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Submission to Inquiry into the Carbon Farming Initiative bills

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Executive Summary

The Carbon Farming Initiative (CFI) draft legislation potentially provides an opportunity for Australia's primary industries to participate in the development of a low carbon economy in Australia through a carbon offsets program covering Kyoto and Non-Kyoto carbon credits. Properly implemented with rigorous, cost efficient accounting methodologies and supported by ongoing mitigation research, the CFI could provide an excellent platform for the wider coverage of offsets in future post-Kyoto international climate change agreements.

This submission comes from scientists associated with the Climate Change Research Strategy for Primary Industries (CCRSPI) and the Primary Industries Adaptation Research Network (PIARN). It outlines the measures necessary to facilitate maximum engagement in the CFI by land managers and maximum flow of carbon offsets into the mainstream Kyoto market that we expect to be associated with any national price on carbon

We believe that the success of the CFI and its capacity to make a significant contribution to meeting the national 2020 target of a 5% reduction on 2000 emission levels will depend on the following factors:

- Rigorous, cost effective carbon reduction methodologies accepted internationally, necessary to:
  - allow land managers to participate in the CFI;
  - ensure carbon credits generated can be traded in international Kyoto and post-Kyoto markets.
- Ongoing mitigation research to improve productivity and reduce the carbon intensity of Australian primary industries;
- Ongoing climate change adaptation research, appropriately integrated with the mitigation research, to enable Australia's primary industries to adapt to inevitable climate change and ensure synergistic outcomes are achieved.

The following submission summarises the current state of climate change research and outlines future research requirements to achieve the above outcomes

Current and future international responsibilities of Australia's land based sector

Under the 1997 Kyoto Protocol to the UNFCCC, Australia agreed to limit growth in greenhouse gas (GHG) emissions to no more than 8% above 1990 levels in the first commitment period of 2008-12. In addition to emissions from fossil fuel use and other industrial sources, Australia accounts for release of methane and nitrous oxide emissions from agricultural activities and for GHG emissions from deforestation. These emissions are offset to a small degree by uptake of carbon dioxide from the atmosphere into growing trees in eligible forests planted since 1990. Emissions reductions and sequestration in these areas are called Kyoto credits

Parties to the Kyoto Protocol were able to elect whether or not to report emissions and removals in lands managed for grazing, cropping, revegetation and pre-1990 forests (Article 3.4). Australia, like almost all other countries, chose to omit them from the accounts on the basis of difficulty of accounting at a national and project scale, and the perceived climate risks to permanence. Hence, changes in carbon stocks in these managed lands are called 'non-Kyoto' credits or offsets.

Australia's current favourable position in meeting its Kyoto obligations is largely due to the decrease in land clearing emissions (Article 3.7). The acceptance of these offsets was only possible internationally through Australia meeting rigorous international scientific accounting standards.

There is considerable push for future international obligations ('post-KP') accounting for the land-based sector to be more comprehensive and include all managed lands, so that those offsets such as soil carbon change in agricultural land would have to be reported. This is why the CFI applies the same rigour to non-Kyoto and Kyoto credits. However Australia currently lacks the data, monitoring and modelling capacity to report verifiable changes in carbon stocks, and non-carbon dioxide emissions and removals for agriculture and other land use.

Further investment in research, development and extension (RD&E) is needed to develop the technologies and tools necessary to defensibly and cost-effectively report for both Kyoto and non-Kyoto sources and sinks. Farmers, foresters and other land managers will not be able to fully participate in opportunities for CFI credits in both domestic and international markets without this investment. They will also suffer the more significant threat of loss of profitability due to the introduction of a carbon price. Further, this will translate to a longer term (post-Kyoto) threat to Australia's compliance with the Cancun mitigation target for 2020 of 5% below the 2000 level of emissions.

Current national research programs

The Commonwealth, through the DAFF Climate Change Research Program (CCRP), is currently investing $46 million in an RD&E program to support Australian landholders to mitigate GHG emissions, sequester carbon sustainably and adapt to inevitable climate change. This investment, which largely concludes in early 2012, is supported by very significant co-investment from the CCRSPI partners, research and development corporations (RDCs), state primary industries agencies, CSIRO and universities. Co-investment from these sources has more than doubled the original investment.

