Climate Policy
Submission to Senate Select Committee Inquiry

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April 2009

This submission focuses primarily on terms of reference (b), (c) and (e). It is not confidential.

Recommendations

Greenhouse accounts

1. Australia's biocarbon accounts should be upgraded urgently to improve their comprehensiveness, transparency and reliability.

2. Australia should adopt 'full carbon accounting', covering all sinks and sources, as the basis for domestic action and advocate its adoption globally for post-Kyoto commitments.

Green carbon

Native forest logging and clearing causes about 20% of Australia's emissions and should receive commensurate policy attention and funding.

3. Protection of remaining relatively intact native forests and other natural ecosystems is essential for climate protection and should be enshrined in a new legislative framework.

4. Restoration of degraded forests and natural ecosystems has the potential to sequester large additional amounts of carbon permanently and should be a central element in responding to climate change.

5. Australia should establish a *REDD Plus* fund to support management and restoration of native forests and natural ecosystems, and their green carbon stores, and to encourage increased agricultural soil carbon (production carbon). (REDD is the global move to 'Reduce Emissions from Deforestation and Degradation'.)

Employment benefits

6. Evidence that *biodiversity and landscape protection* is an important source of employment should be confirmed, and needs for research, training, information and institutional support identified.

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Submission

1. Context and definitions

Scientific evidence demands a dramatic global reduction in atmospheric greenhouse gas concentrations to return towards the levels prevailing before the industrial revolution. Human activities cause greenhouse gas emissions from two primary sources – fossil carbon stocks (carbon stored in deposits of coal, oil and gas, and in calcium carbonate used for cement) and biocarbon stocks (carbon stored in the landscape, both soils and vegetation). About 75% of the post-industrial increase in atmospheric carbon dioxide concentrations is from burning fossil fuels and cement production, and about 25%% from land clearing and degradation.[2]

Australia, as a developed country and the world's highest per capita greenhouse gas emitter, has the capacity and responsibility to make major cuts. These should be enshrined in legislation as minimum targets to be achieved by 2020 and 2050, at levels consistent with the best available science.

In Australia, the primary policy objective should be to cut emissions (not net emissions) of greenhouse gases. The second objective should be to maintain and increase biocarbon storage in storage in the landscape, consistent with meeting other objectives for land use and management, including water.

In this submission, different groups of emission sources and sinks are distinguished, and the following terminology is used.

Fossil carbon. Carbon stored in coal, oil and gas deposits, and calcium carbonate.

Biocarbon. Carbon stored in the terrestrial landscape, in soil and vegetation. This, in turn, is differentiated into

- *green carbon*: carbon in natural, self-regenerating ecosystems, capable of being stored permanently if managed appropriately;
- *production carbon*: carbon in agricultural systems (including plantations) where food or fibre production is the dominant management objective.

A key difference between fossil carbon and biocarbon is that fossil carbon produces only emissions; biocarbon may be both emitted and sequestered.[3] It is important to distinguish between 'emissions' and 'net emissions' where annual emissions and uptake are combined.

2. Australia's greenhouse gas accounts

Comprehensive, transparent reliable greenhouse accounts are essential for forming and managing climate policy. Australia's accounts for land-based sectors are not yet fully consistent with IPCC (Intergovernmental Panel on Climate Change) recommendations and have other deficiencies that hamper analysis.

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[2] IPCC 4th assessment report, Working Group 1, Ch. 2

[3] Generally I adopt the term 'uptake' for greenhouse gas sequestration, often also termed 'removal'.

2.1 The accounting system

Australia produces two sets of greenhouse accounts[4] – a relatively comprehensive UNFCCC inventory and the partial Kyoto accounts covering only those sectors in the Kyoto Protocol. Even the UNFCCC accounts are incomplete: for example, they do not include soil carbon emissions from native forests; uptake by native forests managed for conservation or cultural purposes; emissions or uptake from non-forest native vegetation; soil carbon changes on agricultural land. In addition, the quality of the data in sections of Australia's accounts is seriously deficient, especially those relating to native forests.

From a climate perspective, the more comprehensive the greenhouse accounting, the less the risk of mis-directed policy. Australia is capable of producing much more comprehensive and reliable greenhouse accounts than it currently publishes or than might be adopted globally, and there is no institutional barrier to doing so. Providing the methodology is compatible with IPCC recommendations, more comprehensive Australian accounts can be aligned at the reporting stage, exactly as the Kyoto and UNFCCC accounts are now. This would in any case be required if the CPRS were to be implemented, because it covers fewer sectors than the Kyoto accounts.

