SUBMISSION

Garnaut Climate Change Review: Land use – Agriculture and Forestry

Please find enclosed submission to Issues Paper 1.

Yours Faithfully

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Protection of Forests as Carbon Sinks and Carbon Banks, and their Inclusion in a Future Emissions Trading Scheme

Executive Summary

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Recommendation 12
The 'polluter pays' principle must be carefully monitored to avoid industry rorting of an Australian ETS.
Terms

This submission has focussed entirely on the native forest logging sector of the forestry industry, and the greenhouse gas (GHG) emissions and climate change impacts of current logging and burning regimes.

Introduction

The atmosphere is estimated to contain approximately 760 billion tonnes of carbon, while the world’s forests contain approximately 1,146 billion tones of carbon. Climate stabilization cannot be achieved this century without forests. Australia, like any country, but especially as a developing country, must be at the forefront.

Under Article 3.3 of the 1997 Kyoto Protocol to the 1992 United Nations Framework Convention on Climate Change, vegetation is contemplated as the primary 'sink' mechanism for the biological sequestering of carbon. This, in combination with the abatement mechanisms (for reduction of carbon actually introduced into the atmosphere) are the principal ways in which the Kyoto Protocol attempts to reduce the build-up of greenhouse gas in the atmosphere.

Forestry has great potential in reducing greenhouse gas (GHG) emissions and thus mitigating the effects of (dangerous) climate change, especially as forests are recognised as the largest terrestrial carbon sinks. Aggressive adoption of forest management options that conserve and sequester carbon are not only necessary for sustainable development but also for preventing forests from becoming a significant net source of carbon dioxide into the atmosphere in the future and contributing to climate change.

If we as a planet lose our forests, we lose the fight against climate change.

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3 http://www.gasandoil.com/ogel/samples/freearticles/practitioner_01.htm
5 Brown, S., “Forests and Climate Change and the Role of Forests as Carbon Sinks”, US Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Western Ecology Division, Corvallis, USA, p.125
6 *The Forests Now Declaration: Forests Now in the Fight Against Climate Change*
SCIENTIFIC RECOMMENDATIONS

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Clearfell Logging

“In Australian wet schlerophyll forests and mixed forests, logging is generally by clearfelling followed by a high intensity burn.” During a clearfell logging operation all the trees and the understorey vegetation in a forested area are cut down, knocked over or bulldozed using heavy machinery (Picture 1). The commercially valuable trees that are logged in Australian temperate montane forests are overwhelmingly: Mountain Ash (Eucalyptus regnans), Alpine Ash (Eucalyptus delegatensis) and Shining Gum (Eucalyptus nitens). However, many other plant species, including rainforest species, are affected in this process.

Picture 1
Clearfell logging on Mount Baw Baw, Victoria. The car gives an idea of the scale of such an operation.

Bulldozers or excavators with a chainsaw head attachment cut the trees down leaving only the stumps in the ground. (Smaller trees and shrubs that grow in the understorey are also bulldozed. A Tasmanian study undertaken by the group “Timber Workers for Forests” found that on average only 26 percent of the trees that are logged are taken from site and sold. The remaining 74 of logged trees on the forest floor as debris. This regime results in a “severe form of soil disturbance” as a result of subsequent trafficking by heavy logging machinery.” This method of dragging the logs results in the formation of

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8 Other species that are also logged are *Eucalyptus obliqua* (Messmate) and Mountain Grey Gum (*Eucalyptus cypellocarpa*).
9 Such species include Myrtle Beech (*Nothofagus cunninghamii*), Sassafras (*Atherosperma moschatum*) and Soft Tree Ferns (*Dicksonia antarctica*).
11 ibid.
large depressions and ‘tracks’ of up to 30 centimeters in the soil, which are visible from satellite images. Such effects on the soil have been reported to persist for between 30 to 40 years after logging has ceased.\(^\text{12}\) High soil disturbance from logging machinery has been identified as being a major cause of carbon emissions from the forestry sector.

The logs that are selected for sale purposes are transported by large trucks with semi-trailers from the log landing to the mill site where upwards of 80% end up as woodchips for domestic or export paper consumption.

