SUBMISSION

Submission to the Department of Agriculture

Submission to the Agriculture and Land Sectoral Plan

13 December 2023

The Australian Academy of Technological Sciences and Engineering (ATSE) is a Learned Academy of independent, non-political experts helping Australians understand and use technology to solve complex problems. Bringing together Australia's leading thinkers in applied science, technology and engineering, ATSE provides impartial, practical and evidence-based advice on how to achieve sustainable solutions and advance prosperity.

As Australia moves towards a net zero economy, the agriculture and land use sector has an opportunity to lead the charge – both nationally and internationally – to ensure a sustainable future. The land use sector has been the main driver of Australian emissions reductions to date, and has become a net carbon sink (The Treasury, 2023). This has helped Australia to meet its Kyoto commitments and is keeping Australia on track to meet its Paris commitments, while enabling Tasmania to become the first state with net zero emissions (DCCEEW, 2022). Australia advocated for the inclusion of the agriculture and land sector within these international agreements, including through Article 3.4 of the Kyoto Protocol. While the success in this sector is important it must also be recognised that methods such as soil carbon capture have limits, as explained in ATSE's previous work on Australia's soil carbon opportunities and risks. Between 1999 and 2006, the Australian Government invested in a Collaborative Research Centre (CRC) for Greenhouse Accounting, which provided much of the research underpinning the sector's successes in emissions reduction.

ATSE commends the Australian Government for beginning this work to develop six sectoral plans to reduce emissions across Australian industry, and for its initial focus on the agriculture and land use sectors that will play a vital role in any emissions reduction plan. As the agriculture and land use sector manages around 50% of the land in Australia, leadership from the agriculture and land sector will pave the way for other sectors in creating real reductions in emissions without the use of carbon credits - supercharging new economic opportunities and ensuring the sector remains competitive in rapidly changing international food, beverage and fibre markets.

Australia can and should lead the world in developing sustainable farming practices and exporting our innovations across the world. To support the development and adoption of the best possible farming and land use technologies to support a sustainable transition in the sector, ATSE makes the following recommendations:

Recommendation 1: Develop a whole-of-landscape emissions accounting system, in line with the highest international standards.

Recommendation 2: Fund research into additives for feedstock that reduce methane emissions, including methods of making feedstock additives commercially and practically viable for farmers, through Australia's Rural Research and Development Corporations

Recommendation 3: Provide support to farmers, through information, on-the-ground advisors and subsidies, to encourage the adoption of low-methane feedstock for livestock.

Recommendation 4: Fund measures to make pre-coating of nitrogen fertilisers standard for Australian agriculture, to reduce nitrous oxide release into the atmosphere.

Recommendation 5: Fund the installation and monitoring of technologies such as Flux Towers across Australia's most important agricultural regions to ensure measurement of soil carbon is made accurately, on-location.

Recommendation 6: Provide long-term funding to Australian agricultural research through the RDC and CRC programs to support the agriculture sector through the net-zero transition and changing climates.

Ensuring an integrated and impactful approach to emissions reduction

An integrated and collaborative approach is needed to effectively tackle climate change. All parts of the sector will need to come together to ensure that solutions are not siloed or that emissions reductions do not result in increases in other sectors. A whole-of-landscape Agriculture and Land Sectoral Plan that links land use practices, water policy, environmental policy and farming techniques together to promote the heath of the agriculture sector and drive down emissions is needed. The Sectoral Plan should consider adjacent communities and industries, including the minerals and energy sectors, which can greatly impact land use and agriculture. One Health principles should also be built into its design: the environment, food and land use are inextricably linked with health outcomes for the population, and this plan provides an opportunity to embed health principles into agricultural practices for the benefit of all.

A comprehensive emissions accounting system is essential to a whole-of-landscape approach and enable accurate tracking of progress on emissions reduction targets. This holistic accounting methodology would need to be based on the best available evidence and align with international accounting standards (e.g., the

ISEAL guidance on greenhouse gas reporting). Aligning with international standards would not only improve the accuracy of the system, but also allow for embedded emissions in Australian agricultural products to be defined and advertised – potentially creating a competitive advantage for Australian agricultural producers in a low-carbon future. This work could be led by the Australian Government to ensure a consistent approach, supported by The Zero Net Emissions Agriculture CRC.

