Submission on Issues Paper 1 (Climate Change: Land use-Agriculture and Forestry)
Mick Harewood, January 2008

These comments are set out generally in the order of the topics raised in the issues paper. However, an over-riding comment is made up-front. Mitigation measures have to be real. Incentive schemes and tax-effective tree-planting schemes may have the appearance of potentially doing something to reduce atmospheric GHG (greenhouse gas) levels, but subsequent events such as catastrophic wildfires or land use or land management changes by new owners can rapidly undo any perceived benefit. Any financial benefits for GHG mitigation should only accrue at the rate at which genuine GHG emission reductions are achieved.

Section 2, Context: Climate Change and the agriculture and forestry sectors.

It is noted that agriculture contributes an estimated 16.8% of Australia's GHG emissions (2005) but only 3% of GDP. While there are arguments in favour of continued regional employment and food security, it might be rational to consider reducing the size of those parts of our agricultural industries that contribute significantly to GHG emissions through targeted disincentives for further investment in these areas (e.g. a GHG emissions tax on meat produced from cattle and sheep, levied at the wholesale level.)

It is also true that agriculture uses and disproportionate amount of Australia's fresh water resources, relative to the value obtained from irrigation diversions. Given that the inevitable consequence of warming will be a reduction in streamflow duration into dry periods due to enhanced evapotranspiration, it is particularly important to remove past distortions that have lead to the profligate use of water resources. Examples of these distortions to the operation of markets include the granting of perpetual property rights to holders of annual irrigation extraction licenses in NSW on the eve of the COAG meeting of June 2004, the construction of irrigation dams by various governments at no direct cost to the beneficiaries, the failure to acknowledge or make a charge for the opportunity cost associated with increased water use by pine plantations and dense regrowth forests [i]. How these distortions might be removed is beyond the scope of this submission. However, these are examples of market failure where the external impacts have not been considered, and this must be rectified in relation to both GHG emissions and fresh water resources/habitats.

The potential for woody vegetation cover to act as a CO2 sink should be considered in the light of the views of climate scientists looking into the (warmer) future. (Pittock, 2005 pages 186-188). Salient points include:

- The small potential size of terrestrial sinks for CO2 relative to current emissions. Pittock (2005) cites the IPCC estimate that there is the potential to sequester 10 to 20 percent of CO2 emissions by 2050. Another perspective comes from an estimate cited by Flannery (The Weather Makers, page 77) that during one year, 1997, the world used fossil fuels that took 422 years to accumulate in the earth's crust during the Carboniferous era.
- The likelihood that forests and plantations may become potential net emitters of CO2 increased rates of decay, die back (drought associated dieback has occurred during the hotter, dryer summers of this decade in the northern parts of the Bega Valley Shire) and increased frequency and severity of wild fires.
- The higher albedo of woody vegetation compared to grassland or wheat fields.

3.1 Adaptation in the Agriculture and Forestry Sectors.

This section of the issues paper lists a broad range of potential adaptation measures under a broad range of headings. The list would become much longer when each is expanded to cover different industry sectors and different geographical regions. My view is that individual enterprise managers will make their own decisions about the best options in response to market signals and climate predictions. The role of government is therefore to continue to provide the best available information on climate patterns and to try to build into the psyche of land managers the expectation of a future where GHG emissions are increasingly heavily taxed in some way or other.

The third dot point in the list of adaptation opportunities suggests that improved fire management can be achieved through "landscape change and prescribed burning." This is an extremely important area of concern for the sustainability of human settlements on much of the southeast of this continent. In spite of major improvements in equipment and training for wildfire suppression, losses of property and lives continue to grow as settlements continue to spread in the peri-urban fringe of cities and towns and wildfire intensity and frequency seems to increase.

The notion that prescribed burning can effectively reduce fire hazard is open to question in much of the peri-urban fringe and in the southeast forests in general. Work undertaken by the CSIRO National Bushfire Research Unit (Cheney, Gould and Knight 1992) in developing a prescribed burning guide for the regrowth forests of Eden showed that the only fuel elements that contributed to fire rate-of-spread and intensity were near-surface dead fuel moisture content (inversely related) and near-surface fuel height (or %cover, since these parameters were interchangeable). They defined the near-surface fuels as the grasses, ferns and trailers and the dead litter that gets caught-up in these plants. They found that surface litter tended to smoulder after the fire front passed and that shrub fuels did not contribute to fire under the relatively mild conditions chosen.

While it is likely that other fuel elements would contribute to wildfire intensity in extreme conditions, the main driver of fire spread and risk is likely to be the perfectly aerated and moderately dense near-surface fuel component. The significance of this for prescribed-burning policy is that repeated prescribed burning in the southeast forest tends to favour pyrophyllic species such as bracken fern (*Pteridium esculentum)*, wire grass (*Tetrahaenea juncea*), Blady grass (*Imperata cylindrica*) and Wallaby grass (*Notodanthonia longifolia).* Therefore, over time the application of prescribed burning is likely to increase the overall flammability of these forests through the rapid regeneration and spread of the most flammable fuel components.

