



Kyoto Greenhouse Agreement - an action agenda for the farming community

Ian Carruthers

*Australian Greenhouse Office
GPO Box 621, Canberra ACT 2601*

Abstract. Climate change is an issue of major significance for us all. Though the full effects of greenhouse emissions of gases including carbon dioxide, methane and nitrous oxide on the earth's atmosphere are not yet completely understood, we cannot afford to ignore the conclusion of the majority of the scientific community that global warming caused by human activity is occurring. This paper outlines how the Kyoto Protocol deals with issues associated with reducing emissions and increasing carbon storage, through activities such as agriculture and forestry. The issue of emissions trading is also discussed. Finally, the various programs coordinated by the Australian Greenhouse Office to reduce Australia's greenhouse gas emissions are outlined.

Emissions associated with the agricultural sector, excluding land clearing, comprised 20% of Australia's total emissions in 1996. Livestock generated almost 70% of the emissions of the agricultural sector, primarily methane emitted as a by-product of microbial fermentation associated with the digestion of feed, and methane and nitrous oxide emitted through the decomposition of animal wastes. Emissions from land clearing in the same year contributed an estimated 14% to Australia's total emissions.

Vegetation plays an important role in reducing the level of greenhouse gases in the atmosphere, as trees and other plants sequester (absorb) carbon dioxide from the air. Over decades, forests build up an enormous store of carbon in trees, shrubs, soil and fallen leaves, and are considered carbon 'sinks'. Given the very large potential of the world's grasslands, woodlands, rangelands and forests to act as 'sinks' for greenhouse gases, it is recognised that agriculture can play a major role in greenhouse mitigation action. Additionally, relative to other country signatories to the Kyoto Protocol, the agricultural sector represents an important source of greenhouse gas emissions for Australia.

The Kyoto Protocol

The Kyoto Protocol represents a broad measure of international agreement that serious and effective action is required to reduce greenhouse gas emissions. It provides the international framework for countries (primarily developed countries at this point) to undertake and implement commitments to reduce their emissions of greenhouse gases. The objective is to achieve stabilisation of greenhouse gas

concentrations in the atmosphere at a level that will prevent dangerous human-induced interference with the climate system.

The Protocol is significant in that countries have agreed to emissions reduction targets, and will be required to submit national reports to demonstrate compliance against their targets. Many countries, including Australia, have signed the Protocol. To become legally binding the Protocol must be ratified by at least 55 countries, accounting for at least 55 percent of the total 1990 carbon dioxide emissions of developed countries. It is unclear how long this may take.

Australia's target under the Protocol

Australia's commitment under the Kyoto Protocol is to restrict its greenhouse gas emissions to 8 percent above 1990 levels during the first commitment period. In determining Australia's 1990 baseline, Article 3.7 of the Protocol allows for nations to include net emissions from land use change (*i.e.* land clearing) if it can be demonstrated that the combined land use change and forestry sector was a net emitter of greenhouse gas emissions in 1990. That is, if the annual amount of carbon released to the atmosphere from land use change and forestry operations is **more** than the annual amount of carbon taken up by vegetation growth. Using current estimates, Australia's land use change and forestry sector is a net emitter, and therefore Australia is eligible to count land use change in its 1990 baseline.

This mechanism was included in the Kyoto Protocol in recognition that land clearing contributes to a substantial proportion of Australia's total emissions. The trigger mechanism will allow Australia to gain credit for the efforts made to reduce emis-

sions from land clearing.

Once the 1990 baseline has been determined, we can then define Australia's emissions reduction target for the first commitment period, which covers the years 2008-2012. Emissions are effectively averaged over the five years to measure compliance, and it is only carbon sequestered during this period that will count towards meeting Australia's target. For the agricultural sector, during 2008-2012, we will need to count emissions associated with:

- Animal digestion
- Manure management
- Rice cultivation
- Agricultural soils
- Prescribed burning of savannas
- Field burning of agricultural residues, and
- Other practices.

