could be addressed by local planning requirements.

Implementation issues

If the Government were to proceed with the afforestation grant scheme, some critical issues to be resolved would be:

- Setting the budget for the scheme, including phasing
- Setting the maximum size for grants
- Setting the criteria for assessing and prioritising tenders
- Developing the systems to receive, process, and store information from tenders
- Deciding the role of third parties in the scheme
- Setting a period of time within which a grant would have to be repaid if deforestation occurred
- Combining this option with the East Coast Forestry Project
- Combining this option with wider initiatives in the *Plan of Action*.

Afforestation Option 2: Choice between an AGS and devolution of sink credits and their associated liabilities

Description

Under this option, growers of each Kyoto forest established from 2007 onwards could choose whether to:

- Seek a grant under the AGS proposal (see above), or
- Opt to receive forest sink credits and their associated liabilities.

The devolved credits and liabilities mechanism would operate in a similar manner to the already confirmed Permanent Forest Sink Initiative (PFSI). Landowners would enter into

covenants with the Crown that would give them the right to receive sink credits. Those covenants would also impose obligations to:

- Meet any emission liabilities that arose whenever the amount of carbon in the forest fell, including repaying credits when the trees were harvested or deforested
- Meet all costs incurred in monitoring, verifying and reporting the carbon in the forest
- Allow access to the forest for the purpose of auditing and verifying the carbon in it.

Covenants would be registered against land titles, and would be in perpetuity. They would run with the land and bind all future owners.

Landowners would be responsible for marketing sink credits if they chose to sell them, and would carry all risks associated with whether sink credits would continue to be available beyond 2012.

The Crown would also require certain rights and powers to manage the risk of landowners not meeting their obligations under a covenant. Such powers might include:

- The right to register statutory land charges against land titles for debts not paid, and
- The right to retain a proportion of credits from all participants to cover the Crown's risk of people defaulting on their obligations.

Advantages

Providing the option to select a devolved credit and liability mechanism could:

- Provide more choice for forest investors, allowing investors to pursue this mechanism where they believed it to be to their advantage
- Create an economic incentive to potential forest investors that would increase the rate of new planting
- Deliver sustainable land management, climate change and economic benefits through increased forest establishment
- Provide a source of units the Government might consider purchasing to meet future commitments
- Improve opportunities for domestic and international firms to hedge against current/future controls on their emissions, or offset their emissions in line with a possible shift to a price on emissions in the New Zealand economy.

Disadvantages

Disadvantages that an investor would need to consider before selecting a devolved credit and liability mechanism are:

- Payment under the proposed AGS would be certain, while future income streams under a devolved credit and liability mechanism would be uncertain
- There are future liabilities for participants under a devolved credit and liability mechanism that would not be faced by those who planted new forests under the AGS
- There are potential cost recovery provisions that would not apply to the proposed AGS
- Small land/forest owners might have difficulties finding buyers for credits, and face high transaction costs associated with selling credits earned.

Implementation issues

- If the Government were to proceed with this option, a key step would be (in addition to implementation issues noted for the AGS, above) to review and, if necessary, adapt the arrangements currently being developed for administering the Permanent Forest Sink Initiative so that they were suitable for a devolved credit and liability mechanism
- The option would need to be combined with wider initiatives from the *Plan of Action*.

Questions: Afforestation options

Please record your answers in the submissions pages at the back of this publication, or file online at www.maf.govt.nz/climatechange.

22. Are there other options for encouraging afforestation you would like to put forward?
23. Please rank the afforestation options presented in terms of your preferences.
24. If Afforestation Option 2 were implemented, which mechanism would you choose if you were establishing new forests: AGS, devolved credits and associated liabilities, or a combination of both (ie. AGS for some areas and devolved credits and liabilities for other areas)?
25. Additional comments: you may like to comment on your reasons for choosing the option you did or on the design detail of how the option might best be implemented.

Deforestation options

Deforestation of a hectare of mature radiata pine forest is expected to be recorded as an emission of around 800 tonnes[19] of carbon dioxide in the national carbon account. That is equivalent to an emissions cost of around $13,000 for each hectare of land deforested (assuming $15.92 per tonne of carbon dioxide).

It is common for forests to be planted under commercial arrangements whereby the owner of a forest is separate from the owner of the underlying land, such as through a 'forestry right' or lease. The Government's deforestation controls will be placed on whichever party takes the decision to deforest.

The Department of Conservation, regional councils and private landowners all sometimes cut down exotic trees for weed control purposes. Such activity is expected to be classified as deforestation, and therefore lead to an emissions liability. Under any of the deforestation options the Government would need to decide how to deal with deforestation undertaken for weed control purposes. There may also be other similar situations, such as deforestation for biosecurity reasons, where the Government will need to consider how any measures to address deforestation will be applied.

Four options have been identified for managing deforestation. The options are targeted at the deforestation of non-Kyoto (pre-1990) forest.

Figure VII: Overview of possible deforestation management options

Government pricing mechanisms	Market-based mechanisms	Regulation
1. Flat charge on land use change from forestry to another use Impose flat charge on deforestation of non-Kyoto forests	2. Tradeable permit regime Government allocates tradeable deforestation permits; forest owners who deforest non-Kyoto forests are liable for emissions above the level of permits they hold	3. Centrally determine deforestation levels Pass new legislation to limit rates of deforestation of non-Kyoto forests (national deforestation limit) 4. RMA controls on deforestation Use RMA to control deforestation

19 There is some debate over how the Kyoto Protocol rules require New Zealand to assess the level of carbon released through deforestation. Officials are currently investigating this issue internationally. They recommend that the domestic rules be designed to reflect the agreed international position.

Questions

Please refer to page 68 and 82-83 for questions on the four deforestation options.

