

Department of Planning  
and Environment

# Growing NSW's primary industries and land sector in a low carbon world



Primary Industries Productivity  
and Abatement program

March 2022



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## Acknowledgement of Country

The Department of Planning and Environment acknowledges the Traditional Owners and Custodians of the land on which we live and work and pays respect to Elders past, present and emerging.

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# Minister's message

Governments around the world are taking strong action to address climate change. The NSW Government is playing our part in the global decarbonisation agenda, taking a leadership role in the race towards net zero.

Last year, I released the first stage of our plan to achieve net zero emissions by 2050 and the NSW Government has just committed to halve our State's emissions by 2030 on 2005 levels. We are committed to reducing our emissions in ways that grow the economy and reduce costs to businesses.

This ambitious approach, combined with work that the Government is undertaking on valuing natural capital, also recognises that the State's climate change and nature agendas are interrelated.

The primary industries and land sector play a vital role. It contributes more than \$13 billion to the NSW economy every year and is the main driver of economic prosperity in regional NSW. It also contributes almost 14% of our total carbon emissions.

We recognise that the sector must be supported to implement low carbon production technology and processes and to access finance and new revenue streams. The Primary Industries Productivity and Abatement program does exactly that by supporting

farmers and land managers to optimise productivity, reduce emissions, access carbon markets and seize new market opportunities.



## **The NSW Government will invest \$125 million to develop data, metrics and the market, support early adopters and build broader capacity across the sector.**

While the NSW Government is taking action to decarbonise, the market is also demanding change. There is increasing demand for sustainable products by consumers and investors and meeting this demand will be critical to future growth of agricultural industries.

The NSW primary industries and land sector is in an excellent position to seize opportunities to meet this demand with our strong global reputation, highly productive farmland and world-class agricultural practices.

Our economy, livelihoods and well-being all depend profoundly on our most precious asset: nature. Decarbonising our economy will not only enhance our natural capital but create significant opportunities for NSW in ways that can grow our primary industries and land sector, create jobs, boost regional economies and reduce the cost of doing business.

This program will further future-proof NSW primary industries, build greater economic and climate resilience for regional NSW,

attract private investment into NSW and support our state as we move to a low carbon future.

I look forward to working with the primary industries and land sector, finance sector and regional communities to address climate change and take the massive opportunities that the world's move to decarbonisation offers.



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**The Hon. Matt Kean MP**  
Treasurer, and Minister  
for Energy



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# Summary

The NSW Government is leading the way in the race towards net zero emissions. Its Net Zero Plan Stage 1: 2020-2030 (the Plan)<sup>1</sup> sets out the State's ambitious agenda to reduce emissions by 50% by 2030 on 2005 levels and achieve net zero by 2050. The Primary Industries Productivity and Abatement program (the program) is an integral element of the Plan. It focuses on major opportunities to reduce emissions across the NSW primary industries and land sector.

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As the world decarbonises, the primary industries and land sector is facing a unique combination of factors:

- increasing concern about environmental, social and governance (ESG) performance across the supply chain, by the investment community and from consumers
- significant appetite from within the sector to act on climate change and benefit from abatement opportunities
- growing interest from the finance sector to pursue nature-positive, low emissions practices that improve returns and reduce risk.

The sector is well positioned to meet changing market demand and seize the opportunities presented through improved productivity, access to finance and the generation of new revenue streams through carbon markets.

At the same time, there is growing recognition of the high rate of depletion of natural capital, and the impact that this will have not just on our natural world, but on our economic future.

The NSW Government will invest \$125 million to support land managers in taking on-ground action, to develop data, metrics and environmental markets, and to help producers meet the growing interests in ESG performance from consumers, the supply chain and the investor community.

This will ensure the sector can thrive in a low carbon world, while also enhancing NSW's natural capital.

The program has 3 focus areas:

- **Developing market and industry foundations** – \$52 million to develop trusted and transparent data, metrics and frameworks to underpin strong market activity
- **Building critical mass and capacity** – \$72 million to incentivise land managers to take early action on high priority areas and build carbon management and emissions abatement capacity and expertise
- **Accelerating finance for natural capital and low carbon farming** – \$1 million to initiate work with the financial sector to help finance nature-positive and low emissions practices by farmers and land managers.

The first focus area lays a strong foundation, providing the evidence for action and investment. The second focus area builds confidence and skills, demonstrating how to take real on-ground action. The third focus area aims to unlock finance, linking strong environmental performance to good economic sense. Together these investments will support farmers and land managers to reduce emissions and access environmental markets while optimising productivity and seizing new market opportunities.

A photograph of a man wearing a brown hat and a blue and white checkered shirt, standing next to a brown and white cow in a field. The cow has a tag with the number 57 on its ear. The background shows a clear blue sky and distant hills.

# Introduction

NSW boasts some of the world's finest agricultural products, from our premium beef to our high-quality fibre. Our strengths lie in our highly productive farmland, world-class agricultural practices and well-connected logistics infrastructure. The NSW primary industries and land sector maintains a strong presence and reputation in global markets, with established links to sources of international demand. Agriculture is a major export and economic driver in NSW, contributing \$20.9 billion to the economy in 2020-21.<sup>2</sup>

As the world decarbonises, the primary industries and land sector faces shifting trends in consumer and market preferences with a growing focus on environmental performance and risk. To remain competitive, both internationally and domestically, NSW primary producers will need to demonstrate credible action on climate change. Consumers are increasingly aware of their personal carbon footprint including the food and fibre they purchase. A 2019 study<sup>3</sup> found that 55% of Australians were making purchasing decisions based on ethics, fair trade and the environment.



At the same time, the economic case for natural capital investment is growing. Natural capital refers to the world's stocks of natural assets, and the services that flow from them, which include geology, soil, air, water, and all living beings. Humans derive a wide range of services from natural capital, often called ecosystem services. The land sector delivers provisioning services, food, fibre and fuel, regulating services—such as water purification and, importantly, climate regulation—and cultural services such as connection to country.

Putting these drivers together, international markets and investors are increasingly asking farmers to demonstrate their environmental credentials. This means a market advantage for farmers who can reliably demonstrate strong environmental performance, due to increased market access and price premiums for goods. The National Farmers' Federation<sup>4</sup> estimates that driving investment in innovative, sustainable and future market-ready agriculture can build a \$100 billion agricultural economy by 2030. By investing now, NSW can play a fundamental role in that story.