Public understanding would be helped by clearer explanation of methodologies and more opportunities for public involvement. For example, it is not widely understood that the 'agriculture' and 'forestry' greenhouse sectors do not align with the 'agriculture' and 'forestry' industry sectors.

Australia's biocarbon accounts should be upgraded urgently to improve their comprehensiveness, transparency and reliability.

Australia should adopt 'full carbon accounting', covering all sinks and sources, as the basis for domestic action and advocate its adoption globally for post-Kyoto commitments.

2.2 Reformatted for policy coherence

By re-formatting Australia's UNFCCC accounts to differentiate fossil carbon from biocarbon, green carbon from production carbon, and emissions from uptake, the implications of proposed policies can more readily be analysed (see table[5]).

In broad terms, Australia's major emission sources in 2006 (as reported) were:

- Fossil carbon from energy provision and industrial processes: 429 Mt CO2-e (68%)
- Green carbon, primarily from native forest clearing and logging: 94 Mt CO2-e (15%)
- Production carbon mainly from animal husbandry and waste: 111 Mt CO2-e (18%)

Green carbon emissions are under-estimated, probably significantly. Their relative contribution to Australia's emissions is likely to be closer to 20% and may be higher.

The major sources of sequestration in 2006 (as reported) were:

[4] These are annual accounts of greenhouse gas emissions and uptake, equivalent to a cash flow account. An account of carbon stocks is not produced.

[5] See also *Working Paper 4. Australia's national greenhouse accounts re-arranged for policy relevance.* http://www.greeninstitute.com.au/content/index.php?/site/projects/forests_and_greenhouse/

- Green carbon uptake by previously logged native forests: -57 Mt CO2-e
- Production carbon uptake by post-1990 plantations: -23 Mt CO2-e
- Increase in the quantity of carbon stored in wood products: -4 Mt CO2-e

The amount of green carbon actually absorbed annually by previously logged native forests is unknown but likely to be large. The reported figure (–57 Mt CO2-e) has been held constant since 1990 and is not based on empirical evidence. Furthermore, in the standard accounts, annual emissions from native forest logging are netted off against regrowth from all earlier logging, giving the misleading impression that logging is a greenhouse-positive activity. In reality, native forest regrowth 'offsets' are an unrecognised carbon subsidy to current logging.

Uptake by post-1990 plantations (-23 Mt CO2-e in 2006) comes primarily from the 800 000 ha of plantations established under tax-subsidised MIS schemes. Once they start being logged, this level of sequestration will only be maintained by continuing to expand the area of new plantations.[6]

Carbon storage in wood products is relatively small (-4 Mt CO2-e per annum) but would be significant if wood growers were allowed to offset it against their logging emissions as Australia is proposing.

Analysis of Australia's current emissions shows that:

- fossil carbon emissions are the dominant problem (60-70%) but biocarbon is a significant contributor;
- protecting green carbon by ending native forest logging and clearing can save around 20% of Australia's greenhouse gas emissions (far exceeding uptake by new plantations);
- regrowth of previously logged and degraded native forests is likely to sequester large (tens of megatonnes), but as yet unknown, quantities of carbon dioxide annually (also far exceeding uptake by new plantations).

2.3 2020 Projections

The government has published emission projections for 2020[7] but only the Kyoto account projections contain enough information to analyse.[8] Net Kyoto emissions in 2020 are projected to be 663 Mt CO2-e.

Kyoto plantations are projected to sequester –21 Mt CO2-e (which implies either continued rapid expansion in the area planted or substantially deferred logging).

Native forest clearing contributes 44 Mt CO2-e and would, if ended, reduce Australia's projected 2020 Kyoto emissions by at least 7%.[9]

[6] It appears that uptake by new 'Kyoto' native forests, as distinct from 'Kyoto' plantations, is not included in the 2006 accounts.
[7] http://www.climatechange.gov.au/projections/index.html
[8] The 'Forestry' data looks inconsistent as well as assuming constant native forest uptake of 57.3 Mt CO2 per annum through to 2020.
[9] It is probable that this figure understates clearaing emissions by netting out uptake by vegetation regrowing on land cleared since 1990 against emissions from clearing land that was forested in 1990.

3. Biocarbon, climate and jobs

The necessary reductions in global greenhouse emissions cannot be achieved by tackling fossil fuels alone. This is recognised in relation to tropical rainforests through the REDD (Reducing Emissions from Deforestation and Degradation) negotiations but applies equally to forests and other natural ecosystems in temperate and developed countries such as Australia. Both fossil and biocarbon emissions have to be tackled and reductions in biocarbon emissions, or increases in biocarbon storage should not be conceptualised as 'offsets' against fossil carbon emissions.

Biocarbon emissions may be up to 40% of Australia's emissions (not net emissions) and require commensurate policy attention, resources and funding.