For the land use change and forestry sector (see Table 1 for an understanding of the activities this covers), the Protocol identifies activities that will need to be counted during the commitment period.

Article 3.3 of the Protocol states that, "net changes in greenhouse emissions by sources and removals by sinks resulting from direct human induced land use change and forestry activities, limited to afforestation, reforestation and deforestation since 1990, . . . shall be used to meet the commitments (*under the Protocol*)". That is, emissions associated with land clearing, and carbon sequestered through vegetation growth, will need to be counted during the commitment period 2008-2012. While Table 2 provides some indication of how the terms 'afforestation', 'reforestation' and 'deforestation' are defined, these definitions have not been agreed to internationally, and themselves will require some definition - for example how long is "historically"?

The Protocol also includes provision (under Article 3.4) for the negotiation of additional, "human induced activities related to changes in greenhouse gas emissions by sources and removals by sinks in the agricultural soils and the land use change and forestry categories", that would count towards meeting emissions reductions targets. These negotiations are yet to take place, but the types of activities to be negotiated could include pastoral practices, forest management practices, activities to build up soil carbon, and soil conservation.

There is significant interest in what activities will be allowed under the Protocol, as it is seen as a potential indicator of the types of carbon credit activities that could be allowed in any emissions trading regime. At present however, there are still many uncertainties surrounding the exact activities that will or will not count in the land use change and forestry area. It is expected that many issues will be negotiated over the next few years to clarify this.

Emissions trading

The Kyoto Protocol includes an agreement to establish an international system (among developed countries) for emissions trading. Carbon sinks such as tree planting could be incorporated into an emissions trading system, for example by issuing credits to tree planters relative to the amount of carbon sequestered in vegetation. A high level of interest has been expressed by landholders and industry in the potential role that carbon credits may play in any emissions trading regime, and some trading of carbon rights has already occurred.

The Australian Government has not made a decision on the establishment of a national emissions trading system, and the potential incorporation of carbon credits in such a system. There is, consequently, no official system currently in place that provides carbon credits to owners of forest plantations which could potentially be sold or banked in an emissions trading system.

The Australian Greenhouse Office is releasing a

Table 1. Description of land use change and forestry activities^A contributing to emission and removals of greenhouse gases.

Activity	Sources	Sinks
Forestry	CO ₂ released from commercial harvesting. CO ₂ released from fuel wood consumption.	CO ₂ removed by incremental growth of managed forests and plantations.
Land use change	CO ₂ released from loss of carbon from above ground biomass. CO ₂ released from on-site and off-site burning of above ground biomass. CO ₂ released from decay of above ground biomass. CO ₂ released from soil disturbance (including decay of roots). Non-CO ₂ release from on-site burning of forests (including prescribed burning and wildfires).	CO ₂ sequestered in post-burning regrowth.
Pasture improvement and minimum tillage	CO ₂ removal as a result of particular land management regimes.	

^A 'Land use change and forestry' is an overarching title used internationally for sources (emissions) and sinks (removals).

Table 2. Definition of terms associated with land use change and forestry activities.

Term	Definition	Comment
Afforestation	"planting of new forests on land which historically has not been covered by forest"	
Reforestation	"planting of forests on land which historically has contained forest but which has been used for another purpose since last being covered by forest"	In negotiating the Kyoto Protocol there was an intention to avoid creating "perverse incentives". So that whatever definition of reforestation is accepted, it will not encourage clearing of land now to benefit from future regrowth in the commitment period.
Deforestation	"conversion of land from forests or grasslands to pasture, crop land or other managed uses" (ie. land use change).	It should not be confused with harvesting in commercial forests where there is no land use change.

series of four discussion papers on emissions trading over this year, the third of which will discuss the concept of carbon credits. The first of these discussion papers has been released and is available on the AGO's homepage (<http://www.greenhouse.gov.au/>). Others will be placed on the homepage as they are released. The Australian Greenhouse Office expects to provide advice to government on a domestic emissions trading scheme by the end of 1999.

