Mrs Karyn Paluzzano MP,
Chair of the LA Standing Committee on NRM (Climate Change)
Parliamentary House
Macquarie St
SYDNEY NSW 2000

Attention: Committee Manager - Vicki Buchbach

Dear Mrs Paluzzano

Thank you for the opportunity to provide a submission to the Legislative Assembly Standing Committee on Natural Resource Management (Climate Change) Inquiry into Emissions Trading Schemes.

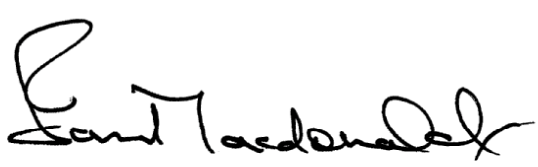
The submission has been jointly prepared by the Department of Primary Industries and the Department of Environment and Climate Change. Notably, the submission addresses each element of the Terms of Reference for the inquiry. It highlights the implications of an emissions trading scheme (ETS) for the agriculture and forestry sectors and discusses in general terms the costs and benefits for natural resource managers of inclusion or non-inclusion in the scheme.

The NSW Government considers that ideally all sectors, should be included in an ETS where this provides the most efficient and cost-effective means of reducing emissions. NSW is interested in further exploring the technical issues associated with coverage of the agriculture and forestry sectors in an ETS.

In relation to transition to the national ETS, the submission notes that transitional arrangements should protect the legitimate business interests of those who have responded to the investment incentives created by the Greenhouse Gas Reduction Scheme (GGAS) as well as maintaining the environmental integrity of greenhouse policy.

Finally, the submission provides a brief overview of some potential economic and environmental implications for NSW of offset activities.

Yours sincerely



**IAN MACDONALD**
**Minister for Primary Industries**

**VERITY FIRTH**
**Minister for Climate Change and the Environment**

**TAB A**

# Joint NSW Department of Environment and Climate Change and Department of Primary Industries submission to

# Legislative Assembly Standing Committee on Natural Resource Management (Climate Change) Inquiry into Emissions Trading Schemes

**Terms of Reference**

That the Committee inquire into and report on the implications for natural resource management in New South Wales of national and international emissions trading schemes with a particular emphasis on:

a) Costs and benefits for natural resource managers of national and international greenhouse gas emission trading schemes

b) Transitional arrangements for participants in the New South Wales emission scheme to a national scheme; and

c) Economic and environmental implications for the State of offset activities.

## Background / Context

At its meeting on 20 December 2007, the Council of Australian Governments (COAG) committed to ensuring an effective national response to climate change, encompassing a single national emissions trading scheme (ETS), a nationally consistent set of climate change measures to support the ETS, and a national cooperative approach to long-term adaptation to climate change. The NSW Government is committed to working cooperatively with the Commonwealth, and the States and Territories, through the COAG process, to implement a national emissions trading scheme by 2010 that drives emissions reductions at least-cost to the Australian economy.

Generally speaking, an ETS with broad coverage will lower the costs of abatement for the Australian economy, and provide for a better distribution of those costs across industry sectors. The NSW Government supports broad coverage, including the agriculture and forestry sectors, but recognises that a lack of accurate, verifiable and cost-effective emissions measurement and reporting mechanisms are likely render these sectors unsuitable for inclusion in the ETS at this time.

The inclusion of agriculture and forestry in the ETS as covered sectors, or as offset providers outside the scheme, will have far-reaching ramifications for

natural resource managers. The NSW Government is working to build the capacity of these sectors to respond to the effects of climate change, and to prepare them for future inclusion in the ETS.

Proposed national Emissions Trading Scheme (ETS)

The Commonwealth Government is committed to a national ETS commencing by no later than 2010, with the detailed scheme design to be completed by the end of 2008.[1] The Commonwealth Government has indicated that the scheme will be a "cap and trade" scheme, whereby:

- total emissions are capped over a period of time;
- permits to emit greenhouse gases are issued up to the level of capped emissions;
- companies participating in the scheme are required to surrender sufficient permits to cover their emissions;
- companies can trade permits to let the market find the cheapest way to meet any necessary emission reductions; and
- businesses can cut their emissions or buy more permits.