3.1 Green carbon

Maintaining natural ecosystems (including their genetic and species diversity) is essential to meet the ultimate objective of the UNFCCC because of their role in the global carbon cycle and because of the wide range of ecosystem services they provide that are essential for human well-being.[10]

Green carbon – in biodiverse self-regenerating natural ecosystems – has a crucial role because it is an ecologically permanent carbon store under most circumstances. Native forests store the highest quantities of carbon per hectare, reaching extraordinary densities in the old-growth eucalypt forests of Victoria and Tasmania.[11] International research shows that forests can continue accumulating carbon for up to 800 years. Recent Australian reports dated logged trees in East Gippsland at 500-600 years old.

Options for storing carbon in the landscape are limited by the availability of land, water and time. If existing green carbon stores are cleared or logged, it will take decades or centuries to recover the lost carbon, depending on the age of the vegetation destroyed. To recover the carbon more quickly, by replanting a larger area, would mean competing with food production for land and water.

Climate change requires a paradigm shift in thinking about biodiversity and natural ecosystems. In a developed country like Australia, the presumption should be that all native vegetation will be conserved, recognising its critical importance as a permanent carbon store, as well as its role in protecting biodiversity, water and other values. This is the opposite of the Environment Protection and Biodiversity Conservation Act approach which assumes implicitly that continued loss and degradation of natural ecosystems is acceptable provided listed threatened species and communities are protected.

The climate objective should be to protect natural ecosystems in perpetuity, both ecologically, through appropriate management, and legally, through appropriate land tenure, zoning, covenants or equivalent.

Protection of remaining relatively intact native forests and other natural ecosystems is essential for climate protection and should be enshrined in a new legislative framework.

[10] http://www.cbd.int/doc/meetings/cc/ahteg-bdcc-01/other/ahteg-bdcc-01-findings-en.pdf
[11] Mackey, B et al, 2008, *Green carbon. The role of natural forests in carbon storage.* ANU E Press. epress.anu.edu.au

Restoration of degraded native forests and natural ecosystems has the potential to sequester large additional amounts of carbon permanently and should be a central element in responding to climate change.

3.2 Production carbon

Although carbon fluxes on agricultural land are not currently reported in Australia's greenhouse accounts, they are likely to be significant given the huge land areas involved. In particular, increased uptake from adopting carbon-conserving methods of agriculture should be strongly encouraged.

Biochar, biofuel and biomass feedstocks are another matter. The fundamental physical limitation on the rate at which plants can convert solar energy to a useable form is the efficiency of photosynthesis. Solar cells are 30—100 times more efficient (taking into account that plants produce chemical energy and solar cells directly useable electricity).

Only in limited circumstances will it be greenhouse positive to obtain energy from plants, whether for conversion to liquid fuels, or to burn for electricity generation or heat.

The circumstances in which it is greenhouse positive to convert an existing carbon store -- plants and the ecosystem of which they are part -- into another form of stored carbon -- charcoal or biochar -- are even more limited.

Biofuel, biomass feedstocks and biochar will rarely be carbon neutral as assumed by the CPRS and their treatment under emissions trading should reflect actual not presumed emissions.[12] MRET (Mandatory Renewable Energy Target) should exclude native forest wood.

Agricultural techniques that conserve and increase soil carbon should be strongly encouraged.

Proponents of biofuel, biomass feedstocks and biochar should be required to demonstrate their greenhouse balance on a full life cycle analysis and have their emissions rated accordingly.

Native forest biomass is not 'renewable' and should be excluded from the Mandatory Renewable Energy Target.

3.3 Finance and employment

3.3.1 A *REDD Plus* fund

Emissions trading is not the preferred policy mechanism for permanently reducing biocarbon emissions and enhancing uptake.[13] The quickest and most effective way to reduce Australia's green carbon emissions is through regulating native forest clearing and logging, accompanied

[12] The CPRS does not appear to consider biomass feedstocks other than as an energy source. Biomass is a major input to pulp and paper production and increasingly to other industrial processes.

[13] For example, see: Kea3, 2009, *REDD and the effort to limit global warming to 2°C: Implications for including REDD credits in the international carbon market*, 2009, Report for Greenpeace International. There are also measurement issues and more fundamentally the fact that, because trading is linked to carbon fluxes, it does not provide a permanent income stream to look after native vegetation and protect green carbon stores.

by a transition fund for affected workers and industries. For the long term, a *REDD Plus* fund should be established to pay for green carbon management and enhancement, and to encourage increased agricultural soil carbon.