Reducing Australia's greenhouse gas emissions

The formation of the Australian Greenhouse Office was announced by the Prime Minister in late 1997, and the Office was established in April 1998. The AGO is the lead Commonwealth agency on greenhouse matters, coordinating climate change policy and delivering greenhouse response programs. In practical terms, it means that the AGO will oversight and monitor Australia's effort to reduce emissions and play a key role in assisting Australia to meet its Kyoto target.

Australia's domestic action to reduce its greenhouse gas emissions is focussed through the National Greenhouse Strategy. The Strategy was released in November last year and directs action across all sectors. The National Greenhouse Strategy outlines Commonwealth support for revegetation, protection of existing vegetation, and promotion of sustainable land management practices. These are primarily focussed through the Natural Heritage Trust and are delivered through the Bushcare, Farm Forestry, and Landcare programs. Other activities address forest sustainability, sustainable management of private forests, forest products as a carbon store, and agricultural management practices.

There is compatibility between sustainable land management practices such as minimum tillage/stubble retention, improved pasture, rangelands vegetation improvement, soil conservation works, and positive outcomes from a greenhouse perspective. Many of the activities that will be encouraged

under the National Greenhouse Strategy, relevant to the agricultural sector, are expected to focus on the opportunities for reducing emissions through sustainable land management practices, as well as the potential for the agricultural sector to participate in any emissions trading regime through establishing sinks. Also of importance will be communicating information on greenhouse issues to the agricultural sector.

Bush for Greenhouse (BFG), a new Commonwealth program referred to in the National Greenhouse Strategy, will in part provide information on how well vegetation sequesters carbon. The Bush for Greenhouse program aims to increase corporate investment into environmental plantings, *i.e.* revegetation activities that would be consistent with the Bushcare objectives. It is expected that the program will offer another avenue for funding revegetation activities. Bush for Greenhouse will offer industry the potential to gain recognition for carbon sequestered through revegetation as an offset to their emissions under the Greenhouse Challenge program.

The Greenhouse Challenge program is a voluntary program in which participating companies are required to compile an inventory of all sources and sinks of greenhouse gases within their company boundaries. At present, a company can only claim greenhouse gas offsets if it owns the land and vegetation growing on it (*i.e.* forestry operations). The Bush for Greenhouse program will allow companies who invest in revegetation activities (and may not necessarily own the land) to be able to access offsets.

It is expected that an investment facilitator will be contracted by the Commonwealth to facilitate investment by the corporate sector into revegetation activities and negotiate agreements. Bush for Greenhouse will also invest in research to help develop and refine the tools and methodologies required to estimate carbon sequestration from the revegetation. Any tools and methodologies developed under Bush for Greenhouse will become public resources.

The Australian Greenhouse Office is also estab-

lishing a National Carbon Accounting System to provide better methods and data for measurement of emissions and sinks from land based activities.

Conclusions

Australia has made a commitment to reduce its greenhouse gas emissions. How we achieve this will require changes for industry, governments at all levels and the community at large. It will require careful consideration of the best, most effective, and most economic means of reducing Australia's contribution to the greenhouse problem. Since agriculture and associated activities are important contributors to Australia's greenhouse gas emissions, it

is important that landholders be aware of activities that both contribute to or reduce emissions.

There are still many decisions to be made at the international and domestic levels with respect to land use and forestry issues. The uptake or sequestration of carbon dioxide by trees and vegetation offers significant potential to reduce the level of greenhouse gas emissions, and could play an important role in meeting the emissions target established for Australia under the Kyoto Protocol. However, before emissions trading becomes a reality, numerous technical issues concerning measurement, monitoring and verification of emissions and enforcement of trading rules must be resolved.
