Submission by the
Forest Industries Association of Tasmania

to

Garnaut Climate Change Review

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on

Issues Paper 1: Climate Change: Land use - Agriculture and Forestry

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Contents

1. Overview

Wood is stored atmospheric carbon and solar energy, and wood and wood-based materials are the only materials that our society has at its disposal which are truly renewable, and the alternatives (plastic, metals, masonary, glass, and animal products) all require a great deal more energy to make with resultant greater emissions. FIAT supports an Australian Emissions Trading Scheme that recognises the true credentials of wood and wood-based products including biomass-based energy systems, and welcomes the development of such a scheme.

Figure 1: FIAT foresees a not distant future where products (and services) carry certification and labelling which reflect their true associated emission levels so that the market can be more emissions-discerning in its demand for products.

FIAT supports an Australian Emissions Trading Scheme that has broad non-selective coverage, that covers the forestry and forest products sectors including native forest management. The sensible and sustainable management of Australia's forests provides the only proven method of capturing and storing atmospheric carbon that we have at our

disposal. Wood products are composed of stored atmospheric carbon held together by stored solar energy, and we must encourage greater and more prolonged use of wood products which will have the dual abatement advantages of storing atmospheric carbon whilst replacing the use of alternative, more-emissions-intensive products such as metals, masonry and plastics. When wood-products reach the end of their serviceable life they should be segregated, collected and burned as biofuel to recover their inherent stored carbon-neutral solar-energy.

This approach is consistent with the approach of the International Panel on Climate Change (IPCC) set out in "Mitigation of Climate Change" (IPCC Fourth Assessment Report, Working Group 3 Report):-

> "W*ood products can displace more fossil-fuel intensive construction materials such as concrete, steel, aluminium, and plastics, which can result in significant emission reductions (Petersen and Solberg, 2002). Research from Sweden and Finland suggests that constructing apartment buildings with wooden frames instead of concrete frames reduces lifecycle net carbon emissions by 110 to 470 kg CO2 per square metre of floor area (Gustavsson and Sathre, 2006). The mitigation benefit is greater if wood is first used to replace concrete building material and then after disposal, as biofuel. (p.551)*"

FIAT suggest that the Agriculture and Forestry sectors should be given separate consideration for inclusion in an Australian Emissions Trading Scheme - the Forestry and Forest Products sector is much more homogeneous and less fragmented than the Agricultural sector, and most of the potential issues identified in the Issues Paper #1 are more pertinent to Agriculture much more than Forestry.

FIAT is concerned that development of an Australian Emissions Trading Scheme will disadvantage traditional forest growers who would have difficulty demonstrating the financial and business-as-usual additionality required by the AGO's Greenhouse Friendly program for abatement projects. We strongly urge that any additionality requirement be

that proposed by the National Emissions Trading Taskforce being "*that it* (the project) *reduces emissions beyond a plausible baseline*" (page 68, National Emission Trading Taskforce 2006).

FIAT congratulates the Garnaut Review on the compilation of Issues Paper #1, which presents a clear, concise, informed and informative compilation of the issues.

2. About FIAT

The Forest Industries Association of Tasmania (FIAT) is an industry association formed in 1983 to represent the interests of processors of Tasmanian forest products. FIAT was formed out of a predecessor Association, the Tasmanian Timber Association (TTA). FIAT and TTA collectively have provided representational services to the Tasmanian timber industry for in excess of 60 years. Our members' activities are diverse and include:

- the production of veneers, hardwood and softwood timber, pulp and paper;
- woodchip production and export; and
- plantation and native forest management.

FIAT's 18 member businesses include all of the State's larger processors of forest products. They utilise a significant proportion of the crown sawlog output as well as all of the high quality decorative veneer produced in the State. FIAT Members' activities account for more than 75% of the gross value of production in the forest and wood products industry in Tasmania.

Included within the FIAT membership are the State's largest industrial forestry Companies that account for the vast bulk of plantation development and management enterprises on private land in Tasmania and the largest native forest management enterprises in the private sector in this State.

As such FIAT and its members have a significant interest in the development and implementation of an Australian Emissions Trading Scheme and welcome the opportunity to comment on the Discussion paper on Abatement Incentives Prior to the commencement of the Australian Emissions Trading Scheme.

FIAT's role is described in our Annual Report as follows: -

Role:

In addressing its first objective, FIAT's role is characterised by helping to create the right external environment within which industry has to operate. This has two main dimensions - the policy environment and the public image of the industry in the eyes of the community.

The policy environment centres on government legislation and regulations which determine the limits to what industry can do. The policy environment must be tackled at both the Federal and State Level.

Industry's public image rests on public opinion and the various factors which influence that opinion. This is important because public opinion has a strong bearing on the development of Government policy.

In addressing its second objective, FIAT's role is to facilitate discussion and joint action among its membership, to project the membership position in wider forums as appropriate and to encourage other bodies to participate positively in the public debate to ensure that the industry retains a public license to operate.

3. FIAT comments

3.1 General comments

Whilst not certain, there is general scientific consensus that the mankind-induced release of carbon dioxide, methane and other defined “greenhouse gases” are resulting in an increase of the temperature of the earth’s biosphere.

The bulk of current greenhouse gas emissions are the result of burning fossil fuels with the subsequent release of carbon which has been stored outside the biosphere (underground) for between 50 and 200 million years.

Trees and all plant matter are composed of carbon derived from captured atmospheric carbon dioxide through the action of photosynthesis - trees are thus stored atmospheric carbon held together with stored solar energy. Deforestation - harvesting or clearing forests without then regenerating or reforesting the land - releases the carbon stored in forests (in the wood, bark, branches, leaves, roots and soil) back into the atmosphere from where it came.

When a forest is grown, either following harvesting or on ground previously not forested, atmospheric carbon dioxide is captured from the air and the carbon atoms are used as the basic building blocks of plant material, thus the grown forest becomes a store of atmospheric carbon.

There are two fundamental forms of forests from which wood is harvested:

- natural or native forest - regeneration after harvesting is via re-establishment of essentially the same forest structure as existed naturally, generally via techniques which mimic the natural regeneration processes of these forests; and

- plantation forests - established via planting of nursery-grown seedlings as monocultures, usually with intensive management to control competing plants - plantations generally produce around three times as much harvestable wood per hectare per year as native forests on the same site.

Whilst growing trees capture and store atmospheric carbon, even restoring all the forests cleared by mankind will not compensate for the carbon introduced to the biosphere from the burning of fossil fuel - it will only remove the carbon from the atmosphere that was contained in the forests prior to them being cleared.

When forests are harvested to produce wood products, the products thereby produced continue to store atmospheric carbon whilst in use - the stored carbon is only released back into the atmosphere when the wood products are burned or decay.