There is also an opportunity for the land sector in generating and selling high quality carbon offsets. A Carbon Market Institute (CMI) report suggests that efficient and effective carbon markets could deliver between \$10.7 and \$24 billion in revenue and create between 10,500 and 21,000 jobs for rural and regional communities in Australia by 2030<sup>5</sup>. These offsets are in demand from governments and private entities who are working to meet their own emissions reduction targets. High quality offsets can deliver benefits in addition to carbon,



including improved productivity; enhanced biodiversity; drought resilience; and community outcomes for Traditional Owners. Land managers across all land tenures in NSW are well placed to deliver these benefits and receive the associated revenue.

To take advantage of these opportunities, farmers and land managers have a quickly expanding array of technologies and practices available to them. Using a variety of emissions reduction and sequestration actions, farmers can reduce the emissions intensity of their products, increase productivity and maximise the potential of their land as a carbon sink.

Under the program, the NSW Government will invest \$125 million to 2030 in the decarbonisation of the State's primary industries and land sector. The program will support regional communities by providing farmers and land managers with enhanced opportunities to improve their financial security and resilience, diversify and increase their income streams and reduce their emissions.



# Context





## Global demand for carbon neutral products and investments is increasing

### **Governments and businesses are committing to net zero emissions**

Since the Paris Agreement was signed in 2016, governments across the world have announced ambitious plans to decarbonise their economies. Many of these economies are among the biggest markets for Australia's exported goods and services, particularly our agricultural exports. More than 50% of Australia's top agricultural export markets have adopted commitments to achieve net zero emissions by around mid-century including China, the US and Japan.

Other jurisdictions, such as Singapore and South Korea, have also committed to decarbonise their economies by 2050. These countries have relatively small land masses available to offset their residual emissions using sustainable land management practices and are expected to look to places like Australia to buy their carbon offsets. This is because Australia has a vast land mass and strong certification frameworks that provide confidence in the value and robustness of the abatement.



Government ambition is also being matched by the carbon reduction commitments of businesses. Companies like General Mills and Nestle have committed to reaching net zero emissions in their product lines by 2050 and are looking for low carbon supply chains and offsets to help them meet their goals.

In light of these commitments, the demand for low carbon agricultural goods and carbon offsets is forecast to grow substantially over the coming decade.



## Decarbonisation ambitions of major agricultural trading partners

### The United States

- 50-52% emissions reduction by 2030
- Net zero emissions by 2050

### Japan

- 46% emissions reduction by 2030
- Net zero emissions by 2050

### The European Union

- 55% emissions reduction by 2030
- Net zero emissions by 2050

### China

- Emissions peak in 2030
- Net zero emissions by 2060

### The United Kingdom

- 78% emissions reduction by 2035
- Net zero emissions by 2050

### New Zealand

- 50% emissions reduction by 2030
- Net zero emissions (excluding biogenic methane) by 2050

### Indonesia

- Net zero emissions by 2060
- 41% emissions reduction by 2030 (conditional target meaning external support is required)

### South Korea

- 40% emissions reduction by 2030
- Net zero emissions by 2050.



## Decarbonisation ambitions of major food companies

### Nestle

- 50% emissions reduction by 2030
- Net zero emissions by 2050 across its supply chains

### General Mills

- 30% emissions reduction across its value chain by 2030
- Net zero emissions by 2050

### Unilever

- Net zero emissions from products up to point-of-sale by 2039

### McDonalds

- 31% reduction in emissions intensity across its supply chain by 2030
- Net zero emissions by 2050

### Fonterra

- No net increase in emissions from dairy farming between 2015 and 2030

### Coles

- 75% reduction in direct emissions by 2030
- Net zero by 2050

### Woolworths

- 19% reduction in supply chain and waste emissions by 2030
- Net zero by 2050.

In light of these commitments, the demand for low carbon agricultural goods and carbon offsets is forecast to grow substantially over the coming decade.

**Table 1:** Governments and businesses are committing to net zero emissions

## Investors are increasingly concerned with the environmental, social and governance performance of their investments

Financial institutions globally are increasingly applying environmental, social and governance (ESG) factors to their investment strategies and are making commitments to decarbonise their operations and portfolios, funnelling capital towards low carbon investments.

Australian banks are part of this global trend.

- National Australia Bank, which achieved carbon neutrality in 2010 for its operations, will provide \$70 billion of financing to low carbon activities by 2025 and has committed to align its lending portfolio to a net zero economy by 2050.<sup>6</sup>
- The Commonwealth Bank of Australia is committed to decreasing the emissions intensity of its business lending and reducing its own emissions. It has pledged to finance \$15 billion of low carbon projects by 2025.<sup>7</sup>
- ANZ will fund and facilitate at least \$50 billion by 2025 to help its customers lower their carbon emissions.<sup>8</sup>
- Westpac is committed to providing \$15 billion in lending to climate change solutions by 2030.<sup>9</sup>

Financial markets are also moving beyond carbon emissions and have started to connect the climate and nature-related risk agendas. Biodiversity loss entails physical, transition and systemic risks for investors. Leading financial actors are integrating nature-related risks in their approaches to sustainable investing, lending and underwriting practices, including reporting on biodiversity portfolio footprints and developing common biodiversity metrics and targets.

There are strong linkages between the different aspects of emissions reduction and natural capital. For example, increasing vegetation sequesters carbon while simultaneously enhancing biodiversity. Taking these factors into consideration is important for the financial sector for several reasons:

- it is rapidly becoming the norm to report on environmental performance to shareholders and the public. As a result, banks are increasingly focused on improving the environmental performance of their investments
- consumers are increasingly questioning the environmental impacts of the products they buy. Meeting this demand could result in a higher market share or margin for farmers and land managers who can demonstrate their environmental credentials. This, in turn, can reduce the financial risk to the banks
- the protection of natural capital is essential to adapting to the physical risks of climate change. For example, the impacts of drought on production can be mitigated through management of soil and the preservation and protection of water resources. Lowering the risk from climate change impacts means lowering the investment risk for the bank.

NSW primary producers and agribusinesses that can demonstrate strong ESG credentials are more likely to be able to access greater and deeper pools of capital at lower cost.