The obvious alternative fuels management strategy for householders is to use mowing or brushcutting to reduce the near-surface fuel component. On the broader scale to be embraced by forest managers, strategies that enhance the population of lyre birds and small herbivores might be beneficial (e.g. fox baiting, wild dog and cat suppression, the provision of surface water resources in dams.)

Those experienced in wildfire suppression will be well aware that tankers can typically operate for 10 minutes or so before require re-supply with water (depending on the nature of usage.) Therefore, the turn-around-time for a trip to the nearest reliable source is critical. This suggests that the provision of surface water resources throughout the forested landscape would be highly advantageous. Most natural streams are ephemeral in flow and forested lands tend to be deeply divided by incised drainage lines. The provision of surface dams (capturing road run-off) or large tanks would seem to be justified in protecting forest assets such as plantations, and in protecting the peri-urban fringe.

Recommendations on Adaptation.

I suggest that the key government role is to continue to provide the best available climate data and to continue to develop the climate models that allow for regional predictions of changes to temperature and rainfall (including extreme events such as floods and extreme fire-danger weather).

A further role for government might be to expand the past work on fire behaviour and control to look at:

- Changes to the flammability of vegetation that might result from repeated rotational prescribed burning
- The feasibility of providing surface water resources for fire suppression and the costs relative to, for example, fire suppression aircraft. (My perception is that these make great TV footage and can "save" the odd house but contribute little or nothing to containing the overall size of large running fires and therefore the overall cost, especially if GHG emissions are included.)

3.2 Mitigation options for agriculture and forestry.

The points in this section on diffuse sources and sinks, diversity of entities and variability of emissions are noted and important. The trade-exposure of certain agricultural sectors is by no means unique and the issues are really part of the general issue of choosing to be part of the global solution to global overheating, rather than part of the problem.

The best approach is probably for the government to provide a clear market signal and for individual enterprises to make their own best choices in response to the certainty the GHG emissions will be increasingly constrained in the future.

My considered view is that a **GHG emissions tax applied at the wholesale level** is the best overall approach for a number of reasons. These are

1. It does not have to involve a net increase in the overall tax burden, since funds raised can be used to reduce other taxes such as payroll, income, GST, or local government rates and charges. Some of the funds raised could be used to support adaptation by disadvantaged groups.
2. An international agreement on a cap on emissions does not have to be reached any time soon (and let's face it, it won't be) for the scheme to commence.
3. The GHG emissions tax can be introduced at a modest level and have a built-in annual rate of escalation until GHG neutrality is achieved. The initial rate I would suggest would be the rate that makes wind-power commercially competitive with coal-fired electricity. The annual rate of escalation should be based on modelling which has a target of GHG neutrality[ii] well before dangerous warming has occurred.
4. The certainty of an annual escalation in the rate of GHG emissions tax, however modest, gives the necessary market signal for strategic investment in long-term low emissions technologies. Australia could, over time, gain the kind of competitive advantage that Germany has gained through its price and market access guarantees to renewables.
5. Wholesale sales taxes are about the most efficient taxes to levy. It would be relatively easy to do for static electricity from fossil fuels and for transport fuels. In the agricultural sector, the majority of emissions come from enteric fermentation, so a wholesale levy on beef and sheep meat would be a good place to start. This would give a major stimulus to sales of kangaroo meat, with its associated lower emissions. Another GHG tax could be levied on nitrogenous fertilisers. These may be rather crude instruments, but we have to start somewhere. As the science evolves, accreditation schemes might be feasible for certain "best practice" exemptions. However, the administration costs involved in going into too much detail may outweigh the benefits.

Mitigation Opportunities.

Two of the three opportunities listed on page 6 highlight serious knowledge gaps which could lead to perverse and unfortunate outcomes. These are the production and supply of biomass for electricity production and the creation of tradable offsets through emissions reduction or carbon sinks. The important knowledge gaps relate to changes in stored carbon in forests and plantations throughout the cycle of oldgrowth or multi-aged forest logging, burning (pre-logging, post logging and under regeneration), sawn timber and woodchip production and transport, thinning operations and the long-term fate of forest products. Very little is known about changes in soil carbon stores in the Australian context, although soil organic matter has been listed as an important parameter for assessing changes in site quality that may be associated with logging and burning. (Montreal Implementation Group, 1998)

The official view from the public forest manager in NSW is outlined in brief in the ESFM Plan (Ecologically Sustainable Forest Management Plan, Eden NSW, Forests NSW 2005). Under "Carbon Cycle" (page 13 of the ESFM Plan) the following statements are made:

"Decomposition of plant and animal matter in mature and over-mature forests adds to the carbon dioxide produced in normal growth processes such that there is no net impact on oxygen and carbon dioxide levels in the atmosphere.
Decomposition in regrowth forests is relatively little resulting in a net accumulation of about 5 tonnes per hectare per annum of carbon in the tissues of the trees, and the actively growing forest becomes a sink for atmospheric carbon. The cycle is prolonged if the timber containing carbon and obtained from regrowth forests is then put into service."