A combination of sustainably managing forests for wood products, storing the sequestered carbon in wood products in service whilst regenerating the original forest and sequestering additional carbon will enable an overall increase in carbon absorbed from the biosphere for at least the life of the wood products in service.

3.2 The operation of an Australian Emissions Trading Scheme

An emissions trading scheme is being developed for proposed commencement in Australia in 2010 as a primary measure to limit and reduce Australia's greenhouse gas emissions.

Whilst the details of an Australian Emissions Trading Scheme are still being refined, FIAT understands that it is proposed to be a cap-and-trade structure - that is, total emissions are capped, emissions permits are allocated under the cap, and trading of permits is allowed.

FIAT contends that it is imperative that any scheme be as simple and uncomplex as possible to ensure firstly that it is understood readily, and secondly, that the entire carbon accounting/reporting/trading framework is internationally consistent which will facilitate outcomes rather than allow any component to founder due to unnecessary complexity or lack of consistency.

3.2.1 Defining the "cap"

FIAT understands that initially, Australia's emissions cap will be the agreed Kyoto target of 596 million tonnes of CO_2 equivalents, and that the cap will be progressively reduced so that by 2050 the cap will be at 60% of 2008 levels, or a total of 240 million tonnes of CO_2 equivalents.

3.2.2 Allocating permits

Permits to emit, called "Assigned Amount Units" under International Panel on Climate Change (IPCC) definitions, represent the right to emit one tonne of carbon dioxide or the agreed equivalent mass of another greenhouse gas. Permits will be allocated to Australia by the IPCC in the first commitment period under the Kyoto Protocol, and the Australian Government will then allocate permits to organisations within Australia.

It is proposed that initially most emissions permits will be allocated free of change, with the remaining permits being auctioned. In subsequent years, less permits will be given free of change, and more will be auctioned.

FIAT understands that the Australian Government is yet to determine how the income derived from auctioning emission permits will be spent.

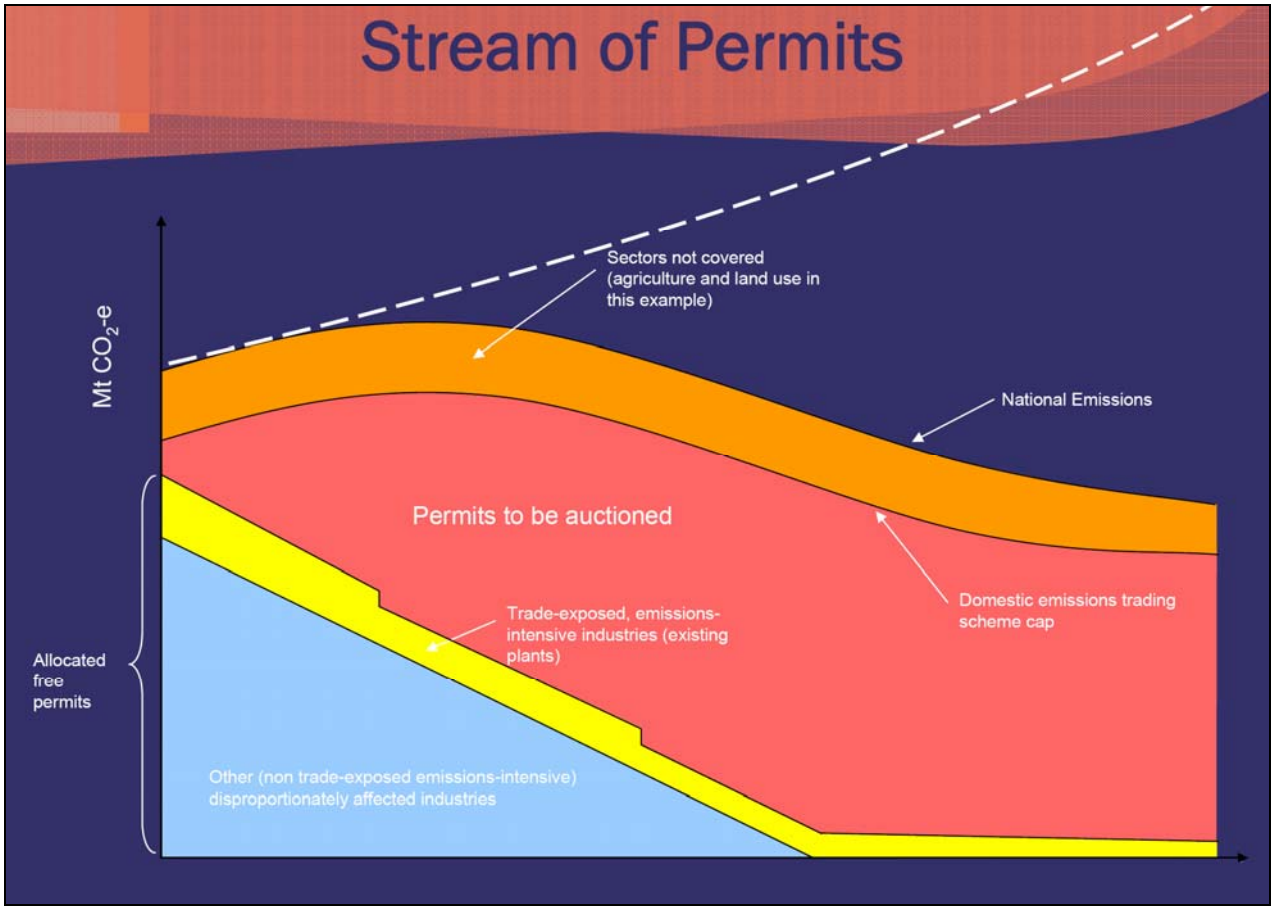

Figure 2: The allocation of free emissions-permits will decline with each year of operation of a trading scheme until only emission-intensive-trade-exposed industries might receive free permits - diagram reproduced from Prosser 2007 after PMC 2007

3.2.3 Offset credits from greenhouse gas projects

FIAT understand that under the proposed Australian Emissions Trading Scheme structured activities that effectively reduce emissions can be defined as abatement projects. The abatement pool will be made up of:

- Carbon that can be demonstrated to have been captured from the atmosphere via:
  - photosynthesis and biomass accumulation
  - geosequestration and ocean sequestration (IPCC defined options for carbon capture and storage)
- Emission reductions under a defined baseline - that is, a facility makes a change in its operating methodology that results in reduced emissions.

FIAT understand that an organisation can generate its own abatement offsets or purchase abatement offsets generated by someone else to either allow for greater emissions or to reduce the need to purchase emission permits.