The initiative has resulted in a number of nationally coordinated research teams, working collaboratively to produce world class research that is laying the foundation for the nation's future mitigation and adaptation activities in primary industries. Examples include: the Reducing Emissions from Livestock Research Program (RELRP), the Nitrous Oxide Research Program (NORP), the Soil Carbon Research Program (SCRP) and a Bichir Research Program.

To date, the CCRP (and partner) investments have created an extensive network of soil carbon sampling sites across all states and territories (except ACT); a unique network of automated nitrous oxide monitoring sites; a nationally coordinated program researching abatement technologies for the livestock sector; and targeted bichir activities. These outputs have ensured that high quality, internationally recognised, peer-reviewed data is available to develop practical, cost-effective mitigation strategies in synergy with best management practices for sustainable production within crop, pasture and rangeland agro-ecosystems.

Specific achievements of the CCRP research have included:

- Increased accuracy in estimating the impact of a range of management practices on soil carbon change in regional agro-climatic zones.
- Investigation of management activities to improve soil carbon sequestration, such as lower stocking rate and rotational grazing. Preliminary results suggest that there is little if any measureable impact on soil carbon levels.
- Identification of nitrous oxide emission potential (low, medium, high) for Australia's major agro-climatic zones and rural industries, and preliminary emission reduction technologies.
- Practical on-farm strategies for reducing methane emissions from livestock through breeding, dietary supplements and forages.
- Improved methods for comprehensive, rapid and cost-effective measurement of methane and nitrous oxide emissions.

The majority of the CCRP (and partner) investments in these national programs will end in early 2012. The scope of these national research programs range from developing technologies that can be adopted immediately (e.g. improved nitrogen fertiliser management, nitrification inhibitors, dietary supplements, rehabilitation of degraded croplands with pastures), through to those technologies that will be available in the next 5 to 10 years (e.g. plant and animal breeding) and those that will deliver higher levels of abatement, but still require significant development time (e.g. rumen and soil microbial manipulation).

For Australia to be ready to make its case on the international stage and to ensure the CFI is a success it is vital that the investment in these national programs be continued. This will

a) avoid significant loss of research momentum, capability and specialist infrastructure created by the CCRP, and

b) ensure that more significant mitigation technologies continue to become available for adoption and incorporation into the CFI.

Without this investment both the research momentum and capability will dissipate by the end of 2011.

RD&E investment requirements of the CFI

A wide and rapid implementation of the CFI through strong engagement of the nation's land managers is necessary if Australia is to capture the obvious potential of its land based primary industries and make a substantial contribution to the national GHG accounts.

Australia is a geographically large and diverse agricultural landscape, and the CCRP (and partner) RDE investments have captured only a fraction of the enormous breadth and diversity in soils, climate, and management systems both relevant and necessary for a nationally successful CFI.

The potential of the CFI to deliver the desired outcomes to the nation and its land managers can only be achieved if the CFI is supported by RD&E investment that delivers the following:

- An accessible set of technologies and tools that enable landholders to account CFI activities at a scale affordable to them and acceptable internationally;
- Science-based technologies to reduce the carbon intensity of Australian agricultural production while maintaining productivity growth and sustainability;
- Climate change adaptation strategies to respond to inevitable climate change that incorporate CFI activities to produce synergistic outcomes.

The specific research priorities indentified below emphasise the need for more comprehensive long term research and effective communication and education for farmers and agricultural industries. This will ensure realistic expectations for CFI credit opportunities and widespread understanding of the potential impacts on other aspects of farm viability and rural communities.

Specific activities which need to be addressed in future RD&E programs are:

Livestock offsets

A range of technologies are being developed in the CCRP that can deliver options for livestock producers to engage in the CFI:

- Technologies around dietary supplements and forages have delivered some options that can be developed into CFI methodologies with immediate effect. This research should continue in order to evaluate a wider range of forages and supplements, as these are technologies that can integrate readily into the CFI.
- Breeding plants and animals that result in lower livestock emissions is still a few years from being CFI-ready and therefore requires sustained investment to ensure the delivery of these technologies to the CFI.
- Rumen manipulation technologies are still very much in their infancy, but have the potential to deliver the larger and sustained mitigation required for agriculture to meet its share of longer term mitigation targets.
- A number of methods for the comprehensive and rapid, cost-effective measurement of methane are in varying stages of development. These technologies need to be developed further to provide agriculture with improved capability to measure methane from livestock.