## There is a growing focus on climate-related financial risk

There is growing focus on disclosing climate-related financial risk to enable investors to make more informed decisions. The Taskforce on Climate-related Financial Disclosures (TCFD) developed a framework for effective climate-related disclosures which include disclosures on:

- transition risk to businesses arising from the decarbonisation of the economy
- physical risk of damage to infrastructure or demand as a result of more extreme weather events
- litigation risk including stakeholder litigation and regulatory action arising from climate change.

Globally and in Australia, financial regulators are moving to require the standardised disclosure of climate-related financial risks in line with the TCFD framework.

The Australian Prudential Regulatory Authority is stress testing the banks on their exposure to climate risk. This follows a series of legal opinions that, under Corporations Law, Australian company directors should be managing their firms' climate-related financial risks.

The focus on disclosure of climate-related financial risks means that banks are increasingly concerned with the exposure of their investments to climate risk. Farmers and land managers who can demonstrate they are reducing emissions and managing the physical risks of climate change are a more attractive, lower risk investment. Similarly, buying products which have low emissions intensity can help processors and retailers reduce climate risk from their supply chain. This makes farmers that can produce low emissions goods increasingly attractive to buyers.

There is also a growing focus on nature-related risks. The Taskforce for Nature-related Financial Disclosure (TNFD) has recently commenced operations and is expected to release a draft framework in



the first half of 2022. It is anticipated that the TNFD framework will be adopted by most countries and corporations that have adopted the TCFD. Being able to demonstrate nature-positive and sustainable agricultural practices will be a competitive advantage for NSW farmers.

## Recognition of the importance of valuing and investing in natural capital is accelerating

In 2019, the World Economic Forum (WEF) estimated that \$44 trillion of global economic value generation, more than 50% of global Gross Domestic Product, is moderately or highly dependent on nature. *The Global Risks Report 2021* (WEF 2021) ranks biodiversity and ecosystem collapse as one of the top five most likely and impactful risks humanity will face in the next ten years.

In the UK, HM Treasury commissioned an independent review on *The Economics of Biodiversity* by Professor Dasgupta. The review estimates that globally, between 1992 and 2014, produced capital per person doubled, human capital per person increased by about 13%, but the stock of natural capital per person declined by nearly 40%. The review concludes that nature is a 'blind spot' in economics and that we can no longer afford for it be absent from economic decision making.

This challenge has been recognised by the establishment of the Taskforce on Nature-related Financial Disclosures (TNFD), which NSW recently joined. The mission of the international TNFD is to develop and deliver a risk management and disclosure framework for organisations to report and act on evolving nature-related risks, which aims to support a shift in global financial flows away from nature-negative outcomes and toward nature-positive outcomes.

## Markets value environmental outcomes

There are several markets currently acting in NSW to place an economic value on environmental outcomes. Two examples include:

### Carbon and biodiversity markets

Governments in Australia and overseas have used markets to achieve environmental outcomes at lower-than-expected costs. In NSW, land managers can currently access markets for both carbon and biodiversity. For example, the Commonwealth's Emissions Reduction Fund (ERF) allows the creation of Australian Carbon Credit Units (ACCUs) which can be bought by the Commonwealth, by entities with a regulatory requirement or by voluntary purchasers who wish to offset their own emissions.

In NSW, land managers can also generate biodiversity credits from their land. These credits are then available to the market for purchase by developers, other land managers or the Biodiversity Conservation Trust to offset the impacts of development or land clearing.

### Sustainably certified products

There are markets for sustainably certified products, businesses and projects. Certification enables investors and consumers to align their purchasing power with their values to achieve better environmental outcomes. Producing low emissions products can also give NSW a competitive edge in international markets, as a recent study from the Office of the NSW Chief Scientist and Engineer found<sup>10</sup>. For example, marketing low emissions livestock products (such as meat, dairy and wool) would provide a competitive advantage for NSW farmers in high value exports.



### Carbon market example

## Emissions Reduction Fund

Australia's largest carbon market is the Emissions Reduction Fund (ERF) administered by the Australian Government. Under the ERF, carbon abatement projects across Australia can generate Australian Carbon Credit Units (ACCUs). Each ACCU represents one tonne of carbon dioxide equivalent net abatement.

The ERF provides funding for carbon abatement projects through a process of reverse auctions, whereby project operators can bid to enter a contract with the Australian Government to deliver ACCUs. The scheme funds projects that deliver carbon abatement at least cost.

There is a modest demand for ACCUs driven by the Commonwealth's Safeguard mechanism, and this demand is expected to increase over time. This policy legislates an emissions baseline for Australia's largest greenhouse gas emitting corporations. Those corporations which exceed their baseline are required by law to purchase ACCUs to offset their surplus emissions.

In addition to regulated demand for ACCUs, there is increasing voluntary demand from governments and businesses looking to offset their emissions to meet their own emissions reduction targets and move toward net zero. The International Taskforce on Scaling Voluntary Carbon Markets aims to scale an effective and efficient voluntary carbon market to help meet the goals of the Paris Agreement. This Taskforce aims to overcome barriers to the voluntary carbon market to increase demand for high quality carbon offsets such as NSW ACCUs.



## Governments globally are seizing opportunities

Governments across the world and Australia have adopted policies to abate greenhouse gas emissions in their primary industries and land sectors. These policies are aimed at capturing these growing markets for sustainably certified products, biodiversity credits and carbon credits from land-based sequestration.

### European Union

The EU has several policies designed to tackle primary industries emissions.

- The EU's Land Use, Land Use Change and Forestry policy includes a 'no debit rule' for 2021-2030, requiring all emissions from land use to be compensated by an equivalent sequestration of carbon.
- The Common Agricultural policy delivers a 'green direct payment' to farmers who engage in crop diversification and carbon sequestration. Carbon sequestration could be through permanent grassland maintenance and/or the creation of ecological focus areas.
- The 'Farm to Fork Strategy', a component of the European Green Deal due to be announced in late 2021, is expected to establish an EU carbon farming initiative with carbon accounting principles and verification standards.

### United Kingdom

The UK is currently piloting a 'sustainable farming incentive' as a part of its environmental land management scheme. This policy is part of a broader agricultural transition in the UK. This will see a dismantling of untied agricultural subsidies in favour of subsidies for farming practices that generate public goods.

The sustainable farming incentive pays farmers to sustainably manage their land. It outlines several standards that are supported by actions to develop and maintain natural features, such as hedgerows or grasslands.