The Commonwealth Government has provided the following timetable for development of the ETS:[2]

| | |
|---|---|
| June 2008 | Phase 1 consultation with stakeholders to inform the development of the Green Paper (including consultation with the agriculture and forestry sectors on the question of their inclusion in the ETS and on the timeframe for that inclusion) |
| July 2008: | Public release of Green Paper on scheme design |
| July to September 2008 | Phase 2 consultation on the Green Paper |
| December 2008 | Public release of exposure draft of legislative package |
| December 2008 to February 2009 | Phase 3 consultation on exposure draft of legislation package |
| End 2008 | Firm indication by Government of planned medium-term trajectory for the scheme |
| March 2009 | Bill introduced into Parliament |
| Mid-2009 | Government aims to achieve passage of bill by Parliament |
| During 2009 | Phase 4 consultation on emissions trading regulations |
| 3rd quarter 2009 | Act enters into force; scheme regulator established |
| 2010 | ETS will commence |

The "coverage" of the ETS - the entities that would be liable for their emissions under the scheme - is still to be decided. Activities that are not covered by the scheme may be eligible to create offset credits. The question of whether agriculture and forestry will be included in the scheme as covered sectors or as offset providers is one of the key issues to be resolved.

[1] http://www.greenhouse.gov.au/emissionstrading/about.html
[2] http://www.greenhouse.gov.au/emissionstrading/timetable.html

The NSW Government strongly supports the implementation of a national ETS. Ideally all sectors should be included in an ETS where this provides the most efficient and cost-effective means of reducing emissions. NSW is interested in further exploring the technical issues associated with coverage of agriculture and forestry in an ETS.

International ETS

An international agreement has not been reached on reducing greenhouse gas emissions beyond 2012 or on the introduction of a global ETS. The UN Climate Change Conference held in Bali in December 2007 established the "Bali Roadmap" which lays out a process to negotiate the emissions targets to succeed the limits set by the Kyoto Protocol (under which the current emissions targets expire in 2012). The Roadmap seeks for this negotiating process to be completed by the end of 2009.

Given that there is no current prospect of an international ETS being developed in the near future, the Commonwealth Minister for Climate Change and Water has indicated that the national ETS will be designed to potentially link with other emissions trading schemes globally.

An international ETS could slow and perhaps halt climate change, albeit at higher average temperatures and a different climate equilibrium than exist today. Australia would be a major beneficiary, as various scientific studies have indicated that Australia is particularly vulnerable to unmitigated climate change.[3]

Further work

Considerable analysis, including economic modelling will be required over the coming months as the national ETS is designed to examine the impacts of the ETS on natural resource management and primary industries.

On 17 April 2008, the Primary Industries Ministerial Council agreed to work with the Federal Minister for Climate Change and Water to inform primary industries sectors on the impacts of emissions trading.

The Council emphasised the need to advance strategic mitigation and adaptation issues for the sectors through activities such as regional and sectoral climate change vulnerability assessments and collaboration on research. It was agreed that, as a priority, an economic and industry assessment and analysis of the benefits and costs of scheme coverage for the agriculture, forestry and fisheries sector should be undertaken. It is envisaged that the Victorian Department of Primary Industries would take the lead on this work, with input from NSW and other jurisdictions.

[3] CSIRO, Australian Bureau of Meteorology (2007), *Climate Change in Australia – Technical Report 2007*

The NSW Government, particularly NSW DPI and DECC, is also committed to undertaking necessary economic modelling to assess the possible impact of the national ETS on key NSW agricultural industries.

## a) Costs and benefits for natural resource managers of national and international greenhouse gas emission trading schemes

Natural resource managers

Natural resource managers in NSW include: the NSW Government; local governments; farmers; irrigators; forest operators; mining companies; Catchment Management Authorities (CMAs); and community volunteers.

The major impact of an ETS on natural resource management will be via the effects on agriculture and forestry. However, ETS-induced energy price increases will have some impact on fisheries and other NRM operations.