Recommendation 1: Develop a whole-of-landscape emissions accounting system, in line with the highest international standards.

Reducing emissions in livestock

The single largest contributor to agricultural greenhouse gas emissions is ruminant methane, contributing to 42% of Australia's agricultural greenhouse gas emissions, which comes primarily from cattle (Climate Council, 2021). Methane is far more potent than carbon dioxide as a greenhouse gas – removing just one tonne of methane is the equivalent to removing 28 tonnes of carbon dioxide (IPCC, 2014). Methane decays faster than carbon dioxide (but this decay leaves carbon dioxide in the atmosphere) meaning that its strongest effects are felt over the decade after its release (Climate Council, 2021). Reductions in methane emissions will have more immediate impacts than an equivalent carbon dioxide emission reduction. This has led to the development of an international consortium called the Global Methane Hub, providing US$200 million to support work on methane reduction in livestock. Immediately tackling methane emissions from livestock must therefore be central to any sectoral plan for reducing greenhouse gas emissions.

Recent developments in feedstock have seen the emergence of red seaweed (*Asparagopsis*) and other food additives (e.g., Bovaer, 3-NOP) as potentially viable ways to reduce methane emissions from cattle. Including additives in feedstock can reduce methane emissions by up to 98%, depending on its concentration in the feedstock and other conditions (Black et al., 2021; Kinley et al., 2020). There is also promising work to incorporate reduced methane production into the breeding programs for both cattle and sheep. While the percentage reduction in methane emissions is smaller than feedstock additives the effects are cumulative each breeding cycle. Encouraging the uptake of these methane-reducing strategies is therefore vital to the reduction of emissions across the agricultural sector.

There are still significant challenges in ensuring a sector-wide uptake of these options. Many feedstock additive companies are relatively new, and production will need to be scaled up rapidly to meet industry-wide demand. Feedstock is most widely used for feedlot and dairy cattle. Further research and development will be needed to support farmers of free-grazing cattle to deliver feed additives into the diets of their cattle and to assess the viability of these methods compared to other options such as enhancing pastures with secondary compounds. Funding and support from the government will be needed to facilitate this research and development, and to provide information about, and encourage farmers to adopt, new technologies in this space as they are developed.

Recommendation 2: Fund research into additives for feedstock that reduce methane emissions, including methods of making feedstock additives commercially and practically viable for farmers, through Australia's Rural Research and Development Corporations.

Recommendation 3: Provide support to farmers, through information, on-the-ground advisors and subsidies, to encourage the adoption of low-methane feedstock for livestock.

Enhancing carbon captured in soils

Soil carbon sequestration provides an opportunity for the agriculture sector to contribute to Australia's negative emissions practices. ATSE's Soil Carbon Opportunities and Risks explainer outlines how soil can be used to offset emissions from other sectors. However, there is an opportunity cost to prioritising sequestration over other agricultural and land use options, and sequestration efforts are highly impacted by natural weather and climate variations. Further, the real costs of measuring carbon captured in the soil (estimated at $30-100/ha) and compliance with regulations can lead to costs exceeding returns, especially on larger farms.

To take advantage of the opportunity presented by soil carbon sequestration, it must be profitable for landholders. Increasing the price paid for landholders to engage in soil carbon sequestration, through higher prices on Australian Carbon Credit Units, could improve the cost-benefit analysis for landholders. However, this would have flow on effects for other industries that rely on carbon credits for emissions reductions. Instead, investing in reducing the costs of measurement and compliance would ensure that soil carbon sequestration can remain profitable without impacting other industries. Other measures such as pre-coated nitrogen fertilisers can help to reduce nitrous oxide (another greenhouse gas) loss into the atmosphere. If the Australian Government supported the pre-coating process for nitrogen-based fertilisers, fertiliser producers could provide this to farmers as standard. This would reduce the cost of reducing emissions for farmers while not requiring farmers to adopt new practices, resulting in a much faster roll out.

Measuring these changes in soil carbon within agricultural production systems will be necessary to monitor progress and adapt policy mechanisms to meet changing conditions. Changes in soil carbon across large areas require the adoption of Flux Towers. Flux Towers measure exchanges in carbon dioxide, water and energy between the ecosystem and the atmosphere. The installation and monitoring of towers across Australia's agricultural sector will be necessary to build and accurate picture of soil carbon levels across the sector. As this will require sector-wide planning and coordination, the Australian Government could help to lead the sector by funding the installation and monitoring of Flux towers in important agricultural regions.