**Slash burning**
The forest area is then subject to a high intensity fire, also known as a ‘slash burn’. During slash burning, the remaining tree stumps, logs, debris and slash piles are ignited using napalm based incendiaries. The centre of the burn can reach up to 1000°C. This method of burning causes a convection current, emitting large amounts of greenhouses gases (GHGs) and particulate pollution into the upper atmosphere. (Picture 2) Destruction of forest biomass by burning releases carbon dioxide (CO\(_2\)) as well as other GHGs.\(^\text{13}\) These GHGs are by-products of incomplete combustion and continue being emitted long after slash burning has taken place. In emissions from slash burning in montane Messmate (*Eucalyptus obliqua*) forests “58-63% of the total weight of organic material and its carbon content was lost to the atmosphere during burning”.\(^\text{14}\) There is therefore a large amount of slash, logs and debris remaining, which are only partially burnt and continue to slowly decompose emitting carbon into the atmosphere. Further, slash burning of Messmate forests results in carbon emissions of approximately 197 tonnes of carbon per hectare.\(^\text{15}\)

\[\text{Picture 2 - Emissions from regeneration burning in Tasmania}\]

\(^{12}\) Rab, M. A., “Rhabilitation of snig tracks and landing following logging of Eucalyptus regnans forest in the Victorian Central Highlands : a review”, Australian Forest Resources 61, 1998, p.103-113

\(^{13}\) This includes methane (CH\(_4\)), carbon monoxide (CO), nitrous oxide (N\(_2\)O) and oxides of nitrogen (NO\(_x\)) among others harmful pollutants. Brown, S., “Forests and Climate Change and the Role of Forests as Carbon Sinks”, US Environmental Protection Agency, National Health and Environmental Effects Research Laboratory, Western Ecology Division, Corvallis, USA, p.118


\(^{15}\) Ibid. p.281
Carbon Emissions from Clearfell Logging and Slash Burning

In Victoria alone such logging and forest management practices contribute to approximately over 7.5 million tonnes of carbon dioxide into the atmosphere per year. Mature Mountain Ash forests with an undisturbed rainforest understorey have been measured to store between 1230-1500 tonnes of carbon per hectare. However, after successive clearfell logging and slash burning regimes, carbon stocks at stand age of 30-60 years hold between 387-646 tC/ha; a net reduction of carbon storage of between 843-854 tC/ha. (Figure 1)

The above data shows that forests that have seen only natural disturbance in intervals of over 300 years, store almost double the amount of carbon than forests that are clearfell logged on an 80 year rotation. The study identified that carbon pools for the logged and burnt forest were low because:

1. relatively frequent fires [from regeneration burning every 80 years] emit gaseous carbon;
2. wood products were not returned to the soil [as would occur in an older forest as dead wood decays on the forest floor and is returned to the soil];
3. short half-life of the pulp component;
4. high soil disturbance; 
5. E. regnans were grown only to 63% of optimum size; and
6. the understorey was underdeveloped. The sequestered carbon

Figure. 1 Carbon pools in (a) undisturbed mature forests where the aboveground biomass is replaced on an average of 321 years after natural bushfire events (no logging history); and (b) disturbed forests following clearfell logging, high intensity regeneration burning, reforestation and subsequent clearfell logging on an 80 year rotation

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16 Firstly the figure of 843 tonnes of carbon emissions per hectare logged (tC/ha) was extrapolated by subtracting the mean total carbon value from a logged forest (after the fifth consecutive 80 year logging rotation) from the mean total carbon value for an undisturbed mature forest (ie. 1230 tC/ha – 387 tC/ha = 843 tC/ha). (Source: Dean, C., Roxburgh, S., Mackey, B., “Growth Modelling of Eucalyptus regnans for Carbon Accounting at Landscape Scale”, in Amaro, A., Reed, D., and Soares, P., (eds.) Modelling Forest Systems, CAB International 2003, p.36). The figure of 843 tC/ha was then multiplied by the figure of 8,995 hectares which is the amount of temperate montane forest logged annually in Victoria (Source: Monitoring Annual Harvesting Performance : state wide summary report (2004-2005), commissioned and published in 2006 by the Victorian Government Department of Sustainability and Environment). Check this figure of 8995???

17 Dean, C., Roxburgh, S., Mackey, B., “Growth Modelling of Eucalyptus regnans for Carbon Accounting at Landscape Scale”, in Amaro, A., Reed, D., and Soares, P., (eds.) Modelling Forest Systems, CAB International 2003, p.27

18 ibid., p.36-37
might be even lower if the following landscape scale effects were considered: escaped burns into forested areas, effect of logging roads on fire frequency, duration between felling and germination (1 to 2 years), and the diesel fuel used by the log skidders and loaders. 