It is very difficult to accurately estimate the costs and benefits of the national ETS for natural resource managers in NSW until the details of the ETS design are released, including the emissions reduction targets and trajectories.

A key influence on the impact of an ETS will be the decision of the Commonwealth Government as to whether the agriculture, land use and forestry sectors are covered sectors, meaning they would be liable for their emissions. At this stage, it appears that these sectors will be excluded from initial ETS scheme coverage, in part due to perceived measurement difficulties and the absence of a clear model to create a manageable number of points of obligation. Instead, it may be that activities carried out within these sectors, such as afforestation, may be eligible to create offsets that can then be sold to liable parties under the ETS.

In further exploring the technical issues associated with coverage of the agriculture and forestry sectors in the ETS, modelling of economic impacts will be required at national, regional and industry levels. However, some generalisations can be made, as follows.

Costs of ETS

If **agriculture and forestry sectors were to be included as ETS covered sectors**, natural resource managers would face the cost of purchasing and surrendering sufficient permits to meet their net greenhouse gas emissions. The extent of the cost would depend upon the level of the target, emissions trajectory selected and the nature of the business. For example, if agriculture were covered, livestock production would be far more significantly affected than cropping, because livestock production is more emissions intensive.[4]

The potential costs of an ETS if **agriculture and forestry are excluded but are able to participate as offset providers** include:

[4] ABARE presentation to Primary Industries Ministerial Forum, Cairns, February 2008.

1) ***The increased cost of inputs*** including fuel, electricity, chemicals, fertilisers and transport resulting from the inclusion of other sectors in an ETS leading to increased operating costs for farms and forestry operations. Shares of emissions-intensive farm inputs in total farm costs are relatively low, so the indirect impacts of carbon pricing on on-farm costs are likely to be modest in the short-term.[5] Nevertheless, for export businesses, this may have an impact on their international competitiveness.

   This indirect impact will vary depending on the type of agricultural enterprise. Emissions-intensive inputs are estimated to account for 39% of the total costs of cropping compared to 17% of the total costs of livestock production. Therefore the impact of an ETS will be greater on cropping than on livestock industries if agriculture is not a covered sector.[6]

   It is noted that the increased cost of inputs will apply even if agriculture and forestry are not able to participate in the scheme as offset providers.

   ***These costs could potentially lead to reduced international competitiveness***: If an Australian ETS was introduced without similar action overseas, NSW producers competing in export markets and competing domestically against imports would be at a cost disadvantage. Commodity producers are price takers on the world market and would be particularly affected. Such a scenario would most likely result in lower output and lower investment in those sectors in Australia. Carbon leakage could occur, whereby production moves offshore, resulting in an economic loss for NSW producers and possibly poorer overall environmental outcomes.

   The NSW agriculture sector is significantly trade exposed, with about 60% (by value) of agricultural output destined for overseas markets. Some commodities are more trade exposed than others. NSW's most trade-exposed primary industries include beef, wine, wool, wheat, cotton and sheepmeat.[7]

   With respect to forestry, the pulp and paper industry is highly emissions intensive and faces competition in domestic markets from producers in Asia, predominantly from China, Indonesia and Korea. Australia imports an estimated $4,109 million in timber products each year.[8]

   To address this potential impact on competitiveness, the Commonwealth Minister for Climate Change and Water has publicly stated that the ETS

[5] ABARE, Australian Commodities, September Quarter 2007, p. 504.
[6] ABARE presentation to Primary Industries Ministerial Forum, Cairns, February 2008.
[7] ABARE (2007), Australian Commodity Statistics 2007, December; ABARE (2007), Cat. No. 1329.0, Australian Wine and Grape Industry, 2006, January; ABARE (2007), Cat. No. 5368.0, International Trade in Goods and Services, Australia, December; ABARE (2008), Cat. No. 7121.0, Agricultural Commodities, Australia 2005-06, March; ABARE (2007), Cat. No. 7215.0, Livestock Products, Australia September 2007, November; ABARE (2007), Cat. No. 7501.0, Value of Principal Agricultural Commodities Produced, Australia, Preliminary 2005-06, June.
[8] 2005/06 figure from ABARE, Australian Forest and Wood Products Statistics, May 2007.

will be designed with mechanisms to address the competitiveness of trade-exposed emissions-intensive industries[9]. The Garnaut Review also suggests that trade-exposed emissions-intensive industries could be provided with compensation for loss of competitiveness until major competitors have similar carbon constraints.[10] It should be noted that neither the Review nor the Commonwealth Government has proposed a definition of trade-exposed emissions-intensive industries at this stage.