3.2.4 The effect of an Australian Emissions Trading Scheme on the costs of products and services

The introduction of such a scheme should make emission-intensive products and services more expensive when compared to low-emissions products and services - early results of economic modelling being undertaken by Alison George at Monash University indicates that at a carbon dioxide price of $30/tonne (the cost of emissions permits will be set by the market under a cap-and-trade scheme), the price of aluminium would rise by 18%, cement 16% and steel 5-10%, whilst the price of wood would rise by only 0.2-0.4% (Figure 3), reflecting the different levels of emissions required to produce each material.

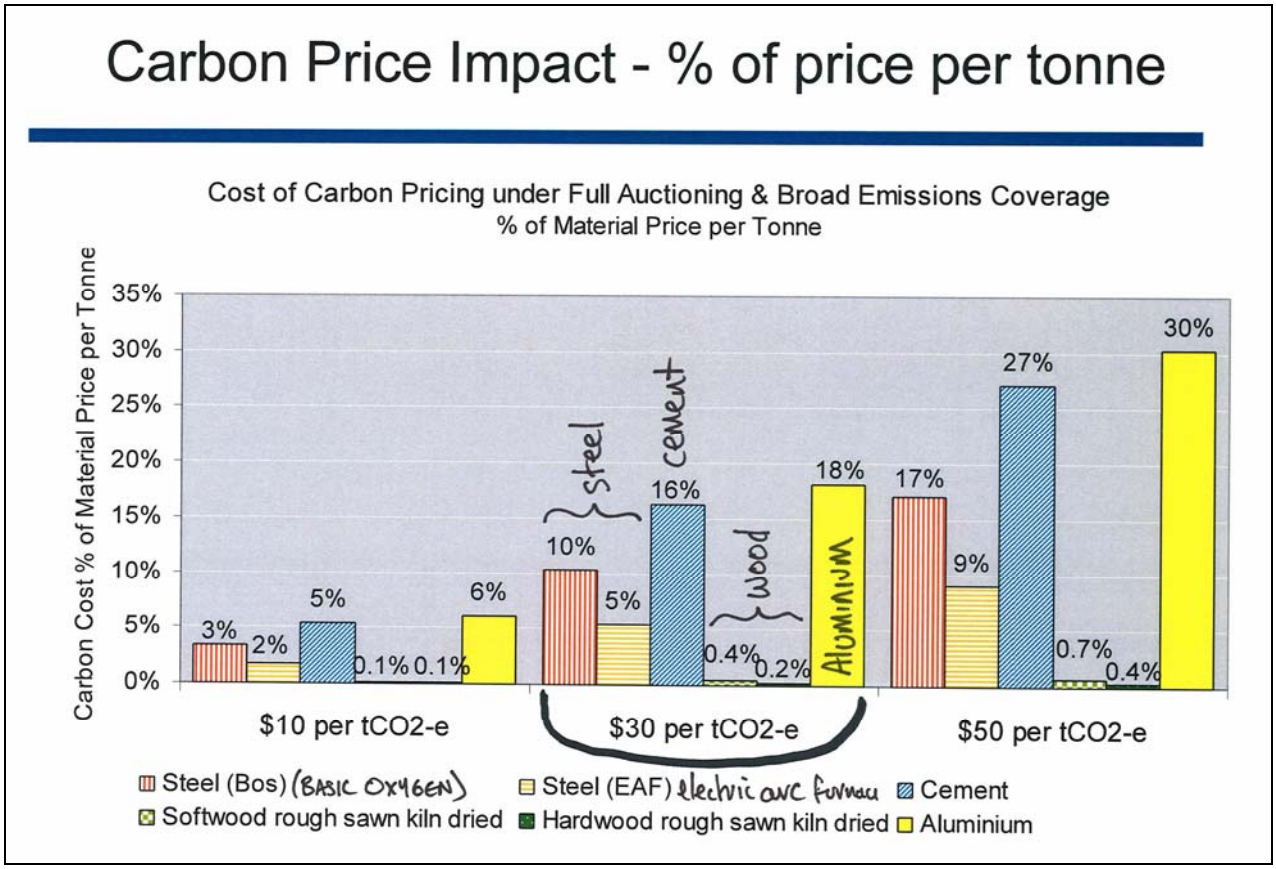

Figure 3: Steel, cement and aluminium will show price increases relative to wood products due to their considerably higher manufacturing emissions under an Australian Emissions Trading Scheme operating with full auctioning of permits - Figure reproduced from presentation by Alison George, 2007.

3.3 Context: Climate change and the agriculture and forestry sectors

3.3.1 Emissions in context

Global human-induced emissions are currently in the order of 50,000 million tonnes of CO_2e per year (46% Annex 1 countries under Kyoto, 54% non-Annex 1 countries) - equivalent to 7.6 tonnes of CO_2e per person per year.

Australian emissions are currently around 530 million tonnes per year CO_2e - equivalent to 26 tonnes of CO_2e per person per year.

3.3.2 Forestry and Agriculture have some fundamental differences

The Issues Paper generally combines the Agriculture and Forestry sectors for discussion and consideration. Whilst these sectors are similar in that that they both involve the growing of biomass for consumption by our society, they are different in many respects and require separate consideration:

- There is considerably less diversity in forestry than there is in agriculture.
- Forestry crops are generally routinely measured to estimate the standing volume of wood.
- It is easier to generalise regarding the stored carbon in a forest crop than it is to generalise regarding the storage and emissions of greenhouse gasses in a diverse agricultural context.
- Forestry crops generally take much longer to reach harvest age than agricultural crops - plantation forests are harvested after 8 to 35 years, native forest crops after 60 to 90 years.

3.3.3 Forestry as an important sequester of atmospheric carbon

The emissions due to forestry activities are reported under the category of Land Use, Land Use Change and Forestry (LULUCF). The Kyoto Protocol reporting rules and the UN FCCC reporting rules differ in respect of the reporting of forestry emissions/sequestrations under the LULUCF reporting category. The key difference being that changes in the carbon stocks of Australia's native forests and Australia's wood products pool are not reported under the Kyoto rules whereas they are under the UN FCCC reporting rules. This is another source of emerging inconsistency that, if not resolved, will ultimately bedevil this process due to confusion and lack of cohesiveness.

As depicted in Box 2.1 of the Issues Paper, the Australian LULUCF emissions-sector showed a negative emission level (i.e. a net sequestration) in 2005 (UN FCCC reporting rules). The LULUCF emission sector, however, includes cropland, grassland, forestry, and the forest products pool, and separating out these sub-sectors more clearly depicts the value of Australia's forests as a sequester of atmospheric carbon. As such we have

redrawn the bar-chart from Box 2.1 (Issues Paper 1) separating the sub-sectors within LULUCF - as shown in Figure 4 below.

