National Farmers Federation

20 December 2023

Department of Agriculture, Fisheries, and Forestry
Climate Policy Branch
Marcus Clarke St
Canberra ACT 2601

Dear Sir/Madam,

RE: Agriculture, Land, and Emissions Discussion Paper

The National Farmers' Federation (NFF) is the voice of Australian farmers.

The NFF was established in 1979 as the national peak body representing farmers and more broadly, agriculture across Australia. The NFF's membership comprises all of Australia's major agricultural commodities across the breadth and the length of the supply chain.

Operating under a federated structure, individual farmers join their respective state farm organisation and/or national commodity council. These organisations form the NFF.

The NFF represents Australian agriculture on national and foreign policy issues including workplace relations, trade, and natural resource management. Our members complement this work through the delivery of direct 'grass roots' member services as well as state-based policy and commodity-specific interests.

Overview

Government must recognise Australian agriculture's unique contribution to productive landscape management, food security, and emissions reduction. Agriculture must not and cannot become the solution to other sector's problems via too much focus and reliance on offsets in the agricultural landscape. The task of national emissions reduction is a shared responsibility for all sectors, agriculture will continue to play our part, we cannot be singled out as the only or primary solution to this complex problem.

The NFF welcomes the opportunity to provide strategic comment to further shape the direction of Government's proposed Agriculture and Land Plan to guide Australia's 2050 net-zero ambition. We thank the Department for their proactive, extensive, and ongoing outreach with industry on this critical issue, and we appreciate that the proposed Plan has been developed without prefabricated assumptions. NFF have so far experienced little engagement with DCCEEW who is responsible for drafting the 'Land' component of the proposed Plan. Agriculture, and by extension the NFF, is the key impacted stakeholder in this process. We therefore seek that DCCEEW be more proactive in its engagement with NFF in the ongoing consultation process.

The NFF has carefully reviewed and considered the questions raised in the Agriculture, Land, and Emissions Discussion Paper, and we have provided responses where relevant. The Discussion Paper has been segmented into five key sections; our submission has been structured accordingly.

Background

Agriculture and Food Security

Agriculture is a complex sector as emissions output is fundamentally and inextricably linked to the production and supply of nutritious food and fibre for domestic and international consumers. It is critical that the sector continues down the pathway of emissions reduction, and, that in a transition to a national low-carbon economy, we adequately acknowledge and remember the need to strike the right balance between feeding and clothing the population and minimising agriculture's impact.

The Australian agriculture sector has established a vision to become a $100 billion industry by 2030[1]. We have made significant progress to-date, reaching a record valuation of $92 billion during the 2022-23 financial year. $83 billion was attributed to exports, and approximately 72% of total production was exported to the international market[2]. As global hunger is forecast to reach 600 million by 2030[3]. Australian agriculture will play an increasingly important role in producing the nutritious food and fibre required to safeguard global food security. Each Australian farmer produces enough food to feed 600 people each year, 150 at home and 450 abroad.

It is clear, therefore, that agriculture has an imperative to feed and clothe the world. Government ambition to reduce agriculture's emissions must not come to the detriment of food and fibre production and the economic prosperity of the 300,000 Australians that it employs[4].

Industry Complexities

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?

In recognition of Australian agriculture's unique contribution to productive landscape management, food security, and emissions reduction, climate policy must provide a

[1] NFF 2030 Roadmap: Australian Agriculture's Plan for a $100 Billion Industry
[2] ABARES Insights March 2023: Snapshot of Australian Agriculture 2023
[3] FAO 2023: The State of Food Security and Nutrition in the World: Urbanisation, Agrifood Systems, Transformation and Health Diets Across the Regional-Urban Continuum
[4] https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia-detailed/latest-release

pathway for a profitable, productive, and sustainable agriculture sector into the future. Agriculture is a complex sector, and it remains difficult for us assess the full scope of our achievement, Government must recognise this into the design of the Plan to ensure the sector is treated equitably.

NFF's 2023 Climate Change Policy is attached as Appendix Item 1.

Agriculture plays a significant role in managing Australia's natural landscape. Farmers are Australia's frontline environmentalists and oversee the sustainable use of over 55% of the Australian land mass (427 million hectares), 356 million hectares of which is used for agricultural production. 7.6 million hectares of cattle producing land has been identified for conservation or protection purposes[5], and the sector remains at the forefront of climate action, having reduced emissions by 4.4% (3.8 Mt CO_2-e) since 2005 levels[6]. Several industry sector ambitions have also been developed, with significant progress and achievement. For example, the national red-meat industry has reduced its emissions by 65% since 2005, and grains and grass-fed beef fall well below the global median for emissions intensity[6]. As enteric fermentation from livestock represents 69% of agricultural emissions in 2023[7], this is a significant achievement that must be acknowledged and celebrated, and one that demonstrates the sector's steadfast commitment to climate action, often at the individual cost and expense of farmers.

Agriculture is also distinctly unique as it the only sector that actively sequesters carbon from the atmosphere. GHG emissions sequestered on-farm through pastures, cropping, and trees for example are not reflected in the National Greenhouse Accounts for agriculture as this is attributed to LULUCF totals. Carbon is also embedded in all agricultural produce; these are complexities that make it difficult to assess agriculture's contribution to emissions reduction, and ones that must be recognised in the ongoing design process of the Plan.

Unlike fugitive fossil fuel emissions, agricultural emissions are predominantly biological, are a natural process, and broadly cyclical in nature. Recognising that CH_4 has a significantly lower atmospheric lifetime (12 years) than CO_2 which can persist for decades longer, CH_4 emissions from livestock are not as persistent or damaging as CO_2 emitted from fossil fuels. Furthermore, if the total number of livestock in Australia remains constant, farmers' contribution to additional global heating through CH_4 emissions from the national herd will not contribute to additional warming. Prof. Mitloehner and Prof. Allen, two livestock experts in the field agree there is a task for ruminant agriculture, but it must be viewed through an appropriate prism of a need for innovation, realistic ambition, and more accurate reporting. If farmers reduce emissions beyond this baseline, it will have the equivalent effect of actively reducing warming from the atmosphere, and hence must be rewarded. Agriculture

[5] FAO Global Conference on Sustainable Livestock Transformation
[D] DCCEEW 2023: Quarterly Update of Australia's National Greenhouse Gas Inventory: June 2023
[7] DCCEEW November 2023: Australia's Emissions Projections 2023

will continue to contribute; other sectors will appropriately achieve reductions much more sharply.

Developing Emissions Pathways

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?

Unlike the fossil fuel sector, agriculture is not captured under existing frameworks or regulatory frameworks to reduce its emissions (i.e., Safeguard Mechanism). Subsequently, as the Safeguard Mechanism begins to take effect, over the medium- and longer-term, agriculture's share of total emissions, while declining as a trajectory share, will increase as a proportion of the National Inventory. This will place additional focus on the sector. This must not be taken as a reason to demand greater performance from agriculture which has been previously articulated in this submission.

Agriculture Cannot Reach 2050 'Net-Zero'

Unlike other sectors where sectoral plans are also in development, net-zero remains a distinct impossibility for agriculture. While technological innovation has and will continue to support ongoing emissions reduction, food and fibre cannot be produced without emissions.

The recently published DCCEEW '*Emissions Projection 2023 Report*' forecasts future emissions from the agriculture sector. Between 2025-35, emissions are projected to remain constant at approximately 80 Mt CO_2-e. This trend can be extrapolated outward to 2050, and paints a clear, unambiguous picture: agriculture is highly unlikely to reach net-zero by 2050.

Furthermore, NFF recognises that the IPCC propose to achieve climate neutral outcomes for methane (a 50% reduction from 2005 levels is required) and for N_2O (a 20% reduction by 2050). While ambitious, the transformation required to achieve climate-neutrality is constrained by significant barriers (i.e., introducing new technologies and innovation at-scale) and as such, there is an expectation that agriculture is unlikely to reach net-zero.

The Need for Higher Ambition

While the agriculture sector recognises that climate change can negatively impact agricultural productivity and profitability, and emissions reduction will mitigate the extent of this risk, action should be built around a trajectory approach rather than a hard target. The NFF supports an economy-wide aspiration of net-zero emissions by 2050 provided that no sector specific targets or taxes are imposed. We understand that this is the current intention by Government, and we stress that this remains the case. It is our position that

targets are the least attractive mechanism of choice, they lock sectors into specific action and ignore the complexities of on-ground circumstances. Despite an overall declining trajectory, year-over-year agricultural emissions fluctuate due to variable climatic factors favourable to production – this makes achievement of a hard target difficult and generates uncertainty.

To account for the variable nature of emissions reporting and fact that technological development is ongoing and rapidly evolving, we recommend that a routine review process on a proposed basis of five-years is established for the Agriculture and Land Plan. This will ensure the Plan is aligned to established science and technological developments.

Opportunities for First Nations

NFF recognises the role indigenous peoples have and continue to play in managing Australia's land resources including biodiversity conservation work undertaken in Indigenous Protected Areas. Utilising First Nations knowledge in land management are important attributes, they need to be viewed in collaboration and conjunction with a number of contemporary farming practices and mechanisms that are already contributing to sustainable and resilient landscapes.

Building on Existing Effort and Knowledge

Significant progress on emissions has already been achieved by the agriculture sector through its focus on productivity, investment in technology and innovation, and its implementation of improved land management practices. We remain committed to continued improvement.

Industry Leadership

A range of actions have been undertaken by the sector to address climate change. There exist several industry climate ambitions of varying scope, these have been represented in the Discussion Paper.

In addition to industry climate commitments, several frameworks, and models to demonstrate agricultural sustainability and on-farm natural capital are also being developed. These include the Australian Agricultural Sustainability Framework, Farming for the Future, and AgCarE model which all need continued support.

Environmental Offsets

Carbon offsets, specifically vegetative sinks, are likely to be one of several mechanisms of choice to support Government's ambition towards a national 2050 net-zero target. The intersection between offsets and agriculture is a point of concern to the NFF. Offsets in an agricultural landscape risk compromising the availability of productive land. Any mechanism

must focus on less productive (or most suitable) land for establishment. Otherwise, offsets will create perverse social, economic, and environmental outcomes to the sector and natural environment. These include:

- Diminished capability to produce nutritious food and fibre for domestic and international consumers;
- Diminished farm income earnings potential and business resilience;
- Diminished regional employment opportunities;
- Creating greater fire risk;
- Using agriculture as a solution for other sectors rather than them resolving their own challenges in more persistent ways; and
- The creation of refuges and safe harbors for invasive plants, weed, and animal species. Impacts include destruction of crops and pastures, damaged fence infrastructure, spreading of disease to livestock and humans, and predation of livestock and native species (i.e., biodiversity decline).

The fundamental issue is that vegetative offsets are not a medium- or long-term solution for polluting sectors. If they are simply balancing their emissions by creating offsets, then we very quickly run out of land and the permanence of the sequestration via woody perennials exacerbates that problem.

The Importance of Technological Innovation and Research and Development

Unlike other sectors, agricultural emissions are complex and notoriously hard-to-abate. It is NFFs position that technological innovation will play a critical role in continued achievement. Government must continue to support the sector to reduce its emissions through a continuation and strengthening of investment to drive and incentivise innovation and increase the commercial viability of emerging technologies. The benefits of targeted Government investment and schemes must be shared amongst all farm producers. This will allow the entire sector to continue reducing its emissions whilst building adaptive capacity and improved resilience to climate change.

What are the opportunities to reduce emissions and build carbon stores in agriculture and the land? What are the main barriers to action?
What are the practical solutions to increase uptake?

There exists a suite of opportunities currently employed by and undergoing exploration by the sector to reduce emissions at the direct source (point), site, or atmospheric level, and build carbon stores on land. A comprehensive list is detailed:

- Low-emission anti-methanogenic feed supplements (i.e., *Asparagopsis*, *3-Nitrooxypropanol*);
- Methanotrophs bacteria;

- Improved genetics;
- Soil carbon sequestration;
- Slow-release and coated fertilisers;
- Conservation tillage;
- Electrification and biofuels;
- Precision agriculture (i.e., maximising on-farm efficiencies by minimising inputs); and
- Other novel approaches not yet developed.

Anti-Methanogenic Feed Additives

A significant body of research and commercial trials into the viability of anti-methanogenic feed additives across ruminant systems for *Asparagopsis* seaweed and *3-Nitrooxypropanol* (*3-NOP*) is ongoing. Research has primarily been conducted in confined animal settings, and there exists a strong need to conduct further research to develop, adapt, and evaluate anti-methanogenic strategies for extensive grazing systems. To-date, results have largely produced encouraging results, however the extent of observed successes appear dose and geographical dependent. Anti-methanogenic feed additives nevertheless appear to be the dominant mechanism of interest by Government and International Organisations in supporting agriculture reduce its emissions. However, it does have attached its own challenges, complexities, and barriers of adoption. This will be explored in the proceeding section.

Asparagopsis

Two red seaweeds (*Asparagopsis Taxiformis* and *Asparagopsis Armata*) have demonstrable real-world high-inhibitory effects on CH_4 production. Other seaweeds with a high CH_4 mitigation potential are also identified, and include[8]:

1. *Cladophora patentiramea* (green);
2. *Cystoseira tri-nodis* (brown);
3. *Dictyota bartayresii* (brown);
4. *Gigartina* spp. (red);
5. *Padina australis* (brown); and
6. *Ulva* spp. (green).

Studies involving sheep, beef, and dairy cows report dose-dependent decreases of CH_4 production ranging between 9-98% when diet is supplemented with *Asparagopsis*. For instance, a University of New England study recorded emission reductions of 95% amongst cattle fed a feedlot diet of *Asparagopsis* oil – other studies reported a more subdued outcome of 28% (however at lower dosages)[9]. Research regarding body mass gain and the safety aspect of *Asparagopsis* remains vexed. While several studies indicate bromoform

[8] FAO 2023: Methane Emissions in Livestock and Rice Systems: Sources, Quantification, Mitigation and Metrics
[9] MLA July 2023: Final Report: Effect of Asparagopsis Extract in a Canola Oil Carrier for Long-Fed Wagyu Cattle

residues are not detected in the meat or fat of sheep and beef fed *Asparagopsis*, an accumulation of iodine and bromide in dairy milk and health problems observed in sheep accustomed to consuming large amounts of seaweed in coastal regions is reported. This marks a significant hurdle. In alignment with FAO recommendations, Government (through the administration of the MERiL Program) must prioritise research projects in the following key areas:

- Research to determine CH_4 mitigation and productivity changes under different diet and management conditions;
- Research to determine what concentration thresholds are to be established to safeguard animal health and human safety; and
- Effective methods for growing, processing, and storing *Asparagopsis* including how to improve its palatability and efficient delivery methods (especially in extensive grazing systems).