The potential for reduced international competitiveness would apply to agriculture and forestry even if they are not able to participate in the scheme as offset providers, due to increased input costs.

2) ***Market signals and incentives for change:*** If not included as covered sectors in the national ETS, complementary measures may be needed for the agriculture and forestry sectors to mitigate greenhouse gas emissions produced by those sectors.

3) ***Delay in investments to develop improved understanding of emissions measurements*****:** Non-coverage may delay investments to develop improved understanding of emissions measurement and opportunities in these sectors. This in turn may make it more difficult for land managers to create offsets as it could lead to increased transaction costs in demonstrating actual abatement.

Benefits of ETS

The potential benefits for natural resource managers of an ETS include:

1) ***Reduced climate change impact:*** If emissions trading schemes are implemented globally and assist in slowing climate change, this would represent a major economy-wide benefit. The Garnaut Review has suggested that ETS coverage should be as broad as practically possible "in order to provide an incentive for emissions reductions in all sectors, maximise market liquidity, to minimise the costs of an ETS, and to avoid distortions that may result from the exclusion of particular gases or sectors".[11] According to this rationale, it is preferable that agriculture and forestry were covered by the ETS if it is practical to do so, in terms of measurability and transaction costs.

2) ***Direct environmental and financial benefits from the adoption of ETS induced mitigation strategies:*** NSW DPI is currently conducting extensive research into the capacity of soils to sequester carbon, including methodologies for accounting for and measuring soil carbon. Soil carbon sequestration could provide co-benefits for natural resource managers as increasing soil carbon also improves soil moisture holding capacity and

[9] The Hon. Penny Wong, MP, Minister for Climate Change and Water, *Climate Change: A Responsibility Agenda*, address to the Australian Industry Group, 6 February 2008.
[10] Garnaut Climate Change Review, Emissions Trading Scheme Discussion Paper (March 2008), pp. 38-40.
[11] Garnaut Climate Change Review, "Emissions Trading Scheme Discussion Paper", p27

nutrient cycling, which will improve profitability and reduce the impact of drier seasonal conditions.

3) ***Financial benefits for primary industries resulting from new opportunities:*** Primary industries able to innovate, adapt and reduce emissions will have the capacity to benefit financially from an ETS. There are likely to be opportunities for landowners including:

   - providing sites for wind and solar power;
   - production of biofuel from sources such as agricultural crops, forest and crop residues;
   - generation of alternative energy such as capture and use of methane from intensive livestock; and
   - providing wood products to meet demand associated with the increased cost of energy-intensive alternatives.

   Price signals will encourage innovation in production. Innovators may be able to profit from their entrepreneurship by selling expertise and technology to firms in Australia and overseas.

4) ***Providing tradeable emission credits:*** These would be available to farmers who are able to cost-effectively reduce their emissions, provided that transaction costs are kept to a minimum, and further R&D is undertaken to adequately prepare the agriculture and forestry sectors for inclusion in the ETS as covered sectors, or as offset providers outside the scheme.

5) ***Resolution of land use competition*****:** The Garnaut Review has suggested that a market mechanism such as ETS could resolve the competition for land between forests, biofuels and food production.[12] A market for forest offsets or biofuel has the potential to facilitate change in land use from food production to forestry or fuel production. The environmental, social and economic implications of this potential change may warrant attention by the designers of the national ETS.