Most standards offer introductory, intermediate and advanced levels of actions which correspond with different degrees of complexity and different levels of financial reward. The actions are designed to deliver benefits to biodiversity, native species and carbon sequestration. Farmers can choose which standards they want to develop, where on their property they want to maintain them and are paid for performing the actions specified under the standards they choose.

### New Zealand

New Zealand's *Climate Change Response (Zero Carbon) Amendment Act 2019* commits to reducing all greenhouse gases (except biogenic methane) to net zero by 2050 and reducing all biogenic methane by 24–47% by 2050.

The New Zealand Government has established a government-industry partnership called [He Waka Eke Noa](#) to develop an approach to reduce primary industry emissions. Specifically, it will develop an on-farm emissions reporting system to calculate the net emissions of every farm and will establish a farm level pricing mechanism to be in practise by 2025. If a pricing mechanism is not established by 2025, agricultural emissions will be brought into the general New Zealand Emissions Trading Scheme.

### USA

The Biden administration has re-entered the Paris Agreement and committed to a net zero emissions target by 2050, with an interim target 50–52% by 2030. The administration plans to direct US\$30 billion in farm aid money from the US Department of



Agriculture's Commodity Credit Corporation to abate emissions in the agricultural sector. These funds will help establish a market for carbon offsets that encourage farmers to sequester carbon in soil.

At a state level, California's Healthy Soils Program also provides financial assistance for conservation actions that sequester carbon and reduce greenhouse gas emissions among other environmental goals.

## Other Australian states and territories

### Queensland

The Queensland Government's Land Restoration Fund aims to expand carbon farming by supporting land-sector carbon projects that deliver co-benefits. It provides funding to farmers to generate the Land Restoration Fund's premium carbon credits. These premium carbon credits are Australian Carbon Credit Units (ACCUs) that also deliver environmental, social, economic and First Nations co-benefits.

Environmental benefits include improving biodiversity, creating healthier soils, wetlands and water systems or conserving habitat for endangered species. Social and economic benefits include improving the resilience and strength of regional communities, supporting direct and indirect jobs and increasing economic opportunities. First Nations benefits include providing on country business opportunities and new service delivery businesses and supporting cultural and customary connections.

### Victoria

The Victorian Government has committed to deliver an investment of \$3.9 million to support research into agricultural emissions reduction technologies and practices. This funding will be directed primarily towards trials of methane-inhibiting feed additives. It has also pledged \$15.4 million to provide information, tools and services to support emissions reduction, adaptation and climate risk management across the Victorian agriculture sector. This amount includes up to \$5 million in grants to help farmers implement recommended actions.

### Western Australia

The Western Australian Government's Carbon Farming and Land Restoration Program aims to realise agriculture's potential to sequester carbon in the landscape and contribute to the growth of the state's carbon farming market. This program provides \$15 million for on-ground projects which create ACCUs, deliver environmental, social and economic co-benefits and contribute to the long-term sustainability of the farming industry. A portion of the funding provides grants to establish innovative sequestration pilot projects, activities and trials to support the adoption of sustainable agriculture practices. The Western Australian Government is also working to develop a carbon neutral agriculture certification scheme.

## Industry is setting ambitious targets

The agricultural industry in NSW recognises the need to act boldly to reduce the emissions intensity of its value chains and has set ambitious decarbonisation targets and plans. This drive for abatement is due to a combination of factors including:

- increasing focus on emissions intensity of products in international markets
- changing consumer preferences
- growing interest from the investment community in restorative land management.

Farmers are also increasingly concerned about climate change impacts and want to be part of the solution.

## Australian red meat and livestock industry

The Australian red meat and livestock industry has set the ambitious target to be Carbon Neutral by 2030 (CN30). This target means that by 2030, Australian beef, lamb and goat production including lot feeding and meat processing, will make no net release of greenhouse gas emissions into the atmosphere. Meat and Livestock Australia (MLA) has stated this commitment is key to helping their industry stay ahead of current and future consumer expectations regarding environmental credentials. Already, emissions from the red meat and livestock industry have fallen by 56.7% since 2005.<sup>11</sup>

## National Farmers Federation

The National Farmers Federation's (NFF) 2030 roadmap identifies Australian agriculture trending towards carbon neutrality by 2030. It also outlines the NFF's aim to have decarbonisation plans in place for all major commodities by 2025 and to produce individual farm carbon footprint assessments.<sup>12</sup> NFF members support an economy-wide aspiration

of net zero emissions by 2050 provided that: there are identifiable and economically viable pathways to net neutrality; and that Australian and state legislation is effective, equitable and advantageous to deliver on-ground programs that benefit agricultural interests and does not provide unnecessary regulatory impediment.

## Dairy Australia

Dairy Australia's Climate Change Strategy 2020-25 commits to 'investing and actively contributing to keep global warming to below 1.5 degrees Celsius'.<sup>13</sup> The strategy will aim to leverage knowledge and empower leadership on approaches to adaptation and resilience while ensuring dairy is part of the global and domestic efforts to reduce the impact of climate change. Dairy Australia highlights several technologies and practices including breeding methodologies, dietary management and vaccines to mitigate enteric methane emissions and reduced fertiliser use to manage nitrous oxide emissions.

## Grain Research and Development Corporation

In 2020, the Grain Research and Development Corporation (GRDC) announced an 18-month investment with CSIRO to support the grains industry to provide essential baseline data around the current level of greenhouse emissions, opportunities for mitigation and shape a plan for emission reduction.<sup>14</sup>

## Farmers for Climate Action

Farmers for Climate Action (FCA) is a movement of more than 5,000 farmers, agricultural leaders and rural Australians working to ensure farmers are a key part of the solution to climate change. FCA's 2020 Regional Horizons<sup>15</sup> is a five-year initiative aimed at creating opportunities for jobs and industries and building a climate-smart rural and regional Australia. They support farmers in building their climate and energy literacy and advocating for climate solutions both on and off farms.



## Emissions profile of the NSW primary industries and land sector

There are two components to the emissions profile of the NSW's primary industries and land sector:

- emissions produced from livestock and agricultural processes
- emissions emitted and sequestered through land use, land use change and forestry.