3-Nitrooxypropanol (3-NOP)

Several meta-analyses that control for the effect of diet composition indicate a decrease in CH_4 production attributed to *3-NOP* dosage greater in dairy (-23.9% and -38.2%) than beef cattle (-21.1% and -26.1%). Models that include a *3-NOP* only dosage indicate a 32.7%, decrease in CH_4 production at an average dose of 70.5 mg/kg DM. A more recent 2023 Australian trial conducted by the University of New England in Armidale; Northern NSW, generated promising results. Over a 112-day period feeding period (barley-based diet) where dosage was increased through time, a 90% inhibition of CH_4 was recorded, reaching 99% at selected times[10]. This research supports *3-NOP* to be a viable anti-methanogenic feed additive, one with proven real-world inhibitory effects. Research must focus on the need to develop a stable form of 3-NOP for grazing animals, or a slow-release form that could be fed less frequently.

Anti-Methanogenic Feed Additives: Barriers to Adoption

The CO_2 emissions of producing, harvesting, processing (drying), storing, and transporting seaweed at scale must be considered to determine the viability and net GHG intensity impact of adoption.

Despite technological advancements, economically affordable enteric CH_4 mitigation solutions remain scarce. There exists a cost-prohibitive barrier to action, one that cannot be overcome unless an incremental increase in the price of animal products produced with a lower carbon footprint, a consistent improvement in animal performance, and/or a substantive carbon mitigation payment, is achieved. Other risks include potential for altered meat and milk flavour and odour, the rapid time required to dry seaweed to prevent

[10] https://www.abc.net.au/news/2023-10-12/dutch-feed-additive-bovear-cattle-methane-emissions-australia/102905724

mould development (which is energy intensive), and the poor activation of biochemical compounds[8].

The development of new ACCU methodologies may address the cost-prohibitive barrier to adoption (this is discussed in greater detail in the below sections). Although projected increases in ACCU prices from $38 a tonne to approximately $48 to $85 a tonne by 2035 will increase the viability of *Asparagopsis* uptake, studies show ACCU prices may need to reach $400 to $600 a tonne for *Asparagopsis* to be viable. This will be dependent on processing delivery and utilisation efficiency outcomes. As such, additional and ongoing Government investment into initiatives like the MERiL Program that help address this shortfall are critical.

Feeding cattle seaweed is not a straightforward process as commended by the environment and green sector, it cannot be viewed as the single solution toward reducing emissions from agriculture. Based on available industry data and projections, 1.25 million cattle are currently in feedlot (equating to approximately 4.36% of the national herd). On average, livestock cattle spend an average of 50 to 120 days in feedlot. While some studies demonstrate an inhibition of methanogenesis of 50% or greater is possible with 1% or less *Asparagopsis* in the diet, dietary supplementation can only be done in feedlot as the current science dictates doses need be administered on a routine daily basis to maximise inhibitory effects. These factors (herd potential and time spent in feedlot) diminish the beneficial impact of this technology. There also exist supply and logistical issues on how to get the product to farm in substantial quantities at an affordable price. This is a major limitation of feed additives, and one unlikely to be adequately addressed in a timely manner by market forces alone, this will require Government support and targeted investment.

Carbon Storage in the Land

Australian farmers are global leaders in adopting practices and technologies that decrease soil emissions and maximise soil sequestration. Improved soil carbon storage through conservation grazing and minimum tillage are notable examples.

Barriers to action around soil carbon mainly stem around permanence risks, and a lack of supporting ACCU methodologies and Government incentives to offset input and lost production costs and encourage uptake. There also exist several challenges for soil carbon to become a tradable product. 15-year trials for soil carbon conducted by DPIE confirm major variances in soil types across landscapes, and a multitude of factors that have the potential to diminish established gains (i.e., climate, fire regimes, pasture type). As such, Government must ensure soil carbon projects are adequately rewarded, and appropriate prices are established and incorporated into methodologies. In doing so, Government must recognise and soil carbon for all its attributes, not just exclusively for ACCUs, and that

projects do not conflict with the "long-term growth of agricultural income and production" as stated in the FAO Global Roadmap on SDG2 unveiled during COP28[11].

To increase uptake of soil carbon storage on land, Government must work to improve community knowledge and understanding of the benefits of soil carbon, including its natural capital benefits, and mobilise financial support and investment. All options for sequestration should be under consideration. Limiting methodologies to, for example, only native species, or only for timber outcomes risks lost opportunities.

Slow-Release Fertilisers

Nitrogen fertilisers are essential for crop growth and yield, and they underpin farm productivity for cropping and horticulture enterprises and grazing systems with improved pastures. It is imperative that nitrogen fertilisers remain available and affordable. Equally measures to minimise losses or maximise utilisation of highly volatile nitrogen products such as urea need continued assessment and innovation to optimise efficiency with limited loss.

Policies that attempt to reduce the use of nitrogen fertilisers will create negative consequences for agricultural productivity, profitability, regional employment, and food security. Experiences in Europe highlight the extent to which these impacts can cause socially, economically, and politically.

While nitrification inhibitors are proven effective at reducing N_2O emissions, they remain cost-ineffective for growers to implement. The cost of urea fertiliser coated with a nitrification inhibitor is around 14% more expensive per unit of nitrogen applied compared to its conventional non-coated counterpart. A public good outcome can therefore be achieved through Government action, potentially via the creation of a pre-farm treated fertiliser aggregation payment method as commended by Prof. Richard Eckard and Prof. Peter Grace. As detailed in their White Paper, the proposed aggregation payment method could work as follows:

- Government to engage in a pre-farm aggregation of N_2O abatement where a limited number of fertiliser manufacturers engage directly with Government to precoat fertiliser products (i.e., urea) at an agreed price per tonne;
- Agreed price is established with the aim of neutralising the cost differential between standard and treated nitrogen fertiliser; and
- Payment is then passed down to the individual grower (e.g., reduced price for treated nitrogen fertiliser).

NFF recognises this proposal and requests Government direct its attention towards its assessment. Such an action could address and help overcome the cost prohibitive barrier

[11] FAO 2023: Achieving SDG2 Without Breaching the 1.5C Threshold: A Global Roadmap

preventing the widespread adoption of nitrification inhibitors. This proposal is attached as Appendix Item 2. Assessment must include risk analyses including for price transparency and biophysical impacts.

Fuel and Energy

The NFF recognises that fuel and energy use by the agriculture sector represent a small, yet significant addition source of emissions. While the electrification of existing heavy machinery on-farm is one pathway towards emissions reduction, progress will be significantly constrained by the high torque and intense duty cycle requirements for heavy machinery and vehicles and higher cost compared to conventional alternatives. As over 80% of energy consumed on farm comes from diesel, electrification may not be the most viable solution. Other pathways like low- or zero-carbon fuels also require consideration. The Discussion Paper must recognise that biofuels from sugar bagasse and other agricultural waste are considered as carbon-neutral fuels and represent a simple yet rapid path to decarbonisation for heavy transport sectors, as transition requires minimal changes to existing equipment and infrastructure. Government assistance and incentives to encourage biofuel projects that use agricultural waste and residues must be provided.

There are range of other opportunities such as closed loop solar/batteries for grain handling equipment, renewable sources for watering systems, and renewable power for refrigeration systems that will all benefit from broader economy innovation and efficiencies that can then be applied to agriculture systems.

It is important to recognise that similarly to the mining sector, most utilisation will be remote and logistics systems for, for example, fuel cells will need to be well thought through for viability and economic equivalence as a policy pre-requisite for implementation. A legitimate transition timeframe will also need to be developed with industry.

Building a National Coordinated Plan: Bringing Together Existing Effort and New Initiatives

When bringing together existing effort and new initiatives into one coordinate plan to map and drive forward emissions reduction from agriculture, Government consultation with industry must be genuine, proactive, and ongoing. Any new regulatory development must be cross-referenced with existing state and national initiatives, and where necessary, new, and existing regulation adjusted to ensure coherence, alignment, and simplicity. Reducing the complexity of new regulatory processes and ensuring consistency with existing processes will build industry confidence and trust in the process and encourage participation.

Additional Opportunities to Reduce Emissions

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

In the immediate term, the most important options to be further adopted or supported mainly centre around getting feed additives to the farm-gate and developing new incentives to reward farmers who reduce their emissions (real progress on a broadly adoptable Integrated Farm Methodology). While R&D into other promising technologies is ongoing (i.e., direct-fed microbials, chemical inhibitors like *Sodium 2-bromoethanesulfonate*, methanotrophic bacterium), they lack the sufficient research base or industry support to warrant a redirection of Government focus. Government must also recognise and support the ongoing access to herbicides (e.g., glyphosate) which enable conservation tillage and soil carbon storage.

The MERiL Program is a Commonwealth initiative designed to make agriculture more sustainable by investing in low-emission feedstock technologies. To-date the program has invested nearly $10 million in supporting farmers undertake R&D into technologies that deliver low-emission on-farm outcomes (i.e., feed additives), with the available pool of funding increase in each Stage. The NFF is a strong advocate of this Program, and the promising research and literature that has emerged from this process for *Asparagopsis* and *3-NOP* specifically showcases what is possible if Government partner with and adequately support industry demonstrate technology solutions that reduce on-farm emissions. Additional funding to support new grant recipients beyond Stage 3 will be a key industry need, as well as the development of new Commonwealth initiatives targeted in different industry areas (i.e., nitrification inhibition).

Total Funding MERiL Program – Grant Recipients		
Stage 1	**Stage 2**	**Stage 3**
$4 million	$4.98 million	TBD

Development of ACCU Methodologies

Extensive research into emerging technologies will ensure sufficient, robust data can be collected and analysed to inform the future development of ACCU methodologies for methane mitigation. In alignment with the FAO Roadmap, Government must mobilise support and investment (including private sector investment and financial incentives linked to climate change initiatives), the development of methodologies is one pathway. It is essential that the development of relevant ACCU methodologies is process driven and scientifically informed. Barriers to action can be distinguished into two main areas:

1. ACCU method generation can take several years, even under the proponent-led process; and
2. Getting the product on-ground to the herd.

Given the significance of ACCU methods, it is essential that sufficient time is provided to ensure that the design process is scientifically informed, and simply done 'right'. This means that the development of new methodologies can take a significant amount of time to develop (i.e., several years), particularly when they generate high levels of stakeholder interest as anticipated for methane. This creates the first barrier to action. Until relevant methodologies are developed, industry will be required to bear the cost burden of adoption (especially small individual landholders that are not the target of the MERiL Program). Without adequate Government support, the cost of adoption for farmers will be extensive and ongoing, this does not factor into likely supply chain issues of getting a novel product to the farm-gate. As such, NFF supports greater ambition to reduce the development timeframe of new method development, and the period for developers to submit a draft method for consideration by the Integrity Committee after EOI approval could be reduced substantially. An expansion of the MERiL Scheme should also be considered.

NFF's 'ACCU Review Discussion Paper' submission is attached below as Appendix Item 3.

Supporting and Enabling Change

Government's role in supporting drive innovation, emissions reduction, and build capacity while supporting profitable production.

Agriculture will play an important role in the pursuit of 2050 national net-zero. Targeted R&D is critical to navigate the sector's unique emissions challenges while ensuring continued productivity. As such, to support drive innovation within the sector, Government must invest an additional $50 million over four years in climate-related R&D that provides robust baseline innovation, drives innovation, builds resilience, and supports communication, adoption, and extension. After taking into consideration funding for research grants, programs, and initiatives like the MERiL Program and the recently established Nature Repair Market, Government must consider a minimum investment of $100 million to avoid the perception of inaction.

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 the sectors?

Given risk is a major barrier to innovation, Government must improve the attractiveness and feasibility of the 'trialability' of new technologies to incentivise participation. This could be enabled by offering a variety of entry-points developed in consultation with landholders and market operators. Focussed pilots for developing measurement technologies, utilising

'nor regrets' test beds for new technologies that to not prevent proven technologies to be unavailable to trialists (a clear threat with potential new grazing feedstocks) and ensuring that designed solutions are farmer centric, not a burden on farmers.

Future industry consultation on the development of this Plan must be centred around and gravitate toward the following priorities:

1. How and where can industry find the skills for a range of needs such as tradespersons, accountants, and lawyers, as Government engages in repairs and advice in the carbon field? (i.e., fixing solar pumps or advising on carbon contracts).
2. How do we turn the carbon outreach program into a more permanent solution?
3. How do we get agronomy and other courses to incorporate carbon farming skills?
4. How do we ensure carbon calculators can be benchmarked to provide credible output estimations?
5. How do we maintain momentum on technology development?
6. How do we leverage existing R&D capacity?
7. How do we build capacity in the (physical and financial) supply chain?
8. Increase accessibility of precision agriculture knowledge and skills to minimise nutrient surplus to crop requirements (this will optimise farmers' financial return and reduce potential for offsite impacts); and
9. Harness clean energy sources to produce low-emission fertilisers like Green Ammonia as a viable method to reduce Scope 3 agricultural emissions. This will require significant Government support.

Extract from NFF Climate Change Policy

What the Industry Needs

Policy

Economic

- Clear assurances that targets and taxes will not be placed on agriculture. This will provide certainty around what we can expect from the government in the future;
- Appropriate restrictions are placed on the Safeguard Mechanism such that agricultural enterprises are not adversely impacted by offset purchases that substantially diminish agricultural productivity;
- Acknowledge that mandatory cap and trade policies are not suited to the farm sector, and specifically excluding the sector from such schemes;
- Recognise that more than 75% of Australian agriculture produce is exported, and that as a trade-exposed sector we must remain competitive within domestic and international markets;

- Reintroduce legislation that would see carbon and biodiversity income treated as primary production income for all typical farm business models to ensure that eligible business input deductions can be appropriately offset against farm income;
- Engage in or facilitate the review valuation methodologies at least to the extent that those methodologies are not adequately acknowledging the income or capital growth attributable to carbon and other non-core commodities;
- Ensure eligibility for the instant tax/asset write off includes climate action investments;
- Compensate farmers and/or give ongoing recognition for lost productive capacity due to land clearing legislation imposed on land managers;
- Recognise the significant contribution agriculture has made to emissions reduction since the 1990s, including acknowledging MLAs CN30 target and that the Australian red meat industry has already decreased annual emissions by 57% or 133.36-54.61 Mt; and
- Introduce a new Regional Investment Corporation (RIC) loan to assist farmers undertake emissions reduction activities.

Emissions Reduction Fund

- Acknowledge the role of vegetation and soil carbon in carbon sequestration and overall soil health via full commercial/compensation systems for agricultural land sequestration (both historical and current);
- Ensure that Australia's climate change strategies encourage economy wide action to reduce GHG emissions and impact on the climate;
- In consultation with the agricultural sector ensure that the most equitable, defensible and appropriate reporting mechanisms are used that recognise international reporting obligations, improved or more accurate measurement systems, and apply principles of equity and balance for the agricultural sector;
- Ensuring that vegetation management policies do not burden farmers with the cost of achieving emissions reduction goals, nor unreasonably restrict development;
- Prioritise development of ERF methodologies that encourage and provide ACCUs for adoption of methane reducing livestock feed technologies as soon as they are available. We recognise incentives in the Budget for this, but more needs to be done to support further innovation, methodology efficiency and adoption;
- More encouragement for the agricultural industry towards emissions reduction/efficiency. Models for adaptation should be an investment focus;
- Ensure that the Climate Active certification system is able to keep pace with technology developments coming from industry and ensure that the system rewards the work that producers have already done to make their land a valuable carbon sink;
- All market-based policies that seek to incentivise climate outcomes must have mechanisms such as standardised contract terms, dispute resolution processes, and clear pricing mechanisms; and

- Primary producers need harmonisation of methodologies, reporting frameworks, and schemes across all jurisdictions.