Deforestation Option 1: Flat charge on land use change from forestry to another use

Description

Under this option, a charge would be levied on any party that removed a non-Kyoto forest and introduced a new land use. The charge would be set at a rate per tonne of carbon dioxide equivalent, and levied on the level of carbon assessed as stored in the forest that had been removed. The level of the charge would be reviewed at regular intervals, such as every one or two years.

The Government would carry a portion of the deforestation costs incurred under the Kyoto Protocol by:

- Agreeing a threshold level of emissions in each commitment period, below which parties could deforest without being liable to pay the charge, and/or
- Setting the charge at a discounted level below the expected international price of greenhouse gas emissions.

This option could be used in conjunction with a further charge on the additional emissions expected to occur if the deforested land is then used for agricultural purposes *(see Agriculture Option 8, pages 52-53).*

Advantages

The flat charge option would be effective at reducing deforestation if the charge was set at or near the international price of greenhouse gas emissions. It shares the benefit of the tradeable permit option in allowing each landowner to assess whether the alternative land uses facing them is preferable to forestry, once the impact of the deforestation emissions charge has been taken into account. In this way the charge option would help to ensure that the overall level of deforestation that occurred, and its location around New Zealand, took account of relevant economic and environmental factors.

This option has the benefit of being relatively cost-effective to operate. It would also have the benefit of automatically reducing the level of fiscal risk facing the Government. If deforestation levels were higher than expected, the charge would raise a higher level of revenue to cover the increased Kyoto costs.

Disadvantages

The flat charge option could make it difficult for the Government to set and manage the level of deforestation emissions it was prepared to cover in the first Commitment Period. The only practical way for the Government to do this would be to reduce the level of the deforestation charge below the expected international price of greenhouse gas emissions. However, it is likely to prove difficult to determine how much the charge should be reduced, because it would be difficult to predict how much more deforestation is likely to occur as a result. There is therefore a risk that the actual level of deforestation costs met by the Government would be greater or smaller than intended.

Under this option, the only way for a forest owner to meet deforestation emission costs would be to pay the charge as determined by the Government at the time of deforestation.

Implementation issues

If the Government were to proceed with this option, the critical issues it would need to address are:

- How to set the level of the charge
- How to administer, monitor and enforce the regime
- Determining the threshold level, if any, where deforestation is exempt from the charge
- Whether the charge applies only to deforestation emissions, or whether it should also cover the future agricultural emissions expected to occur following deforestation.

Deforestation Option 2: Tradeable permit regime

Description

Under a tradeable permit option any party that deforested a sufficiently large area of non-Kyoto forest would incur a financial liability. The size of that liability would be based on the amount of carbon assessed to have been released. The person deforesting would be able to meet that liability by:

- Making a cash payment (based on the international price of carbon at the time of deforestation)
- Relinquishing an appropriate number of general (Kyoto compliant) emission units, and/or
- Relinquishing an appropriate number of New Zealand deforestation-specific emission permits.

Deforestation of small areas of land could be exempted from these arrangements by allowing forest owners to deforest up to a threshold level of emissions in each commitment period (assuming there is more than one) without incurring any deforestation liabilities.

The Government would carry a portion of the deforestation costs incurred in the first commitment period of the Kyoto Protocol by:

- Meeting the cost associated with the deforestation of small areas of land that fall under any agreed threshold; and
- Allocating (for free or at a subsidised rate) a certain level of deforestation permits to the owners of land of non-Kyoto forests at a certain point in time.

Any emissions in excess of the permits allocated will incur a liability.

Advantages

The key advantage of the tradeable permit option is that growers, rather than the Government, would be responsible for deciding whether to deforest. In doing so, they would assess whether alternative land uses were preferable to forestry once the impact of the permit requirements had been taken into account.

This means that decisions on the level and location of deforestation in New Zealand would take into account the specific circumstances of each block of forested land.

Disadvantages

The allocation of emission units may be contentious.

Implementation issues

If the Government were to proceed with the tradeable permit option, the most critical issues to address would be:

- How many permits to allocate in the first Kyoto Commitment Period and subsequent commitment periods
- How to allocate them.[20]

With regard to the number of permits to allocate, the Government has previously proposed to cover deforestation liabilities in the first Commitment Period up to a cap of 21 million tonnes of carbon dioxide equivalent. This is equivalent to roughly 10 percent of the area of non-Kyoto forest that is expected to be harvested in the first Commitment Period, and slightly over two percent of the size of the total non-Kyoto forest estate. The 21 million tonne emission figure is significantly higher than historical rates of emissions from deforestation of planted forests in New Zealand.

The Government has not yet made any commitment about the level of deforestation liabilities it is willing to cover, if any, in Kyoto Commitment Period 2 (CP2) and subsequent commitment periods. If the tradeable permit option were introduced, the Government might also decide what level of liabilities it was willing to meet in CP2 and beyond.

Turning to the issue of how to allocate permits, the Government has considered three mechanisms to date, all of which have advantages and disadvantages:

---

20 It is proposed that deforestation permits allocated to industry would go to landowners. This is because measures to address deforestation will probably tend to affect land values rather than the interests of those existing forest owners who do not own the land under their forests.

- 'Grandparenting' permits to the owners of land under non-Kyoto forests on the basis of land area
- 'Grandparenting' permits to landowners on the basis of land area and the quality of that land. A greater number of permits per hectare would be given to owners of land with more valuable alternative uses (based on a land use capability assessment)
- Auctioning permits on a subsidised basis. Under this option, the Government would meet an agreed, fixed amount of the overall cost of the permits auctioned.