- Sources of income could include existing government land management programs; setting aside a tranche of funds from the emissions trading system either directly or by adjusting the target to create a space for industry to buy credits from the government which then go into the fund; taxing currently untaxed emissions such as aircraft fuel (which could link into an international scheme); voluntary contributions from industry and private donors.
- Funds should be allocated by a government-auspiced expert body primarily on the basis of the management needs of the ecosystem. This avoids having to measure carbon densities or fluxes frequently or precisely, and limits the potential for perverse outcomes such as ecosystems being managed to maximise short-term carbon uptake or storage rather than for resilience and permanence;
- Programs to expand green carbon should give priority to revegetation that enhances the resilience and permanence of existing stores (such as by improving connectivity), or in specific circumstances to cultural and amenity planting;
- Major funding should be allocated to research and development, ecological, economic and social.

A *REDD Plus* fund should be established to support management and restoration of native forests and natural ecosystems, and their green carbon stores; and to encourage increased agricultural soil carbon.

3.3.2 Employment benefits

Data is scarce but there is enough to show that *biodiversity and landscape protection* is already an important source of employment.[14] Research in 2001 reported expenditure in 1996-7 of $1.3 billion in this category, representing 18% of total expenditure on 'environment protection services'.[15] Total 'environment protection' employment was estimated at around 127 000 at the same time – assuming proportionality, *biodiversity and landscape protection* would then have employed about 23 000 people nationally.

In the 12 years since, biodiversity and landscape work has grown through non-government conservation organisations such as Bush Heritage, Trust for Nature, Greening Australia and many others; on-farm work by landholders; on-country work by Indigenous people; government programs such as the National Heritage Trust, Caring for our Country; and many more at state and local level. Very recently, companies have established around the voluntary green carbon market.

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[14] *Biodiversity and landscape protection* is defined as programs that focus on the preservation of natural species and landscape, programs to re-establish native species back into the environment, the construction of barriers to halt damage from development entering areas specified as having a value for biodiversity, and clean up and establishment of catchment zones for water bodies. From Houghton J and Jolley A, 2001, *National Capability Statement on Australia's Environment Industry*. Prepared for Environment Australia by the Centre for Strategic Economic Studies, Victoria University.

[15] Ibid

Extrapolating from the 1997 figures, using an annual growth rate of 3.5%,[16] current employment in *biodiversity and landscape conservation* may be around 35 000 people.[17]

The 2006 census identified 13 000 people working as 'environmental scientists', whose role is to manage and protect the environment, flora, fauna and other natural resources; their qualifications and skills are commensurate with a bachelor degree or higher. Each of these would be supported by several people classified in other occupations. This supports the presumption that total employment in *biodiversity and landscape protection* may be around 35,000.[18]

Biodiversity and landscape proection is particularly important in rural, regional and remote Australia. As an indication, 45% of the environmental scientists in the 2006 census were located outside capital cities. It also has strong linkages with industries such as tourism, agriculture and water management. An updated analysis is needed to confirm its scale and identify needs for research, training, information and institutional support.

Investment through the *REDD* Plus fund proposed in the previous section has the potential to expand income and employment permanently, especially in regional and remote Australia.

Evidence that *biodiversity and landscape protection* is an important source of employment should be confirmed, and needs for research, training, information and institutional support identified.

[16] The 2001 *Environment Industry Action* Agenda projected growth of 3.5% per annum in environment industries. www.innovation.gov.au/Section/Industry/Documents/Environment_Industry_AA_%20Report

[17] Expenditure on *biodiversity and landscape protection* is much more employment-intensive than the economy at large.

[18] For comparison, the ABS estimated mining industry employment in June 2007 to be 117,500

Australia's 2006 UNFCCC greenhouse accounts by industry sector. Mt CO2-e. Emissions are highlighted in pink.
Sectors in italics are normally reported in the 'land use, land-use change and forestry' UNFCCC sector (net emissions 14 Mt CO2-e)

Activity (industry sector)	Fossil carbon	Biocarbon			
		Green carbon		Production carbon	
	Emission	Emission	Uptake	Emission	Uptake
Energy/industrial processes	429				
Agriculture (non CO2)				90	
Native forest clearing		63			
Croplands and non-native grasslands (CO2)				n.r.	n.r.
Other (agricultural lime)				2	
Forestry					
Native forests available for logging		31	-57		
Pre-1990 plantations				2	
Post-1990 plantations					-23
Other (wood products)					-4
Native forests not available for logging		n.r.	n.r.		
Non-forest native vegetation, grazing land		n.r.	n.r.	n.r.	n.r.
Waste				17	
TOTAL 2006 (550 net)	**429**	**94**	**-57**	**111**	**-27**
TOTAL 1990 (516 net)	310	172	-57	107	-15

n.r. = not reported