

Agriculture & Land Sector Decarbonisation Plan - Discussion Paper

GRDC Feedback - December 2023

Introduction

The Agriculture and Land Sectoral Plan specifically targets Scope 1 emissions arising directly from agricultural and land-related activities, as well as those linked with energy, fuel, and electricity consumption (comprising scope 1 and 2 emissions). Other plans include scope 3 emissions.

According to the National Greenhouse Account (NGA), the agricultural sector accounted for 16.8% of national greenhouse gas (GHG) emissions in 2020-21. This is expected to increase as other sectors (e.g. electricity) adopt more readily available and cost effective abatement options. Approximately two thirds of agricultural emissions are attributed to enteric methane followed by contributions from agricultural soils and manure management.

GRDC Feedback

- i. GRDC welcomes the opportunity to provide feedback and supports the direction outlined for the grains industry.
- ii. GHG accounting conducted by CSIRO indicates Australian grain has some of the lowest GHG emissions intensity compared to other exporting nations. Research suggests there are opportunities to reduce grains GHG emissions and emissions intensity, but net zero may be difficult to achieve without reducing production – Australian Grains Baseline and Mitigation Report, CSIRO (2022)
- iii. Over the past two years, GRDC has engaged with the National Farmer Federation (NFF) in the development of the Australian Agricultural Sustainability Framework (AASF). GRDC is supporting Grain Growers Limited (GGL) and Grain Producers Australia (GPA) who are seeking to finalise and implement a sustainability strategy for the grains industry.
- iv. ‘Thrive for Future Generations’ is a key pillar of GRDC’s RD&E strategic plan (2023-2028) targeting programs at the farm level (scope 1) which accounts for the bulk of emissions. GRDC estimate about 25% of the investment portfolio is delivering environmental benefits (including GHG emissions), including investments (totalling \$88M) to mitigate GHG emissions intensity for grain growers. Investments categories include soil carbon, N fertiliser manufacture, legumes and N fixation in rotations, optimised fertiliser management, Precision Agriculture and controlled traffic farming, machinery optimisation, and GHG emissions measurement.
- v. GRDC continues to work with DAFF and DCCEE, along with GGL and GPA, to undertake R&D that informs policy and regulation.

The need for higher levels of ambition

Climate change is already affecting Australia’s producers and the environment. Reducing emissions is critical for reducing future climate risks for the agriculture and land sectors, as well as ensuring our industries are well-placed to compete in global markets. Australia is committed to acting on emissions and both the agriculture and land sectors have an important role to play in supporting our national contribution to global efforts.

Q1 *What are the opportunities to reduce emissions and build carbon stores in agriculture and the land?
What are the main barriers to action?*

Opportunities

The current and emerging technologies to improve production efficiency, lower emission intensity, meet yield potential, and maintain (or build) soil organic carbon and fertility include: optimised application of inputs using variable rate practices and sensor technologies, N fixing (legume) rotations, nutrient balance and budgeting strategies, enhanced efficiency fertilisers, cover crops and green and brown manures, amelioration or restoration of soil condition, soil pH modification, controlled traffic, low emissions machinery, N fixing bio-fertilisers, plant genetics and integration of on-farm energy.

To accelerate the rate of development and adoption of alternative renewable energy sources utilise: a) existing grower networks; and/or b) develop incentive schemes.

Barriers

There is considerable uncertainty as to which on-farm practices can achieve emissions reductions because of system complexity, high spatial and temporal variability, imperfect models, and recognition that emissions factors are generic. The marketplace is awash with products and practices recommended to sequester soil carbon and/or lower emissions, but most lack credible evidence to substantiate claims.

There is an emerging GHG service industry with a rapidly growing number of different and disconnected tools and services. An increasing number of grain growers look to these services to support their low emissions transition and to inform decisions around whether to enter market or credentialing schemes. An investment pioneered by GRDC through Agriculture Innovation Australia (AiA) and subsequently supported by other RDCs, *Know and Show Your GHG Emissions – Environmental Accounting Platform*, is looking to address this barrier by becoming the 'one source of truth' for multiple agricultural commodities, and is due for launch February 2024.

There are limited options available to build soil organic carbon in a meaningful and significant way in grain production systems. GRDC is investing in proof-of-concept research to evaluate options to increase soil organic carbon in grain production systems (2023-2027).

Q2 *How can we progress emission reduction efforts whilst also building resilience and adapting to climate change?*

The manufacture of N fertilisers from renewable energy (not fossil fuels) is possible and significantly lower pre-farm (Scope 3) emissions, however, this is currently cost prohibitive in Australia. Production of regional low-cost green N fertiliser may transform productivity, and therefore, lower emissions intensity from grain production systems if, and when, the cost of manufacture is materially lowered. There are multiple innovations underway to progress this technology. Government initiatives which support and encourage production and adoption of Australian made low-carbon N fertilisers will be important.

Emission reduction measures should quantify on-farm productivity and profitability impacts, so growers and communities know potential trade-offs. Regionally determined marginal abatement cost curves will de-risk decision-making, incentivise adoption, valorise on-farm practice change and identify emerging opportunities.