The Government would also need to determine the threshold level of deforestation below which the regime would not apply, and what legislative arrangements would be needed. Other implementation issues that would need to be addressed under this option include:

- Whether owners of land under indigenous forests should receive deforestation permits
- What characteristics deforestation-specific permits should be given (eg. how long they should remain usable)
- How to treat any deforestation that occurs as a result of weed control activity
- How to administer, monitor and enforce the regime.

Deforestation Option 3: Centrally determine deforestation levels

Description

Under this option, new legislation would be introduced to make it illegal to deforest a piece of land under non-Kyoto forest unless explicit government approval was given. The level of approvals given would then be controlled to ensure that total deforestation remained under the Government's target level for each year or commitment period.

This would most likely require an application process under which landowners wishing to deforest applied to the Government and provided specified information on the likely economic and environmental costs and benefits of deforesting their land.

The Government would meet the emission liability costs of all approved deforestation.

Advantages

This option would be very effective at controlling the overall level of deforestation that occurred.

Disadvantages

The Government would determine what overall level of deforestation was allowed in each year or commitment period, despite it not having complete information on the potential costs and benefits of land use changes around the country. There would be an ongoing risk that the deforestation limit would be set too high or too low.

Further, by deciding whether to approve individual deforestation applications, this option would lead to the Government determining where deforestation was occurring around the country. Inconsistencies in the quality or accuracy of the information provided in support of deforestation applications could lead to poor decisions over where to allow deforestation.

Implementation issues

If the Government were to proceed with this option, the most critical issues it would need to address are:

- What aggregate level of deforestation to allow in the first Commitment Period
- What administrative process and criteria could be used to assess deforestation applications
- What legislative mechanism could be used to establish, monitor and enforce the regime.

Deforestation Option 4: RMA controls on deforestation

Description

Under this option, there could be a national environmental standard (NES) to control deforestation.

Local authorities can already control vegetation removal activities under the Resource Management Act 1991 (RMA). However, they are unable to control these activities for the explicit purpose of managing greenhouse gas emissions unless the Minister for the Environment has developed an NES specifically to do so.

An NES prepared by the Minister for the Environment can prescribe limits for environmental matters including the control of greenhouse gases, prescribe methods to control discharges, and permit and prohibit activities.

This option would:

- Control deforestation by measures such as prohibiting deforestation above certain thresholds on the area or volume cleared per title per year to control greenhouse gas emissions
- Control all environmental effects associated with deforestation (including increased greenhouse gas emissions). This could also impose direct limits on deforestation, prohibit deforestation in areas sensitive to erosion, or limit water quality effects associated with deforestation.

Advantages

This option:

- Increases national compliance as it does not rely on voluntary actions by land users
- Would not require additional systems associated with financial incentives or disincentives, or tradeable permit regimes

- Would be relatively easy to monitor and enforce if it imposed direct limits on deforestation (similar provisions exist in many district and regional plans). It would be readily understood by land users
- Could avoid conflicting land use, water quality and climate change policies if it comprehensively addressed all deforestation impacts
- Might have significant benefits in terms of water quality and soil conservation.

Disadvantages

This option:

- Would involve significant monitoring and enforcement costs and most of these costs will fall on local government
- Might interfere with the many existing district and regional plans that address vegetation clearance, and might be seen to unfairly constrain the use of land
- Might conflict with measures to meet objectives in other government programmes, eg. the Sustainable Water Programme of Action
- Would mean that land managers were not making land use decisions based on price signals.

Implementation issues

The issues that would need to be addressed prior to implementation of this option include:

- Weighing up the costs and benefits of other options as required by the RMA
- The selection of an NES to control the amount of deforestation, or where and how deforestation occurs, and whether to include wider environmental impacts
- The development of clear, effective and enforceable rules
- Communication of legal requirements of the NES to land users and local government
- Arrangements with local government about monitoring and enforcement.

Questions: Deforestation options

Please record your answers in the submissions pages at the back of this publication, or file online at www.maf/govt.nz/climatechange.

26. Are there other options for deforestation you would like to put forward?
27. Please rank the deforestation options presented in terms of your preferences.
28. If it came to a choice between these options, how would you rank them in order of preference?
29. Additional comments: you may like to comment on your reasons for choosing the option you did or on the design detail of how the option might best be implemented.

SECTION D:

CONSULTATION AND SUBMISSIONS

HAVING YOUR SAY

There are two ways you can give the Government feedback on the policy options discussed in the *Sustainable Land Management and Climate Change: Options for a Plan of Action* consultation.

1. By participating in consultation meetings and hui around the country in February and March 2007.
2. By written feedback, either online or using the tear-out submissions section on pages 73-83 in this document.

What do we want to know?

This discussion document can be read or downloaded from the MAF consultation website, www.maf.govt.nz/climatechange. More hard copies can be obtained by contacting climatechange@maf.govt.nz or calling us on 0800 CLIMATE (254 628). As noted at the beginning of this document, the Government is seeking from submitters:

- Creative thinking towards future solutions for climate change, especially around the ideas and options discussed in *Pillar 1: Adapting to climate change* and *Pillar 3: Capitalising on new business opportunities*.
- Specific feedback on which of the detailed policy options you prefer identified under *Pillar 2: Reducing emissions and creating carbon sinks*.
- Indications of your commitment to, interest in and creative ideas for the issues and questions discussed under *Pillar 4: Working together*.

We would like to know not only which of the options presented throughout this document you prefer, but also how they might work together in a balanced package of sustainable land management initiatives as part of the proposed *Plan of Action* to be considered by Cabinet.

Some of the options presented are 'either/or' choices. Others are proposals that could be introduced together with one or more of the other proposals. Which type of option is being presented has been signalled clearly in the text.

A summary table identifying all the options being proposed for discussion and feedback under each pillar is on pages 26-27.

The Government recognises that aspects of climate change can be difficult and controversial. We want to put in place a way of working that welcomes different views and accepts that people have a right to disagree with proposals that may be made. We are looking for a durable and constructive relationship between the different groups and interests involved.

