

13th December 2023

Fertilizer Australia's submission - Agriculture and Land Sectoral Plan

The Australian fertiliser industry, largely through Fertilizer Australia, is closely linked to its international counterparts and the International Fertilizer Association.

This has given Fertilizer Australia a clear view of the actions taken by other jurisdictions in response to emissions from fertiliser, particularly nitrogen fertiliser.

These include the experiment in Sri Lanka, where they banned inorganic fertiliser, contributing to economic collapse, and the inability to feed its own people.

We also saw legislation introduced in Canada that sought to reduce nitrous oxide emissions by 30% by decreasing nitrogen fertiliser applications by 30%. This was met with great condemnation by grower and industry groups and the Canadian government was forced to walk back the legislation, to the point that compliance with the legislation is now voluntary.

When the Albanese government announced its intentions to reduce emissions by 43% by 2030, the Board of Fertilizer Australia agreed that it needs to help the government achieve its goal, at the same time as protecting Australia's agricultural output and the portion of our nation's economic prosperity derived from our farming sector.

The Board agreed that there were more nuanced responses, other than just banning or slashing fertiliser use, that could be recommended to the government. Consequently, the Board convened a sustainability committee to consider appropriate responses.

The first recommendation was to develop a white paper that explored emissions from fertiliser, in particular, nitrogen fertiliser, in the Australian context. Several prominent scientists who specialise in this field were commissioned to draft the white paper titled ["Nitrogen Fertiliser Use and Greenhouse Gases – An Australian Assessment"](#).

This paper, in addition to a concept paper that provided the government with a concept to incentivise growers to use treated nitrogen products, was presented to the Prime Minister, Minister Murray Watt and Minister Chris Bowen, via their offices.

The treatment is a "nitrification inhibitor", which can be applied to fertiliser close to the time of dispatch and slows the conversion of ammonium to nitrate in the soil. Nitrate is a precursor to nitrous oxide, a potent greenhouse gas.

The white paper seeks to inform the government about the volumes of nitrogen that are lost to the atmosphere through nitrous oxide, dinitrogen, and ammonia. Due to our farming techniques and our climate, the losses of nitrogen to the environment in many situations are much lower than in most other countries.

The white paper then goes on to provide some solutions for the government to consider in its deliberations regarding emission reductions in the farming sector.

These include practice changes, resulting in the more efficient and precise use of fertiliser and new technologies. These potential solutions are not exhaustive, and we encourage the government to continue dialogue with Fertilizer Australia as better methods and new technologies enter the Australian market.

The production of ammonia is energy intensive. The current most widely used method (the Haber-Bosch method) requires a source of natural gas or coal. Ammonia is the building block from which most nitrogen fertiliser is made.

There are significant GHG emissions embedded in the production of nitrogen fertilisers, although the amount varies depending on the place of manufacture, the energy source and catalysts used. For example, when urea fertiliser was produced in Australia, it had a GHG 'cost' of 3.3 t CO₂e per tonne nitrogen, while urea produced in China using coal derived energy has twice this GHG cost, as outlined in the white paper.

Manufacturing of fertiliser in Australia has struggled to compete with imports, partly due to our regulatory environment, gas price policy and partly due to less efficient infrastructure.

There are several proposed urea plants being developed in Australia, two in Western Australia and one in South Australia. All three are looking at using natural gas to produce ammonia and then capturing the carbon dioxide and securely storing the excess carbon dioxide back in the ground.

Other technologies seek to use hydrogen atoms from water and combine them with atmospheric nitrogen to produce ammonia. While the addition of carbon dioxide can convert this to urea, many such plants are considering ammonia as a carrier for hydrogen to be used in hydrogen-powered vehicles and machinery.

Still, other technologies are seeking to use renewable energy to produce ammonia in modular, regional plants that can be used as a fertiliser, removing the shipping and inland transport costs and subsequent emissions.

All these technologies are expensive, some are in their infancy, however, they provide an opportunity for the Australian government to invest and become involved in new technology that can contribute to the emission reduction targets, both current and future.

The Board of Fertilizer Australia encourages the government to read and use the white paper and continue dialogue with Fertilizer Australia to find ways to reduce emissions from fertiliser while protecting Australia's farming output, its rural communities, and its prosperity.



Stephen Annells
Executive Manager
Fertilizer Australia

Agriculture, Land and Emissions Discussion Paper responses to questions.

Several questions were posed in the Agriculture, Land and Emissions Paper. Below are the responses relevant to the Australian fertiliser industry's ability to assist the government in its emissions reduction targets.

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

a. Soil Carbon

The management of soil carbon and other soil nutrients, especially nitrogen, are inextricably linked in agricultural soils.