## Emissions produced from livestock and agricultural processes

In 2018 emissions from the NSW livestock and agricultural processes accounted for 19.2Mt or 13.3% of total emissions in NSW. Approximately 73% were enteric methane emissions from cows and sheep. The remaining 27% were produced by cropping practices, lime and urea-based fertilisers and soil and manure management.

In 2019 emissions from the NSW livestock and agricultural processes accounted for 16.3Mt or 12% of total emissions in NSW. Approximately 75% were enteric methane emissions from cows and sheep. The remaining 25% were produced by cropping practices, lime and urea-based fertilisers and soil and manure management.<sup>16</sup>

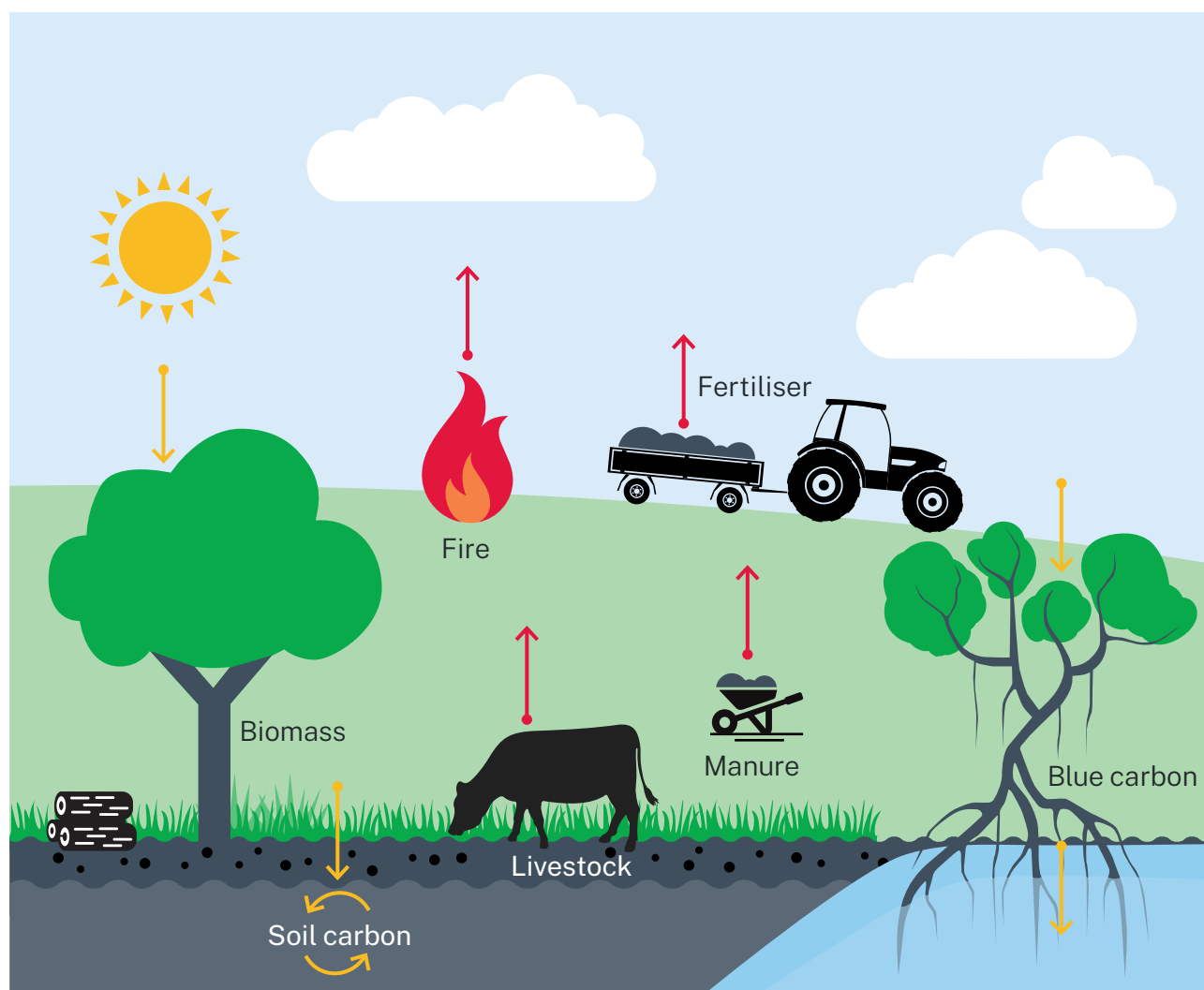


Figure 1: Simplified overview of emissions sources and sinks in the primary industries and land sector