All submissions made as part of this consultation process will be considered closely before decisions on future policy are made.

Further information

Meetings

Public meetings and hui on the sustainable land management and climate change consultation will be held in February and March 2007.

Details of dates and venues were not available when this publication went to print, but will be posted on: www.maf.govt.nz/climatechange.

Alternatively, please call:

0800 CLIMATE (254 628)

or email:

climatechange@maf.govt.nz

Want to know more about climate change?

The MAF website contains information about climate change and its expected impacts on the land management sectors. Go to: www.maf.govt.nz/climatechange.

MAF climate change officials can be contacted at climatechange@maf.govt.nz.

For more information on climate change in the international context see http://www.ipcc.ch.

This consultation is one of a series of government consultations on climate change taking place between December 2006 and March 2007. For links to other climate change policy proposals and announcements, see www.climatechange.govt.nz.

TELL US WHAT YOU THINK

Submissions on the land management and climate change consultation can be made on the tear-out submissions pages that follow or filed online at www.maf.govt.nz/climatechange.

If you have chosen to fill out the submissions pages in this publication, please tear them out along the perforations and post them in the envelope provided to:

Sustainable Land Management and Climate Change Consultation
Ministry of Agriculture and Forestry
PO Box 2526
Wellington

Please note that the closing date for submissions is: 30 March 2007.

Officials will prepare a public summary of submissions received on this discussion paper. The public summary will not attribute comments to individual submitters. Please note that your comments will be subject to the Official Information Act 1982 and may need to be publicly released. If you object to the release of any material provided in your submission, please specify the material that you consider should be withheld, and the grounds for withholding. Please note that even if you do identify specific material that you consider should be withheld, we cannot guarantee that we will withhold this material. All requests under the Official Information Act need to be assessed in terms of the Act and while we will take into account your views, we are not bound by them.

SUSTAINABLE LAND MANAGEMENT AND CLIMATE CHANGE FEEDBACK

The following information will help us analyse your feedback for report back to the Government and the general public:

Responding as

❑ An individual

❑ A group or organisation

If your submission is from a group or organisation, please indicate how many people your submission represents:

[number] ___

Sector/interest/type of organisation

❑ Agriculture Description/type: _____

❑ Forestry Description/type: _____

❑ Maori Description/type: _____

❑ Government Description/type: _____

❑ Other Description/type: _____

Contacts for further information

As part of ongoing engagement and consultation on climate change, we may seek more comment about the design or implementation of some of the policy options outlined in this document. If you are willing for us to ask you for more information about your submission or your views on implementing options, please supply your contact details below.

❑ Yes, I am happy to be contacted to provide more views and information

Name: _____

Company/organisation (if relevant):_____

Address: _____

Email: _____

Phone: _____

QUESTIONS

Please record your answers on these pages, tear out, and post to:
Sustainable Land Management and Climate Change Consultation,
Ministry of Agriculture and Forestry, PO Box 2526, Wellington.

Alternatively, you can record your answers online at:
www.maf.govt.nz/climatechange

Goals for a *Plan of Action* (pages 24-25)

1. Are there any other goals you consider should be included?

_____

_____

_____

_____

_____

_____

2. **Agriculture Goals**
On a scale of 1 to 5, where 1 is 'strongly disagree', and five is 'strongly agree', how do you rate your level of support for the proposed goals for agriculture in this section? *Please circle.*

1 2 3 4 5

3. **Forestry Goals**
On a scale of 1 to 5, where 1 is 'strongly disagree', and five is 'strongly agree', how do you rate your level of support for the proposed goals for forestry outlined in this section? *Please circle.*

1 2 3 4 5

4. If you wish to make any comment on the reasons for your choices, please do so.

Adaptation (pages 28-30)

5. Do you have any comments on the ideas for adaptation discussed in Pillar 1?

6. Are there any other actions you consider might be useful in helping the land management sectors adapt to climate change?

7. How important is it that the proposed *Plan of Action* includes an ongoing process to adapt to climate change? 1 = not important and 5 = very important. *Please circle.*

1 2 3 4 5

8. How strongly do you agree or disagree that the adaptation actions outlined are heading in the right direction? 1 = strongly disagree and 5 = strongly agree. *Please circle.*

   1 2 3 4 5

9. If you agree, who do you think should lead the process to adapt to climate change? *Please tick one box.*

   ❑ Government

   ❑ Sectors

   ❑ Government-sector partnership

10. If you wish to make any comment on the reasons for your choice, please do so.

Business opportunities (pages 36-37)

11. Are there any other ideas you would like to put forward regarding potential business opportunites?

12. How important do you think it is that the proposed *Plan of Action* includes actions to capitalise on business opportunities? 1 = not important and 5 = very important. *Please circle.*

    1 2 3 4 5

13. If you think this is important, who do you think should lead the process of identifying and developing new business opportunities? *Please tick one box.*

    ❑ Government

    ❑ Sectors

    ❑ Government-sector partnership

14. Are there any other comments you would like to make on any of the business opportunities outlined in Pillar 3, or any other ideas you want to comment on regarding potential business opportunities?

Working together (pages 38-40)

15. Do you have any comments on the proposals and ideas about the Government, local government and sectors working together on the proposed Plan of Action? Your answer could include any other ideas you might have.