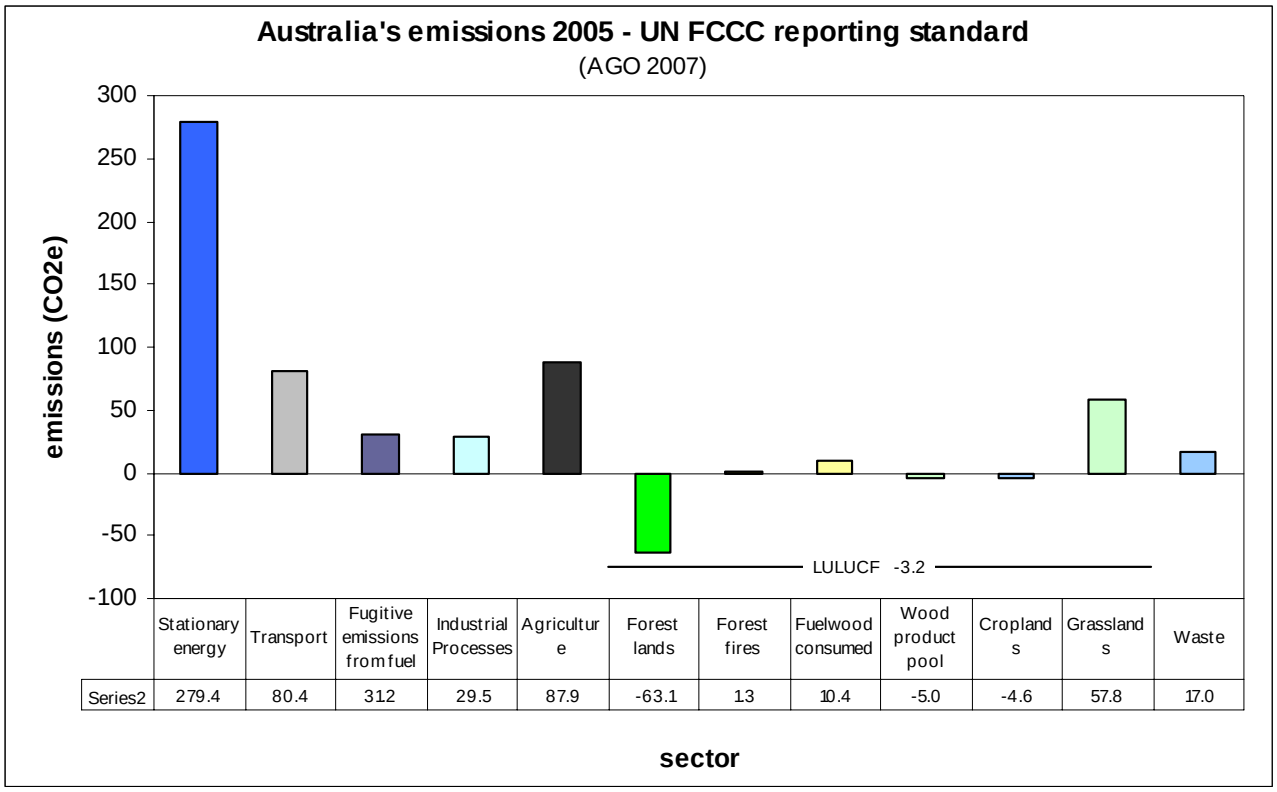

Figure 4: The hidden value of forestry in sequestering carbon dioxide. Australia's 2005 greenhouse emissions, under the UN FCCC reporting standard, depicting an expanded LULUCF sector showing the significant sequestering value of Australia's forests. Data sourced from Tables 2.1, 7.1 and 7.D4, Australia's National Greenhouse Accounts, National Inventory Report 2005 (AGO 2007) - Table 7.1 from the Inventory is reproduced in Appendix 1 for reference.

The emission estimates depicted in Figure 4 were sourced from the AGO's Australian Greenhouse Emissions Information System (AGEIS), and the full set of available estimates for LULUCF from this system are reproduced in Appendix 1 of this submission. The LULUCF sub-sectors depicted in Figure 4 are described below:

- **Forest lands** - a net ***sequestration*** of 63.1 million tonnes of CO_2e by native forests and by plantations established on non-forested land (afforestation), and includes emissions resulting from forest harvesting (being both forest residues and extracted logs but not extracted fuelwood), but excludes changes in carbon stocks occurring due to post wild-fire regeneration;
- **Forest fires**: includes only methane and nitrous oxide emissions from both wildfires and controlled burns (as CO_2 equivalents) - carbon dioxide released by fire is not included as it is assumed to be balanced by post-fire regrowth which is similarly not counted in forest sequestration accounts.
- **Fuelwood consumed**: 10.4 million tonnes of CO_2e ***released*** from the burning of forest-sourced fuelwood;
- **Wood Products Pool** (-5.0 Mt CO_2e) - a net ***sequestration*** due to an increase in the volume of forest products in use: 20 million tonnes of CO_2e were added to the forest product pool in new products (Table 7.D4) suggesting that 15 Mt CO_2e left the pool either through burning or discard to landfill.
- **Croplands** (-4.6 Mt CO_2e) - a net ***sequestration*** of CO_2e by crops.
- **Grasslands** (57.8 Mt CO_2e) - a net ***release*** of CO_2e largely through the continuing conversion of forest and woodland to grassland (56.2 Mt CO_2e).

Emissions from forest fires

The emissions from forest fires can be significant. There is an estimate that during the 2002-03 bushfire season 130 million tonnes of CO_2 was released due to high intensity wildfires - an amount equivalent to one quarter of Australia's reported emissions.

Australia opted not to report on the optional Article 3.4 activities under the Kyoto Protocol on the basis that a forest wildfire in the first commitment period (2008-2012) would, in all likelihood, make meeting Australia's emissions target virtually impossible (DEH - see references).

If Australia's climate changes in the manner predicted there will be increased periods with suitable conditions for high intensity wildfires to occur. Whilst fire is a natural element of Australia's vegetation landscape, increased frequency and intensity of wildfires has the potential to significantly modify existing vegetation community structures.

Methodologies for accounting for emissions resulting from forest fires may need to be refined within the structure of an emissions trading scheme. Currently, under UN FCCC reporting rules, emissions from forest fires are only reported in respect of non-CO_2 emissions on the basis that emitted CO_2 will be re-sequestered, albeit over time, and thus, similarly, net sequestration occurring as a result of post-fire growth is not included as net forest estate sequestration under UN FCCC accounting rules. This net-zero simplification, and particularly the element of the time difference between fire-induced emissions and subsequent regrowth, may need to be refined in order that a financial emissions-related incentive can be attached to fire management within an Australian Emissions Trading Scheme.