<u>Participation in offset creation</u>

If the agriculture and forestry sectors are excluded from ETS coverage, opportunities could nevertheless exist to create offset credits for emissions reduction measures. The potential for these sectors to voluntarily create offset credits would depend on the carbon price and the costs of offset creation, which includes:

- the availability and cost of abatement measures which would vary depending on the type of measure and available technology and know-how; and

[12] Garnaut Climate Change Review, Issues Paper 1, "Climate Change: Land Use – Agriculture and Forestry", p. 6.

- the transaction costs for natural resource managers associated with the management and administration of ETS through the creation and sale of offset credits including:

  - measurement and verification of greenhouse gas emissions;
  - reporting costs; and
  - costs of buying and selling permits/credits (including brokerage fees).

  In the case of agriculture, the costs of measurement and verification of greenhouse gas emissions could be particularly high, due to the small and diffuse nature of sources and sinks; high diversity of entities across a diverse range of locations, climates and industries; and high variability of emissions. The same issues apply to a lesser extent to the forestry sector.

  In addition, climatic conditions could see large swings in emission and emissions abatement levels as temperature and rainfall have a major influence on emissions from agriculture. How the ETS offset rules address the management of climate variability would impact on the administration costs of agricultural offset creation. For example, the rules could deal with climate variability through averaging provisions.

## b) Transitional arrangements for participants in the New South Wales emission scheme to a national scheme

Greenhouse Gas Reduction Scheme (GGAS) - Background

The NSW emissions trading scheme is the Greenhouse Gas Reduction Scheme (GGAS). It commenced in January 2003 and was one of the world's first mandatory emissions trading schemes. The scheme aims to reduce greenhouse gas emissions associated with the production and use of electricity. It can be characterised as a "baseline and credit" form of emissions trading (as distinct from a "cap-and-trade" scheme). GGAS covers the electricity sector and carbon dioxide emissions only.

The GGAS imposes mandatory emission limits on all NSW electricity retailers and some generators and large electricity users (known collectively as the "benchmark participants"). The NSW Government has legislated to extend the scheme to 2020, or until an ETS is introduced.

To meet targets, benchmark participants offset emissions in excess of their benchmarks through the surrender of NSW Greenhouse Gas Abatement Certificates (NGACs), which may be created through low-emission intensity electricity generation, demand side abatement (energy efficiency measures), and carbon sequestration in eligible forestry activities (the latter are defined as afforestation and reforestation of NSW land that was cleared before 1990). NGACs are traded by registered companies on the GGAS Registry. Only registered users can own certificates and only companies that are accredited can create certificates.

Currently, there are seven accredited forest offset providers under GGAS, including Forests NSW. Between 2003 and 2006, 1.3 million NGACs have been created from forestry projects. Each certificate represents one tonne of carbon dioxide equivalent.

To date, most carbon sequestration NGACs have been created by Forests NSW. For example, in 2006, 595,731 carbon sequestration NGACs were created, of which 595,307 were created by Forests NSW. [13]

Transition arrangements

The obligations of liable parties and offset providers under the ETS will likely overlap substantially with the obligations of participants under GGAS. The NSW Government has therefore already legislated to ensure that GGAS will end when a national ETS commences.[14]

[13] Helen Fairweather & Annette Cowie, "Climate change research priorities for NSW primary industries: Discussion paper prepared by NSW DPI for the Ministerial Advisory Council on Primary Industries Science", pp. 51-52; ABARE, Australian Commodities, September Quarter 2007, p. 511.

[14] *Electricity Supply Act 1995 (NSW).*

The NSW Government is currently seeking input on the development of high-level principles to guide the transition process from GGAS to a national ETS. It has released a consultation paper, "Transitional arrangements for the NSW Greenhouse Gas Reduction Scheme", which notes that a smooth transition between the two schemes is highly desirable. It is important to protect the legitimate business interests of those who have responded to the investment incentives created by GGAS as well as maintaining the environmental integrity of greenhouse policy.[15]

The NSW Government will seek to develop a transition plan that is:

- effective in reducing greenhouse gas emissions, by maintaining:
    - maximum consistency with the objectives and key design features of both GGAS and the ETS;
    - incentives to comply with GGAS obligations prior to ETS commencement; and
    - incentives to pursue greenhouse reduction projects to the same extent during the transition phase and in the early years of the ETS;
- efficient, by ensuring that the transitional arrangements do not detract from the overall economic efficiency of GGAS and the ETS, in particular to effect abatement at minimum cost;
- fair, by ensuring that investments made viable as a result of GGAS are not rendered uneconomic by the cessation of GGAS and its replacement with an ETS; and
- provides regulatory certainty and confidence in carbon markets, by minimising the economic costs of transitional arrangements and the cessation of GGAS on both the NGAC and ETS permit markets.[16]

[15] NSW Department of Water and Energy, "Transitional arrangements for the NSW Greenhouse Gas Reduction Scheme" (April 2008), p. 1.
[16] "Transitional arrangements for the NSW Greenhouse Gas Reduction Scheme", p. 3.

## c) Economic and environmental implications for the State of offset activities

Offset activities

A carbon offset is a financial instrument representing a reduction in greenhouse gas emissions. Under the national ETS, offset will not be able to be created by sectors covered by the ETS. The agriculture and forestry sectors will only be able to create offset credits if they are not included in the initial ETS coverage. Those sectors covered by an ETS will be required to obtain and acquit permits for all their emissions and any mitigation actions applied within those sectors will reduce the number of permits required.

Offsets are typically generated by sequestering carbon, or by reducing emissions relative to a business-as-usual base case for an emitting activity, Examples of possible offset activities include:

- Forestry projects:
    - avoided deforestation (e.g. protecting existing native trees and shrubs);
    - reforestation (e.g. revegetating farmland, regeneration of native trees and shrub); and
    - afforestation (planting new forests/plantations on previously unforested land).

- Soil management projects:
    - stubble retention;
    - grazing management/conservation;
    - minimum tillage practices; and
    - organic amendments (e.g. the application of biochar).

  (Note: The potential range of projects eligible to create offset credits may depend on the treatment of soil carbon under national and international carbon accounting systems. It is noted that soil carbon emissions are not included in agriculture emissions accounting, nor are they comprehensively covered under the carbon accounting rules for land use.)

- Methane collection and combustion from improved manure management

- Reducing emissions from ruminant livestock – reduced methane emissions from enteric fermentation (e.g. by improved genetics or rumen biota modification).

- Reducing nitrous oxide emissions from soils (e.g. through better fertiliser and land management or soil amendments – e.g. the application of biochar and other nitrification inhibitors).

Other emissions-reduction opportunities

In addition to offset activities, the introduction of an ETS and the resulting permit (carbon) price may provide natural resource managers with opportunities and incentives to undertake further emissions reduction activities. This could include alternative land uses or more efficient energy use including:

- Provision of land for renewable and low-emissions energy
    - wind power;
    - solar power;
    - hydroelectric power; and
    - biofuel.
- Energy efficiency projects:
    - cogeneration;
    - fuel efficiency projects; and
    - energy-efficient buildings.

Implications of offset activities

Any potential economic or environmental impact will be influenced by the emissions price that emerges from the ETS. The emissions price will depend on a number of ETS design parameters such as the emissions reduction target and trajectory, penalty provisions (including any price caps), access to banking and borrowing, and linkages to the international carbon market. All other things being equal, tighter ETS emissions caps and more stringent emissions trajectories will result in higher offset prices which would make more agricultural and forestry offset activities financially viable.

The economic, social and environmental costs associated with offset activities require further examination.

Economic implications

The ability of the agriculture and forestry sectors to act as sources of emissions offsets can reduce the total costs to the economy of meeting the ETS emissions caps.[17]

The cost of achieving carbon offsets in the forestry sector will be influenced by a range of factors including tree species, forestry practices, geographic location, and carbon yield patterns.

[17] ABARE, Australian Commodities, September Quarter 2007, p. 509.

There is little comprehensive information on the supply of low-cost abatement opportunities in the agriculture sector. Offsets in the agriculture sector face similar measurement difficulties to emission sources as they are small and dispersed sites.[18]

Significant soil carbon research is being undertaken by the NSW Government to understand the physical capacity of soil to store carbon and what this may mean in terms of economic value under an ETS.

