

SUBMISSION TO THE CLIMATE CHANGE AUTHORITY

Action on the land: reducing emissions, conserving natural capital and improving farm profitability – an issues paper

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Summary: For Australia to meet its Paris Agreement commitment, strong climate policies will be required to address the particular challenges facing the land sector. Policies in the agriculture sector should focus on reducing non-CO₂ emissions, increasing soil carbon in agricultural areas for agronomic benefits, and protecting and enhancing storage in long-term carbon stocks, such as agroforestry and native forests.

Overarching considerations: Under the Paris Agreement, all sectors need to approach zero emissions as soon as possible. The exception to this rule is the agriculture sector, where residual emissions will remain for food production. The land sector (agriculture and forestry) is also the only sector with the potential for emissions removals, although these can be difficult to achieve and subject to reversal. Research shows that although the agronomic benefits from sequestering carbon in agricultural soils are significant, the climate mitigation benefits are limited due to the potential for reversal and difficulty increasing soil carbon with long residence time (Lam *et al.* 2013; Powlson *et al.* 2011). Woody biomass represents a higher potential for sequestering carbon and maintaining a carbon stock. Australia, with some of the most carbon-dense native forests in the world (Keith *et al.* 2009) has a unique opportunity for carbon removal through native forest restoration.

General topics:

The agriculture sector, its challenges and opportunities including improving productivity, climate change impacts and natural resource management (NRM)

The most significant emissions reductions in agriculture can be achieved through focusing on permanent reductions of non-CO₂ emissions. Methane comprises the major proportion of the emissions from the agricultural sector and represents waste in terms of conversion of feed into livestock growth. Further research into reducing methane emissions including dietary improvements, research into rumen biology, and the genetic contribution to methane emissions could contribute to substantial permanent reductions in agricultural emissions while improving the efficiency of livestock systems. Similarly, reductions in nitrous oxide emissions mean improvements in the nitrogen use efficiency of farming systems. Promoting management practices, including precision agriculture, that reduce nitrogen losses will have multiple benefits including reduced emissions, reduced costs, and environmental co-benefits such as improved surface water quality.

Options to involve the private sector in creating new markets for NRM outcomes and environmental services

With the Paris Agreement, the market for international offsets is likely to decline, given that all countries now have binding mitigation obligations. The small emissions budget for achieving the

Paris Agreement target of 'well below 2°C' requires rapid emissions reductions in all sectors, meaning that while trading of emissions to maximise cost efficiency may continue, offsetting will need to be phased out.

Enabling and redirecting private sector investment to fund sustainable land use at scale provides promising alternatives to reduce emissions and increase productivity in the agriculture sector. Innovative financial mechanisms to 'green' land-use investment flows include natural capital bonds, greening commodities, subsidy reform, and aggregated financial risk schemes. A particular issue in the agricultural sector is matching diverse production activities to standardised financing and insurance schemes, where innovative investment strategies focused on sustainability can increase rate of returns (McGrath and Murray, 2016). Finally, there is an urgent need for redirecting research investment from input based to sustainable agriculture, notably agroecology (DeLonge *et al*, 2016).

Consultation questions

Q.1 Are there particular land sector abatement activities, or data on land sector abatement costs, that the Authority should consider when conducting the research?

Branca and others (2015) estimate the benefits of improved agronomic practices, integrated nutrient management, tillage and residue management, agroforestry, and water management for tropical-dry and tropical moist climate zones. Improved agronomic practices and integrated nutrient management gave the most benefits in an analysis based on conditions in Malawi, but the findings have relevance for some regions of Australia. Aertsens *et al.* (2013) demonstrate that agroforestry is the measure with the highest mitigation potential in European agriculture (90% of mitigation potential of measures studied). Further research on the mitigation potential of agroforestry in the Australian context is warranted (Doran-Browne *et al* 2017).

Q.3 How can the government, non-government and private sectors address these challenges?

Strong policy for addressing climate change and meeting Paris Agreement commitments will address all of the four challenges outlined. Ambitious policy goals and policy certainty regarding climate change will reduce emissions, reduce climate impacts, conserve natural capital and ease the task of increasing productivity. Meeting demands for increased productivity will become increasingly difficult as climate impacts associated with high emissions scenario develop. Rapid emissions reductions will reduce the expected climate impacts to both agricultural yields and natural capital (Shaw *et al.* 2011; Tebaldi and Lobell 2015; Monier *et al.* 2016). Research into profitable ways to increase soil carbon and implement agroforestry practices, particularly in a drying climate, would be useful in meeting productivity and sustainability challenges.

Q29: What role, if any, could soil conservation laws, policies and agencies play in promoting land management practices that increase the storage of carbon in soils?

We strongly recommend that soil conservation agencies encourage increases in soil carbon on agricultural lands for farmers' own benefit. Soil carbon provides substantial on-farm benefits (Meyer *et al.* 2015), including increased water-holding capacity, increased nitrogen mineralisation, improved soil structure and porosity and increased yield potential (Stevenson and Cole 1999; Wander and Nissen 2004; Rice *et al.* 2007; Lal 2011). Providing incentives and removing barriers for farmers to increase soil carbon for their own benefit would provide productivity and mitigation benefits without the risks associated with trading carbon credits.

Q30: What barriers exist to uptake of soil conservation projects through the ERF?

A number of barriers exist that discourage uptake of soil carbon conservation projects through the ERF. Increasing soil carbon can be an expensive undertaking on Australian farms, as it can require investments in new equipment, higher nutrient inputs (Carlyle *et al.* 2010; Kirkby *et al.* 2011; Lam *et al.* 2013) or additions of costly organic amendments (Sale *et al.* 2012). There are added expenses associated with monitoring and verification, if these increases in carbon are to be traded (Smith 2004; Sanderman *et al.* 2010). There is also substantial uncertainty in projected future precipitation trends in Australia (Timbal *et al.* 2017). If the climate continues to dry, meeting carbon management commitments will be even more difficult and likely require trade-offs, such as reducing stocking rate, that could impact farm profitability (Moore and Ghahramani 2013). The risks associated with meeting targets and the potential trade-offs pose large risks that far outweigh the potential benefits of trading soil carbon offsets. There are also limitations in the extent to which methodologies can generate carbon offsets even in the current climate. For instance, it is likely that in high productivity systems in areas with relatively high rainfall, carbon uptake by the soil will not be enough to offset emissions associated with grazing (Meyer *et al.* 2016). Given all these limitations as well as concerns that increases in soil carbon not be used to allow other sectors to continue emitting, incentivising increased soil carbon for increased productivity and on-farm benefits should be considered the primary policy driver.

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