3.4 Opportunities for adaptation of Australia's forest and forest products sectors

FIAT sees that Australia's opportunities for adaptation of the Forest and Forest Products sectors include:

- Research to understand the implications of a changing climate on forest productivity, and to determine the most appropriate forest management strategies to deal with the anticipated changes;
- Research to explore possibilities for extending the application of wood products as substitutes for other materials such as metals, masonry and plastics which all result in the release of significantly more emissions in their manufacture;

- Finding ways to ensure that wood products that have completed their serviceable life are segregated, collected and burned as biofuel to utilise their stored solar energy as an alternative to introducing more carbon to the biosphere/atmosphere carbon cycle through the burning of fossil fuels. This will involve evolution in the way we use wood-based materials to include greater consideration of end-of-life utilisation (such as the use of different adhesives or alternative coatings and improved segregation in waste streams);
- Evaluate the ecologically sustainable utilisation of eucalyptus forest systems currently in reserves - sustainable management of these "reserved" forests involving harvesting, thinning, and controlled burning would improve their chances of survival under changing climatic conditions. Australia's natural eucalyptus forests are not static ecosystems, they grow old and die of old age, and they are destroyed by fire only to again regenerate. We need to dispense with the current unscientific notion that we can retain these forest/plant communities by adopting a "passive" approach to management: they will change/die in front of us if we do nothing, and change in ways that may not see them survive without management intervention.

FIAT believe income collected by Government through the auctioning of greenhouse gas emission permits should be used to:

- fund the research into adaptation of forest systems to climate change, and into broadening the use and application of wood-based materials;
- promote the development of wood waste recovery systems for bioenergy applications

3.5 Opportunities for mitigation

Forestry can not and will not be the sole solution to reducing atmospheric carbon.

There are two thrusts to reducing the build-up of greenhouse gasses in the atmosphere: reduction of the volume of emissions; and capturing and storing atmospheric carbon (Carbon Capture and Storage - CCS).

The international community has identified three options for CCS currently considered to be plausible (IPCC 2005): geosequestration (pumping CO_2 into the ground); ocean storage (pumping CO_2 into the ocean); and biosequestration (storing atmospheric carbon in biomass via photosynthesis - such as by growing trees). As stated in the IPCC Fourth Assessment Report (IPCC 2007):

> *"Mitigation options by the forestry sector include extending carbon retention in harvested wood products, product substitution, and producing biomass for bio-energy."* (p.543, IPCC 2007).

In line with the IPCC position, FIAT contend that:

- we should be using more wood products, particularly if they can be substituted for products such as steel, aluminium, plastic and concrete;
- we should be using wood-based residues for renewable biomass-based energy production, residues both from wood processing and from the forest, especially as a substitute for energy production from burning fossil fuels;
- we should be managing our existing and future forests to maximise the sequestration and retention of biomass; and
- we should be cleverer about how we use wood - developing ways to do more with less, for example through development of engineered wood products.

3.5.1 Increasing the use of wood-based products

Wood products are stored atmospheric carbon

Forest-based products are essentially stored sunlight and stored atmospheric carbon. Wood, and all plant biomass, is around 50% elemental carbon by mass (excluding water) (e.g. Table 7.A5, Volume 2, AGO 2007a), the rest being hydrogen and oxygen - a general empirical formula for wood is $C_{21}H_{32}O_{14}$. The carbon in wood (and all biomass)

is derived from atmospheric CO_2, and thus one tonne of dry wood is essentially storing 1.8 tonnes of atmospheric CO_2 (1 tonne carbon equates to 3.67 tonnes of CO_2).

When wood is burned it is oxidised producing CO_2, water and heat (the stored sunlight). A cubic metre of wood generally contains around 0.5 tonnes of biomass (varying with species), which, in turn, contains 0.25 tonnes of elemental carbon. When burned, a cubic metre of wood will release around 0.92 tonnes of carbon dioxide.

When wood or other biomass decays (being decomposed by insects, fungus and bacteria) the decay organisms break apart the molecular bonds holding the carbon atoms and oxidise the carbon to leave carbon dioxide (the process of respiration) in the process releasing and using the stored solar energy. Thus, the decay of wood produces the same greenhouse gas emissions as burning ie CO_2 is released. If biomass decomposes in the absence of oxygen, as can occur in unaerated landfills, methane (CH_4) can be formed - methane has 21 times the global-warming-potential of carbon dioxide per tonne of gas. One tonne of wood can produce around 0.25 tonnes of methane, which has three times the global warming potential of the 1.8 tonnes of carbon dioxide that would have been produced by burning or decomposition with oxygen.

The carbon stored in wood products

The AGO estimates (Table 7.D4, AGO 2007a) that:

- in 2005 there was **350 million tonnes of CO_2e** stored in the wood products (wood and paper) in Australia (i.e. 96 Mt of carbon stored);
- in 2005 the total stored CO_2e in wood products **increased by 5 million tonnes** over the previous year - the result of an addition of 20 million tonnes of CO_2e in new wood products, and thus an assumed subsequent removal of 15 million tonnes in discarded forest products.

The longer that wood products can be retained in the biosphere, the longer that the stored atmospheric carbon dioxide can be kept out of the atmosphere.

Forest management and the wood products pool

Intensive management of natural forests via thinning would promote biomass accumulation on those trees most suitable for solid-wood applications which, when harvested, would maximise the yield of wood products with the longest expected usage life in the wood products pool.

Embodied emissions

The use of wood, as well as being a store of atmospheric carbon, has a significant further benefit of material substitution - that is, when wood is used in an application, another material is not used, and all significant other materials (metals, plastics, masonry, glass and animal products) result in the release of a great deal more emissions in their manufacture than does wood. Many estimates of embodied emissions by material (embodied emissions are the greenhouse gas emissions that are released to produce the product) are misleading because they report embodied emission per tonne of product, when the mass of material required to achieve an outcome (e.g. build a house) differs between materials. Table 1 below depicts the estimated emissions for a house constructed using wood where possible compared to alternative non-wood materials, showing the wood-based house results in the emission of one seventh of the greenhouse gasses as the non-wood alternative construction.

Table 1: Wood-based house construction results in one seventh of the emissions compared to non-wood systems. Embodied greenhouse emissions by construction option for a single storey house in Sydney - in tonnes CO_2 equivalents for the house (source: CRC for Greenhouse Accounting - see references).

Construction component	Option 1	Greenhouse gas emissions (CO_2e)	Option 2	Greenhouse gas emissions (CO_2e)
Floor structure	Timber sub-frame	1.9	Concrete slab	12
Floor covering	Hardwood T&G laid on particleboard	0.4	Ceramic tiles	5.2
Wall frame	Timber	0.4	Brick	6.8
Roof frame	Timber	1.2	Steel	5.3
Windows	Timber	0.8	Aluminium	2.2
	Total	**4.7**	**Total**	**31.5**

A cubic metre of dried-dressed sawn product contains around 0.95 tonnes of atmospheric CO_2 equivalents, and an associated total of 1.8 tonnes of CO_2 can be considered to have been released from the forest and sawmill to produce the sawn wood (the embodied emissions) (Table 2).