Without a commitment to this longer-term investment these mitigation technologies face clear market failure, as there is little incentive for industry to invest on their own.

Soil carbon and nitrous oxide sequestration and offsets

Enhanced soil management offers great potential in terms of on-farm mitigation and adaptation of the agricultural industries to climate change. Research priorities in this area include:

- Investigation of **perverse impacts of management strategies** to increase soil carbon: soil carbon and nitrogen cycles are intimately linked and increases in soil carbon through practices approved under the CFI could significantly increase nitrogen-based GHG emissions in some regions.
- Establishment of **benchmarking, monitoring and sampling sites** for ongoing validation of management options proposed through the CFI. These are critical

for accurate assessment of soil carbon change and nitrous oxide emissions and will provide long term data records necessary for a successful and enduring Use the existing CCRP funded network of geo-referenced sampling sites to establish a geographically diverse, permanent soil C monitoring network to accurately and cost-effectively examine annual changes in soil C in response to management and climate variability.

- Use the existing CCRP funded high resolution automated monitoring sites and establish a geographically diverse, semi-permanent (i.e. mobile) N2O monitoring network, where multiple management strategies can be examined at one location for multiple years.
- Establishment of **regional demonstrations sites** comparing region-specific strategies for increasing soil carbon and reducing nitrous oxide emissions, to support local landholders with their own on-farm experimentation.
- Development of **inexpensive, field-based equipment** for instantaneous soil carbon measureme**nts to replace the current ex**pensive, time-consuming, laboratory-based procedures.
- Investigation of opportunities for mitigation offsets in rangelands vegetation and soil carbon – there is currently a high degree of uncertainty in estimates of credits for these activities.
- Investigation of the potential negative impact of some offset activities on productivity of food and fibre production. Intensity-based accounting for the GHG impact will avoid negative socioeconomic impacts of the CFI.

Forests and woody vegetation sequestration and offsets

Forests will play an important role in climate change and GHG mitigation and sequestration in the future, both locally and globally.

Sustainably-managed forests can play an important role in mitigating the impact of climate change by:

- sequestering carbon in new forests;
- reducing further forest loss and associated greenhouse gas emissions;
- increasing sequestration rates through management practices (e.g. changing rotation lengths or harvesting intensities);
- avoiding deforestation through the retention of woody regrowth on previously cleared land;
- altering in savannah burning practices to avoid late season hot burns;
- providing biomass for energy generation and therefore reducing emissions for fossil fuels. Biomass from sustainably-managed forest is a carbon-neutral

form of energy generation, but will require analysis of appropriate financial incentives, performance and emissions standards and information programs

Research priorities for forest industries include:

- Assessment of and management options for risks to forest carbon stocks that may be increased by climate change; for example, through wildfire, cyclone, drought, pests and diseases.
- Accurate carbon accounting systems for forests at regional or sub-regional scales, especially for non-traditional forest species (e.g. revegetation with mixed native species) in new areas.
- Research into the response of forest ecosystems to potential future changes in temperature regimes, carbon dioxide and water availability, in order to determine potential future impacts and responses to climate change. This will require fundamental physiological research, and maintenance and analysis of long-term historical records of responses to past change.
- Improved carbon accounting systems in woody vegetation to provide industry with the knowledge and tools suitable for use at scales appropriate for effective and efficient carbon trading.
- Social and economic analysis for assessment of policy instruments that provide for effective engagement of local land managers in carbon trading.
- Further develop carbon accounting tools (models and systems) suitable for use at a regional scale that provide forest managers with the knowledge to engage in carbon trading, supported by refinements to models of forest growth that underpin these tools. This includes improved linkages between satellite-based, remotely-sensed data and ground plot measurements that allow verifiable and auditable carbon assessments.
- Improved understanding of changes in soil carbon stocks and non-carbon dioxide gases following afforestation of pasture or cropping land in different environments and soil types.
- Research to support economically and socially feasible, and ecologically appropriate, biomass energy production systems and integrated timber and biomass production systems for different forest production conditions for a range of energy consumers.
- Research to mitigate potential impacts of increased biomass utilisation on water resources, biodiversity, forest productivity and other forest values.
- Quantification of mitigation of methane and nitrous oxide from enteric fermentation and waste management for a range of management strategies for extensive and intensive livestock production.

Submission authors

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