16. How supportive are you of the land management sectors working together with local and central government under the proposed *Plan of Action* (where 1 = not supportive and 5 =very supportive)? *Please circle.*

1 2 3 4 5

Agricultural options

17. Are there other options for addressing agricultural greenhouse gas emissions you would like to put forward?

18. If you had to make **one** choice out of Options 5, 6, 7 and 8, which would be your first preference? *Please tick one box.*

- ❑ Option 5: Charge on nitrogen fertiliser
- ❑ Option 6: Tradeable permit regime
- ❑ Option 7: Offset schemes for emissions
- ❑ Option 8: RMA standards to control GHG emissions

19. If you had to make **one** choice out of Options 9 and 10, which would be your first preference? *Please tick one.*

- ❑ Option 9: RMA standards to control new agricultural land uses after deforestation
- ❑ Option 10: Charge where deforested land is used for agriculture

20. Please rank the agriculture options presented in terms of your preferences on a scale of 1 to 5. 1 = don't support and 5 = strongly support. *Please circle.*

Agricultural Option 1: Research (page 44)

1 2 3 4 5

Agricultural Option 2: Technology transfer (page 45)

1 2 3 4 5

Agricultural Option 3: Voluntary reporting (page 46-47)

1 2 3 4 5

Agricultural Option 4: Incentive for nitrification inhibitors (page 47-48)

1 2 3 4 5

Agricultural Option 5: Charge on nitrogen fertiliser (page 49)

1 2 3 4 5

Agricultural Option 6: Tradeable permit regime for agricultural greenhouse gas emissions (page 50-51)

1 2 3 4 5

Agricultural Option 7: Offset schemes for agricultural emissions (page 51-52)

1 2 3 4 5

Agricultural Option 8: RMA standards to control agricultural greenhouse gas emissions (page 52-53)

1 2 3 4 5

Agricultural Option 9: RMA standards to control new agricultural land uses following deforestation (page 54)

1 2 3 4 5

Agricultural Option 10: Charge where deforested land is used for agriculture (page 55)

1 2 3 4 5

21. Do you have additional comments? You may like to comment on the reasons for your choice of options or on the design detail of how the options might best be implemented.

Afforestation options

22. Are there other options for encouraging afforestation you would like to put forward?

23. Please rank the afforestation options presented in terms of your preferences. 1 = don't support at all and 5 = an option you strongly support.

    Afforestation Option 1: Afforestation grants scheme (AGS) (page 58-59)

    1 2 3 4 5

    Afforestation Option 2: Providing growers of new Kyoto Forests with a choice between an afforestation grant scheme (AGS) or the devolution of forest sink credits and their associated liabilities (page 59-61)

    1 2 3 4 5

24. If Afforestation Option 2 were implemented, which mechanism would you choose if you were establishing new forests (please tick one).

    ❑ AGS, or

    ❑ Devolved credits and associated liabilities, or

    ❑ A combination of both (ie. AGS for some areas and devolved credits and liabilities for other areas)

25. Do you have additional comments? You may like to comment on your reasons for choosing the option you did or on the design detail of how the option might best be implemented.

Deforestation options

26. Are there other options for deforestation you would like to put forward?

_____

_____

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_____

27. Please rank the deforestation options presented in terms of your preferences. 1 = don't support at all and 5 = you strongly support.

Deforestation Option 1: Flat charge on land use change from forestry to another use (page 63-64)

1 2 3 4 5

Deforestation Option 2: Tradeable permit regime (page 67)

1 2 3 4 5

Deforestation Option 3: Centrally determine deforestation levels (national deforestation limit) (page 66-67)

1 2 3 4 5

Deforestation Option 4: RMA controls on deforestation (page 67-68)

1 2 3 4 5

28. If it came to a choice between these options, how would you rank them in order of preference? *Please insert the number of your preference in the box below.* 1= your most preferred option and 4 = your least preferred.

- ❑ Deforestation Option 1: Flat charge on land use change from forestry to another use
- ❑ Deforestation Option 2: Tradeable permit regime
- ❑ Deforestation Option 3: Centrally determine deforestation levels
- ❑ Deforestation Option 4: RMA controls on deforestation

29. Do you have additional comments? You may like to comment on your reasons for choosing the option you did or on the design detail of how the option might best be implemented.

_____

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_____

Please post your submission by 30 March 2007, to:

Sustainable Land Management and Climate Change Consultation
Ministry of Agriculture and Forestry
PO Box 2526
Wellington

ANNEXES

Annex 1: Central government programmes relevant to the *Plan of Action*

Government climate change policy

Many climate change policies are being developed for areas outside the land-based sectors, and they will be relevant to the *Plan of Action*. Some examples include: the New Zealand Energy Strategy and its companion action plan, the replacement National Energy Efficiency and Conservation Strategy, the development of policy on biofuels, work on what policies to apply post-2012, and work on transport measures.

Sustainable Water Programme of Action

Led jointly by the Ministry for the Environment (MfE) and the Ministry of Agriculture and Forestry (MAF). Actions proposed under the programme to improve water quality will help reduce nitrous oxide emissions. Work on water allocation, including more efficient use of water, will assist adaptation to climate change.

Adverse Events Policy

Led by MAF, this policy will help reduce the land management sectors' vulnerability to adverse events, and speed the recovery of land back into production.

Water Enhancement Policy

Led by MAF, the Government is considering its role in assisting the development of community water enhancement schemes. With the likelihood of reduced rainfall on the East Coast of New Zealand in the future, community schemes incorporating water storage are an effective form of adaptation to climate change.

Flood Risk Management Review

Led by MfE, this looks at ways of reducing the impacts of flood events on communities and rural areas, including how land management practices and climate change affect risk levels. Catchment management, including afforestation, and design of infrastructure that take projected climate changes into account, will reduce the impacts of adverse climate events on the land.

Review of the National Civil Defence Emergency Management Strategy, Plan and Guide

Led by the Department of Internal Affairs (DIA), this programme will improve the response capability of communities to adverse rainfall events, which are projected to increase in frequency and intensity over much of New Zealand.