Education & Awareness

- Recognise it may be more beneficial for farmers to identify carbon and use this within their own business (insetting) rather than sell to other sectors (as offsets), and that care is needed to prevent market and regulatory distortions which have perverse impacts; and
- Recognise emissions of (the GHG) nitrous oxide are a specific area for the agricultural industry to address. The nature and impact of nitrous oxide are different to other GHGs, meaning that a net zero target is appropriate for carbon dioxide emissions but not to other GHGs.

Incentives

- Allocate a component of the Building Better Regions Fund to fast-track viability assessment of regional low emissions fertiliser manufacturing capability in regional Australia and ensure funding under the Modern Manufacturing Strategy is directly allocated to improving domestic manufacturing for critical agricultural inputs. We understand a portion from this Fund has been redirected to support economic growth and development across regional Australia, but more must be done regarding domestic low emissions manufacturing for critical agricultural inputs;
- Recognise that embedded emissions are significant and that low/no emission manufacturing technology and alternative inputs are needed as a priority and at a lower cost;
- Provide refundable tax offsets on equipment which reduces emissions such as that use in zero till and controlled traffic systems; and
- Ensure that biodiversity payments are accessible for all farmers, not just in pastoral settings. This could be achieved by incorporating agricultural specific criteria under the Carbon & Biodiversity scheme and future programs and publicly reporting the number of successful projects by farm type.

Coordination

- AGMIN and its Climate Change Task Group to engage with industry on its national action plan as a matter of urgency and commit to publicly reporting on progress;
- The Commonwealth must ensure that the complexity of agriculture's climate change interaction are considered in the development of all relevant sector plans especially the Agriculture and Land sector plan; and
- That the National Greenhouse and Energy Reporting Scheme continues to only focus on fugitive emissions and does not incorporate agriculture.

Operational

Economic

- Support adaptation and ensure that agricultural productivity and farm business profitability can be sustained with changing climatic conditions;
- Focus on innovation and investment in climate research and development that provides robust baseline information, drives innovation and builds resilience, and supports communication, adoption and extension;
- Embrace the opportunities for emissions reduction and sequestration in the farm and forestry sectors and facilitate participation of farmers and foresters in carbon markets and natural capital markets;
- Expand and fund practical on farm extension programs like the Victorian Government's On-Farm Action Plan Pilot, which aims to empower producers to understand, measure and reduce on-farm emissions and provides grants for implementation of the recommended actions; and
- Understand that Australian agriculture is on a trajectory towards climate neutrality. Support and fund programs or schemes to assist Australian agriculture in getting to this goal. Recognising that key areas of focus will be methane and nitrous oxide emissions through the development of for example, methane inhibitors and coating, and/or slow-release fertilisers.

Education & Awareness

- On-farm extension programs should be developed regarding the support of natural capital measurement and markets - as key facilitator of climate change mitigation. Support investment in education decision support tools and awareness programs to assist farmers' understanding of carbon emissions, sequestration, offsets, insetting, and carbon markets. What we would like to see could include:

  a) support for what producers at the farm level are currently doing;
  b) support for navigating current articulating system of markets and incentives;
  c) on farm support to engage in new and emerging practices to increase emissions reductions; and
  d) the need for a positive, constructive and overarching climate policy for the agriculture sector, along with providing incentives and subsidies to farmers, including for batteries.

  This needs to be supported in the short, medium, and longer term.

- Partner with industry to deliver public education initiatives that combat misinformation about livestock production and help people understand the most impactful ways they can reduce their impact on the climate.

Incentives

- Partner with industry to introduce initiatives which lower key on farm emissions and transition to low emissions inputs which are manufactured in Australia.

Coordination

- Ensure a consistent approach to carbon accounting and measurement across agricultural sectors to enable accurate measurement and assist with calculating mitigation efforts and offsets, including through the National Soils Strategy; and
- Develop a comprehensive strategy to address climate change which incorporates the AGMIN National Action Plan.

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?

In addition to funding existing and emerging schemes, programs, and methodologies, Government must also help farmers navigate the regulatory and economic environment and access new markets and customers. This could be achieved through extension support (i.e., the provision of trusted agents who can answer queries and guide them through the process). Markets will need to be designed for long-term operation and have robust legislative and governance underpinnings to establish the confidence necessary to support prolonged participation.

Conclusion

The NFF thanks the Department for the opportunity to provide strategic input to shape the development of the proposed Agriculture and Land Plan. We look forward to ongoing discussion on this critical issue as we approach the next phase of the consultation process. Please do not hesitate to contact Warwick Ragg, General Manager NRM via e-mail: WRagg@nff.org.au to progress this discussion.

Yours sincerely,

TONY MAHAR
Chief Executive Officer

Climate Change Policy

Policy Position

The Australian agricultural sector has already reduced its net emissions more than any other sector and remains at the forefront of climate adaptation and action in Australia. Australia's climate policies must recognise producers for the role they play in managing Australia's landscapes, their contribution to food security, and must provide a pathway for a profitable, productive, and sustainable agricultural sector into the future.

The purpose of this policy is to provide a set of principles to reaffirm Australian agriculture's place in the global economy by positioning the sector to take advantage of the social, environmental, cultural, and economic opportunities presented by a low emissions future.

The National Farmers' Federation (NFF) supports Australia's efforts to address climate change. The agricultural sector is focused on ensuring we are contributing to a significant downward trajectory. The agriculture sector understands and expects other sectors across the economy will play their part in reducing emissions rather than expecting agriculture to be the source of significant offsets.

The NFF supports an economy-wide aspiration of net zero emissions by 2050 Provided that:

- There are identifiable and economically viable pathways to net neutrality, including impacts from inputs such as energy;
- Commonwealth and State legislation is effective, equitable and advantageous to deliver on ground programs that benefit agricultural interests and do not provide unnecessary regulatory impediment;
- No sector specific targets are imposed; and

- Global and local food security is considered in conjunction with overarching goals, not separately.

The NFF have not determined a position on a 2030 ambition and recognise many individual commodities have, or are in the process of, setting targets for reductions. However, we recognise that government policy is also a reasonable trajectory towards the 2050 ambition and that there is complexity of how this applies to the agricultural sector. It is best couched as looking for a positive set of outcomes that include a range of policy benchmarks, as outlined below.

Further, as we now move to operationalising climate policy in a productive and sustainable agriculture sector, there are a number of opportunities that we believe should be considered by government to make good on undertakings via the *Powering Australia* policy document and subsequently in government.

For agriculture, the scope 1 and 2 priorities will continue to reduce greenhouse gas (GHG) emissions and seek more efficient and cost-effective ways to address emissions of enteric methane and nitrous oxide. Carbon dioxide emissions in agriculture are already negligible, and where they exist, there will be change as renewable fuel sources become scalable, affordable, and widely available.

In line with trajectories from the Intergovernmental Panel on Climate Change (IPCC), agriculture recognises that the global targets to different GHG are not the same. NFF recognises the IPCC propose to achieve climate neutral outcomes: for methane a 50% reduction from 2005 levels is required and for nitrous oxide, 20% reductions by 2050. The transformation required to underpin these still has significant barriers and requires introducing technologies and innovation at scale to ensure no cost nor productivity impacts on the sector. Failure to support transition will result in unacceptable impacts on food and feed security both in Australia and globally. Government needs to ensure, should it seek to make international agreements, that agriculture is closely consulted on:

- How these agreements will translate;
- How and what assurances will be provided;
- How appropriate reporting metrics can be incorporated to better reflect agriculture's impact and achievement for example including dual reporting of emissions in both GWP* or another suitable metric and existing GWP100 for agriculture;
- Ensuring that they will not unfairly or unnecessarily target agriculture; and
- That the achievements that agriculture has already made are clearly recognised.

Continued investment, including by government, in assisting agriculture to innovate and adapt economically, transition justly and recognise the unique role that agriculture plays through both being an emitter, a sequestor and a food and fibre supplier to the world, are critical drivers and recognised by the Commonwealth Government investment and policy commitments including in *Powering Australia.*
The Research and Development Corporations (RDCs) must continue to support industry to progress low emissions pathways which underpin $100 billion growth, particularly as the impacts of climate change are already and very directly impacting farmers. Government should support coordinated research through RDCs and other research organisations to further the ability of Australian agriculture to continue to progress and promote the leading position in growing low emissions agricultural products it holds. This narrative should enable the government, in conjunction with industry, to ambitiously leverage the low emissions status to secure access to markets.

Governments and industry service providers must have the tools, systems and knowledge required to establish an industry baseline, and be able to communicate this to farm businesses.

As more is understood about the accuracy and viability of alternate reporting metrics, especially for methane from livestock and cropping systems, then ways to utilise those so that agriculture is treated equitably must be progressed.

The NFF will review its position regularly to ascertain if technological and economically credible pathways to achieve this target remain evident.
The NFF's position will be informed by robust science from RDCs and other credible sources which allows producers, industry bodies and agriculture as a whole to establish credible baselines and assess the implications of the policy.
This policy statement is complementary to the NFF policy positions on Natural Capital, Electricity, Climate-Related Financial Disclosure, Energy and Industry Engagement Guidelines for On Farm Activities.

Issue

Australian agriculture has always operated in a varied and challenging climate. The continued success of the Australian agriculture sector will depend on our ability to build on this foundation and continue to innovate and adapt to best manage future climatic risks and to further reduce the emissions intensity of our production systems. We note the important need for Australian agriculture to continue adapting into the future and welcome investments in technology adoption.

There is a great opportunity for Australian agriculture to contribute to our national emissions reduction goals. This opportunity requires innovation to reduce the

emissions intensity and to enable farmers to efficiently participate in emerging markets, including carbon and natural capital markets.

A transition to a low emissions economy will require transformation across a number of sectors, especially energy and transport. It is critical that the suite of government policies that seek to address the challenge of climate change are fully examined, to ensure that the policy levers of government work cohesively to achieve our national objectives, while minimising the risk of unintended or perverse outcomes. A just transition and equitable commitment for all sectors of the economy is critical. While emissions reduction is one goal in climate change policy, broader social, environmental and (particularly regional) community benefits should also be considered. There is a strong need for enhanced guidance on how to manage and incentivise new projects that have multiple co-benefits. This would facilitate a range of technology options and land-based activities which can deliver cost-effective outcomes for emissions reduction and broader economic, social, and environmental outcomes.

The NFF recognises that a number of agricultural sectors will be on a more rapid implementation trajectory. For example, the red meat sector is already substantially investing in its carbon neutral by 2030 (CN30) program and other sectors are committing to outcomes as early as 2030.

In meeting Australia's emissions reduction goals, Australian farmers expect a greater focus on industry and government investment in integrating climate change solutions for the sector. This can be delivered by:

- Focusing on carbon neutral technologies that provide a competitive advantage for existing products;
- Developing new markets, domestic and export, that benefit from innovative carbon neutral technology;
- Collaborating across all of industry to make the greatest gains from the adoption of the latest research and development;
- Adapting and adopting proven and defensible alternate metrics in the National Greenhouse Gas Inventory;
- Enhancing partnerships with private institutions, government, and other industries outside of agriculture; and
- Developing an Australian Agricultural Sustainability Framework to integrate strategies across the whole of agriculture.

Background

The NFF recognises that climate change presents both significant challenges and opportunities for Australian farmers.

The world's population is forecast to exceed 9 billion people by 2050, and demand for food and fibre is on track to increase by 60 per cent in that timeframe. There is no doubt meeting this demand in the context of a changing environment while at the same time contributing to global action to reduce emissions is a global challenge which requires a global response.

In December 2015, 195 countries including Australia, under the banner of the United Nations Framework Convention negotiated the "Paris Agreement" which aims to hold the increase in the global average temperature to well below 2°C and pursuing efforts to limit it to 1.5°C above pre-industrial levels and to increase the ability to adapt to climate change. There is bipartisan support for net zero by 2050 and there is a legislated ambition of 43% reduction from 2005 levels by 2030.

The Paris Agreement specified that to achieve the long-term temperature goal, countries should aim to reach global peaking of GHG emissions as soon as possible to achieve a balance between anthropogenic emissions by sources and removals by sinks in the second half of the century. In 2018, the IPCC issued a scientific report on the potential impacts of global warming and identified that global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. The agriculture sector contributes to our national emissions profile by both sequestering carbon in soils and vegetation and the emissions of GHG from farming practices such as livestock production, cropping practices, the use of fertilisers and the burning of savanna grasslands. Combined, agriculture accounts for about 13 per cent of Australia's National Greenhouse Gas Inventory.

Australian agriculture has been the single biggest contributor to emissions reduction since the 1990s, primarily due to the land clearing legislation imposed on farmers to meet Kyoto Protocol emissions reduction targets and the role of land use, land-use change and forestry (LULUCF). As a result, Australia has a stock of Kyoto 'carryover credits' that are able to be used to contribute to meeting Australia's emissions reduction targets.

The sector continues to make significant voluntary industry led contributions to emissions reduction. Between 1996 and 2016, agriculture has reduced its GHG emissions intensity by 63 per cent.

The Emissions Reduction Fund (ERF) and methodologies under the Carbon Farming Initiative continues to be the primary mechanism under which farmers have reduced emissions. Australian farmers make up over half the projects, and carbon credits delivered through the ERF. Renewable energy technologies have also seen a significant reduction in price over the past decade and has been significant uptake on farms. Australian Carbon Credit Units (ACCUs) must be robust and internationally

recognised for their integrity. Should the Chubb *et al* review find technical concerns, they should be addressed and where farmers are impacted, they should be justly compensated including for the lost opportunity. Care must be taken to ensure that philosophical drivers do not compromise the scope and opportunity in delivering methodologies.

Australia is not only bound by its commitment to the Paris agreement, but by the growing expectations of our community and customers about Australia's environmental credentials. Australian agriculture has a role to play in meeting climate responsibilities and moving towards an economy-wide climate neutral goal by 2050 whilst maintaining productivity and profitability.

What the Industry Needs

Policy

Economic

- Clear assurances that targets and taxes will not be placed on agriculture. This will provide certainty around what we can expect from the government in the future;
- Appropriate restrictions are placed on the Safeguard Mechanism such that agricultural enterprises are not adversely impacted by offset purchases that substantially diminish agricultural productivity;
- Acknowledge that mandatory cap and trade policies are not suited to the farm sector, and specifically excluding the sector from such schemes;
- Recognise that more than 75% of Australian agriculture produce is exported, and that as a trade-exposed sector we must remain competitive within domestic and international markets;
- Reintroduce legislation that would see carbon and biodiversity income treated as primary production income for all typical farm business models to ensure that eligible business input deductions can be appropriately offset against farm income;
- Engage in or facilitate the review valuation methodologies at least to the extent that those methodologies are not adequately acknowledging the income or capital growth attributable to carbon and other non-core commodities;
- Ensure eligibility for the instant tax/asset write off includes climate action investments;
- Compensate farmers and/or give ongoing recognition for lost productive capacity due to land clearing legislation imposed on land managers;
- Recognise the significant contribution agriculture has made to emissions reduction since the 1990s, including acknowledging MLAs CN30 target and that the Australian red meat industry has already decreased annual emissions by 57% or 133.36-54.61 Mt; and

- Introduce a new Regional Investment Corporation (RIC) loan to assist farmers undertake emissions reduction activities.