Building on existing effort and knowledge

There has already been significant action taken by industry, governments, First Nations peoples, local and regional communities to address climate change.

Q3 *Are there initiatives or innovative programs underway that could be applied or expanded on at a national scale?*

GRDCs Sustainability Initiative (released May 2023) [<https://grdc.com.au/about/our-industry/sustainability>] serves as a comprehensive framework to address the 'triple bottom line' and the need for healthy profits, planet and people. The Initiative is comprised of six science-based workstreams; GHG emissions accounting, GHG mitigation, carbon sequestration, soil health, environmental services, and social and human capital. A list of investments recently contracted under the Sustainability Initiative are listed in Appendix 1. Future investments focused on achieving the Initiative include reducing emissions intensity

through optimised fertiliser management e.g., use of enhanced efficiency fertilisers, variable rate practices, inclusion of legumes into crop rotations. Furthermore, GRDC is committed to quantifying GHG emissions representative of Australian grain production systems, aligning with the broader goal of sustainability.

A significant focus is placed on soil management strategies to enhance soil health outcomes e.g., soil fertility and crop productivity, soil carbon sequestration for systems resilience. These efforts are well aligned to the objectives outlined in the National Soil Strategy. Additionally, GRDC's investments extend to addressing environmental services, contributing to the overall health of the ecosystem, and enhancing social capital within the grains industry.

GRDC is committed to investing in supporting communities and social licence that assists grain growers, their employees and their local community e.g., capacity and skills, safety and well-being.

GRDC has established long term trials (>10 years) across Australia from which we can measure and model GHG emissions of farming systems varying in, but not limited to, fertiliser management, crop diversity and frequency. Government investment could expand this network, to identify and quantify levers that impact GHG emission at the regional scale.

GRDC is considering an investment in a major program that is envisaged to demonstrate farm-scale benefits to monitoring, managing, and reporting GHG accounts, including practical options (existing and emerging) to lower emissions intensity, improve production efficiency, and capture value. In principle, the 5-year program has attracted interest in matching co-investment from multiple science and state agencies to create a nationwide trusted body of evidence to support and inform grower decisions, regulation, and policy. The program is designed to leverage existing regionally based activities and ensure consistent approaches and credible national GHG data insights and analytics. The program will aim to provide a national platform for assessing tools, techniques, technologies for GHG abatement and reporting.

We note the recent successful funding announcement for the Zero Net Emissions (ZNE) CRC which has a whole of agriculture focus. GRDC understands that the ZNE program will aim to measure and validate emissions sources and sinks, and through research programs develop and de-risk a pipeline of new emissions reduction technologies and practices to support an accelerated transition to lower intensity emission pathways across multiple agricultural industries. GRDC will work with the CRC to identify synergies between GRDC programs and ZNE CRC, including marginal abatement cost curves, adoption research, impact from data outputs and continued market access, addressing data gaps and informing indicators, sharing models and decision support tools, standardised protocols, data guidelines and standards, and co-location of activities.

GRDC is investing to quantify emissions stemming from the decomposition of multiple crop residues which better reflect the emissions intensity of Australian grain production systems, because it is disaggregated based on environmental factors (e.g., climate, crop type, soil type). Government support would enhance and broaden the impact of this investment to consider management-related factors (e.g., N application rate, stubble management) affecting N₂O emissions from crop residue decomposition.

GRDC recently went to market to evaluate project opportunities for Enhanced Efficiency Fertilisers (EEF) (nitrogen). Major fertiliser companies are currently investing in proprietary research programs to validate the use of these products in the Australian market. To this end, Fertilizer Australia, recently released a white paper for Government consideration. Despite EEF's being around for decades, they are currently receiving extraordinary attention in Europe to reduce N leaching. Unfortunately, due to different production systems and climatic zones, key learnings for Australia are not directly transferrable. To ensure informed decision-making for Australian grain growers, it is imperative to secure significantly more investment for independent EEF trials, as the current data landscape remains limited.

Q4 *How can the Australian Government bring together existing effort and new initiatives into one coordinated plan?*

To consolidate existing efforts and new initiatives into a unified plan, the Australian Government can establish platforms that promote collaboration and ensure consistent approaches across various agricultural

sectors. The initiation of the AASF and Know and Show has, to some degree, laid the groundwork for this coordinated effort.

Opportunities to reduce emissions

Q5 *What are the most important options to be further adopted or supported, looking in the short and the longer-term?*

Improved GHG inventory methods/approaches (i.e., moving towards increasing adoption of Tier 2 and 3 methods) across the agricultural sector, to ensure more accurate and specific data, to reduce uncertainty and facilitate implementation of GHG emissions reductions. That is, GHG accounting is regionally and/or locally specific for Australian agricultural production systems.

In short to medium term, increased testing of blue-sky innovative technologies with end users and the commercial sector.

Support a data governance framework (to produce trusted and interoperable emissions-related data sources. Collation and curation of a measurement catalogue should allow a data model to be shared by partners ensuring consistency and compatibility across the agricultural sector.