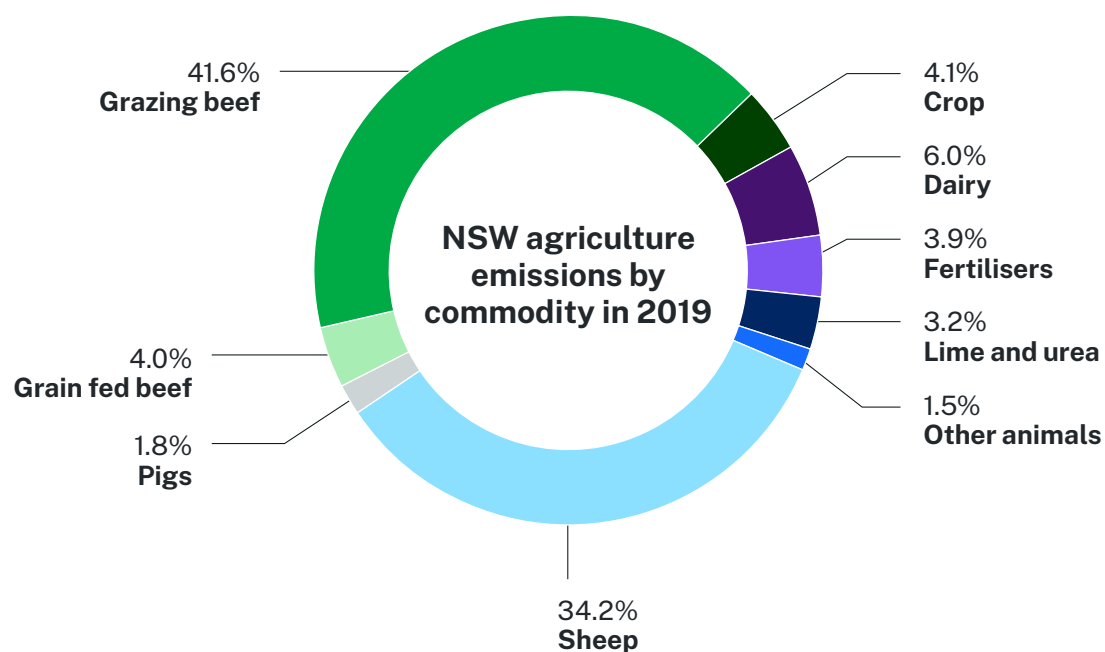
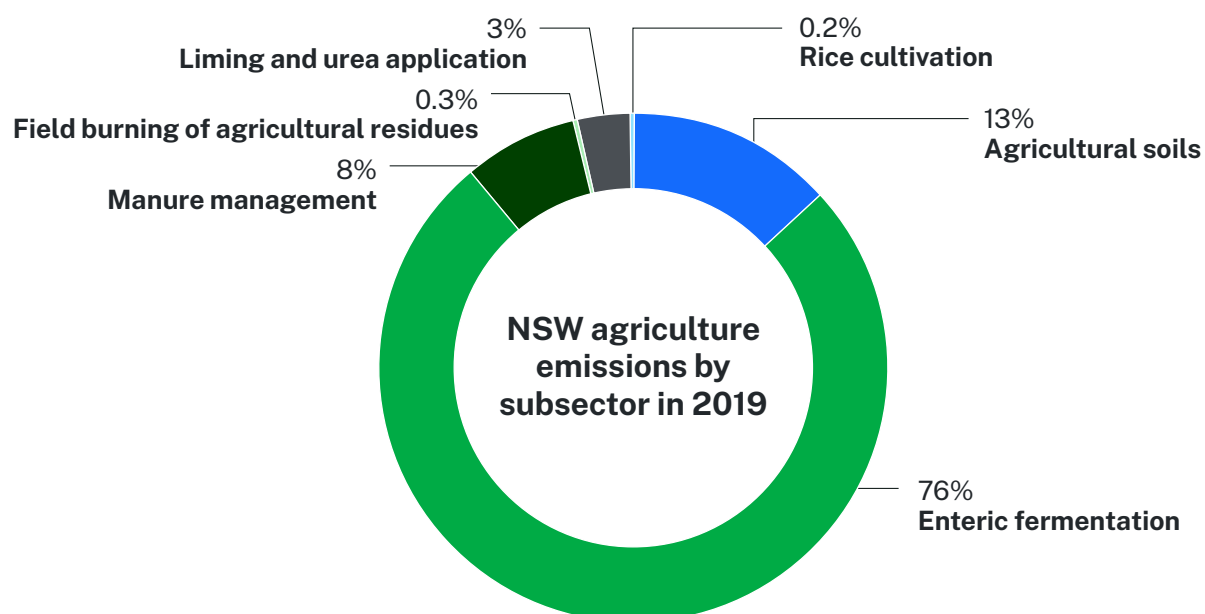


Figure 2: NSW agricultural emissions by source sector (top) and by commodity (bottom)<sup>17</sup>



## Emissions from land use, land use change and forestry

Greenhouse gases can be sequestered through vegetation and soil management across all land types in NSW including private farmland, public land and Aboriginal managed lands. The level of sequestration potential will vary based on a range of factors including type of activity, rainfall, existing land use and more. Greenhouse gases can also be emitted because of land use change and forestry. Many factors feed into whether the land is a source or a sink including rates of clearing and harvesting, grazing practices, tillage techniques and crop rotations.

Land use, land use change and forestry currently contribute to a net carbon sink in NSW meaning more carbon is sequestered than it emits. The net sink is currently 4.7Mt of emissions.<sup>18</sup>

Action is needed to support regional communities by providing farmers and land managers with opportunities to improve their financial security and resilience, diversify and increase their income streams and reduce their emissions with greater certainty.



## Technology and practices to reduce and sequester emissions

A growing range of well-established and emerging technologies and practices can help the primary industries and land sector to reduce its emissions profile while growing the economy.

These technologies and practices can reduce emissions from livestock and agricultural processes and boost sequestration across land types.

### Reducing emissions from livestock

Livestock emissions account for around 70% of agricultural emissions in NSW. Ruminant livestock including cattle and sheep are the main source of emissions due to their high production of methane per unit of feed they consume.

Ruminant livestock have a fore-stomach that allows them to digest coarse plant material. Enteric methane is produced as a by-product of the digestion process and is released into the atmosphere by the animal through belching.

Enteric methane emissions from cows and sheep may soon be able to be addressed at scale through a range of actions including improved herd management, feed additives, vaccines, selective breeding and genetic modification.

CSIRO, in collaboration with Meat & Livestock Australia and James Cook University has trialled and developed a livestock feed supplement. Early results are promising, analysis shows reduced methane emissions in feedlot beef and dairy cattle by more than 80% in trials in Australia and the USA, and there have been increases in livestock productivity.<sup>19</sup>



## Reducing emissions from agricultural processes

Methane and nitrous oxide emissions from animal manure can be reduced through the composting and aeration of manure stockpiles. Nitrous oxide emissions can be targeted with nitrification inhibitors or through feed-management practices.

Fertiliser emissions can be reduced by using chemical nitrification inhibitors. This reduces the levels of the bacteria responsible for the denitrification process in the soil thereby reducing the emission of nitrous oxide.

Farmers can also reduce the amount of fertiliser used, by employing precision farming techniques to ensure the amount of fertiliser applied is exactly what is needed. They can also improve the health and productivity of the soil such by increasing the organic carbon content of the soil, further reducing the reliance on fertiliser and saving money.

There are extensive research and development programs currently underway collaborating with industry, government and academia to bring these technologies to market.

## Carbon sequestration

Farmers and land managers are also able to draw down carbon dioxide from the atmosphere and sequester it in soil and vegetation. Sequestration will play an important role in achieving a net zero emissions global economy. Emissions from industries where achieving carbon neutrality is particularly difficult can be offset through sequestration in the land sector. Sequestration can be undertaken across NSW, on farms, Aboriginal-managed lands and public lands such as National Parks and Crown Lands.

Well known strategies to sequester carbon include vegetation management, tree planting and management of soil carbon.



Land managers who engage in these practices can generate carbon offsets. These can be sold and traded in carbon markets such as the Australian Government's Emissions Reduction Fund.