Emissions Reduction Fund

- Acknowledge the role of vegetation and soil carbon in carbon sequestration and overall soil health via full commercial/compensation systems for agricultural land sequestration (both historical and current);
- Ensure that Australia's climate change strategies encourage economy wide action to reduce GHG emissions and impact on the climate;
- In consultation with the agricultural sector ensure that the most equitable, defensible and appropriate reporting mechanisms are used that recognise international reporting obligations, improved or more accurate measurement systems, and apply principles of equity and balance for the agricultural sector;
- Ensuring that vegetation management policies do not burden farmers with the cost of achieving emissions reduction goals, nor unreasonably restrict development;
- Prioritise development of ERF methodologies that encourage and provide ACCUs for adoption of methane reducing livestock feed technologies as soon as they are available. We recognise incentives in the Budget for this, but more needs to be done to support further innovation, methodology efficiency and adoption;
- More encouragement for the agricultural industry towards emissions reduction/efficiency. Models for adaptation should be an investment focus;
- Ensure that the Climate Active certification system is able to keep pace with technology developments coming from industry and ensure that the system rewards the work that producers have already done to make their land a valuable carbon sink;
- All market-based policies that seek to incentivise climate outcomes must have mechanisms such as standardised contract terms, dispute resolution processes, and clear pricing mechanisms; and
- Primary producers need harmonisation of methodologies, reporting frameworks, and schemes across all jurisdictions.

Education & Awareness

- Recognise it may be more beneficial for farmers to identify carbon and use this within their own business (insetting) rather than sell to other sectors (as offsets), and that care is needed to prevent market and regulatory distortions which have perverse impacts; and
- Recognise emissions of (the GHG) nitrous oxide are a specific area for the agricultural industry to address. The nature and impact of nitrous oxide are different to other GHGs, meaning that a net zero target is appropriate for carbon dioxide emissions but not to other GHGs.

Incentives

- Allocate a component of the Building Better Regions Fund to fast-track viability assessment of regional low emissions fertiliser manufacturing capability in regional Australia and ensure funding under the Modern Manufacturing Strategy is directly allocated to improving domestic manufacturing for critical agricultural inputs. We understand a portion from this Fund has been redirected to support economic growth and development across regional Australia, but more must be done regarding domestic low emissions manufacturing for critical agricultural inputs;
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- Ensure a consistent approach to carbon accounting and measurement across agricultural sectors to enable accurate measurement and assist with calculating mitigation efforts and offsets, including through the National Soils Strategy; and

- Develop a comprehensive strategy to address climate change which incorporates the AGMIN National Action Plan.

October 2023

Executive Summary of the key information in the White Paper titled:

Nitrogen Fertiliser Use and Greenhouse Gases - An Australian Assessment: Challenges and Opportunities

Fertilizer Australia commissioned this White Paper to inform stakeholders about nitrogen use in Australia, provide an understanding of N losses in the Australian context, focussing on GHG emissions, and provide some recommendations on future policy options that could be considered.

This Executive Summary is an overview and readers are encouraged to refer to the White Paper for more detailed explanations and commentary.

The paper was authored by:

Robert Norton, *Norton Agronomic P/L, & School of Agriculture, Food and Ecosystem Sciences, The University of Melbourne*.

Cameron Gourley, *Soil Water and Nutrients Consulting, & School of Agriculture and Food Sciences, The University of Queensland*.

Peter Grace, *School of Biology and Environmental Science, Queensland University of Technology*

Its recommendations were developed in collaboration with Fertilizer Australia's Program Manager, Jeff Kraak, with input from its members.

Last updated 19th September 2023

Preamble

The Albanese Labor Government has committed to reduce greenhouse gas emissions to 43% below 2005 levels by 2030.

A significant source of emissions from agriculture comes from the use of nitrogen fertilisers, and several countries have placed restrictions on the quantity of nitrogen fertiliser in an effort to reduce emissions.

In all examples, this has had a detrimental effect on agricultural output and put the prosperity of those countries at risk.

Through commissioning this independently authored White Paper, the fertiliser industry's peak body, Fertilizer Australia, aims to assist the Australian government in reaching its targets without the perverse outcomes that might result from a mandate that reduces the use of fertiliser, particularly nitrogen. There are more nuanced methods of achieving these outcomes.

A reduction, such as that attempted in Canada, may not have a significant effect on emissions in Australia, but it will drastically slash Australian agricultural production, put regional communities at risk and potentially remove the surplus that Australia exports, damaging Australia's prosperity.

Furthermore, Australia's soils are very old, and the soil carbon is heavily influenced, in a positive way, by the application of fertilisers, particularly nitrogen. The reduction in nitrogen could damage soils.

The White Paper provides the government with an Australian perspective on nitrogen fertiliser use and a baseline for the government to measure changes in emissions.

Australia has a unique agricultural system, with much of it broadacre and in arid climates. Australia's emissions from such enterprises are very low.

While some enterprises in higher rainfall areas produce more emissions, there are solutions to these, using technology and farming practices rather than reducing fertiliser input.

These technologies and farming practices aim to ensure that the amount of nutrients that go into the plants are maximised and the amount lost to the environment is minimised. This is called Nutrient Use Efficiency and can, in certain circumstances, reduce the amount of fertiliser applied.

The White Paper provides several recommendations that can assist the government in developing a well-considered response to emissions from nitrogen fertilisers while maintaining Australia's position as a prosperous country that feeds and clothes the world.

Glossary

Term	Definition
C	Carbon
GHG	Green House Gases
Ha	Hectare
Mt. CO_2E	Metric Tons of carbon dioxide equivalent
N	Nitrogen
N_2	Dinitrogen
NBI-N	Nutrient Balance Intensity (kg N/ha)
NH_3	Ammonia
NH_4	Ammonium
N_2O	Nitrous Oxide
NO_3	Nitrates
NUE	Nitrogen Use Efficiency
PFP	Partial Factor Productivity (grain per kg/N)
SOM	Soil Organic Matter

Challenges and Opportunities

Agricultural Use of Nitrogen

Nitrogen (**N**) is an essential element required in large amounts. It is the most common nutrient limitation for plant growth.

Fertilisers supplement the N supply to plants that comes from the soil and manures, composts and legumes, to enhance crop and pasture production.

N fertilisers have made it possible to sustain the growing world population, sparing millions of hectares of natural and ecologically sensitive systems that otherwise would have been converted to agriculture.

In Australia, N use is fundamental to the productivity and sustainability of its agricultural industries but it is characterised by insufficiency in some areas and an excess in others.

The N challenge is balancing the benefits in productivity from using N inputs while minimising the N losses and the impact of those losses.

The use of N in various industrial, agricultural, and other activities can result in leakage with environmental consequences such as pollution of water bodies and emission of greenhouse gases.

On the other hand, underusing N can result in reduced food production, the loss of soil organic matter (**SOM**), degradation of soil quality and increased erosion.

The opportunity is provided by efficiency-improving technologies and practices that improve productivity and reduce nitrous oxide (**N_2O**) emissions.

Land managers, supported by technology and appropriate policy settings, can address the N challenge where reduced N losses and improved nitrogen use efficiency (**NUE**), across all sectors, provide the foundation for a Greener Economy to, simultaneously, produce more food and energy while reducing environmental pollution.

Nitrogen Fertiliser Manufacturing

N fertiliser manufacture uses fossil fuels such as natural gas and coal, which have a large embedded carbon footprint.

The challenge is that while it is technically feasible to manufacture N fertiliser with a low carbon footprint, it is currently not economical as farmers are, typically, not prepared to pay a premium for N fertiliser manufactured to have a low carbon footprint.

The opportunity is to position Australian agriculture to take advantage of changes in consumer demand for produce with a low carbon footprint.

This may cause a change in farmers' responses to market signals and technology improvements that lower the cost of N fertiliser with a lower carbon footprint.

Policy settings that aid this transition should be considered.

Background information

What is nitrogen and why is it important?

- N is an essential nutrient to plants and forms the source of protein in our food.
- Although it is abundant in the atmosphere as dinitrogen (**N_2**), plant-available forms of N are often the most limiting nutrient in natural and agricultural ecosystems.
- N in soil is mainly present in organic matter, which is transformed to plant-available N through biological activity and soil micro-organisms.
- Too little N leads to low crop yields and declining soil health, conversely, too much N can lead to environmental damage through losses to air, land and water.
- The global production of synthetic N fertilisers using the Haber-Bosch process has enabled food production to support an estimated 40% of the world's population.
- The amount of N cycling through our systems has dramatically increased since the Industrial Revolution and the "Green Revolution".

While N is vitally important for farm profitability, food production and a healthy diet, losses of N from production systems can result in environmental damage at a local and global scale.

The European Nitrogen Assessment and "Our Nutrient World" identified that leakages from the N cycle have negatively impacted water quality, air quality, greenhouse gas balance, ecosystems and biodiversity, and soil quality.

The Nitrogen Cycle

- N is a reactive element that cycles through soils, plants, animals and the atmosphere.
- As N cycles from the air to soil and into plant products, ammonia (**NH_3**) volatilisation, nitrate (**NO_3**) leaching and nitrification/denitrification can result in environmental impacts.
- NH_3 and N_2O emissions can be derived from all N sources, including manures, composts, crop residues, biological fixation and fertilisers.

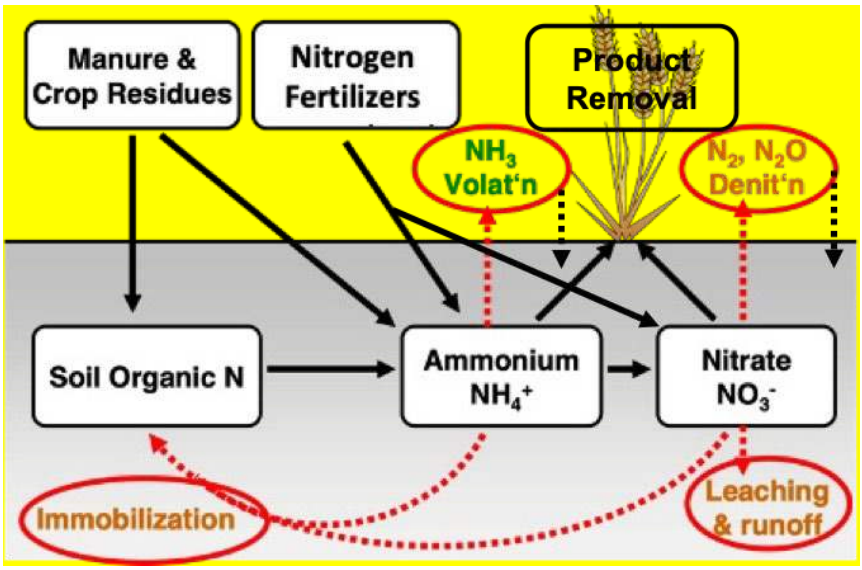

Figure 1. A simplified nitrogen cycle showing the inputs and pools of nitrogen, along with loss and transfer pathways in red (IPNI). (Volat'n = volatilisation; Denit'n = denitrification). Gaseous N can be redeposited.

Nitrogen Use Efficiency

- NUE is the ratio of the sum of N removed in agricultural production outputs and the sum of N added as inputs.
- NUE can be measured in many ways depending on the purpose of the assessment.
- The most common and practical NUE assessment is the 'removal to use' ratio, called a partial nutrient balance. N input minus N removal also estimates N balance on an area basis. These indices are simple to calculate, scalable and applicable for agricultural and environmental assessments.
- Improved field, farm and industry fertiliser use information will assist in assessing and bench-marking N use efficiency.

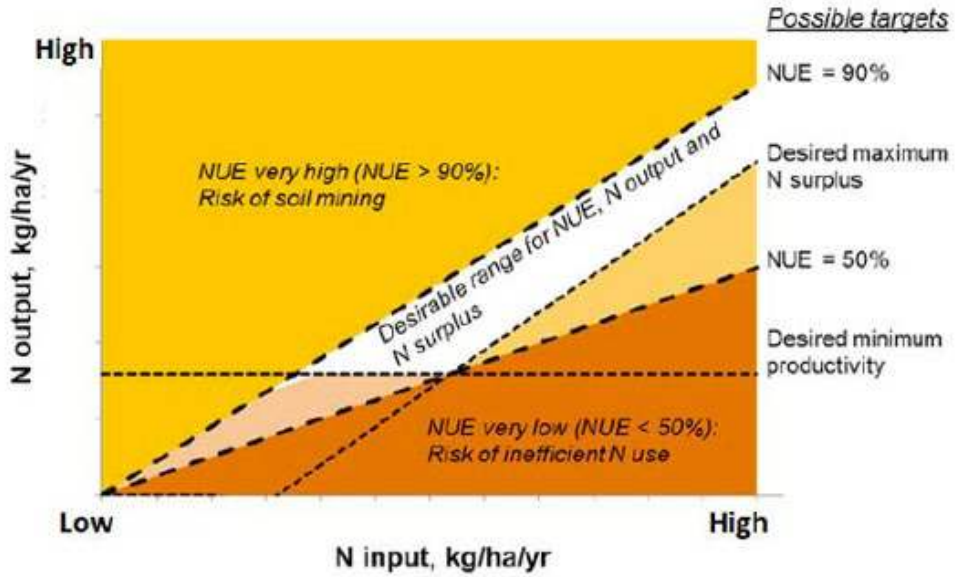

Figure 2. One of several frameworks proposed for interpreting PNB-N to include scaling of N use. The values are only indications, as target PNB-N values are industry and region-specific.

Fate of N not removed in agricultural products

A consequence of the transfers between N pools in the soil and then into crop or pasture plants or the SOM pool, is that some N is lost through a range of pathways. Below is a summary of those pathways.

i Losses of N as gases

Four N gases are released from the soil in appreciable quantities. These are N_2, NH_3, nitric oxide (**NO**) and N_2O.

Denitrification is the principal process where NO_3 is biologically reduced by removing one or more of its oxygen atoms to create N_2, NO or N_2O, depending on soil conditions.

NH_3 gas is produced when ammonium (**NH_4**) from manures or fertilisers decompose.

ii Losses of N through water

- NH_4 is not mobile in the soil, but the NO_3 form of N is and can move through the soil, potentially into drainage waters.

- N in water can lead to algal blooms and eutrophication in water bodies.
- Secondary N_2O emissions can be derived from NO_3 transferred to water.

iii Losses of N to and from organic matter

- N can be released from or incorporated into organic matter depending on the Carbon (**C**)-to-Nitrogen ratio of the material added.
- Cultivation, residue burning and long fallows reduce SOM levels.
- Low SOM can result in poor soil structure, reduced fertility and declining soil health.