Building soil carbon requires an increase in soil organic matter (SOM) which contains important elements such as carbon, hydrogen, oxygen, calcium, nitrogen, phosphorus, sulphur and other elements found in living organisms. Organic nitrogen from SOM is critical to support the soil's physical, chemical, and biological fertility and the management of the soil's carbon volumes.

When European systems were introduced into Australia, nitrogen was largely supplied to crops by mineralisation of pre-existing SOM, resulting in decreased soil carbon.

b. Balanced nutrition with conservation farming practices, including the addition of supplementary nutrients from inorganic and/or organic fertilisers, helps maintain SOM levels and soil health.

For example, too little nitrogen leads to low crop yields and declining soil health; conversely, too much nitrogen can lead to environmental damage through losses to air, land and water.

Too little additional nitrogen will result in plants mining nitrogen from the SOM, releasing carbon in the process.

Using objective tools like soil and plant testing to guide the input of nitrogen and other essential plant nutrients into farming systems will be critical to building soil carbon.

For more information on the importance of nitrogen for maintaining and building SOM refer to:

- [Nitrogen Fertiliser Use and Greenhouse Gases - An Australian Assessment: Challenges and Opportunities](#). Specifically, section 3.
- [Fertcare Soil carbon snapshot](#). Specifically, section 1 and 2.

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

a. Nitrification inhibitors can significantly reduce nitrous oxide emissions.

A significant body of Australian evidence indicates that using urea treated with nitrification inhibitors (such as DMPP) can significantly reduce nitrous oxide production by up to 79%. If growers used DMPP-coated urea instead of standard urea, it would be possible to, conservatively, halve nitrous oxide emissions associated with this product.

While urea treated with nitrification inhibitors is highly effective at reducing nitrous oxide emissions, the losses to nitrous oxide emissions are quite small, 0.2-2.0% of applied nitrogen, depending on soil and climatic conditions. In many situations, this saving is not agronomically nor economically significant for farmers, and most of the research suggests no significant productivity (yield) 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 anticipated nitrous oxide abatement, whereby a limited number of fertiliser suppliers 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 in the form of a reduced price for treated nitrogen fertiliser. Adoption by the farming community would, therefore, be increased significantly, as the product would be sold at a similar unit cost as standard urea, depending on the value of the nitrous oxide abatement payment.

Principles for a pre-farm treated fertiliser aggregation payment.

- The business that treats the fertiliser would aggregate the volumes of treated nitrogen fertiliser and make a declaration to this effect. The suggested audit frequency to confirm the volumes of treated nitrogen fertiliser is no more than 12 months.
- Based on the volumes of treated nitrogen fertiliser sold, an emissions reduction factor would be applied to arrive at the volume of nitrous oxide that had been mitigated.
- The government would pay an agreed amount designed to neutralise the cost differential between standard and treated nitrogen fertiliser.
- This value, after costs, would be passed on to growers through a reduction in the price of the treated fertiliser.
- It is proposed the pre-farm treated fertiliser aggregation payment would remain in place for ten years. The size of the payment would be reviewed at agreed intervals and reduced to zero at the end of the ten-year period, when farmers are likely to be seeing 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 be able to gain the value of the nitrous oxide abatement. This value would be passed onto the grower in the form of a reduction in the price of treated fertiliser.
- Immediate: Nitrous oxide emissions reduction from treated nitrogen fertiliser are immediate. Unlike building soil organic matter/carbon, which takes years to achieve, farmers can immediately benefit from a reduced price for treated nitrogen fertiliser.
- Low risk: The risk to growers in achieving the benefit of nitrous oxide abatement from using treated nitrogen fertiliser would be very low, compared to sequestering carbon in soil or vegetation where the risks are much greater.
- When farmers have used treated fertiliser, they would be able to claim the nitrous oxide 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 as taking direct action on nitrous oxide 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 10 – 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 nitrous oxide emissions relating to the end use of nitrogen fertiliser and improving nutrient use efficiency.
- It should be relatively simple to document and audit the amount of nitrogen fertiliser treated and sold in any given period.
- It would support further fertiliser coating infrastructure investment.
- It incentivises research and development in products that reduce nitrous oxide emissions associated with the end use of nitrogen fertiliser.

b. Encourage greater adoption of objective measures like nitrogen budgets, soil and plant testing to guide nutrient inputs on farm.

Through the Fertcare® stewardship program, the fertiliser industry endorses objective measures such as nitrogen budgets, 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. Minimising nitrogen surplus to crop requirements will significantly reduce the potential for offsite nutrient impacts such as nitrous oxide emissions.

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

c. Encourage greater adoption of precision agriculture tools.

Optimising nitrogen application to minimise nitrogen surplus at a sub-paddock scale (i.e., different application rates within a paddock) will help optimise farmers' financial return on nutrient inputs and reduce the potential for offsite 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.