Emerging opportunities in carbon sequestration can unlock further sequestration potential in NSW for the marine environment. Blue carbon is the term used for carbon sequestered in ocean and coastal ecosystems. In addition to abatement, blue carbon projects can deliver other benefits such as resilience to flooding, marine habitat creation and enhanced productivity in fisheries.

The forestry industry also presents potential abatement opportunities. For example, by using sustainably sourced timber as a building material that simultaneously functions as a carbon sink.





# Benefits of a low carbon sector



The NSW primary industries and land sector is well placed to succeed in a low carbon global economy with many opportunities to grow NSW agricultural businesses, create jobs and boost local economies.

## Improved productivity

Farms that embrace low carbon technologies and processes can benefit from improved productivity and reduced input costs, while also improving natural capital on their land. Often the practices which reduce or sequester carbon are aligned with standard agricultural practices to improve productivity and efficiency. This means that abatement activities can be integrated into the farm business, increasing drought resilience and farm productivity. Examples include:

- Farmers can achieve greater yields on the same land when the soil is carbon rich, as compared to soil with low carbon content. Increased soil carbon can also build drought resilience, as well as soil health.<sup>20</sup>
- Increased vegetation on farm can reduce soil loss through wind erosion, leading to soil carbon being retained. In semi-arid and dry temperate areas, planting 5% of the land to shelter could reduce wind speed by 30%-50%.<sup>21</sup>
- Vegetation directly sequesters carbon, as well as providing shelter for livestock from heat and wind, leading to improved animal health. Studies show that heat stress can reduce fertility in both cattle and sheep.<sup>22</sup>
- In some cases, the same technology which reduces the enteric methane emissions from livestock increases productivity, resulting in a win-win for the farmer.<sup>23</sup> The level of productivity increase depends on the methane mitigation strategy used, but studies have shown increases of up to 20% for some feed additives and grazing strategies.<sup>24</sup>

## Access to finance and new markets

There are a number of trends underway in financial markets that will reward businesses that reduce their emissions.

### Consideration of ESG credentials of an investment

This will see farms with low carbon-intensity rewarded with access to deeper capital pools and, potentially, lower interest rate loans. Examples of this are already occurring. The Commonwealth Bank recently issued a loan to agricultural firm, Stockyard, with the loan interest rate linked to sustainability outcomes.

### Requirements for greater disclosure of climate-related risks

As a result of the Taskforce for Climate-related Financial Disclosure, banks are increasingly concerned with the exposure of their investments to climate change, both in terms of emissions intensity and physical climate impacts.

Technologies and approaches that reduce the emissions footprint of a farm can also help protect it from the physical risks posed by climate change. For example, enhancing the carbon content of soil increases its resilience to variable rainfall and temperature conditions. Similarly, increased vegetation serves as shelter for livestock while acting as a carbon sink.

These types of actions will become increasingly important as droughts become more frequent and extreme, resulting from climate change, posing a more severe risk to



the financial security of NSW farms. Farmers who can demonstrate they are managing their land to lower exposure to the physical impacts of climate change will be able to demonstrate they are a lower risk, justifying lower interest rates on loans.

Given the growing global interest in nature-related financial disclosure, farmers and land managers are expected to see similar trends in needing to demonstrate strong nature-based performance to attract investment.

### Access to markets and improved resilience

Farmers who have significantly decarbonised their production will enhance their profitability and protect the future security of their income streams. Farmers who demonstrate their products are low or net zero emissions will be able to profit from the rapidly growing demand for low carbon products from both consumers and supply chains. This ability to differentiate their products will give farmers a competitive advantage over those whose production remains highly carbon intensive.

Reducing emissions also protects farmers from the potential of carbon border tariffs. Several of Australia's largest export markets, including the EU, the US and Japan have flagged an intention to implement 'border taxes' for carbon-intensive imports. The EU has recently implemented a carbon border adjustment mechanism for select sectors (cement, iron and steel, aluminium, fertilisers and electricity) as part of the EU Green New Deal. The competitiveness of NSW agricultural exports will rely on the ability of farmers to reduce emissions at globally competitive levels.

### Access to new revenue streams

Another key benefit of changing land management practices is accessing new sources of revenue through carbon and biodiversity markets.

Farmers and land managers can generate income through the production and sale of carbon and biodiversity credits:

Carbon credits can be sold either to the Australian Government through the ERF or in the voluntary market to organisations wishing to offset their own emissions. There is strong interest from the voluntary market in carbon offsets which deliver additional environmental, social or cultural outcomes with organisations willing to pay more for these premium offsets.

Biodiversity credits can be sold to the market for purchase by developers or the Biodiversity Conservation Trust to offset the impacts of development or clearing.

The additional money generated by these credits provides added financial security. For example, in times of fluctuating commodity prices or drought.





# The program



## Strategic imperatives

By 2030 NSW will catalyse the widespread adoption and normalisation of technologies and practices that reduce or sequester emissions, support biodiversity and improve agricultural productivity.

Economically, this would see NSW farmers increase their production and access lower interest rates, new markets and green premiums for their produce.

Environmentally, it would see industry achieve its emissions reduction targets and improve the volume and value of the state's natural capital. It would see increasing connectivity of habitat through the landscape and nature flourishing on farms.

There are four strategic imperatives that underpin the program which will drive the adoption of sustainable practices in the primary industries and land sector:

- acceptance of robust, transparent and practical metrics
- cost effective project implementation and measurement
- capacity in the value chain
- critical mass of low carbon projects.

### Acceptance of robust, transparent and practical metrics

Land managers, their customers and financial markets all need to be able to access robust metrics and measures that demonstrate action and impact. They need to be confident that their investments and products deliver what they promise. They need consistency to be able to aggregate data and compare carbon and biodiversity products.

Figure 3 outlines the different decisions that are informed by robust data, methods, metrics and frameworks. Figure 4 provides a worked example in the context of carbon markets.