Review of the New Zealand Coastal Policy Statement

Led by the Department of Conservation (DoC). Climate change is expected to have impacts in coastal areas and, in particular, on settlements and infrastructure. Sea-level rise, increased intensity of storms, and changes in sediment supply to coastlines are all expected to modify coastal hazards in many areas around New Zealand.

Sustainable Land Management Programme

Led by MAF, this programme is examining the role of the Government in supporting local government initiatives to address erosion risk, flood risk reduction and the resilience of farming systems in at-risk catchments.

Sustainable Farming Fund

Led by MAF, this funds a large proportion of projects which support adaptation of farming systems eg. water feasibility studies, irrigation efficiency, dry land management, drought tolerant species and new forestry species.

Biosecurity policy and operations

Led by MAF through Biosecurity NZ, this policy prevents the importation of unwanted pests and diseases, and controls, manages or eradicates them should they get past the border.

East Coast Forestry Project

Led by MAF, this project provides financial assistance for establishing forests on the most erosion-prone land in the East Coast of the North Island, to offset the additional costs and risks associated with afforestation on fragile land.

Annex 2: Private sector initiatives relevant to the *Plan of Action*

The Government welcomes the efforts of primary production sector groups to prepare policies and strategies that improve productivity while being environmentally sustainable. These will complement the *Plan of Action*, and offer ways to implement climate change policies in partnership with the sectors. Some key sector policies and strategies include:

Strategic Framework for New Zealand's Future Dairy Farming and Industry 2005-15

Sets targets to ensure that New Zealand dairy farming achieves a world leadership position in pastoral agricultural environmental sustainability.

Dairying and Clean Streams Accord

Operates between Fonterra Cooperative Group, regional councils, MfE and MAF to reduce the impact of dairying on the quality of New Zealand streams, rivers, lakes, groundwater and wetlands.

Dairy Industry Strategy for Sustainable Environmental Management

Establishes the importance of environmental issues and action within the industry.

Dairy Industry Strategy for Feed Production

Designed to increase production of feed within environmental constraints, and enable the management of climatic impacts on feed supply.

Dairy Industry Strategy for Farm Systems Research and Adoption

Intended to enable the rapid and effective adoption of ideas, skills and technologies on-farm to improve productivity and sustainability.

Pastoral Greenhouse Gas Research Consortium - The New Zealand Pastoral Greenhouse Gas Research Strategy

Designed to develop safe, cost-effective greenhouse gas abatement technologies to reduce livestock methane and nitrous oxide emissions by at least 20 percent by 2012. It aims to improve production efficiencies, develop on-farm technologies, and exploit commercial opportunities in global markets from the science and technologies that emerge from the programme.

Meat and Wool Industry Strategy - Growing the Future

Operates by lifting farm performance through research on greenhouse gases and the environment that affect the sector.

The Forest Industry Strategy

Currently under development, this strategy aims to lift the economic and environmental performance of the sector.

The Forest Industry Development Agenda

A Government-industry partnership aimed at the development of the sector. It includes initiatives on bioenergy, market development, excellence in wood design, encouraging the use of wood in commercial buildings, and market access.

Deer Industry

The deer industry has a strategy under development.

Annex 3: Permanent Forest Sink Initiative

The Permanent Forest Sink Initiative (PFSI) allows landowners to get the economic value of removing carbon dioxide from the atmosphere and storing it in the form of new forests.

The PFSI is a new business opportunity through which landowners can generate income by carbon farming. Because carbon farming does not necessarily require roads to be built or trees to be harvested, it is particularly well suited to isolated and highly erosion-prone land.

Kyoto-compliant exotic forests established after 17 October 2002 (the date the policy was first announced) and Kyoto-compliant indigenous forests established from 31 December 1989 would be eligible to enter the PFSI. Mature indigenous forest is not covered by the PFSI.

Key features of the PFSI:

- Landowners who meet the requirements will receive tradeable Kyoto Protocol compliant emission units
- Landowners will have to meet all costs associated with generating emission units and agree to 'replace' any units should there be a decrease in the carbon stored in the forest
- These rights and obligations will be formalised in a contract between landowners and the Crown. These contracts will be registered against land titles and will bind all future landowners
- Participants in the PFSI will be eligible for East Coast Forestry Project grants on target land on the East Coast
- To qualify for emission units, the new forest must be "direct human induced … through planting, seeding and/or the human-induced promotion of natural seed sources"
- Timber will be able to be removed on a continuous canopy basis
- Landowners who deliberately breach the harvesting restrictions (that is, harvesting outside the allowable limits) will be required to 'replace' emission units for the carbon dioxide released, plus make a penalty payment
- Should the Kyoto Protocol no longer allow emission units to be generated from these forests, then the harvesting restrictions will be removed. However, to the extent that carbon dioxide emission liabilities remain in respect of units already claimed, these liabilities will need to be met by landowners if the carbon dioxide is released into the atmosphere at some future point
- The PFSI is administered by MAF's Indigenous Forestry Unit.

Annex 4: Global warming and climate change

The temperature of Earth's surface has risen over the past 100 years. A small part of this increase has probably been caused by natural climate variations but there is strong evidence that most of the warming over the past 50 years is a result of greenhouse gas emissions caused by human activity.

Greenhouse gases got their name because they act like the outside covering of a greenhouse, letting the sun's warmth through to heat the ground, but preventing it from escaping back into space. Greenhouse gases absorb heat radiated or reflected from the ground, increasing the temperature of the atmosphere. Greenhouse gases that naturally occur in the atmosphere make life on earth possible. Without them, too much heat would escape, and the surface of the planet would freeze. However, in too high a concentration, they would hold in excessive heat and the planet's climate would become more and more unstable.