Importance of Nitrogen for food security and soil health

i. Nitrogen for soil health

- Organic N from SOM is critical to support the soil's physical, chemical and biological fertility.
- Balanced nutrition with conservation farming practices, including adding supplementary N from inorganic or organic N fertilisers, helps maintain SOM levels and soil health.

ii. Nitrogen for food and fibre production

- Organic N - whether from soil or recycled organic materials - cannot sustainably supply enough N to support highly productive $90 billion AUD agricultural production systems.

iii. Balancing role of Nitrogen fertilisers

- Australian farms use around 1.5 Mt of elemental N annually, less than 1.5% of global consumption.
- N fertilisers help replace the N lost in crop products and maintain soil productivity.
- There is a sizeable water-limited yield gap in the Australian grains industry due to sub-optimal N management practices.

Context and operating environment

Nitrogen and Green House Gas Emissions

N_2O emissions, like all GHG, are attributed and reported under the National Greenhouse and Energy Reporting Scheme (NGERS) as being derived from three sources described in the table below:

Scope 1	Direct emissions from the activities undertaken. In the case of agriculture, this includes cultivation, residue burning, and use of N fertilisers, soil ameliorants and fossil fuels. For 2020-2021, the NGERS reported 76.3 Mt CO_2e for agriculture.
Scope 2	Indirect emissions - created by the production of energy used on the farm, such as electricity. Scope 2 emissions for agriculture are estimated at 1.28 Mt CO_2e, out of 163.3 Mt CO_2e.
Scope 3	Indirect emissions – meaning those not produced on the farm itself –they differ from Scope 2 as they cover those produced by customers using the company's products or those produced by suppliers that the company uses. Typical Scope 3 emissions for agriculture are fertiliser manufacture, storage and irrigation infrastructure. Scope 3 emissions are not reported under the National Greenhouse and Energy Reporting Scheme.

- Agriculture produces around 15% of Australia's greenhouse gas emissions, and N_2O represents about 15% of the emissions from agriculture or 8.1 Mt carbon dioxide equivalent (**CO_2e**).
- Direct (Scope 1) N_2O emissions from agriculture are derived from fertilisers (30%), decomposition of crop residues and organic materials (30%), the direct deposition of dung and urine (35%) and where animal manure is stored and land applied (5%).
- Revised N_2O emission factors (EF) for various industries have been recently published, which provide higher confidence (Tier 2/3) estimates of GHG production from applied fertilisers.
- There are additional GHG emissions embedded in N fertiliser (Scope 3) as a consequence of manufacture.

N_2O is a potent greenhouse gas contributing to climate change. It has a much higher global warming potential than CO_2, although its atmospheric concentration is much lower.

The White Paper focuses on Scope 1 emissions - those directly derived from agricultural activities on farm, although Scope 3 emissions associated with fertiliser manufacture are significant.

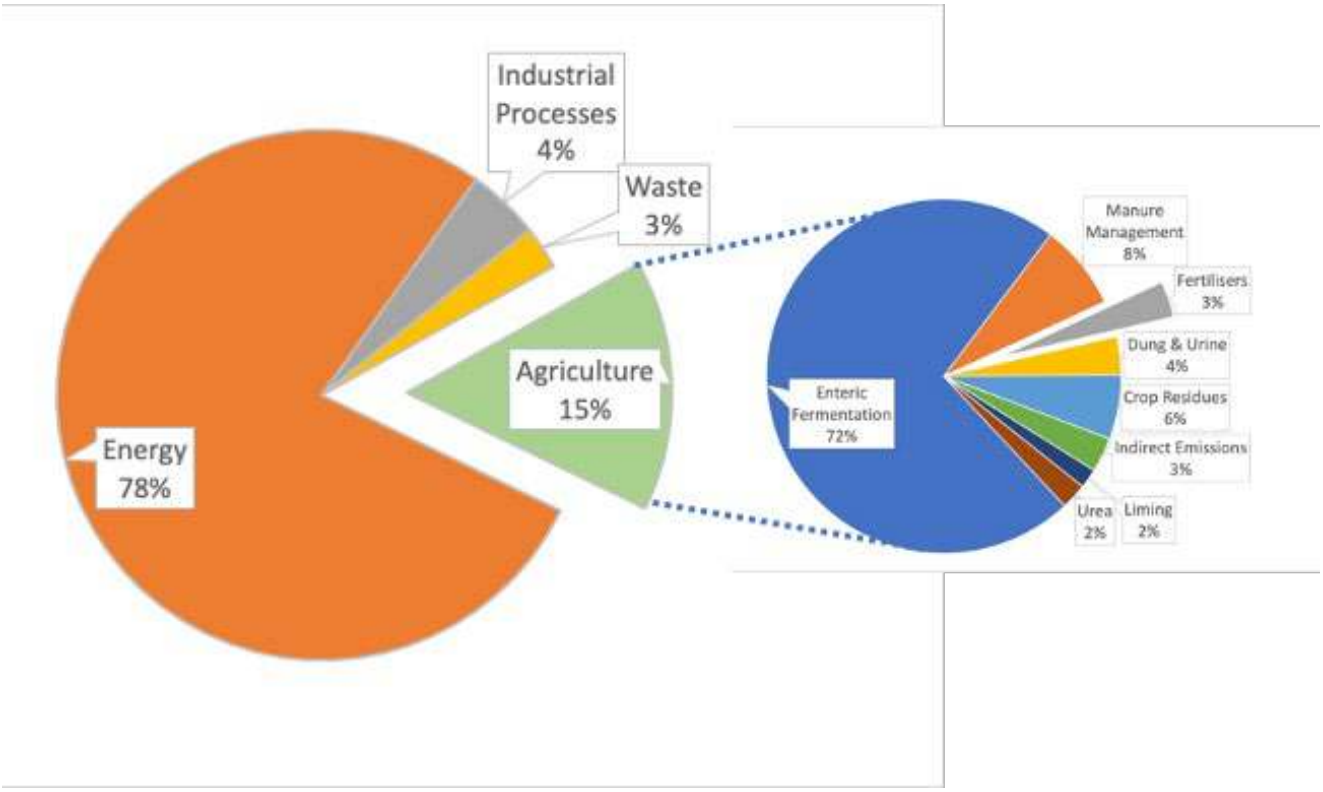

Figure 3: Total Australian Greenhouse Gas emissions for Australia by United Nations Framework Convention on Climate Change, net of Land Use, Land Use Change and Forestry sector (left) and the breakdown of agricultural emissions by IPCC source.

The agricultural sector contributes around 79% of Australia's N_2O emissions. The National Inventory report indicates that N_2O emissions are derived from direct emissions from inorganic fertilisers (2.46 Mt CO2e), urine and dung deposited by grazing animals (2.61 Mt CO_2e), crop residue decomposition (4.38 Mt CO_2e) and indirect emissions due to nitrogen leaching and runoff (2.38 Mt CO_2e). Other agricultural sources of GHG are methane from enteric fermentation, manure management and rice cultivation, and CO_2 released from liming and burning fuels for activities like irrigation, machinery operation and processing. There are additional GHG emissions from urea fertilisers due to the 20% carbon content, released as CO_2, not N_2O. The GHG inventory estimates this adds 1.76 Mt CO_2e.

Estimating Scope 1 nitrous oxide emissions in agriculture

As N_2O emissions can vary significantly due to on-farm management and environmental conditions, generalised emission factors (**EF**) are often used to estimate the amounts emitted.

We also use the term 'tiers' to describe the type and quality of data used to calculate emissions. Tiers are based on the system used by the International Panel for Climate Change. The Tier of data increases as the data improves, so Tier 1 is lower quality and Tier 3 is the highest quality.

The 2019 Intergovernmental Panel on Climate Change (IPCC) indicated a Tier 1 N_2O emission factor (EF) based on 1% N fertiliser use. This EF indicated that for each 100 kilograms of N fertiliser, one kilogram of N is released as N_2O. This assumes a direct and linear relationship between N fertiliser use and N_2O emissions.

In collaboration with the fertiliser industry and farmer organisations, federal and state agencies have undertaken field research across industries since 2003 to develop Tier 2 and Tier 3 EF values and strategies to mitigate emissions.

The Cooperative Research Centre for Greenhouse Gas Accounting (1999-2006), Nitrous Oxide Research Program (NORP, 2009-12), the National Agricultural Nitrous Oxide Research Program (NANORP, 2012-16), the National Adaptation and Mitigation Initiative (NAMI, 2009-12) and outputs from multiple projects funded through the Action on the Ground Program (2012-16) have all provided a public, high-quality data set to support agriculture across all industries and regions.

The most recent summary of this research has drawn the following conclusions:

- An average EF for all N sources was 0.57%.
- EF ranged from 0.17% (non-irrigated pastures) to 1.77% (sugar cane).
- EF were independent of topsoil organic carbon content, soil bulk density and pH but increased with rainfall for every 100 mm over 300 mm.

Estimating Scope 3 emissions for N fertiliser

Significant GHG emissions are embedded in the production of N fertilisers, although the amount varies depending on the place of manufacture and the different N sources. For example, when urea fertiliser was produced in Australia, it had a GHG 'cost' of 3.3 t CO_2e per tonne N, while urea produced in China, using coal-derived energy, has twice this GHG 'cost'.

NH_3 is the basic building block for most N fertilisers. Haber-Bosch is the industrial process of forming ammonia. It directly combines N from the air with hydrogen, under high pressure and temperature.

While producing NH_3 with a low or no carbon footprint is technically feasible, the financial cost for this process is currently greater than the Haber Bosch process, using energy from fossil fuels such as natural gas.

There is significant global interest and investment in decarbonising N fertiliser production using green energy, new production technologies and carbon capture and storage initiatives (**Green Ammonia**). The International Fertilizer Association estimates that the use of Green Ammonia could total almost 80 Mt by 2028.

In Australia, there is also interest in producing a form of Green Ammonia, however, most of the proposed projects target exporting NH_3 as an energy source. Several of these projects have received evaluation funding from the Australian Renewable Energy Agency (ARENA).

As Australia is currently highly reliant on importing N fertilisers, sourcing N fertilisers with a low carbon footprint would reduce Scope 3 emissions for agriculture.

Using Australia's clean energy sources to produce Green Ammonia would be a better method of reducing Scope 3 emissions.

However, N fertiliser with a low carbon footprint will likely carry a price premium.

Nitrogen use in Australia - types, sources, regional and industry use patterns.

i. Types and sources of N for agriculture

- In general, Australian agriculture is based on extensive (Broadacre) rather than intensive land use.

- Most Australian agricultural production comes from approximately 66 million hectares, which have generally low N inputs.
- Rainfed crops are the primary users of N fertiliser.
- Urea is the most common N source, comprising 68% of the N applied nationally.

ii. N fertiliser use by the agricultural industry

- The grains industry uses around 60% of national N fertiliser annually, while other industry sectors use less than 10%.
- Both the prices paid for fertilisers and prices received for produce in Australia, are derived from global prices.

iii. Efficient and effective N use on Australian farms.

- Inorganic N use, in agriculture, is an economic decision by growers in the light of seasonal risk and input price and commodity prices.
- Those decisions vary among industries based on the likely yield responses to supplied N fertiliser and the environments where those industries operate.

iv. Australian N fertiliser use in the global context

- By global standards, N use in Australia is low.
- Both the rate used and any surplus of removal overuse are small, so nutrients are generally used effectively.

Total N fertiliser consumption by country & industry

Australia uses less than 1.5% of the total elemental fertiliser N consumed globally and is ranked the 17 largest consumer out of 117 countries reporting N use.

The largest consumers are China (21%), USA (18%) and India (11%), with the top 20 countries consuming 82% of all N fertiliser.

Over 50% of the fertiliser N applied globally is urea. This is a result of its cost, ease of transport and application.

In Australia, around 70% of the N is supplied as urea, with another 12% applied as ammoniated phosphates (MAP and DAP).

Nitrogen-UE and NBI-N for selected cereal production systems

By global standards, Australian farmers are modest users of N fertiliser. This is mainly driven by seasonal conditions, with little market distortion by commodity support or subsidy schemes.

As a result, there are sizeable annual variations in N use and therefore NUE. Single-year data on crop NUE and PFP does not account for the rotational systems in which Australian crops are grown. More complex calculations are required when animals are involved in the production system, as estimates of manure nutrient recycling and pasture N cycling are likely important in these systems.

Table 1 is a summary of the comparative N use and performance indicators (NUE, PFP-N and NBI) for cereal production for the 20 major N fertiliser users, for the year 2018 (which is the audit period for the IFA Fertiliser-Use-By-Crop data).

While the data in Table 1 has several assumptions embedded in it, a comparison across countries shows that Australia, with low yield and low fertiliser input, still manages a good return on N (PFP), although the nutrient balance indicates efficiencies that can be made.

The fate of the modest surplus of 6 kg N/ha per year is not able to be assessed from these types of evaluation. While it may contribute to N pollution, equally, that surplus may also be carried over from year to year, either as mineral N or sequestered into organic matter.

Table 1. Cereal area and mean cereal yield, mean nitrogen application rate, and the performance indicators of Nitrogen Use Efficiency (also referred to as Partial Nutrient Balance kg nutrient removed/kg nutrient applied), Partial Factor Productivity (PFP-N t yield/kg nutrient applied), and Nutrient Balance Intensity (NBI-N kg N/ha). The Partial Nutrient Balance is based on a weighted cereal grain N content of 1.58% (as is basis). Data is for the audit period 2018, and for the twenty largest N users. Data derived from the FAO CropStat database and fertiliser use from IFA Fertiliser-Use-By-Crop dataset.

Country	**Cereal Area (kha)**	Cereal Prod'n (kt)	Mean Cereal Yield (t/ha)	N Applied (kg N/ha)	NUE (kg grain N/kg N %)	PFP-N (kg grain/kg N)	NBI (kg N/ha)
Argentina	15,111	70,591	4.67	63	116	74	-10
Australia	16,633	33,861	2.04	38	83	53	6
Bangladesh	12,275	58,812	4.79	91	83	53	16
Brazil	21,483	103,260	4.81	70	107	68	-5
Canada	15,002	58,727	3.91	98	63	40	37
China	99,932	612,122	6.13	170	57	36	74
Egypt	2,592	17,564	6.78	283	38	24	177
EU27	52,324	273,885	5.23	118	69	44	36
India	98,094	321,556	3.28	118	43	28	67
Indonesia	17,058	89,454	5.24	97	85	54	15
Iran	9,081	18,651	2.05	105	31	19	73
Mexico	9,426	36,068	3.83	104	58	37	44
Pakistan	13,736	39,658	2.89	150	30	19	105
Russia	41,989	109,839	2.62	34	119	76	-7
Thailand	12,016	37,867	3.15	83	59	38	34
Türkiye	10,871	34,396	3.16	88	57	36	38
Ukraine	14,258	69,112	4.85	67	114	72	-9
United Kingdom	3,106	21,084	6.79	166	64	41	59
United States	53,646	439,708	8.20	144	90	57	15
Vietnam	8,605	48,924	5.69	133	0.67	43	43

Recommendations

- Consider policies encouraging the widespread use of nitrification inhibitors to improve NUE and reduce N_2O emissions.
- Formally assess the effectiveness and risks of N inhibitors and slow-release technologies.
- Encourage greater adoption of objective tools like soil and plant testing, which follows Fertcare® stewardship principles, to guide fertiliser use.
- Encourage greater adoption of precision agriculture tools that assist in spatially and temporally targeting inputs where and when they are most needed.
- Incentivise the Australian manufacture of N fertilisers with a low carbon footprint and N inhibitors.
- Engagement of industry bodies, research organisations and state and federal governments in sharing of data on inputs, NUE and N_2O emissions.
- Avoidance of free market disruption with taxes, levies or quotas on N fertilisers.