**Scale of impact**

There has been suggestion that the effects of logging temperate montane forests can be “considered within the framework of natural catastrophic disturbance by stand-replacing fire.” That is, the forests subject to clearfell logging and slash burning resemble those regenerating from bushfire. However, clearfell logging and slash burning practices have a great impact on the forest environment, including:

- The destruction to the integrity of physical soil properties and structure from intensive mechanical disturbance from logging machinery, road construction, excavation of log landings and the dragging of logs causing snig tracks;
- the loss of soil carbon from mechanical disturbance cited above as well as exposing the bare soil to high intensity burning, which would not occur in a natural bushfire;
- degradation of microbial and fungal communities due to mechanical disturbance and high intensity burning, cited above;
- the impact of total tree removal which would not occur during a bushfire;
- the damage done by bulldozers as well as the high intensity slash burn on understorey vegetation; and
- changes in the understorey plant composition.

**Recommendation 2**

Soil is the greatest terrestrial carbon sink. It is crucial to recognise and protect the carbon sequestration potential.

**Soil Disturbance, Carbon Storage and Sequestration**

Carbon sequestration in soils occurs through plant growth. Plants convert carbon dioxide from the atmosphere into woody tissue, bark and leaves, through photosynthesis. As the plants die, soil microorganisms decompose the plant material releasing approximately 60% of the carbon back to the atmosphere and storing 40% to the organic residue, known as the humus layer. These organic residues accumulate over time and can persist in the soil for hundreds or even thousands of years, effectively storing large amounts of carbon.

Clearfell logging and slash burning reduce the amount of carbon stored in the soil as well as changing the structure and composition of the understorey vegetation. “It is generally

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21 Dean, C., Roxburgh, S., Mackey, B., “Growth Modelling of Eucalyptus regnans for Carbon Accounting at Landscape Scale”, in Amaro, A., Reed, D., and Soares, P., (eds.) Modelling Forest Systems, CAB International 2003, p.34
accepted that high intensity burning can lead to a significant loss of soil carbon from the upper soil layer. A study into the mean value of soil carbon stored in a temperate montane forest that had never been logged was 654 tC/ha compared to that of clearfell logged and slash burnt forests that stored on average soil carbon of 97 tC/ha after successive logging rotations.

In Figure 1, graph (a) shows that the loss of soil carbon in a natural fire event is almost negligible, whereas graph (b) distinctly shows the exponential loss of carbon from the soil with every successive logging rotation of 80 years. This is because heavy machinery used in logging causes a high amount of disturbance causing a breakdown of soil structure and disturbance to sensitive microbial and fungal communities, as well as exposing the soil during the very hot regeneration burn that follows.

Soil carbon can react and bind with other chemicals that are found in the soils, making it quite stable and good for sequestration of carbon. Stable forms of soil carbon are organic molecules that are chemically bonded to the mineral soil. Carbon accumulated on the surface of the forest floor has a short residence time and is more vulnerable following disturbance, compared to stabilised soil carbon, which has a residence time of many decades. Such soil carbon forms when the humus layer enters the slow soil carbon pool. In Australian temperate montane forests, 45% of humus enters the slow soil carbon pool, which has a half-life of 693 years compared to the humus layer having a half-life of 2 years.

The goal of storing and sequestering carbon in soils is to promote carbon transformations from plants to the humus layer and from the humus layer into the slow soil carbon pool, which is more stable. Microorganisms and fungi in the soil convert carbon stored in plants into soil organic carbon. Disturbance of the soil microbial community can affect the amount of carbon converted to carbon dioxide vs. to soil organic carbon. If more carbon accumulates in the slow pool, then the carbon is less likely to be lost to the atmosphere and can remain stored in the soil. Current logging and burning practices have a deleterious impact on the conversion of soil carbon from the humus layer to the stable slow soil carbon pool.

It is important to recognise that even if the practice of slash burning were not employed during forestry operations, mechanical disturbances from clearfell logging results in high rates of decomposition of soil organic matter. Consequently there will still be carbon emissions to the atmosphere from the soil.