Climate models predict that greenhouse gas emissions will continue to increase atmospheric temperatures. The rise projected for the next 100 years is likely to be more rapid than any natural variations over the past 10,000 years. Because rising temperatures cause changes (often drastic) in the climate, the effect of global warming is often referred to by the more general term, 'climate change'.

The effects of climate change

The effects of climate change are already measurable – the world's temperatures and sea levels are rising, and most glaciers are retreating. Changes in regional rainfall patterns have already been observed and are expected to alter more strongly as climate change continues. The frequency of some extreme weather and climate events such as heatwaves, droughts and floods is also expected to increase. These changes are likely to influence native ecosystems, agriculture, coastlines, and our economy, infrastructure, health and security. For example, changing weather patterns could cause increases in the number of refugees seeking international support, as repeated droughts and floods drive people from their traditional homes.

Not all impacts will necessarily be negative and the severity of impacts will vary across the globe. But it is almost certain that, overall, more people will be harmed by climate change than will benefit from the changes. Adverse impacts will become ever more predominant, and beneficial effects are expected to diminish because of larger cumulative emissions of greenhouse gases and associated changes in Earth's climate. Because of the long life-time of some greenhouse gases in the atmosphere, there will be time lags of decades to centuries between reductions in emissions and a corresponding halt to temperature increases.

As temperatures rise, insects and organisms that are not usually found in New Zealand because they prefer warmer climates, could become established.

Evidence for climate change

There is now clear evidence that Earth's climate system has demonstrably changed since pre-industrial time, and that most of the warming over the last 50 years has been caused by emissions of greenhouse gases created by humans. The Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) reports that warming is expected to continue, with an increase in globally averaged temperatures of between 1.4 and 5.8° C.

This is two to ten times larger than observed warming in the 20th century. How high the temperatures go, how soon, and whether changes can be reversed, depend on human action. The greater the reduction in greenhouse gas emissions, and the earlier they are made, the smaller and slower the projected warming and rise in sea levels.

What are the greenhouse gases?

The main greenhouse gases are:

- Methane from farm animals and waste
- Carbon dioxide from burning of fossil fuels and from deforestation
- Nitrous oxide from soil
- Synthetic gases like sulphur hexafluoride, perfluorocarbons and hydrofluorocarbons.

The international response to climate change

The international community has recognised that the issue of climate change needs a global response and that it is sensible to start limiting the growth of greenhouse gas emissions now in order to reduce the negative impacts expected from future global warming. Countries have been working through the United Nations to achieve this.

Two important international agreements deal with the threat of global climate change. The United Nations Framework Convention on Climate Change (UNFCCC) was adopted at the Rio Earth Summit in 1992. The Kyoto Protocol, a further agreement negotiated in accordance with the UNFCCC, was finalised in December 1997.

The objective of the UNFCCC is to stabilise greenhouse gas concentrations at a level that avoids dangerous human interference with the climate system. As mentioned earlier, New Zealand is one of 180 countries that signed and ratified the UNFCCC. All developed countries that ratified the UNFCCC agreed to non-binding targets to reduce greenhouse gas emissions to 1990 levels by 2000. Only a few countries made appreciable progress towards achieving those targets.

The UNFCCC was designed so that it could be developed further by countries in response to new scientific evidence that suggested the objectives of the UNFCCC would not be met by voluntary reductions and that legally binding targets were required. They agreed to a further international agreement, the Kyoto Protocol.

The Protocol sets target levels of greenhouse gases for developed countries to achieve during 2008-2012 (the first Kyoto Commitment Period). The Protocol is only the first step in the reduction of greenhouse gases worldwide, and it is expected that further, stricter targets will be set in future commitment periods. New Zealand signed the Protocol in 1998, and has been actively involved negotiating the detailed rules by which it will operate.

To enter into force, the Protocol had to be ratified by at least 55 parties to the UNFCCC, including countries representing at least 55 percent of the developed world's emissions. This happened on 16 February 2005. International negotiations are now underway to agree the framework to address climate change at the end of the first Kyoto Commitment Period.

GLOSSARY

Many of the definitions in this glossary have been sourced from the Intergovernmental Panel on Climate Change at http://www.ipcc.ch/pub/syrgloss.pdf.

Abatement
Processes and technologies leading to the reduction of greenhouse gas emissions.

Adaptation
Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Afforestation
The act or process of establishing a forest on land that has not been forested in recent history.

Afforestation Grant Scheme (AGS)
A scheme proposed by the Government whereby landowners would be invited to tender for grants for the establishment of new post-2007 Kyoto-compliant forests.

Annex I Countries
Group of countries included in Annex I to the United Nations Framework Convention on Climate Change, including all the developed countries in the Organisation for Economic Cooperation and Development, and economies in transition (including Russia and Ukraine).

Annex B Countries/Parties
Group of countries included in Annex B in the Kyoto Protocol that have agreed to a target for their greenhouse gas emissions, including all the Annex I countries except Turkey and Belarus.

Biofuel
A fuel produced from plants, animal products and waste. Biofuels include alcohols, biodiesel, black liquor from the paper manufacturing process, wood and soybean oil.

Carbon credits
A tradeable unit representing the right to emit one tonne of carbon dioxide-equivalent emissions.

Carbon dioxide (CO_2)
A naturally occurring gas, which is also a by-product of burning and breakdown of fossil fuels and biomass, land-use changes and other industrial processes. It is the principal human-induced greenhouse gas that affects the Earth's temperature.

Carbon dioxide equivalent (CO_2e)
The quantity of a given greenhouse gas multiplied by its global warming potential (GWP), which equates its global warming impact relative to carbon dioxide (CO_2). This is the standard unit for comparing the degree of warming which can be caused by emissions of different greenhouse gases.

Climate change
A change in climate, attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and that is additional to natural climate variability observed over comparable time periods.