Encourage widespread use of N inhibitors and slow-release technologies with assistance from government policy and support.

Scientific advancements will continue to play a vital role in developing solutions and options for reducing N losses. Some specific technologies, such as nitrification inhibitors, have proven effective at improving NUE and reducing N_2O emissions but at present, are typically not cost-effective for growers to implement.

Reference to encouraging and/or incentivising through the pre-farm aggregation proposal (Appendix A)

Formally assess the effectiveness and risks associated with inhibitors and slow-release technologies before widespread use.

The Australian Industrial Chemicals Introduction Scheme (**AICIS**) assesses the risks of importing or manufacturing (introducing) industrial chemicals and promoting their safe use. Not all the inhibitor products currently available on the Australian market are listed in the AICIS inventory.

Agricultural chemicals that claim to control weeds, pests and diseases must be reviewed by the Agricultural Pesticides and Veterinary Medicines Authority (**APVMA**) before being released. Inhibitors and slow-release fertiliser products do not require regulatory approval for use on Australian agricultural land.

If there were to be widespread use of inhibitors and slow-release formulations, some formal review may be of value to consider issues such as:

- the level of effectiveness of a product to reduce N loss, e.g., N_2O emissions
- the operator's occupational health and safety issues associated with applying inhibitors (both the active ingredient and solvents/carriers) to fertiliser and the safety of those who apply treated fertiliser to soil

- plant safety to assess the potential for phytotoxicity
- consumer safety and international trade implications resulting from ingestion/use of food and fibre crops treated with inhibitors, slow-release formulations, and/or unintended consequences resulting from widespread use of these products. For example, the hygiene of common bulk transport and handling equipment for food, e.g. grain and treated fertiliser
- implications of widespread use of inhibitors and slow-release fertilisers on soil microbial health
- risks to the broader environment, e.g. the water quality of deep drainage or surface water runoff from treated fields.

New Zealand is introducing an agricultural use registration process for inhibitors, including establishing maximum residue limits for agricultural produce under the Codex Alimentarius Commission (**CAC**). The CAC is the central part of the Joint FAO/WHO Food Standards Programme and was established by FAO and WHO to protect consumer health and promote fair practices in food trade. Australia could consider a similar approach.

Encourage greater adoption of objective measures like soil and plant testing to guide nutrient inputs

Through the Fertcare® stewardship program, the fertiliser industry endorses objective measures such as soil and plant testing and appropriate analysis and interpretation methods to provide evidence-based, site-specific nutrient management recommendations. This is based on meeting crop nutrient demand from existing soil nutrient availability, supplemented where necessary by applied fertiliser and other nutrient sources, e.g. animal manures or compost. Minimising nutrient surplus to crop requirements will significantly reduce the potential for offsite nutrient impacts such as N_2O emissions.

There is a need for greater use of soil and plant testing by growers to guide nutrient inputs. Whilst many factors contribute to crop and pasture responses to nutrient inputs, soil and plant tests have proven to help guide nutrient inputs.

Policies encouraging greater grower adoption of soil and plant testing as the basis for nutrient inputs should be considered.

Encourage greater adoption of precision agriculture tools

Minimising nutrient surplus to crop requirements at a sub-paddock scale will help optimise farmers' financial return on nutrient inputs and reduce the potential for off-site impacts.

Variable-rate fertiliser application technologies have been available for some time, though adoption is generally low. However, the ability to gather and interpret agronomic and economic data and spatially apply varying rates of inputs, such as fertiliser, is challenging for many growers. Others with specialist skills are often needed to implement precision agriculture pragmatically.

Policies that make precision agriculture knowledge and skills more widely available and demonstrate the benefits to growers should be considered.

Incentivise the Australian manufacture of N fertiliser with a low carbon footprint and N inhibitors:

The production of "green" NH_3, as a feedstock to N fertiliser manufacture, is an evolving technology. Using renewable energy sources in manufacturing can reduce N fertilisers' Scope 3 carbon cost.

Fertiliser businesses are yet to see any material demand from farmers for low-carbon fertiliser, including the price premium reflecting the increased cost of manufacture. Since this impedes the development of "green" NH_3 projects for fertiliser use, the government may need to consider adjusting policy settings to stimulate this development.

N inhibitors and their ingredients are largely imported, which may lead to supply chain insecurity. Policy settings which support local manufacture of inhibitors to secure supply of existing and emerging inhibitors that are under development in Australia should be considered.

Compared to other parts of the world, Australian manufacturing is often up the higher end of the cost spectrum. Government policy settings which support development of Australian manufacturing employing new technologies which result in low-carbon N fertilisers should be considered.

Encourage greater levels of data sharing:

The research effort in developing N best management practices will need to continue as farming systems evolve and new technologies are available for deployment. The various commodity research and development corporations and the fertiliser industry hold high-quality data on fertiliser use. The ongoing high-quality research undertaken across industries provides more complete estimates of N_2O emissions, which will affect the Australia Greenhouse Gas inventory. There would appear to be an opportunity for more active data sharing among these groups on N use and N_2O emissions. This will better quantify N budgets, and N use efficiencies across applications and scales.

Avoidance of free market disruption with taxes, levies or quotas on N fertilisers

A suite of national policy approaches can support continued improvement in N management. Australian agriculture is fully exposed to the global market in purchasing inputs and marketing produce. A recent ABARE report notes that agricultural support interventions such as direct restrictions, tariffs, taxes and levies can influence production decisions, farming practices and the use of inputs such as fertilisers by changing the relative costs and returns of using resources in agriculture.

Appendix A

Concept proposal for a pre-farm treated fertiliser aggregation payment

Developed by Richard Eckard, UoM and Peter Grace, QUT

in collaboration with Jeff Kraak, Fertilizer Australia with support from their members

Introduction

This paper outlines the background and principles which might guide a proposal for the development of a treated fertiliser policy mechanism to encourage farmer use of nitrification inhibitors.

This paper uses DMPP as an example because it is the nitrification inhibitor technology with the greatest amount of Australian nitrous oxide (N_2O) data, particularly in grains. When sufficient peer-reviewed data becomes available for other products/technologies, a similar approach would be followed.

Background

N_2O is a potent greenhouse gas, contributing 4% of Australia's national greenhouse gas emissions in terms of its global warming potential. Australia's agriculture sector is the primary emitter of N_2O, producing approximately 60% of the total emissions per annum. Within the Agriculture sector, soils produce 95% of the N_2O, mainly from the direct emissions associated with applying nitrogen (N) fertilisers, crop residues and dung and urine, which approximate to 8 Mt CO_2e.

The current National Greenhouse Gas Inventory (NGGI) (3.D.a.1) estimates that 2 Mt of carbon dioxide equivalent (CO_2e) emissions are directly emitted from N fertiliser application. N fertilisers contribute to an additional 2 Mt CO_2e of indirect N_2O emissions via N leaching and atmospheric deposition. Fertiliser N applications also indirectly contribute to crop residues, which produce 3 Mt of N_2O per annum. Since one N_2O molecule is equivalent to the warming effect of 273 CO_2 molecules, this conversion value is then used to ensure we can bring together all greenhouse gases into a single currency for standardising greenhouse gas emissions.

Depending upon a number of soil factors, as the amount of N applied as fertiliser increases, N_2O emissions also tend to increase. In most cases, the emissions are a proportion of the N rate which is known as the emission factor (i.e., the amount of N applied emitted as N_2O-N), which varies by sector and currently ranges from 0.2% for dryland grains cropping to 2% in sugar cane. For example, in sugar cane 2% of the applied N rate is deemed to be emitted as N_2O-N. If 200 kg N is applied, 4 kg N is emitted as N_2O-N which is 6.3 kg N_2O (converting it to the N_2O molecule itself). This emission is then converted to a value that allows us to determine its impact on the atmosphere in terms of its warming effect. So, if 200 kg N is applied in sugar, the N_2O emissions are equivalent to 1,716 kg CO_2 in terms of its impact on the atmosphere in terms of warming.

Mitigation options

There are four agronomic management interventions that can be used either singularly, or in combination, to potentially reduce N_2O emissions:

- Reducing the rate of N fertiliser applied (as per the existing Cotton ERF method);
- Delayed or split applications of N fertiliser so that it coincides with plant uptake, leaving the applied N less prone to losses (from leaching or denitrification);
- Placement of the N fertiliser in bands below the surface where it is less susceptible to loss; and/or
- Applying a specific N fertiliser or product which slows nitrate production (NO_3^-), the primary precursor to N_2O. An example is the commercial coating of urea with a nitrification inhibitor like DMPP and its derivative products.

Urea is the dominant source of N fertiliser used across Australia, with the Fertilizer Australia sales statistics revealing that 66% of the N from fertiliser sold in 2021 was supplied from urea. There is ample evidence in grain systems (e.g., Migliorati et al. 2014 and 2016; Scheer et al. 2016. Schwenke et al. 2019a & 2019b) that the use of DMPP with urea can significantly reduce the production of N_2O by 79%. Peer-reviewed evidence also exists in the horticulture sector (80%), but limited evidence in pastures 11-22% and sugar cane (54%), the latter production systems due to the limited number of studies (Table 1).

If DMPP-coated urea was used instead of standard urea, a 59% reduction of N_2O emissions (1.13 Mt CO_2e) is possible across the agricultural sector per annum (Table 2)[1]. This is valued at $31.6M per annum on the Australian Carbon Credit Units (ACCUs) market at the current valuation of $28/t CO_2e. If nitrification inhibitors were used on all N fertilisers sold in 2021, resulting in the same reduction in N_2O, this would translate to 1.71 Mt CO_2e or $50M per annum.

Table 1. Paired treatment studies in Australia where DMPP with urea have been directly compared with respect to Emission Factors (EF) of N_2O.

System	Inventory EF (%)	DMPP studies	Urea EF (%)	DMPP EF (%)	DMPP EF Reduction (%)
Grains (Irri)	0.85	4	0.55	0.11	80
Grains (low rain)	0.05	0	-	-	-
Grains (high rain)	0.85	21	0.73	0.15	79
Hort	0.85	13	0.75	0.15	80
Pasture (Irri)	0.4	2	0.46	0.41	11
Pasture (non-irri)	0.2	4	0.18	0.14	22
Sugar	1.99	2	2.6	1.2	54
Cotton	0.55	0	-	-	-

[1] N_2O reduction with DMPP will increase to 64% if alternative nitrogen fertiliser distribution for Australia (Heffer et al. 2017) is used. N use in non-irrigated pasture = Grassland + Other - NGGI value for irrigated pasture. Per annum N_2O reduction with DMPP in non-irrigated grains increases to 239,000t CO_2e with Heffer et al (2017) data compared to 161,000t CO_2e using NGGI data.

Table 2. Differential in N_2O emissions (CO_2e) if DMPP coated urea is substituted in Australia. Based on 2021 Fertilizer Australia data of total N fertiliser consumption.

System	Inventory EF (%)	Urea - N[2] ('000t)	DMPP EF Reduction (%)	Urea CO_2e ('000t)	DMPP CO_2e ('000t)
Grains (Irri)	0.85	38	80	139	28
Grains (non-Irri)	0.2[1]	537	79	461	97
Hort	0.85	54	80	197	39
Pasture (Irri)	0.4	54	11	93	82
Pasture (non-irri)	0.2	443	22	380	296
Sugar	1.99	50	54	427	196
Cotton	0.55	90	80[3]	212	42
TOTAL		1266		1908	782

[1]Weighted average in current NGGI
[2]66% of total N fert in Australia x NGGI Activity data (2019) to apportion N use by sector
[3]assumed same DMPP reduction in N_2O as irrigated crop

The market failure and pre-farm aggregation proposal

Currently, the cost of urea fertiliser coated with a nitrification inhibitor is around 14% more expensive per unit of N applied, compared to conventional urea. While highly effective at reducing N_2O emissions from N fertiliser application (see Table 1), the actual N saved is typically less than 10 kg N per hectare per year. In many situations, this saving is not agronomically significant for farmers and, not surprisingly, most of the research suggests no significant productivity benefit. If an offset method were developed to incentivise farmers to purchase this precoated fertiliser, the returns at an average grain farm would be less than $200 per farm per year; therefore, farmer adoption would be almost impossible to achieve. We, therefore, see a public good outcome from the government addressing this market failure.

It would be far more efficient and cost-effective for the government to engage in a pre-farm aggregation of N_2O abatement, whereby a limited number of fertiliser manufacturers engage directly with the government to precoat fertiliser products like urea at an agreed price per tonne. This payment would then be passed onto growers as a reduced price for treated N fertiliser. Therefore, adoption by the farming community would be increased significantly, as the product would be sold at a similar unit cost as standard urea, depending on the value of the N_2O abatement payment. We also understand from Fertilizer Australia that their members are not looking for a profitability outcome from this mechanism, just the credential of supplying a more benign form of fertiliser (reduced nitrous oxide emissions associated with the end use of fertiliser) but at no loss of profitability to their core business.

We recommend that the Minister for Climate Change and Energy work with Fertilizer Australia and its members to develop this pre-farm treated fertiliser aggregation payment that will reduce emissions from N fertiliser use on Australian farms.

Principles for a pre-farm treated fertiliser aggregation payment

- The business treating the fertiliser would aggregate the volumes of treated N fertiliser and make a declaration to this effect. The suggested audit frequency to confirm the volumes of treated N fertiliser be no more than 12 months.
- Based on the volumes of treated N fertiliser sold, an emissions reduction factor would be applied to arrive at the volume of N_2O that had been mitigated.
- The government would pay an agreed amount designed to neutralise the cost differential between standard and treated N fertiliser.
- This value (after costs) would be passed on to growers by reducing the price of the treated fertiliser.
- It is proposed the pre-farm treated fertiliser aggregation payment would remain in place for ten years. The payment size would be reviewed at agreed intervals and reduced to zero at the end of the ten-year period when farmers will likely see strong market signals around GHG emissions.

Benefits of a pre-farm treated fertiliser aggregation payment for growers

- Easy: Growers would not be required to provide documentation to government departments to gain the value of the N_2O abatement. This value would be passed onto the grower in the form of a reduction in the price of treated fertiliser.
- Immediate: N_2O emissions reduction from treated N fertiliser are immediate. Unlike building soil organic matter/carbon, which takes many years to achieve, farmers can immediately benefit from a reduced price for treated N fertiliser.
- Low risk: The risk to growers in achieving the benefit of N_2O abatement resulting from using treated N fertiliser would be very low compared to sequestering carbon in soil or vegetation where the risks are much more significant.
- When farmers have used treated fertiliser, they can claim the N_2O abatement in calculating the emissions footprint of agricultural products they produce.
- The cost of using treated fertiliser would decline compared to current levels.