These paragraphs gloss over the release of GHG associated with process of converting oldgrowth or multi-aged forest to regrowth. The 1982 Eden Native Forest Management Plan (SF NSW 1983) contains estimates of 11 cubic meters of sawlogs, 100 tons of pulplogs and 230 tons per hectare of "coarse fuels" per hectare left behind in a typical logging operation. There would also be tens or perhaps hundreds of tons per hectare of finer logging slash left behind, but this has not been accurately quantified. (Following the 1980 Timbillica fire, bark accumulations of up to 200 tons were no longer permitted and bark was to be dispersed in piles of a maximum of 5 tons). The "coarse fuels" and fine logging slash are substantially consumed in post-logging burns, the autumn or winter following logging.

Elsewhere, Roxburgh et al (2006) estimate that 1000 tons per hectare of stored carbon is potentially mobilised by logging operations. Therefore, depending on site quality, it could take 200 years or so before the carbon stores in a regenerating forest are returned to that of the oldgrowth forest. Taken together with the impact of regenerating forest on water yield and flow duration[iii], this suggests that all oldgrowth and multi-aged forest should be preserved in its present state for the foreseeable future. (I understand this is the policy recommended by Stern.)

Another aspect of the oldgrowth to regrowth conversion phase is the direct energy use by logging and log hauling equipment. The 1994 Environmental Impact Statement prepared by State Forest of NSW asserted that most of the fuel use was associated with road construction, but provided no supporting evidence. Studies by Keruish (CSIRO) in the 1970's showed that at slopes over about 30 degrees, logging operations became uneconomic due to the cost of fuel consumption in uphill snigging by bulldozers. The GHG impacts of energy use in logging and wood processing would be "captured" by a GHG emissions tax on fuel and electricity. It is important that the diesel excise exemption that applies to diesel fuel used in primary production be scrapped in order to remove this incentive for profligate use of dwindling transport fuels.

Thinning regrowth forest for pulp is undertaken as a commercial operation at about year 30 in the Eden region. Non-commercial "regrowth spacing" operations using brushcutters have been undertaken at year 12 to 15 when federal government grant money was available. The thinning operations seem to leave a rather large load of tree heads, bark, limbs and wood from non-commercial species such as *Allocasuarina littoralis*. The fate of thinning slash is likely to be, substantially, burning in the autumn following thinning operations. Detailed accounting of the GHG impact of thinning operations is required if the assertions in the ESFM Plan are to be tested.

The situation with plantations is a little different in that some have been established with the purpose of combating dryland salinity, a result of past clearing of woody vegetation. My view is that the tax incentives provided by "prospectus plantation schemes" have seriously distorted the market and that far more plantations have been established than would have been economically rational,[iv] especially if the water yield reductions had been taken into account.

The granting of tax credits up front is inappropriate when considering GHG mitigation. The rate of earning for any GHG credits should be linked to the actual rate of CO2 sequestration, with some kind of compulsory insurance-bond scheme to provide for losses due to wild fire. This may slow the rate of investment in plantations relative to that which has occurred in the recent past. However, as Ajani (2007) points out, this has not been particularly rational and is probably best considered as part of the tax minimisation industry. (The real cause of Australia's trade deficit in forest products is a lack of investment in pulp and paper manufacturing infrastructure in recent decades.)

Conclusions.

A Greenhouse Gas (GHG) emissions tax, levied at the wholesale level, is likely to be the most efficient and effective market instrument for reducing Australia's GHG emissions and re-shaping our economy for the future.

The political and economic impact of such a tax will be manageable if it is introduced at a modest level but has a built-in guaranteed rate of escalation. This will allow investors to make appropriate strategic decisions.

Credits for bio sequestration of CO2 should be accrued at the actual rate of sequestration, not "up front" in prospectus plantation schemes.

The diesel excise exemption applying to primary production should be removed forthwith.

The most important impacts of climate change on the sustainability of human life in Australia are probably in the areas of wildfire risk and diminished water resources. While tree plantations may have the potential to sequester some CO2 in the short term, their impacts on fire risk and water yield reductions are undeniable. Offsets for tree plantations should not be artificially encouraged through up-front tax deductions. The whole-of-cycle accounting of GHG emissions and sequestration should be conscientiously undertaken if any offsets related to forestry are to be made available for trading.

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[i] See for example Zhang et al 2007 or Vertessy, 1999.

[ii] This begs the question of what is the background rate of secure GHG storage in deep ocean sinks? While we can make reasonable estimates of human-induced emissions and estimate of sequestration by biological processes, there are missing bits to the worldwide CO2 balance. Irrespective of what target for atmospheric CO2 we might agree upon, we have to get to neutrality sooner or later. The interim policy should be, in my view, to use the best estimates of background secure GHG storage in the deep oceans and distribute shares to countries based on their 1990 populations.

[iii] See for example Kuczera, cited in Vertessy 1999.

[iv] See Ajani J 2007 for a fuller discussion in the context of Australia's forest based industries.