Table 2: Sawn timber and greenhouse gas emissions, as tonnes of carbon dioxide equivalents - CO_2e (FIAT estimates).

1 cubic metre of dried-dressed sawn timber product		**tonnes CO_2e**
equivalent emissions of carbon stored in wood		**0.95**
embodied emissions due to:	biomass burned for timber drying in sawmill	0.84
	plant used on-site in sawmill	0.001
	electricity consumed at sawmill	0.004
	biomass loss in forest	0.92
	fuel used forest harvest, transport, regeneration	0.05
	total embodied emissions	**1.81**

Long-term storage of carbon in wood products

An emerging technology gaining interest in Australia is the production of charcoal from wood via a pyrolysis process. The charcoal produced can then be ploughed into agricultural soils where it remains essentially inert whilst improving the porosity, water-holding capacity and thus productivity of the treated soil. The charcoal then exists as a long-term store of atmospheric carbon. The benefits of this process would be maximised if wood products were to be converted to charcoal at the end of their serviceable life.

Another option for removing carbon permanently from the atmosphere/biosphere cycle would be to harvest logs from a grown forest then drop them into the ocean above a deep ocean trench where the logs would not decompose but would become a component of deep ocean sediments. Whilst a viable mechanism for permanently removing carbon from the biosphere/atmosphere carbon cycle, it is a concept that is unlikely to gain widespread support and would deprive the community of access to the fibre that could otherwise have been derived from the logs.

3.5.2 Increasing the use of biomass-based fuels

Wood as an energy source

A dry tonne of wood or other biomass stores around 18 gigajoules of energy from sunlight. A cubic metre of wood therefore stores around 9 gigajoules of energy.

Biomass-based energy is carbon-neutral solar energy.

An appropriately structured Emissions Trading Scheme must allow the emissions associated with burning biomass to be balanced by the atmospheric carbon sequestered in the growth of the biomass.

Options for utilising wood as an energy source

There are a number of emerging and re-emerging energy products of wood and woody residues (both from sawmills and forest harvesting operations) which are gaining interest as unsustainable fossil-fuel-based energy becomes more expensive or less acceptable:

- **Heat** - wood is burned for heat as is used by many sawmills to heat drying kilns - energy capture efficiency can be 85%.
- **Electricity** - heat from burning is used to produce steam which spins generators to produce electricity - energy capture efficiency can be 30%. Around half a megawatt of electricity energy can be continuously produced from a plant consuming 5,000 tonnes of green sawdust per year.
- **Heat + electricity** (cogeneration) - heat from burning is used to generate some electricity (10% energy capture efficiency as electricity) and the remaining heat is available for use (70% energy capture efficiency as heat).
- **Pyrolysis** - wood residues are heated with minimal air to produce syngas (synthetic gas), bio-oil and charcoal, the mix of products being dependent upon operating conditions (air and temperature). Bio-oil has 40% of the heating value of fossil-fuel-based heating oil, syngas has 10% of the heating value of natural gas and charcoal can be used to improve the quality of agricultural soils whilst keeping carbon from returning to the atmosphere.
- **Gasification** - wood residues are heated with small and controlled amounts of air under controlled conditions that turn a high proportion of the wood into syngas. Forestry Tasmania has a small pilot gasification plant intermittently operating at the Tahune airwalk facility where the produced syngas is fed into the air intake of a diesel motor which reduces diesel use for electricity generation.
- **Pelletisation** - sawmill sawdust is dried and compressed into dry (7% moisture content) relatively uniform pellets which can be used in purpose-built furnaces. This technology is gaining prominence in North America and Europe. A limited supply of Tasmanian-made wood pellets are currently retailing in Hobart for $520 per tonne for use in specially designed wood-pellet domestic fire-boxes.
- **Ethanol** - produced from a two-stage process: the breakdown of woody biomass to starch followed by fermentation and distillation to produce ethanol (alcohol). There are no commercial plants in operation but construction is soon to start on a pilot plant in Queensland or NSW. Energy capture efficiency is around 50%.
- **Synthetic diesel** - wood residues are converted to syngas, which is then converted to synthetic diesel using the Fischer–Tropsch process. Synthetic diesel has 90% of the energy value of fossil-fuel diesel. Around 180 litres of synthetic diesel can be produced from a green tonne of woody biomass, with energy capture efficiency of around 70%.

Australia currently produces around 10 million tonnes (green basis) of sawmill residues (some is currently used as fibre for paper production in Australia and overseas). Australia also currently has around 750,000 hectares of eucalypt plantation managed

principally for biomass production which would be (conservatively) capable of sustainably producing in the order of 7.5 million green tonnes of biomass annually. Australia's native forests yield around 5 million green tonnes of wood-chips, as residue from sawlog harvesting, which are currently exported. In total, there is in excess of 20 million tonnes of log-based biomass that could potentially be used for biomass energy production - 20 million green tonnes of wood equates to (FIAT estimates):

- 200 million gigajoules of total inherent energy;
- 17 million megawatt-hours of electricity;
- 4,700 megalitres of ethanol; or
- 3,600 megalitres of synthetic diesel

Sensible end-use of wood products

Australia should not be wasting any wood products. As much as possible end-of-use wood products, being essentially stored solar energy, should be recovered and used as a energy source. An Australian Emissions Trading Scheme should be structure so as to promote the environmentally sensible burning of wood-based wastes and residues.

3.5.3 Increasing the mass of stored atmospheric carbon in standing forests

Only a growing forest is capturing atmospheric carbon - whilst there is an increase in the overall quantity of biomass in a forest system, there is a net capture (sequestration) of atmospheric carbon dioxide. Once a forest reaches maturity, the rate of biomass production is balanced by the rate of decay. A mature forest then remains as a standing store of atmospheric carbon until the forest either dies of old age or the forest is burned in a fire.

Wildfire poses a significant risk to most of Australia's forests - whilst most forest types will survive a high intensity wildfire, the expected loss of biomass and hence the release of resulting greenhouse gas emissions would be high. Many forest types could be managed with controlled low-intensity fuel reduction burns which, whilst resulting in some

greenhouse gas emissions, would have the effect of minimising the likelihood of an extreme fire event, with the net result that in the longer term emissions from fire would be significantly reduced.