Environmental implications

*Potential land use change*

Forest offsets have the potential to favour change land uses - notably, the reforestation of land used for agriculture.

An ETS may also result in some land use change within agriculture – for example, switching from food production to biofuel production.

*Spillover benefits*

The Australian Bureau of Agricultural and Resource Economics (ABARE) has noted that some offset activities in agriculture and forestry may provide other "win-win" opportunities through spillover benefits. Examples include:

- on farm vegetation management, which could provide shelter for livestock and crops, reduce the incidence of salinity, and conserve biodiversity, as well as provide opportunities for carbon offsets; and
- preventing or reducing deforestation, creating new forests and implementing more effective land management practices to create offsets have the potential to contribute to more sustainable natural resource management and improved environmental outcomes.[19]

*Impacts of plantations*

Australian studies show that any long-term reduction in water yields due to the development of plantations at a catchment level is minor. At the catchment level, the water yield impact of plantations cannot be measured if the plantations do not exceed 20% of the catchment.[20]

At a local level, the effect of plantations on creek water flows will often be more immediate and evident than at the broad catchment level. Creeks fed by areas on which plantations are established will have reduced water flows and may completely dry out in drier periods.

[18] ABARE, Australian Commodities, September Quarter 2007, p. 511.
[19] ABARE, Australian Commodities, September Quarter 2007, p. 507.
[20] Keenan, RJ, et al, "Plantations and water use: a review prepared for the Forest and Wood Products Research and Development Corporation", Bureau of Rural Sciences, Canberra, 2004, pp.8-12.

Plantation forestry for pulpwood and timber markets is generally not viable in low rainfall areas. The great bulk of plantations in Australia are in regions with an average rainfall in the range of 600-1200mm per annum.[21]

[21] Keenan, RJ, et al, "Plantations and water use: a review prepared for the Forest and Wood Products Research and Development Corporation", Bureau of Rural Sciences, Canberra, 2004, pp.8-12.

## ADDENDUM: Carbon Capture and Storage

While not typically considered in the context of natural resource management, coal is one of NSW's most important natural resources, and the implications of both climate change and of a national ETS for the coal mining industry will be significant.

In relation to costs for the mining industry of a national ETS, it is important to consider that around 70% of NSW's coal production is exported and hence the majority of the coal industry is trade exposed. (noting that the emissions that could be 'captured' in an ETS are those arising from mining, and not from the ultimate combustion of exported coal).

In relation to offset activities, there has been some discussion at a national level about whether carbon capture and storage (CCS) could be considered as a sequestration activity that could be used to provide offsets. For instance, the National Emissions Trading Taskforce proposed in 2006 that CCS be treated as a sequestration activity that can create offset credits.[22] However, the Taskforce later recommended that CCS not be counted as an offset under the national ETS, but as abatement-at-source, as is the case under the European Union ETS.[23] The position of the Garnaut Review on the use of CCS for offset credits is not yet clear.

Carbon capture and storage (CCS) technology is at various stages of development in Australia and overseas, but deployment may still be some years away. Research and development in CCS, including the construction of pilot plants, requires substantial capital outlays with no guarantee of a return.

The coal industry and indeed the broader resource sector are significant export industries for Australia, and play a distinctive role in some NSW regional economies. Accelerated CCS research and development could mitigate some impacts of an ETS.

The Garnaut Review has stated that there is a strong case for structural adjustment assistance to communities dependent on emissions-intensive industries, in the form of assistance to established coal-based electricity generators with early testing and deployment of CCS.[24]

[22] National Emissions Trading Taskforce, "Discussion Paper: Possible Design for a National Greenhouse Gas Emissions Trading Scheme" (August 2006), p. 78.
[23] National Emissions Trading Taskforce, "Possible Design for a National Greenhouse Gas Emissions Trading Scheme: Final Framework Report on Scheme Design" (December 2007), pp. 22-23.
[24] Garnaut Climate Change Review, Emissions Trading Scheme Discussion Paper (March 2008), pp. 6; 54-55.