Co-benefits
The benefits of policies that are beyond the scope of the original policy.

Commitment Period (CP)
A range of years within which Parties to the Kyoto Protocol are required to meet their greenhouse gas emissions target, which is averaged over the years of the commitment period. The first commitment period is 2008-12. The targets are set relative to greenhouse gas emissions in the base year (in New Zealand's case, 1990), multiplied by five.

Deforestation
The direct human-induced conversion of forested land to non-forested land (such as agriculture).

Emissions
The intentional and unintentional release of greenhouse gases into the atmosphere.

Emission unit or **allowance**
A tradeable unit representing the right to emit one tonne of carbon dioxide-equivalent emissions.

Forest
A minimum area of one hectare of land with tree crown cover (or equivalent stocking level) of more than 30 percent, with trees with the potential to reach a minimum height of 5 metres at maturity in situ. A forest may consist either of closed forest formations where trees of various storeys and undergrowth cover a high proportion of the ground or open forest. Young natural stands and all plantations which have yet to reach a crown density of 30 percent or tree height of five metres are included under this definition. So, too, are areas normally forming part of forest that are temporarily unstocked as a result of human interventions, such as harvesting or natural causes, but which are expected to revert to forest.

Fossil fuel
A fuel that is sourced from fossilised biomass, such as oil and gas.

Greenhouse gas (GHG)
Greenhouse gases are constituents of the atmosphere, both natural and human-induced, that absorb and re-emit infrared radiation. Greenhouse gas emissions covered by the emissions limitation commitment for the first commitment period of the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6).

Greenhouse gas intensity / Global Warming Potential (GWP)
This index approximates the time-integrated warming effect of a unit mass of a given greenhouse gas in today's atmosphere, relative to that of carbon dioxide.

Gross domestic product (GDP)
Represents the national income earned by production in a country.

Intergovernmental Panel on Climate Change (IPCC)
Established by the World Meteorological Organisation and the United Nations Environment Programme to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation.

International price of greenhouse gas emissions
The price at which Kyoto units are traded. There are many prices at any given time. For the purposes of this document and the Crown Accounts, this was estimated at $15.92 per tonne of carbon dioxide equivalent as at June 2006.

Inventory
A list of an organisation's or a country's greenhouse gas emissions by sources, removals by sinks, and carbon stocks. An inventory is prepared by each country that has ratified the UNFCCC.

Kyoto Protocol
A protocol to the United Nations Framework Convention on Climate Change that requires ratifying countries listed in its Annex B (industrialised nations) to meet greenhouse gas reduction targets during the period from 2008 to 2012 *(see http://unfccc.int for further information).*

Kyoto forest
Forest that has been established by direct human activity on land that was not forest land as at 31 December 1989.

Kyoto compliant land
Land that was non-forest land as at 31 December 1989.

Land managers
Farmers (including arable, horticultural, and pastoral) and foresters.

Low-emissions technologies
Technologies that lead to reduced emissions of greenhouse gases compared to conventional technologies.

Methane (CH_4)
A hydrocarbon that is a greenhouse gas produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and oil, coal production, and incomplete fossil fuel combustion.

Mitigation
Any action that results, by design, in the reduction of greenhouse gas emissions by sources or removals by sinks.

National Environmental Standard (NES)
Prepared by the Minister for the Environment under s.43 of the Resource Management Act to prescribe limits or methods for environmental matters, including the control of greenhouse gases.

Nitrification inhibitor
Products that reduce the conversion of various forms of nitrogen into nitrate and nitrous oxide.

Nitrous oxide (NO_2)
A powerful greenhouse gas emitted through soil management practices, animal wastes, fertilisers, fossil-fuel combustion and biomass burning.

Offset
Compensating for the effects of activities through other means. Offsetting greenhouse gas emissions could include planting trees, using nitrification inhibitors, or improving the energy efficiency of farm operations.

Permanent Forest Sink Initiative
Allows landowners to get the economic value of removing carbon dioxide from the atmosphere and sequestering (storing) it in the form of new forests. *See Annex 3*

PGGRC
Pastoral Greenhouse Gas Research Consortium.

Post-2012 negotiations
Negotiations already commenced that aim to agree on an international framework for addressing climate change following on from the first Commitment Period of the Kyoto Protocol.

Price-based instruments (measures)
An intervention that encourages or discourages practices by changing the price of, or creating a price for, activities that emit or absorb greenhouse gases.

Revenue recycling
The return to the economy of revenue derived from a policy measure.

RMA
Resource Management Act 1991.

Rumen
A stomach of a ruminant animal.

Ruminant animal
Cloven-hooved mammals, including cows, sheep, deer and goats, that digest their food in two steps.

Sequestration
The uptake and storage of carbon. Carbon can be sequestered (stored) by plants as organic material or by industrial processes such as pumping deep underground.

Sink
Any process, activity or mechanism that removes a greenhouse gas or a precursor of a greenhouse gas from the atmosphere.

Sink credits
A sink credit is a unit derived from a forest sink activity that results in a net removal of greenhouse gases.

Technology transfer
The set of processes that covers the exchange of knowledge and goods among different stakeholders, leading to the dissemination of technology for adapting to or mitigating climate change.

Threshold
Criteria that define which firms, sites, or other business units are required to participate in a policy measure.

Tradeable permit regime
The situation where a government allocates permits to industry members to cover all or some of their current greenhouse gas emissions. Members are liable for emissions above the level of emission permits they hold.

UNFCCC
United Nations Framework Convention on Climate Change, negotiated in 1992. It aims to stabilise greenhouse gas concentrations at levels that avoid dangerous human interference with the climate system.

Voluntary Greenhouse Gas Reporting (VGGR)
A system by which sector participants voluntarily report their emissions to a central registry according to a prescribed and standard format.