Q6 *What are the practical solutions to increase uptake?*

Multiple channels of delivery for regionally based evidence and guidance. Participatory action research to engage grain growers and service providers can:

- demonstrate the linkage between production efficiency and reducing emissions intensity,
- identify the range of market opportunities available to capture value, including how to assess their suitability, evaluate risks and effectively comply with data and reporting requirements, and
- determine emissions intensity benchmarks and marginal abatement cost curves for existing and emerging practices relevant to the region.

Successful strategies and best management practices that can be replicated in other regions, contributing to the broader scale-up of low-emission intensity and sustainable practices in agriculture.

Developing emission pathways

The plan will explore different ways for agriculture and land to contribute to whole-of-economy emission goals, whilst also delivering on national priorities that include a profitable and productive future for agriculture, and sustainable management of Australian landscapes.

Q7 *How do you see the agriculture and land sectors contributing over the medium and longer-term? What are the opportunities to deliver emission reductions in parallel with wider goals?*

The grains industry is supporting emission intensity reduction through:

- improvement in farmer literacy in GHG accounting to drive uptake of the use of accounting tools across farming businesses,
- collation of data to support the development of regional and state benchmarks,
- principles for long-term and tactical management of emissions intensity, including collection of emissions data combined with seasonal projections to calculate the cost- and abatement- benefits from the implementation of on-farm practices, and
- adoption of existing and emerging practices and technology to support on-farm emissions measurement and management.

Industry is collectively promoting grain production for enhanced trust within rural and urban communities, and thereby improve social license among customers and consumers.

Supporting and enabling change

The plan will explore ways in which the Australian Government can help to accelerate emissions reduction in agriculture and increase carbon storage in the land.

Q8 *How can the Australian Government better support agriculture and the land sectors to:
a) drive innovation, b) build capacity, c) ensure the system enables emissions reduction?*

There is a need for greater national coordination and collaboration to improve efficiency and quality of research and data and enable more rapid adoption of low emissions strategies.

Q9 *What new initiatives could the Australian Government design that would support emissions reduction and carbon storage in agriculture and land and help ensure a productive, profitable, resilient and sustainable future for agriculture and land sectors?*

Understanding the scale and complexity of the challenges along the supply chain is critical to designing initiatives for broad adoption or coverage. An evidence base of trade-offs, scalability, and commercialisation of technical innovations for key emissions sources is important for maintaining credibility and momentum.

A roadmap will help align efforts for practice change, not only tools needed but incentives for commercialisation of those at scale.

Practical measures, technologies and incentives and intense support are needed for rapid change at the farm level.

Strong industry leadership and input is required to guide Government policies and plans that affect the supply chain.

Q10 *A consistent and trusted approach for assessing and reporting emissions is often raised as a barrier to reducing emissions. Is there a role for the Australian Government in addressing this concern, and how can producers and land managers be supported?*

There is an opportunity for more active data sharing among relevant stakeholders. Data sharing through the AiA Environment Accounting Platform tool will enable this.

Q11 *What skills, knowledge and capabilities do you think producers and land managers need to implement change? What information and data would help them make decisions about emissions reductions and sustainable land management in the short and longer-term?*

Skills, knowledge and capabilities

Growers and advisers need to be able to calculate enterprise GHG account, emissions intensity, and understand the principles of low emissions agriculture.

They can then manage profit and emissions at the enterprise and production levels by understanding the practices to reduce emissions intensity and the interaction between profitability and sustainability.

They need to be cognisant of the approaches to capture value from managing GHG performance.

Information and Data Required

Growers need to efficiently and cost-effectively collect the required data to populate enterprise GHG accounts and/or enter market-based schemes.

The industry requires GHG activity data and emissions factors that are representative of Australian agricultural production systems, with a view to adopting higher tier inventory methods (i.e., Tier 3) through support for the collection and collation of robust (internationally recognised) scientific evidence required to underpin such revisions.

Appendix 1: List of GRDC investments instigated under the Sustainability Initiative (code and title). Note that another 8 investments are currently under negotiation and close to contract execution.

AGI2211-001OPX: Know and Show GHG Emissions: Environmental Accounting Platform.

ATC2306-002CAX - Ecosystem services - markets and opportunities for Australian grain growers (consultancy).

CSP2006-011RTX: Grains sector GHG baseline and mitigation project.

CSP2207-002RTX: Communication and outreach of the insights from the grains sector GHG baseline and mitigation project.

CSP2302-011RTX: Options to increase soil organic carbon in grains production systems.

RAI2303-001CAX: Impact of GRDC research on socio-economic resilience of regional communities.

SCU2307-001RTX– Regenerative Agriculture: understanding the intent, practices, and benefits.

UOQ2204-010RTX: Predicting nitrogen cycling and losses to enhance modelling.

UOQ2307-004: Assessing engineered microbial communities to reduce nitrous oxide emissions in soils.

UOQ2307-003RTX: Developing methodologies for crop and farm level alignment with Australian Sustainability Frameworks.

VCQ2311-001SAX: Joint-RDC Community Trust Program - Grains Focal Study.

Wildfire Energy (GrainInnovate): Converting farm crop residues into green hydrogen suitable for ammonia synthesis and for use in fuel cell vehicles.