3.6 Practical considerations for including agriculture and forestry in an emissions trading scheme

3.6.1 Coverage of the Forestry and Forest Products sectors

FIAT strongly believe that forestry and forest products, including native forest management, plantation forestry and the wood products carbon pool, should be included in an Australian Emissions Trading Scheme. FIAT support the view that "*comprehensive emissions coverage under an ETS maximises the opportunities for achieving mitigation at least cost to the overall economy*" (page 4, Issues Paper 1).

FIAT understands that Australia opted not to report on Forest Management under Article 3.4 of Kyoto Protocol, the principal reason being concern that there is "*an unlimited potential debit (in emissions) from risk of extreme fire events etc. as may occur in 2008-2012*" (p.20, DEH - see references). This is a reporting concern, and not reflective of the global issue of greenhouse gas emissions. In contrast, UN FCCC reporting guidelines include emissions from forest fires and emissions stored in forest products, Australia reports these totals (see Figure 2 and Appendix 2).

The importance of inclusion of the agriculture sector in an Australian Emission Trading Scheme is beyond the scope of FIAT's submission. However, FIAT strongly believes that an ETS that has general coverage of all sectors which either add to or reduce Australia's greenhouse gas emissions, will provide the least opportunity for perverse distortions that might result in either reduced overall emission reductions, or worse still, an increase in emissions. As an example of incomplete coverage resulting in perverse distortions: the Australian Building Code has the energy efficiency objective to reduce greenhouse gas emissions yet does not consider the energy-use or emissions resulting

from materials manufacture, which in the case of concrete and steel are considerable when compared to wood - this is resulting, in some cases, in greater overall emissions due to considerations of only operating-life emissions - see Box 1.

Box 1: Incomplete coverage of emissions accounting results in increased emissions - the example of the Australian Building Code 2007

The existing 5-Star requirements within the Building Code of Australia which, whilst having the "Energy Efficiency" objective being: "*… to reduce greenhouse gas emissions by efficiently using energy.*" (p.73, Volume Two, BCA 2007 - (ABCB 2007)) do not consider **embodied emissions** or **embodied energy**, yet make rules regarding construction methods based upon the estimated **operational energy** usage of resulting structures. The Australian Building Code currently deems a concrete-slab-on-ground floor system to meet 5-Star operational energy requirements, whilst a raised timber floor/sub-floor does not. Yet the embodied emissions associated with the concrete are estimated to be more than six times that of the wooden floor (Table 1 above): for a generic house in Western Sydney the embodied greenhouse gas emissions in the concrete floor as compared to the timber floor would be paid back through operational energy savings in approximately 62 years (AGO 1999) - in Hobart the payback period is around 150 years (FIAT estimate). The requirements of the Australian Building Code are encouraging a shift away from timber floor construction towards concrete, resulting in a net national increase in overall greenhouse emissions, all under the ideology of reducing emissions.

FIAT strongly believe that rational, sensible and transparent coverage of all sectors is in the long term benefit of Australia and the planet. Forestry and forest products sectors are greenhouse positive: the emissions associated with wood are much less than the emissions associated with other products (see Table 1 above) and wood/plant based energy systems are renewable and sustainable (as long as the sun continues to shine).

Whilst there is incomplete coverage of emissions accounting, reporting and trading there remain possibilities for undertaking activities, endorsed and/or encouraged by distorted emissions reporting structures, that are not just ineffectual but can be detrimental and result in net increases in emissions.

FIAT acknowledge that defining the structure of an Australian Emissions Trading Scheme will be complex and demanding, and that the necessary methods for accounting for emissions associated with forestry, forest management, both in production forests and in reserves, and wood products (including the benefits of carbon stored in wood products) is a significant task, but we say not an insurmountable one.

Whilst Australia has now ratified the Kyoto Protocol, we need to be mindful of the limitations of the Kyoto emission accounting framework and not to be unduly restricted by them. Under the Kyoto Protocol, all carbon stored in a standing forest is deemed to be released to the atmosphere at the time of harvest, this clearly is not the case: stored forest biomass shows a decay profile, as do derived forest products. Conversely, under the UN FCCC accounting rules the carbon stored in harvested wood products is counted and reported internationally. An Australian Emissions Trading Scheme must cover all actual carbon flows and stores so that the market for products can truly be considerate of the emissions value of differing products, i.e. the accounting of greenhouse gas emissions must closely reflect the actual emissions associated with activities, not a politically satisfactory version.

FIAT foresees a not too distant future where products (and services) carry certification and labelling which reflect their true associated emission levels - as depicted in Figure 1.

3.6.2 On Abatement Projects: Additionality and Permanence

Whilst not specifically discussed in the Issues Paper #1, previous Federal Government publications (for example the documents for the AGO's Greenhouse Friendly program,

and PMC's Abatement Incentives discussion paper, September 2007), have specified that forest abatement projects would need to demonstrate financial and business-as-usual additionality in order that the forest grower could to be eligible to trade sequested carbon. FIAT strongly opposes the need for financial and business-as-usual additionaility for forest emissions-offset projects, and contends that the additionality requirement be that proposed by the National Emmissions Trading Taskforce "*that it* (the project) *reduces emissions beyond a plausible baseline*" (page 68, National Emission Trading Taskforce 2006) (sometimes referred to as "environmental" additionality) is an appropriate additionality criteria for abatement projects.

The forest industries generally and FIAT membership specifically have long understood the role of forestry and wood products in sequestering and storing atmospheric carbon. To deny forest growers the right to claim the carbon sequestered through their efforts is unreasonable, particularly given the country will be counting the sequestered carbon as an offset for emissions in the internationally reported emissions accounts.

Similarly, the Greenhouse Friendly program requirement for permanence in respect of abatement projects is not an appropriate criteria. Permanence in respect of projects is specified as being 70 years - not very long when considering the bulk of the human-induced greenhouse gases have resulted from the burning of fossil-fuels that have been storing their carbon out of the atmosphere/biosphere for the last 50 to 200 million years. As an Annex 1 country, Australia is required under the Kyoto Protocol to report via annual stock inventories - this methodology should be the applicable framework for projects: that the stock of stored carbon is the carbon for which emissions credits can be issued.

3.7 Trade-exposed emissions-intensive firms

Australia has significant forest products trade with non-Annex 1 countries - and there is high likelihood that some of Australia's forest products trading partners will not be involved in emissions trading.

The pulp and paper sector might be the hardest hit - the price of domestically produced paper will rise to reflect its embodied emissions, yet paper imported to Australia from non-emissions-trading countries will not suffer emissions-related price increases.

A suggested approach for such trade-exposed emission-intensive industries such as paper would be to allocate emission permits freely. This would result in the price of domestically produced paper being low relative to other commodities in order to match the price of imported paper. Such a market distortion is less than optimal as it sends incorrect signals to the local market at a time when the local market will be engaging in product substitution to minimise the cost increases due to emissions.