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23 Pennington, P. I., Laffan, M., Lewis, R., and Otahal, P., “Assessing the long-term impacts of forest harvesting and high intensity broadcast burning on soil properties at the Warra long term ecological research site” in Pennington, P., Laffan, M., (eds.) “Procedures for the measurement of changes in soil physical properties following logging of wet Eucalyptus oblique forest”, Forest and Wood Products Research and Development Corporation, Australian Government, 2003, p.80
24 Dean et al. 2003 p.36
25 The time it takes for half of the carbon to decompose.
Changes in understorey vegetation

Scientific research into the history of bush fire frequency in temperate montane forests shows that prior to European settlement such events would occur on average every 300 years. Many Australian tree species, such as the Eucalypt and Wattle, regenerate after fire. Fire is required for these trees to release their seeds and current logging and slash burning practices in Australia are specifically designed around the regeneration of the commercially valuable Eucalypt species. However, the understorey vegetation of many Australian temperate montane Eucalypt forests is comprised of rainforest species, which are not tolerant to high intensity fire and do not grow back or return after clearfell logging and slash burning. Such forestry practices are causing major changes in plant species composition, stand structure and ecological characteristics of large areas of forests.

Rainforest species are essential for maintaining a moist microclimate, however they are being replaced by fire prone species, which increases the flammability of these areas. This is also a central policy concern, as bushfire risk is often cited as a major reason to exclude forests from carbon trading schemes. In temperate montane forests, “changes in the composition and abundance of fuel, changes in the relative humidity beneath the canopy, and changes in species composition may influence whether a stand burns.” This has major implications for the future as not only does this predispose large areas of forest to become more likely to burn during a natural bushfire event, it will also result in an increase of carbon dioxide in the atmosphere due to more frequent fires.

Changes in the fire frequency and intensity in Australian ecosystems is also having major impacts on the forest biomass. Because of current logging practices, we are seeing a change in the species composition of temperate montane forests. Carbon that was previously stored in the biomass of the forest understorey is being released to the atmosphere during slash burning and is not re-accumulated in areas of eucalyptus regrowth. This is because the rainforest understorey species that dominate in undisturbed montane forests do not return after such pernicious disturbance and are being replaced by a drier assemblage of plant species. Using radiocarbon dating techniques and field observations, a Victorian study into the age of wet forest understories showed that a number of plants growing in the Eucalyptus regnans dominated wet forests of the Central Gippsland region were up to 370 ± 70 years old. This indicates that these understorey plants are capable of surviving low intensity natural bushfires and that they are long-lived in this type of environment. These plant species however do not tolerate being bulldozed and then burnt in fires that reach up to 1000°C, which is why areas that have been subject to clearfell logging and slash burning contain plant species that are re-grow

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27 “The response of vegetation to changing fire regimes and human activity in East Gippsland”, Victoria, Australia, Department of Geography and Environmental Science, Monash University. Peter A. Gell, Ian-Malcolm Stuart and J. David Smith


29 See below for further discussion on fire management policy options.


32 ibid., p. 345
after fire and for this reason such forest areas pose a higher fire risk than existed prior to human disturbance.

**Thinnings operations**

Current clearfell logging regimes occur on a 50-80 year rotation, with the forest area undergoing another lot of mechanical disturbance after 20 years from heavy logging machinery during thinnings operations. Clearfell logging and slash burning is intended to promote intensive growth of the commercially valuable eucalyptus trees. After such practice, a very thick monoculture stand of eucalypt trees re-grows, very much resembling a plantation style crop (Picture 3), not a biodiverse native forest. (Picture 4.) Because of such thick growth, thinning of the crop is required to allow the trees to grow tall and straight which is desirable for the next logging harvest. This results in further mechanical disturbance to the soil after only 20 years causing additional soil respiration and destruction of the soil microbial community, thus further emitting carbon dioxide to the atmosphere. It is also important to note that thinnings operations also impact severely on the already seriously debilitated rainforest understorey vegetation. If any rainforest species happen to survive clearfell logging and slash burning, it is very rare for these specie to survive a third lot of mechanical disturbance from thinnings operations. Picture no. 7 shows that there are no rainforest species in the stand eucalyptus trees that have re-grown after clearfell logging, slash burning and thinnings.

![Picture 3 - picture of area of regrowth after thinnings. Make a note that there is very little understorey vegetation and none of that vegetation is rainforest species that would have been there prior to logging.]
Recommendation 3
Areas of undisturbed forests should be protected from logging and preserved for their carbon sequestration potential.