Benefits of a pre-farm aggregation method for Australia

- Gets the job done: Emission reduction associated with treated fertiliser is immediate at the time of application to the soil. The government would be seen to be taking direct action on N_2O emissions. There is no waiting many years for the benefit as is the case for sequestering carbon in soil or vegetation.
- Simplified administration: Rather than dealing with thousands of growers, the government would only deal with 5 – 15 businesses that treat N fertiliser.
- Applications for the pre-farm treated fertiliser aggregation payment, including the aggregated volumes of treated fertiliser for a period (e.g. 12 months), and the declaration made by fertiliser companies, could be verified by an independent auditor.

Benefits of pre-farm aggregation method for the fertiliser industry

- Reputation: The industry would be seen as taking a positive step toward reducing N_2O emissions relating to the end use of N fertiliser and improving nutrient use efficiency.
- Should be relatively simple to document and audit the amount of N fertiliser treated and sold in any given period.
- Would support further fertiliser coating infrastructure investment.
- Incentivises research and development in products that reduce N_2O emissions associated with the end use of N fertiliser.

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National Farmers Federation

03 October 2023

ACCU Review Implementation
Department of Climate change, Energy, the Environment and Water
Kind Edward Terrace
Parkes ACT 2600

Via email: ACCUScheme@dcceew.gov.au

Dear DCCEEW,

RE: ACCU Review Discussion Paper

The National Farmers' Federation (NFF) welcomes the opportunity to provide a submission to the Department in response to the 28 questions outlined in the Australian Carbon Credit Unit (ACCU) Review Discussion Paper.

The NFF was established in 1979 and is the authoritative voice of the Australian agriculture industry. The NFF serves as the national peak body representing the broad interests of farmers across geographical and commodity borders. Operating under a federated structure, individual farmers join their respective state farm organisation and/or national commodity council. These organisations in turn form the NFF. As a general principle, the NFF seeks to ensure that any legislative reform does not have a perverse or adverse impact on agricultural productivity.

Overview

The NFF recognises the importance of this consultation and welcomes the opportunity to share our views on implementing the recommendations from the ACCU Review. It is important to note that while the NFF is not individually engaged within the carbon market, it does represent the agriculture sector, and therefore plays an important role in this discussion.

NFF have articulated several comments and concerns for the ACCU Review Implementation Taskforce to consider while undertaking activities to implement recommendations to improve transparency of the ACCU Scheme.

We trust that our views, and by extension the views of the Australian agriculture sector, are recognised and carefully considered by the Department.

Consultation Questions: NFF Response

Question 1: Are the proposed principles fit for purpose and how should they be applied to improve ACCU Scheme governance and integrity?

NFF holds some concern with the proposed introduction of ACCU Scheme Principles to guide and support the application of the existing Offsets Integrity Standards (OIS). We welcome the incorporation of language under Principles 1, 2, and 3 around ensuring the ACCU Scheme represents "real" greenhouse gas reductions or removals, that data is made publicly accessible subject to privacy or other commercial sensitivity protections, and that barriers to participation for regional communities are addressed and reduced. The inclusion of language like "real" marks a positive step forward as it sends a clear market signal that innovation and mitigation rather than the low-cost alternative (vegetation offsets) will be rewarded, alleviating potential pressure on land-use conflict within the farm sector. To support the execution of Principle 3, extension support officers and the provision of trusted, independent advice will be a necessary action.

NFF however holds some concern over additionality as outlined in Principle 1 (Integrity). While additionality is important as it maintains the overall integrity of the ACCU Scheme, this condition will stifle research and development (R&D) and erect a barrier for companies looking to accelerate sustainability action. This is apparent as it remains unclear, for example, whether existing methane mitigation trials will allow this additionality provision to be triggered and be able to generate ACCUs once a relevant methodology has been approved. That is, participation in trials should not then disqualify eligibility for a scheme.

Question 4: What are the risks to the market from publishing information about ACCU holdings?

NFF does not support the default publishing of data for all relevant area-based offset projects by the Clean Energy Regulator (CER), a legislative rule enabled by amendment to the *Safeguard Mechanism (Crediting) Amendment Act 2023* and by extension the *Carbon Farming Initiative Act 2011.* It is the position of the farm sector that an immediate exemption on the mandatory reporting of CEA data for projects managed by land managers is implemented. This is because appropriate protections must be put in place to ensure sensitive private data released by the CER, specifically details regarding the location of a project, are kept confidential. NFF proposes that this exemption remain in place as a manageable short-term solution until a complete database with in-built privacy protections is developed.

The farm sector welcomes engagement with relevant Government agencies to design and create a template standard that can be used to facilitate the reporting of voluntary data. The NFF Farm Data Code is one of several policy frameworks that could be utilised to inform the establishment of this digital infrastructure platform to report national CEA data.

Question 5: Are there other grounds or circumstances where information should be withheld, for example, an exemption for existing projects?

As detailed in the previous section, an exemption for the mandatory reporting of CEA data for projects managed by land managers must be immediately implemented. This will address key privacy consideration issues in the interim until a permanent resolution to this complex issue is developed.

Question 6: Should the government continue to focus its purchasing on least cost abatement? If not, what other considerations should it prioritise and why?

NFF is supportive of Recommendation 3.3 regarding the shifting of responsibility of Australian Government purchasing of ACCUs away from the CER and to another Government body. NFF supports a structural separation of the Emission Reduction Fund (ERF) auction system away from the CER and have previously articulated to the Department via submission to the Independent Review of ACCUs that this responsibility could reside, for example, with the Department of Industry given its expertise in grant programs. Any residual functions of the CER should also be aligned with this separation logic to ensure consistency with the objective of this Recommendation.

Question 8: What assistance or guidance would proponents need to effectively participate in the EOI process?

Recognising that some stakeholders lack a sufficient resource base to develop an EOI, NFF supports the development of measures that assist stakeholders prepare an EOI. This could be achieved by creating new grant opportunities or alternate funding support. This aligns with assurances that this wasn't a cost shifting measure by the Government.

Question 12: Are the proposed areas where the department could provide assistance during method development the right areas or skill gaps to focus on?

NFF is supportive of efforts undertaken by the Department to help method proponents understand how to participate in the ACCU Scheme and the development process of new methods through clear guidance material, workshops, and seminars. Barriers to participation must be broken down, and this can be achieved through proposed education assistance outlined in Section 2.3.1. With regards to advice on the policy landscape, farmers and landholders need to be kept engaged through consultation processes to ensure the policy and method development (and its impacts) are understood. Such a process will also ensure that the Government understands farmers' on-ground needs.

Question 13: Is the proposed approach to deal with newness appropriate to support participation in research, trials and demonstration projects needed to support method development?

As outlined in our response to Question 1, NFF holds significant concern around the issue of newness and additionality. Newness dictates that a business or entity can only earn ACCUs if the work they are undertaking is new (additional to normal business as usual conditions). This requirement would render companies engaged in undertaking research and trials of emerging technologies (i.e., feed additives to reduce enteric methane emissions from livestock) unable to earn ACCUs if that work is currently operationalised. This is not an unreasonable approach as early adopters must be allowed to explore and innovate, with a reasonable expectation of future legitimate participation. A further example is the establishment of Leucaena to assist in methane management. The folly of not allowing people to participate in a program that would not have existed if the trial work wasn't undertaken is stark.

The Australian agriculture sector has been actively engaged in decarbonisation efforts both through individual and collective action and has committed significant investment into the development of anti-methanogenic technologies with promising, measurable results. There also exists discussions around better or alternate pathways to nitrogen management in cropping enterprises, ongoing exploration of the viability of soil carbon sequestration, and a suite of sector-based emission reduction targets over various timeframes and ambition. While the industry is strongly committed towards embarking on the journey of decarbonisation, assistive technologies to do so remain expensive and cost-prohibitive to producers unless there is a possibility of receiving ACCUs.

ACCU generation requires methodologies to be developed which can take upward of several years, even under the proponent-led process in addition to a significant

input in R&D. NFF is concerned however that R&D has not reached its maximum potential given fears around how newness will work, and that existing research will not be treated as additional and hence trigger the additionality threshold provision. NFF supports options put forward in the Paper that address this issue as they do not prejudice future crediting opportunities. NFF supports all three options outlined in Section 2.3.2 as detailed:

- *An introduction of an "in lieu of newness" provision for entities undertaking research and trials;*
- *An introduction of a "notice of intent" system where land managers undertaking research projects could declare their activity and receive an exemption to the newness provision; and*
- *Reforms that exempt research projects from newness provisions in cases where the project is used to inform future method development or where a future project would only be commercially viable with ACCUs.*

As each of these options circumnavigate the newness barrier, if implemented, this will increase R&D levels. This would reduce technology cost, accelerate commercial viability of emerging technologies, and speed-up the method development process creating a pathway for ACCUs to be earned – an outcome that would further assist in bridging this cost gap.

In addition to recommendations outlined in Section 2.3.2, NFF notes that the most effective response involves the automatic exemption of any program designed to reduce methane emissions from the newness requirement, especially if such a program has no demonstrated long-term commercial viability without the support of ACCU generation.

Question 16: Will the proposed process for dealing with confidential data in consultation submissions balance the desire to ensure the ACCU Scheme is transparent while encouraging commercially sensitive data and information to be provided?

The proposal to provide stakeholders that choose to share commercially sensitive data under a proponent led method development process an opportunity to request their submissions be made either anonymous or confidential must be adopted. This is the minimum threshold requirement, and one that is reasonable given the sensitivity of the matter. These options will give certainty to stakeholders

that commercially sensitive data will be protected, and this will encourage and facilitate stronger stakeholder engagement in the process.

Question 19: Are the proposed timeframes reasonable? Could they be shortened?

The proposal to have draft methods or modules open for public consultation for a minimum of four weeks is not sufficient. A minimum timeframe of two months should be given for public consultation as this will ensure stakeholders have adequate time to carefully prepare a submission for review. Public consultation should also be proactive and meaningful. The Department must not limit announcement of a new public consultation to an email and website update, rather, it should proactively seek out and contact industry groups directly.

While NFF recognises that some methods may take longer to develop relative to others, we are supportive of greater ambition to reduce the development timeframe of new method development. A timeframe of 2 years is significant, and the proposed 18-month period for developers to submit a draft method for consideration by the Integrity Committee after an EOI is approved could be reduced substantially.

Further, NFF would like to note that the development process for new methodology like the Integrated Farm Management Method should be aligned with the sunsetting of similar methodologies to ensure there exists a seamless transition for stakeholders.

Question 20: Should there be a mandated requirement to complete method development within a set timeframe?

Recognising that new methods will garner different levels of stakeholder interest and extended timeframes may be required to ensure a method is developed properly and free from errors, NFF does not support the introduction of a mandated requirement to complete method development within a hard deadline. A best practice guidance note with appropriate caveats would be a more sensible and sensitive approach.

Question 21: Does the proposed approach for reviewing and maintaining methods properly balance the need for integrity with the industry need for certainty?

NFF is supportive of the requirement that the Integrity Committee review an expiring method within a reasonable timeframe prior to the date it is due to

sunset. We propose that this review must be undertaken no later than twelve months before the sunset period. Public and targeted industry consultation on sunsetting methods must be a requirement rather than an option, and feedback gathered from such processes must be collated and used to advise the Minister on whether to remake or allow a method to sunset. This is of particular importance and would ensure issues are addressed head-on. For example, the Department has announced its intention to sunset the Animal Effluent Management Method to the dismay of industry.

Separately, NFF welcomes the proposed changes to Crediting Period Extension (CPE) Reviews and a relaxing on the requirement for crediting periods to undergo amendment. While NFF supports the proposed role of the Integrity Committee to advise whether a crediting period should be increased or decreased, before a decision is made, industry consultation must be held.

Question 24: Does the proposed scope of the Integrity Committee's role compromise its primary role as an independent ACCU Scheme assurer?

NFF is not concerned that an expansion of the Integrity Committee's functions, roles, and responsibilities will compromise its primary role as an independent ACCU Scheme assurer. These proposed expansions are consistent with and have been drawn out from Recommendations put forward by the independent umpire, the Chubb Review.

Question 25: Should the ACCU Scheme allow for a preliminary form of EIH consent to be given by a registered Native Title body corporate to allow a project to be registered by agreement? If yes, what form should or could that preliminary consent take?

The issue of accessing EIH consent is a major transactional issue in the process of developing projects, especially those with a substantive permanence period. There are three (3) key concerns:

- The time taken to identify the EIH, especially where there is either no Native Title determination resolved (so there may be competing interests from native title applicants) or there may be land where Native Title MAY be found to exist in the future, but at the point of contracting no potential EIH has either come forward or been identified. This scenario makes completing ILUAs quite difficult and a mechanism to 'grandfather' the possibility of an EIH emerging might be of value that would allow a pathway around the

intertemporal problem of wanting to complete the carbon contract in the absence of a formally, or even informally, identified party. NFF would welcome a discussion on how this might be progressed;

- That the EIH, or more particularly their appointed agent, does not negotiate in good faith. We have been advised that there are examples where the proponent (the carbon accumulator), the lease and the Native Title holder are all happy to enter into an arrangement and a land council or similar interlocutor has interest in the transaction. Some clarity on those roles would be helpful; and

- Where lease condition might need to be varied that they be done so in a manner that protects the principal purpose of the lease (predominately grazing) and the variation is not used as a mechanism to recast or reprioritise the purpose of the lease. To put it another way, carbon contracts cannot be used as a driver to undermine existing lease conditions to the extent that those use rights are changed or undermined.

NFF understand the ILUA process is quite complex and difficult, though has been subject to some improvement. The model of an ILUA (including but not limited to EIHs) is a reasonable process. Extreme care needs to be taken that it is not exercised as a de facto veto over the progress of legitimate commercial transactions. They are not an alternate policy tool; they are a necessary commercial transaction. Where policy change is sought, that should be done in a broader and more consultative manner.

Question 26: How could the preliminary agreement be withdrawn and what guidance or processes could be provided, noting the competing interests involved? Is a dispute resolution mechanism needed?

Building on the response to Question 25, If an EIH consent is granted then it should continue to stand. The circumstances for its withdrawal, if they are to exist, should be extremely tightly defined. Where such a withdrawal is contemplated not only should a dispute mechanism be required, but it should be treated as a commercial matter and appropriate penalties should also be available.

Question 27: How should eligible interest in land be defined for the purposes of the ACCU Scheme that ensures First Nations interests are appropriately respected?

Are there other ways of recognising interests that fall short of a Native Title determination through benefit sharing arrangements, and how might this work?

The first step is to recognise where Native Title, whether exclusive or non-exclusive has been resolved, that scenario should form the basis for an IULA negotiation. Where determination is pending then it is reasonable, providing that there is only one applicant for the Native Title, for that to form a part of an agreement, contingent on the (presumably future) resolution of the determination, recognising this is a slow and drawn-out legal process. Where no applicant exists then some reasonable savings provision COULD be negotiated for abundant caution, care would need to be taken that it can't unreasonably undermine a contract nor act in a non-commercial way.

Question 28: What support and resources do First Nations eligible interest holders, project proponents and communities need when considering or providing consent?