Another approach would be trade tariffs.

A third approach would be a requirement in some form that trade be carbon neutral.

FIAT submits that economic modelling needs to be undertaken to understand the implications of these options.

4. Further information

FIAT thanks the Garnaut Review for the opportunity to submit comments on Issues Paper #1 and we look forward to further constructive dialogue in the future. Please do not hesitate to contact FIAT for clarification or further information at:

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Appendix 1: Emissions in context

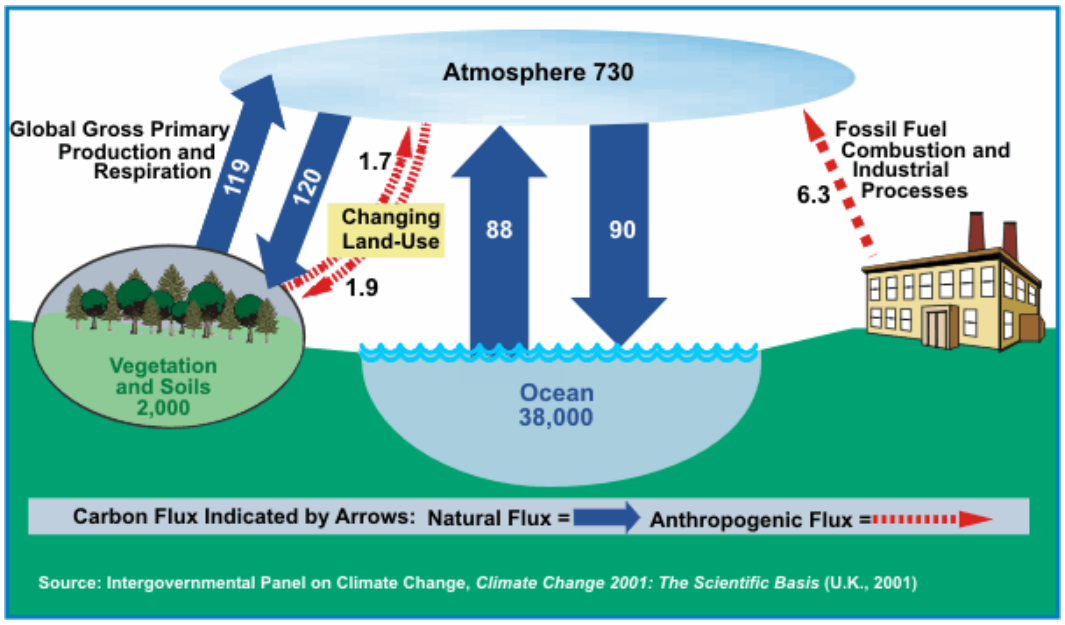

Figure A1 - Gross global carbon flows- may not include non-CO_2 greenhouse gases

Australia's emissions under UN FCCC guidelines - Table reproduced from AGO 2007: Australia's National Greenhouse Accounts - National Inventory Report 2005 - The Australian Government Submission to the UN Framework Convention on Climate Change April 2007.

Table 2.1 Australian net greenhouse gas emissions by sector, 2005

Sector and Subsector	CO_2		CH_4		N_2O		CO_2-e	
	Mt	%	Mt	%	Mt	%	Mt	%
1 All energy (combustion + fugitive)	361.1		1.3		0.008		391.1	
Stationary energy	277.2	73.5	0.1	1.1	0.003	4.0	279.4	53.5
Transport	78.3	20.8	0.03	0.5	0.005	6.2	80.4	15.4
Fugitive emissions from fuel	5.6	1.5	1.2	22.5	0.0001	0.1	31.2	6.0
2 Industrial Processes	23.0	6.1	0.003	0.1	0.0001	0.1	29.5	5.6[b]
3 Solvent and other product use[a]	NA	NA	NA	NA	IE	IE	IE	IE
4 Agriculture	NA	NA	3.2	58.9	0.07	84.2	87.9	16.8
5 Land use, land use change and forestry	-6.8	-1.8	0.1	2.5	0.002	3.1	-3.2	-0.6
6 Waste	0.03	0.01	0.8	14.4	0.002	2.3	17.0	3.3
Total net emissions	**377.4**		**5.4**		**0.08**		**522.2**	

(a) Emissions are included in industrial processes for confidentiality reasons.
(b) HFCs, PFCs and SF_6 are not separately reported here but are included in the CO_2-e totals

Appendix 2: UN FCCC LULUCF reporting for 2005

Table 7.1 reproduced from AGO 2007: Australia's National Greenhouse Accounts - National Inventory Report 2005 - The Australian Government Submission to the UN Framework Convention on Climate Change April 2007.

Table 7.1 Land use, land use change and forestry net CO_2-e emissions, 2005

Greenhouse gas source and sink categories	CO_2-e emissions (Gg)			
	CO_2	CH_4	N_2O	Total
5 Land use, land use change and forestry[a]				**-3,218**
A. Forest lands [b]	-52,758	992	271	-51,495
B. Croplands[c] [d]	-5,191	487	133	-4,571
C. Grassland[c] [d]	56,156	1,327	363	57,846
D. Wetlands	NE	NE	NE	NE
E. Settlements	NE	NE	NE	NE
F. Other Lands	NE	NE	NE	NE
G. Other[e]	-4,999		NE	-4,999

(a) A negative sign denotes a sink. (b) Includes emissions from prescribed burning and wildfires. (c) Includes emissions from biomass burning. (d) The results for 2005 will be revised following the next update of the inventory . (e) Includes Harvested Wood Products

Breakdown of Australia's UN FCCC reported emissions for 2005 under LULUCF (numbers are thousands of tonnes of CO_2e) - extracted from the AGO's Australian Greenhouse Emissions Information System (AGEIS):

Land Use, Land-Use Change and Forestry UNFCCC			**-3218.47**	
Cropland			**-4570.61**	
	Land converted to Cropland		-4570.61	
		Biomass Burning		620.44
			Controlled Burning	*620.44*
		Forest Land converted to Cropland		-5191.05
Forest Land			**-51494.94**	
	Forest Land remaining Forest Land		-29561.65	
		Biomass Burning		1262.96
			Controlled Burning	*304.56*
			Wildfires	*958.4*
		Fuelwood Consumed		10354.94
		Managed Native Forests		-43476.42
		Plantations		2296.87
	Land converted to Forest Land		-21933.28	
		Grassland converted to Forest Land		-21933.28
Grassland			**57846.3**	
	Land converted to Grassland		57846.3	
		Biomass Burning		1689.94
			Controlled Burning	*1689.94*
		Forest Land converted to Grassland		56156.35
Other			**-4999.22**	
	Harvested Wood Products		-4999.22	