A recent study assessing the carbon sequestration potential of managed forests in Australia, examined the impact that current forestry practices had on the carbon carrying capacity (CCC). This research concluded that areas of forest that had been subject to clearfell logging and slash burning would take approximately 53 years to recover to 75% of their CCC and over 150 years for the CCC of these forests to recover to more than 90% of their pre-logged levels.\textsuperscript{33} The Australian study made reference to similar studies carried out in the eastern hardwood forests of the United States, which showed similar trends. Forests subject to logging had much lower above-ground biomass density than mature forests and “generally less than 50% of the predicted CCC of approximately 250 tC/ha”.\textsuperscript{34} Therefore, areas of mature forests or forests that have not been subject to human disturbance must be protected from forestry practices and preserved for their carbon sequestration potential.

Areas of forest with no prior history of human disturbance should be protected for the ecosystem services they provide such as carbon sequestration and storage potential.


\textsuperscript{34} ibid., p.9
Recommendation 4
Areas that have seen disturbance from logging and slash burning should be allowed to recover to their pre-disturbed state. These forests have the potential if allowed to mature to sequester and store large amounts of carbon. This is provided they are not clearfelled logged and burnt again.

The protection of mature stands of negligibly disturbed forests for their carbon storage and carbon sequestration potential (CSP) is extremely important. It also concludes that if allowed to recover and regenerate, logged and burnt forests should also be protected for they have the “potential to accumulate significant quantities of additional biomass, and thus sequester atmospheric carbon into the future.” The study found that the CSP in logged forests is between 141-186 tonnes of carbon per hectare. Thus the CSP of temperate forests in south-east Australia (which comprise approximately 76% of these forest types Australia-wide) is in the order of 680-895 MtC.

Areas of ‘high conservation value’ that have been subject to logging and burning should be allowed to recover to a ‘mature state’, to regenerate to their pre-disturbance state. Restoring the carbon sinks.

Areas that have been logged will take many decades to recover to their pre-logged state, but if allowed to they can act as large areas of forest that will sequester large amounts of carbon (especially in the soil) if allowed to remain standing and not be logged or subject to further mechanical or fire disturbance. These forests have great sequestration potential and if left alone can also be areas where we could foster the formation and accumulation of the stable form of soil carbon known as the slow soil pool.

Recommendation 5
Proper scientific field research and carbon accounting must be undertaken in each of the vegetation classes that are commercially logged, quantifying the impact of current forestry practices on the terrestrial carbon sink.

In order to measure current carbon stocks, carbon carrying capacity, carbon sequestration potential and the carbon loss from forestry operations in Australian temperate montane forests, detailed scientific research must be undertaken. This fact is recognized by leading scientists in the field. Further, scientific research is required in all Australian forest types in which logging and burning regimes are employed. The research that is carried out must also be multi-faceted, taking into account all components of the forest biomass and the affect of logging and burning.

35 ibid.
36 ibid.p.10 (note the figure for CSP only takes into account above ground carbon stocks in the vegetation biomass. Soil carbon is not accounted for in these calculations, so one could expect the CSP to be much larger. See Methods, p.2)
37 providing important ecosystem services such as habitat for endangered species, water production etc.
The lack of research also has significant flow-on effects. The mathematical modeling required to assess the carbon carrying capacity of forests is problematic because it is “limited by a lack of field data.” For example, there has been only limited research on the effect of slash burning on carbon emissions to the atmosphere. Research must be conducted into the gamut of forestry practices which result in carbon emissions.

**Recommendation 6**
The AGO should include carbon emissions from soil disturbance and burning of slash piles in its carbon accounting studies relating to native forestry.

The AGO states that “Changes in dead organic matter…and soil carbon are not considered,” in their carbon accounting studies. Firstly, the AGO excludes emissions and removals from soil carbon which “are not considered to be significant with the losses during forest harvest.” This is contrary to scientific research both in Australia and overseas. Mackey report shows loss of soil carbon from temperate montane forest after logging in the order 557 tC/ha. Secondly, the AGO “does not report CO2 emissions associated with the fires,” particularly the release of carbon in the slash. This is imperfect because the burning of the slash represents a carbon emission which is not accounted for. Further, the sequestration of this carbon may take years even decades to accumulate.

**Recommendation 7**
AGO should carry out carbon accounting for forests in conservation reserves, not only forests managed for timber production.