Appropriate technical and advisory support should be available to ALL parties. The NFF have continued to express concern that rights holders or applicants have access to legal resources from land councils and elsewhere, similar resources continue not to be made available to especially the farm sector.

Conclusion

The NFF thanks the Department for the opportunity to provide feedback to the questions outlined in the Discussion Paper. We look forward to continued discussion and engagement. Please do not hesitate to contact Warwick Ragg, General Manager (Natural Resource Management) via e-mail: WRagg@nff.org.au or phone (02) 6269 5666 at the first instance to progress this matter.

Yours sincerely,

TONY MAHAR
Chief Executive Officer

National Farmers Federation

27 July 2023

Climate Disclosure Unit
Market Conduct and Digital Division
Department of the Treasury
Langton Crescent
Parkes ACT 2600

Via email: climatereportingconsultation@treasury.gov.au

Dear Treasury,

RE: Climate-Related Financial Disclosure: Second Consultation

The National Farmers' Federation (NFF) welcomes the opportunity to provide a submission to the Department of the Treasury in response to proposed positions for the detailed implementation and sequencing of standardised, internationally aligned requirements for disclosing climate-related financial risks and opportunities in Australia.

The NFF was established in 1979 and is the authoritative voice of the Australian agriculture industry. The NFF serves as the national peak body representing the broad interests of farmers across geographical and commodity borders. Operating under a federated structure, individual farmers join their respective state farm organisation and/or national commodity council. These organisations in turn form the NFF. As a general principle, the NFF seeks to ensure that any legislative reform does not have a perverse or adverse impact on agricultural productivity.

Context

The NFF are considerably concerned about the impact of Climate Related Financial Disclosure (CRFD) reporting, especially in the context of scope 3 obligations. The land sector is a complex area that sees an array of mechanisms utilised to adapt to, and mitigate the impacts of, climate change. This submission will articulate a range of concerns and solutions.

In the current context, the farm sector is opposed to formalising scope 3 emissions reporting unless and until we can clearly understand the impacts of the shared cost and time commitment of the likely compliance burden.

At the outset, we recommend Treasury immediately convene a land sector specific consultation with the NFF and other stakeholders to better understand the issues and impacts of this compliance.

The land sector is in a unique position as a sequester and emitter and can be categorised as being comprised of both small and medium producers that do not have internal or currently accessible capacity to make complex assessments of emissions status. A range of emerging options that may become viable for the agriculture sector have been articulated below further in the submission.

There is a large number of programs on foot in the agriculture sector that address climate change impacts. These include several sector-based ambitions to reduce emissions over various timeframes and with varying ambition. What resonates through all these sector specific plans however is a widespread ambition for the agricultural sector/s to contribute to emissions reduction.

It is clear therefore that these sectors are committed towards supporting, via individual action, the execution of a trajectory decline in total agricultural emissions – this does not necessarily mean that agriculture will, or is likely to, achieve net-zero. The contest of producing food and fibre contrasting with the aspiration to reduce emissions in the agriculture sector is real. It is increasingly clear that agriculture is a hard to abate sector.

The NFF Climate Change Policy recognises that there should be an economy-wide aspiration to reach net-zero by 2050, providing that economic and limited regulatory thresholds are met, and no sector specific targets are imposed. For clarity, the NFF does not hold the view that agriculture can achieve net-zero by 2050, but rather the sector will continue to operate on a long-term declining trajectory as new technology and innovations become available and viable.

For example, uptake of enteric methane emitting technologies, while promising at laboratory and trial scale, are seemingly increasingly cost and delivery prohibitive. With regards to cost, the current cost structure of $2.00 per head per day is unlikely to be offset by a carbon payment given current price trends, and subsequently is not currently commercially viable, even with carbon payments. Regarding delivery, it remains near impossible to deliver feed additives to large scale cattle enterprises, especially those situated in the rangelands. Equally, the efficient delivery of product in extensive grazing areas that would approach commercial viability remains unlikely on the current evidence. Finally, delivery in

intensive feedlots and dairy, whilst possible, does not see sufficient change to the business model to underpin viability.

Pathway to Engagement

The farm sector has nevertheless been quite active in addressing climate change. As articulated earlier, exploration of the viability of enteric methane inhibitors is continuing. There are also discussions around better or alternate pathways to nitrogen management in cropping enterprises and ongoing exploration of the viability of soils carbon sequestration. Energy efficient technologies including transition of heavy machinery are also being developed.

In terms of reporting, for an extensive period of time, the agriculture sector has been heavily focused and involved in ensuring that credible carbon calculators are developed for public use. These include but are not limited to the following:

Australian Farm Institute: Carbon Opportunity Decision Support Tool (CODST)

This tool is designed to support land managers better understand the opportunities of carbon farming. CODST was developed by AFI and forms part of AgriFutures Australia's $2 million investment in carbon initiatives. The tool explains which carbon opportunities may be available for a producer and encourages users to consider the potential benefits and costs of different carbon projects for their farming businesses. The tool covers the following issues of 1) EMR, 2) private carbon markets, 3) access to sustainability linked loans, 4) carbon neutral certification, and 5) productivity gains – and it guides users through a "decision-tree questionnaire" process, questioning users about their risk appetite and business goals. Upon completing this questionnaire, users are then provided with a suite of carbon opportunities that may be a good fit for their farm business. The tool has been designed to be general in nature to ensure its applicability across commodity types, geographical areas, and business structures.

- Tool: https://carbontool.farminstitute.org.au/

MLA Carbon Calculator

Launched in March this year, the MLA Carbon Calculator will help agricultural producers baseline their enterprise GHG emissions (i.e., create a carbon account) to assist them develop their emission reduction strategies. Having this data available will ensure producers/businesses have the tools and insight necessary to pursue emerging market opportunities. The calculator is based off

Based off the Primary Industries Climate Challenges Centre (PICCC) Sheep and Beef Greenhouse Accounting Framework (SB-GAF) tool.

A carbon account includes the following 2 elements: 1) GHG emissions (including enteric CH4), and 2) in/direct emissions of N2O from fertiliser application, and excreta and methane from manure.

- Tool: https://carbon-calculator.mla.com.au/

Australian Dairy Carbon Calculator 2023

This calculator (i.e., decision-support tool) estimates dairy farm carbon emissions and what impact GHG abatement strategies have on farming systems. This helps users identify farm efficiency improvements that lower emissions. GHG abatement strategies that are modelled by this calculator fall into four categories:

1. Herd management;
2. Feeding management;
3. Soil management; and,
4. Farm intensification.

- Tool: https://www.dairyaustralia.com.au/resource-repository/2023/01/30/australian-dairy-carbon-calculator-2023#.ZCu4fexBzCQ

HortCarbon Info

Launched in August 2022 by the QLD Government, *HortCarbon* Info is a free decision-support tool designed to provide QLD horticulture businesses an accurate way to calculate their on-farm GHG emissions. GHG emissions are calculated for electricity, fuel, fertiliser, dolomite and lime, crop residues, refrigeration leakage, and on-farm waste – accounting for approximately 95% of GHG emissions generated during a growing operation. This tool also contains additional information to help farm business managers better understand options to reduce and/or offset their GHG emissions by learning more about carbon sequestration options like forestry/soil carbon, and where emissions occur in the supply chain/relevant emission factors. Generated reports are confidential.

- Tool: http://grf-smartfarm.daf.qld.gov.au:3838/apps/hortcarboninfo/

Greenhouse Accounting Framework (GAF) Tools

GAF tools are free decision-support frameworks for greenhouse accounting on Australian dairy, sheep, beef, grain (i.e., cropping), feedlot, sugar, cotton, horticulture, pork, buffalo, deer, and poultry industries. These tools are designed to align with the Australian National Greenhouse Gas Inventory (NGGI) method to predict the magnitude and sources of GHGs emitted from farms/products. GAF tools do not calculate soil organic carbon change.

- Link: https://piccc.org.au/resources/Tools.html

These examples are still nascent and need to be benchmarked to ensure they are providing credible and expected answers. The NFF will be seeking to progress this challenge in the near-term.

In parallel, the NFF has received further government investment to continue developing the Australian Agricultural Sustainability Framework (AASF). The AASF identifies 17 principles that stretch across the ESG engagement environments. One of those principles deals with greenhouse gases. The process for development of the AASF has focussed on aligning these principles with a range of international drivers, this includes the sustainable development goals and the Taskforce for Climate Related Financial Disclosure. While this serves as strong evidence of the agricultural sectors recognition of this issue, it is also the case that we have some considerable way to go until we are in a position to align a set of national or sub-national datasets. Attached to this submission is the NFF Climate Change Policy. Also attached is the GHG principle which shows the mapping against international drivers and alignment with domestic industry frameworks and schemes.

The third plank of this engagement is the development of extension or support services for farmers. The NFF have been successful in convincing Government that for the new operating paradigm, carbon farmers are ill equipped to understand the environment. There have been a range of concerns expressed that where farmers are dealing with carbon aggregators or other market participants they are at a disadvantage in terms of their understanding of risks and commitments. As a result, the Commonwealth has funded the Carbon Outreach Program to commence the provision of independent advice. The current status is that a train the trainer package development contract is about to be set, and an expressions of interest round has commenced seeking providers of extension officers. There is also a further funding commitment for carbon and biodiversity extension officers under the carbon smart agriculture component of the Natural Heritage Trust managed by the Department of Agriculture, Fisheries and Forestry (DAFF). Both these programs

will take time to be rolled out and deliver results, and are indeed likely to go beyond the transitional implementation timeframe to CRFD.

Engaging on the Journey

The agricultural sector's priority has become to understand its own disposition in relation to individual producers' emissions and sequestration so it can make informed decisions about how individual farmers can understand and respond to climate policy in order to consider how they might manage their business in this new paradigm.

As is evident in the previous section there is a substantial body of work being developed by the agriculture sector to better understand interaction with climate change parameters. As a complex sector this will take some time to progress. It is therefore difficult to envisage how the agriculture sector might provide sufficient reporting in an efficient manner to satisfy scope three requirements of the CRFD in the proposed time frame.

The mechanism for reporting will need to be the subject of significant consideration. It is of concern to NFF that the current consultation could not just allow, but promote each individual reporting entity to develop their own reporting framework which for agriculture, as a scope three participant, may find to be confronted with a variety of reporting mechanisms that essentially report the same information. For example, a mixed farm may have a bank loan, a relationship with a chemical, fuel, machinery and other farm input suppliers, a relationship with a meat processor, a grain accumulator, and a wool buyer. Any or all of these bodies may be scope 1 or 2 reporting entities and would therefore seek to engage information from a single farmer. This is seen to be an unacceptable, inefficient, and inconsistent approach. **The NFF therefore recommends that a significant process be undertaken to develop a standardised indicator and reporting code of practice.** Again, the agriculture sector is already thinking about this for different but not inconsistent purposes. Carbon calculators and the NFF's AASF could assist in informing these solutions.

Furthermore, discussion need to be held to understand what level of verification is likely to be expected. In a hierarchy sense we can currently report at state level granularity utilising the National Greenhouse Gas Inventory. It would be helpful if there can soon be a greater granularity at NRM region scale. As previously discussed, farm level tools using algorithms and other default datasets are under development and validation review, and thia process will take some time.

Critically, we need to understand whether outputs from calculators or estimators are going to be sufficient.

If it is determined that these are not sufficient then the next level is biophysical measurement at a farm scale, then this will be problematic. Small and medium farmers in particular are likely to be unable to meet this threshold without substantial cost (for no tangible benefit). They will neither have the skill base, the access to technology, nor the economic driver to do so. The potential that this will be the expectation is a key driver to ensure we have effective and targeted land sector consultation.

Serious consideration needs to be given to implementation timeframes at this early stage.

Other Concerns

It is troubling, and intellectually challenging, to have an inherent financial audit process intersecting with a biophysical multifaceted landscape that will inherently have challenges in providing hard data. We note that Treasury have used phrases like “best efforts” and “materiality”, and once again we would like to reiterate that this demands critical discussion with the land sector. The key point is that agriculture is not a one-type category (i.e., emission or sequestration), nor a point-source mechanism that can be more easily monitored and/or metered.

Concerns arise regarding the reporting and disclosure of project data and how such data will be utilised and shared. The NFF holds the view that industry sector reporting must be protected, and that the supply of information to financial institutions should be avoided where possible to ensure such institutions do not discriminate against various industry groups. This is a major identified risk and one that must be adequately addressed.

Additionally, further clarification regarding the potential cost of compliance requirements outlined in this consultation across all participant groups needs to be better communicated and understood. It remains unclear how compliance will be enforced, and the NFF would like to articulate that such a regulatory mechanism must work effectively and efficiently.

Conclusion

The agricultural sector is very concerned of the likely impact and/or transferred cost that is anticipated. We remain eager to engage in further consultation and to find a pathway to better understand these issues through the aforementioned land sector consultation. Please do not hesitate to contact Natural Resource Management (NRM) General Manager, Warwick Ragg (WRagg@nff.org.au) to further discuss these important issues.

Yours sincerely,

TONY MAHAR
Chief Executive Officer

E NV IRO NM E N TA L S T E W A RDS HIP

GREENHOUSE GASES & AIR

AASF – P1. Net anthropogenic GHG emissions are limited to minimise climate change.

AASF criteria for this principle:

C1. GHG emissions are reduced throughout lifecycle
C2. Carbon emissions are sequestered throughout lifecycle
C3. Where necessary (if C1 & C2 are impractical), GHG emissions are offset throughout lifecycle by purchasing recognised credits or participating in recognised projects

AgCarE	Carbon Results	MORE
Australian Beef Sustainability Framework	Priority Area 6.1 “Manage climate change risk”	MORE
Behind Australian Grain	Priority Area: Carbon Footprint – “Minimise the industry’s carbon footprint”	MORE
Cotton BMP	Sustainable Natural Landscape “Carbon sequestration and emissions are considered and managed across the whole of farm”	MORE
Dairy Sustainability Framework	Commitment 4, Goal 10: “Reduce GHG emissions intensity”	MORE
GRI 13: Agriculture, Aquaculture and Fishing Sectors 2022	Topic 13.1 Emissions	MORE
ISO13065:2015 Sustainability Criteria for Bioenergy	Principle 5.2.1 “Reduce anthropogenic GHG emissions”	MORE
ISO26000: Social Responsibility	Climate Change Mitigation & adaptation	MORE
Montreal Process	Criterion 5: Maintenance of Forest Contributions to Global Carbon Cycles	MORE
Roundtable for Sustainable Biomaterials	Principle 3: GHG emissions	MORE
SAFA (FAO)	Environmental Integrity: Greenhouse Gases & Air Quality	MORE
Sheep Sustainability Framework	3. Environment; 4. Climate Change	MORE
Sustainable Agriculture Initiative:	Principle Climate: “An agricultural sector that minimises greenhouse gases and air pollution, acts as a significant greenhouse gas sink, enables adaptations to a changing climate and supports the resiliency of farmers and farming communities.”	MORE
UN SDG 13 – Climate Action	“Take urgent action to combat climate change & its impacts”	MORE

Note: this list includes examples of AASF principle & criteria alignment / relationship to Australian and international sustainability initiatives – it is not a complete list. Exclusion from this list does not reflect lack of alignment.