Recommendation 4: Fund measures to make pre-coating of nitrogen fertilisers standard for Australian agriculture, to reduce nitrous oxide release into the atmosphere.

Recommendation 5: Fund the installation and monitoring of technologies such as Flux Towers across Australia's most important agricultural regions to ensure measurement of soil carbon is made accurately, on-location.

Adapting the sector to meet changing climates

While the agriculture and land sector need to be a part of Australia's response to climate change, it must also adapt to the changing climate. Drought risk, both in terms of drought likelihood and severity (Climate Council, 2018), and drought impacts on farm profits (Hughes & Gooday, 2021), is rising in Australia. Lower rainfall and more extreme weather events damage crops, and rising temperatures are contributing to heat stress in livestock (AdaptNSW, n.d.). For the sector to thrive, these impacts will need to be mitigated.

Research and mitigation techniques have primarily focused on minimising the impact of droughts and other extreme weather events on crops and livestock. While effective, Australia's agricultural sector has experienced a brain drain due to low funding levels and funding instability which hampers our efforts to produce local solutions to local environmental problems. A long-term funding scheme for agriculture research in Australia is needed. This funding needs to be both sufficient to cover high quality research and stable over long periods of time to get the most benefit. Support for research should focus on developing new methods of low-carbon farming, reliance to climate change, increasing profitability in both good and bad years and incorporating Traditional Knowledge into agriculture and land use practices. Long-term research support will also help to keep highly trained and skilled experts in reducing agricultural emissions in Australia, ensuring Australia has the skills needed to face future challenges.

Recommendation 6: Provide long-term funding to Australian agricultural research through the RDC and CRC programs to support the agriculture sector through the net-zero transition and changing climates.

ATSE thanks the Department of Agriculture for the opportunity to respond to consultation on an Agriculture and Land Sectoral Plan. For further information, please contact academypolicyteam@atse.org.au.

Level 2, 28 National Circuit
Forrest ACT 2603
Australia

PO Box 4776
Kingston ACT 2604
Australia

+61 2 6185 3240
info@atse.org.au
atse.org.au

ABN 58 008 520 394
ACN 008 520 394

Australian Academy of Technological Sciences & Engineering

References

AdaptNSW. (n.d.). *Climate change impact on our agriculture*.

Black, J. L., Davison, T. M., & Box, I. (2021). Methane emissions from ruminants in Australia: Mitigation potential and applicability of mitigation strategies. *Animals*, *11*(4). https://doi.org/10.3390/ani11040951

Climate Council. (2018). *Climate change and drought factsheet*. https://www.climatecouncil.org.au/resources/climate-change-and-drought-factsheet/

Climate Council. (2021). *Agriculture's contribution to Australia's greenhouse gas emissions*. https://www.climatecouncil.org.au/resources/australia-agriculture-climate-change-emissions-methane/

DCCEEW. (2022). *State and territory greenhouse gas inventories: annual emissions*. https://www.dcceew.gov.au/climate-change/publications/national-greenhouse-accounts-2020/state-and-territory-greenhouse-gas-inventories-annual-emissions

Hughes, N., & Gooday, P. (2021). *ABARES Insights: Climate change impacts and adaptation on Australian farms*. https://www.climatechange.environment.nsw.gov.au/impacts-climate-change/agriculture

IPCC. (2014). *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf

Kinley, R. D., Martinez-Fernandez, G., Matthews, M. K., de Nys, R., Magnusson, M., & Tomkins, N. W. (2020). Mitigating the carbon footprint and improving productivity of ruminant livestock agriculture using a red seaweed. *Journal of Cleaner Production*, *259*. https://doi.org/10.1016/j.jclepro.2020.120836

The Treasury. (2023). *Emissions reduction*. https://treasury.gov.au/policy-topics/measuring-what-matters/dashboard/emissions-reduction

Level 2, 28 National Circuit
Forrest ACT 2603
Australia

PO Box 4776
Kingston ACT 2604
Australia

+61 2 6185 3240
info@atse.org.au
atse.org.au

ABN 58 008 520 394
ACN 008 520 394

Australian Academy of Technological Sciences & Engineering