Currently, it is only areas outside conservation reserves, within the commercially managed estate, that are included in the emissions reporting. Undertaking carbon accounting for areas of ecologically intact mature forests that has never been subject to clearfell logging or slash burning is important for measuring carbon storage as well as the sequestration potential of these forests.

42 Dean et al. 2003 p.36. Soil carbon of temperate montane forest is on average 654 tC/ha while that of clearfell logged and slash burnt forests is on average soil carbon of 97 tC/ha.
**Recommendation 8**
Forestry should not be grouped with land use and land use change, but should be considered as a stand-alone sector. As a significant greenhouse gas emitter it should not be in with agriculture and land use change, as all these sectors are so different to each other that any figures or data relating to all of them do not give any sort of accurate indication as to the emissions from each sector.

**Recommendation 9**
The native timber industry should not be allowed carbon credits for re-growth forests as ‘reforestation sinks’ as logging and burning practices are responsible for the emission of millions of tonnes of greenhouse gas in Australia every year.

has found that logging practices release more carbon that what the forests can sequester and on this basis (based on research already conducted)

On the basis of current research and the data provided in this submission, the native forestry sector is a net emitter of carbon. Like any carbon emitting industry the native forestry sector should be charged a carbon tax in any future ETS.
POLICY RECOMMENDATIONS

European Union Emissions Trading Scheme

The European Union Emissions Trading Scheme (EU ETS) does not recognise carbon credits from avoided deforestation, forest regeneration, revegetation and sustainable forestry management.\(^43\) There has been some progress regarding LULUCF credits in the EU ETS. On March 29, 2006, the World Bank convened a group of policymakers to review options for including forestry credits in the European Union Emissions Trading Scheme (EU ETS). The second amendment that arose from this convention removed the ban on use of LULUCF credits in the EU ETS.\(^46\) However, forest activities are nonetheless still not recognised.

Direct comparison with the European example is unadvisable, as European forests are already under more stress and are more damaged than their Australian counterparts, which consequently have more potential to sequester carbon. However, it is useful to examine certain policy concerns which apply to both Australian and European forests.

The scientific uncertainty and lack of long-term contribution to avoiding climate change that led the EU to reject inclusion of forests as sinks in primary stages should not be used as a reason to similarly exclude forests from an Australian ETS. Instead, as this submission has argued,\(^47\) the establishment of a comprehensive body of research on the carbon sequestration potential of Australia’s native forests is essential. Such a body of research would evince the huge potential of forests to contribute to an Australian ETS in sequestering and storing carbon. This would in turn offset arguments that the inclusion of forests as sinks in an ETS is unnecessary and overly difficult and costly\(^48\) in light of the large potential net benefits.

A similarity between the EU ETS and a proposed Australian ETS is that “scientific complexity, insufficient data and the challenge of monitoring LULUCF projects has … led to criticism of [including] such projects [in an ETS].”\(^49\) However this can be addressed by adopting “a cautious approaching in measuring and monitoring sequestration activities,” such as employing full carbon accounting by using a range of scientific models.\(^50\)

Furthermore, “the key technical issues associated with carbon forestry projects that led to the exclusion of this sector when the first Linking Directive was negotiated, have been

\(^{43}\text{See COP 7 of the Marrakech Accords, restricting the allocation of carbon credits in the Clean Development Mechanism to afforestation and reforestation.}\)

\(^{46}\text{Amendment 2: Delete Article 11a(3)(b) and renumber. (Removes ban on use of LULUCF credits in EU ETS)}\)

\(^{47}\text{See above, recommendation no ???????????}\)


\(^{50}\text{ibid.}\)
satisfactorily addressed during recent years when Parties to the Kyoto Protocol defined solutions for dealing with permanence, additionality, leakage and measurement & monitoring.\footnote{51}

Permanency is also an issue, particularly for privately owned forest. Private owners would benefit from keeping native forests in the ground if carbon credits attached to their forests’ potential to sequester carbon, however it is also essential that an emissions trading scheme has appropriate legal power and legal identity to ensure consistency and ongoing monitoring of obligations.\footnote{52}

The risk of high-level emissions from natural phenomena such as forest fire or disease is another policy consideration contributing to the exclusion of forests from the EU ETS. Within that argument, forests are considered uncertain sources of carbon credits because forest fire or disease could destroy the forest and release the carbon stored.\footnote{53} This is particularly of relevance for the Australian context.

**Recommendation 10**

An Australian ETS should not follow the European Union ETS example of not recognising carbon credits from avoided deforestation, forest regeneration, revegetation and sustainable forestry management.

**Considerations of bushfire for an Australian ETS**

Bushfire is a well-recognised risk to Australian forests. However, potential large-scale emissions in the case of bushfire need not see the exclusion of forests from an Australian ETS given the possible policy and natural mitigation options.

Insurance has been suggested as an option to mitigate the risk posed to carbon stores by bushfire. This may raise issues of liability in the case of private ownership. As outlined by the Law Institute of Victoria, a proposed national emission trading scheme will raise legal issues such as licensing or property rights, compliance with requirements of the emissions trading scheme and exclusions from the emissions trading scheme.\footnote{54} In the case of bushfire, there may also be a concern for private owners about liability for emissions. However, the fact that Australia has legal recognition (or legislative provisions for potential legal recognition) of separate land, forestry and carbon rights in most states\footnote{55}...
means that there is potential for flexibility in liability for carbon emissions from disturbance of native forest. Rights and therefore liabilities for carbon could potentially be separated from land and forestry rights.

An alternative possibility is that “permanent ‘non-harvest’ forest sinks”, or native forest sinks, be created to “lock-up carbon in perpetuity – regardless of temporary effects of fire damage to tree stock.” Further, avoided deforestation incentives such as the AGO’s ‘Greenhouse Friendly’ scheme, a voluntary avoided deforestation project with RIO Tinto purchasing carbon offsets by purchasing the logging permits from private land holders, provides competition and thus incentive to maintain stands of native forests. This would in turn protect them for their carbon storage and sequestration services.

There are also natural mechanisms available that, if facilitated, would address concerns of fire damage. This has been discussed above particularly in relation to rainforest species. Policy options would also be available to exclude liability for carbon emissions from natural bushfire, especially given its ongoing relevance in the Australian context.

Additional fire management options have been discussed for Australia. In 2007 submissions were invited to aid inquiry into the impact of public land management practices on the frequency, scale and intensity of bushfires in Victoria by the Environment and Natural Resources Committee of the Parliament of Victoria. Of particular interest were the submissions made by Professor David Lindenmayer and by Dr Kevin Tolhurst. Lindenmayer is critical of current ‘fire break’ and back burning fire risk mitigation practice, and suggests that “more cost-effective and better asset protection may be generated from other options that could be implemented for the same investment required for a ‘fire break’.”

**Recommendation 11:**

Given the risk of bushfire and the potential of subsequent large-scale carbon emissions, appropriate and adapted fire management options must be adopted. Policy options should also be developed which would protect carbon credits despite temporary damage from fire.

**The ‘polluter pays’ principle**

The international environmental law principle of ‘polluter pays’ involves the calculation of a carbon cost in monetary terms to charge a polluter per tonne for their carbon emissions. This is largely a regional custom, with strong support in most of the Organisation for Economic Co-operation and Development (OECD) and European Community (EC) nations. However its application in some EC nations has been criticised for allowing rorting of the EU ETS. There is increasing evidence that industry passes the

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56 Australian Rainforest Foundation (ARF)’s Submission to the National Emissions Trading Taskforce, 27 November 2006, p. 1.
57 Cite above bit where Lenka talks about
cost of such a principle onto consumers, raising the cost of utilities and resulting an overall profit. For example, according to the German Association of Chemical Industry, this creates profits of more than 5 billion Euro per year for the German power sector. This is a situation that must be avoided in a proposed Australian ETS. Transparency here is essential, as it is crucial that for any ETS all sectors are properly accounted for otherwise there a lack of credibility could undermine the entire system.

If the ‘polluter pays’ principle were properly accounted for and enforced in an Australian ETS, the forestry sector would be liable for their carbon emissions from logging and burning practices. This sector must be carefully held accountable for any price rise in products, as carbon liability should essentially remain with the sector responsible for decisions to conduct logging operations.

As recognised by Professor Garnaut in the S.T. Lee lecture at the Australian National University, the largest risk to the development of an effective policy response is that vested interests would gain control of the policy process and rort an ETS to benefit their own economic interests, rather than work towards climate change mitigation.

**Recommendation 12:**
The 'polluter pays' principle must be carefully monitored to avoid industry rorting of an Australian ETS.
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