Assessing the environmental performance of agricultural businesses and land requires a range of analytical tools:

- **robust methods and standard metrics** – to help holistically and practically measure the environmental impacts of the business or product. A metric could be the quantity of feed additives consumed by livestock to reduce their emissions. Another could be the level of tree cover or the amount of carbon stored in the soil. Each metric needs to be consistently defined and calculated. Each method needs to be scientifically sound, with a clear link to the environmental impacts it is measuring. The suite of metrics needs to be holistic to ensure that improvements in one area are not negated by other activities that worsen environmental impacts in other ways. Metrics need to be supported by rigorous methods for measurement, verification and assessment, and tools and data sets that enable environmental performance to be measured.
- **frameworks which put the metrics in context** – it's important to standardise what good performance looks like. For example, how much carbon needs to be added to the soil, how much tree cover is appropriate and what proportion of the time does livestock need to be on the relevant feed supplements so that a business can be regarded as achieving the relevant environmental objective.
- **aligned targets and objectives** – stakeholders including customers, investors and industry need to be aligned on the overarching environmental goals. For example, a goal could be that a business is carbon neutral by a certain date, or a sector is delivering net positive outcomes for biodiversity.

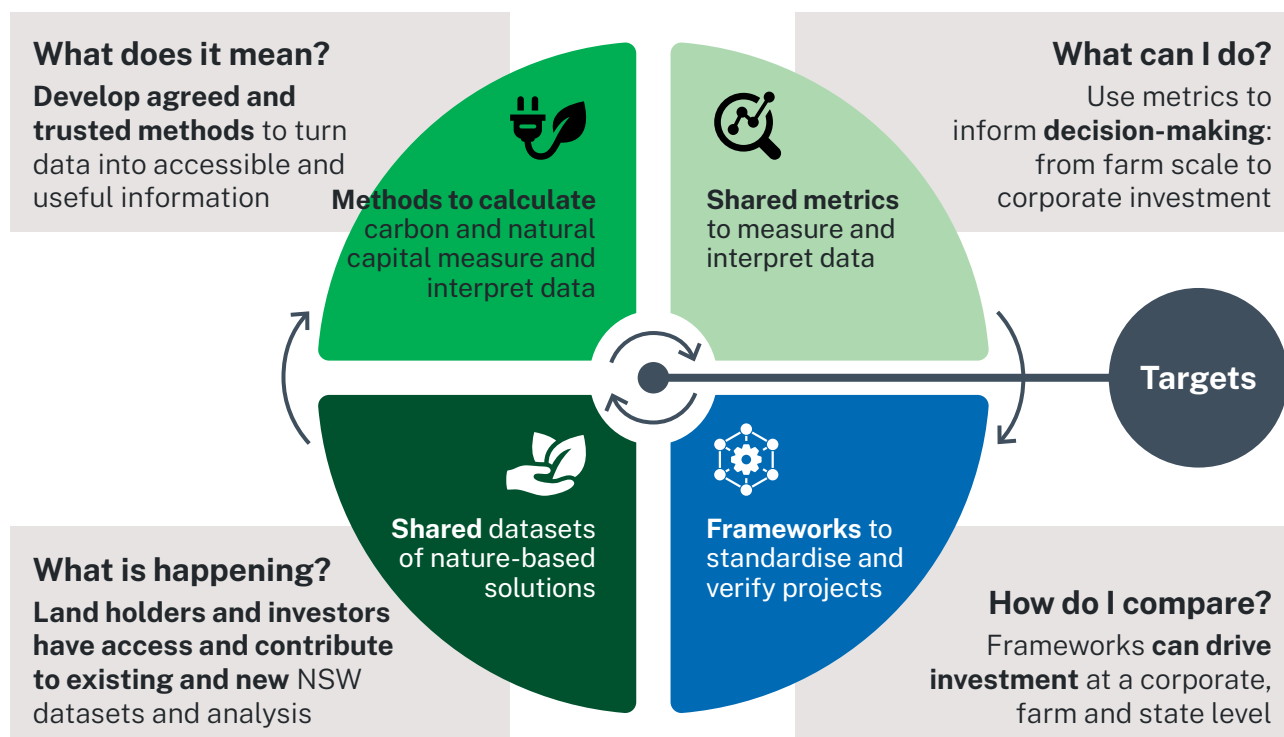


Figure 3: Decision making is informed by robust data, methods, metrics and frameworks

Data	Method	Metric	Framework	Target
<ul style="list-style-type: none"> <li>Carbon abatement project data (e.g. forest cover change over time, ground cover, soil data)</li> </ul>	<ul style="list-style-type: none"> <li>Approved Emissions Reduction Fund (ERF) Methods</li> <li>Other voluntary carbon methods and standards, such as The Gold Standard</li> </ul>	<ul style="list-style-type: none"> <li>Australia Carbon Credit Unit (ACCU)</li> <li>Other voluntary carbon credit units</li> </ul>	<ul style="list-style-type: none"> <li>Task Force on Climate-Related Financial Disclosures (TCFD)</li> <li>Other voluntary carbon methods and standards, including Environmental, Social, and Governance</li> </ul>	<ul style="list-style-type: none"> <li>Targets and commitments (e.g. Net Zero, Climate Positive, Carbon Neutral)</li> </ul>

Credible action on carbon abatement requires robust, shared datasets, agreed methodologies, tradable metrics, and benchmarking standards to verify and compare projects.

Figure 4: The pathway to credible action on carbon abatement



At the heart of each of these dimensions is integrity and trust which must be based on good science. The environmental objectives need to be set in line with the science. For example, considering what is needed to prevent global warming beyond dangerous levels or what is needed to ensure the integrity of ecosystems. Individual metrics, and the framework within which those metrics sit, needs to be scientifically sound and measurement needs to be transparent, verifiable and occur within a good governance framework.

### **Cost effective project implementation and measurement**

Taking action must make good economic and environmental sense. We know cost is a major barrier to undertaking sustainability projects. This can include the cost of projects, the cost of accessing environmental markets and the cost of measurement and verification.

Upfront cost can be reduced by a combination of increased commercial availability of technologies, availability of low-cost finance and government incentives. The cost of accessing environmental markets can be reduced through minimising transaction costs, novel aggregation methods and value stacking across different markets.

Measurement and verification need to be delivered at low cost to ensure that the economic benefits of achieving sustainability outcomes accrue to land managers and are not lost to the process of measuring their impact. These costs can be reduced by:

- making existing datasets widely available and accessible
- developing new data sets to meet industry needs
- using emerging opportunities such as remote sensing technologies to verify impact at scale.

Costs can also be reduced by accelerating the deployment of new technologies and by investing in common infrastructure or supply chain infrastructure.

### **Capacity in the value chain**

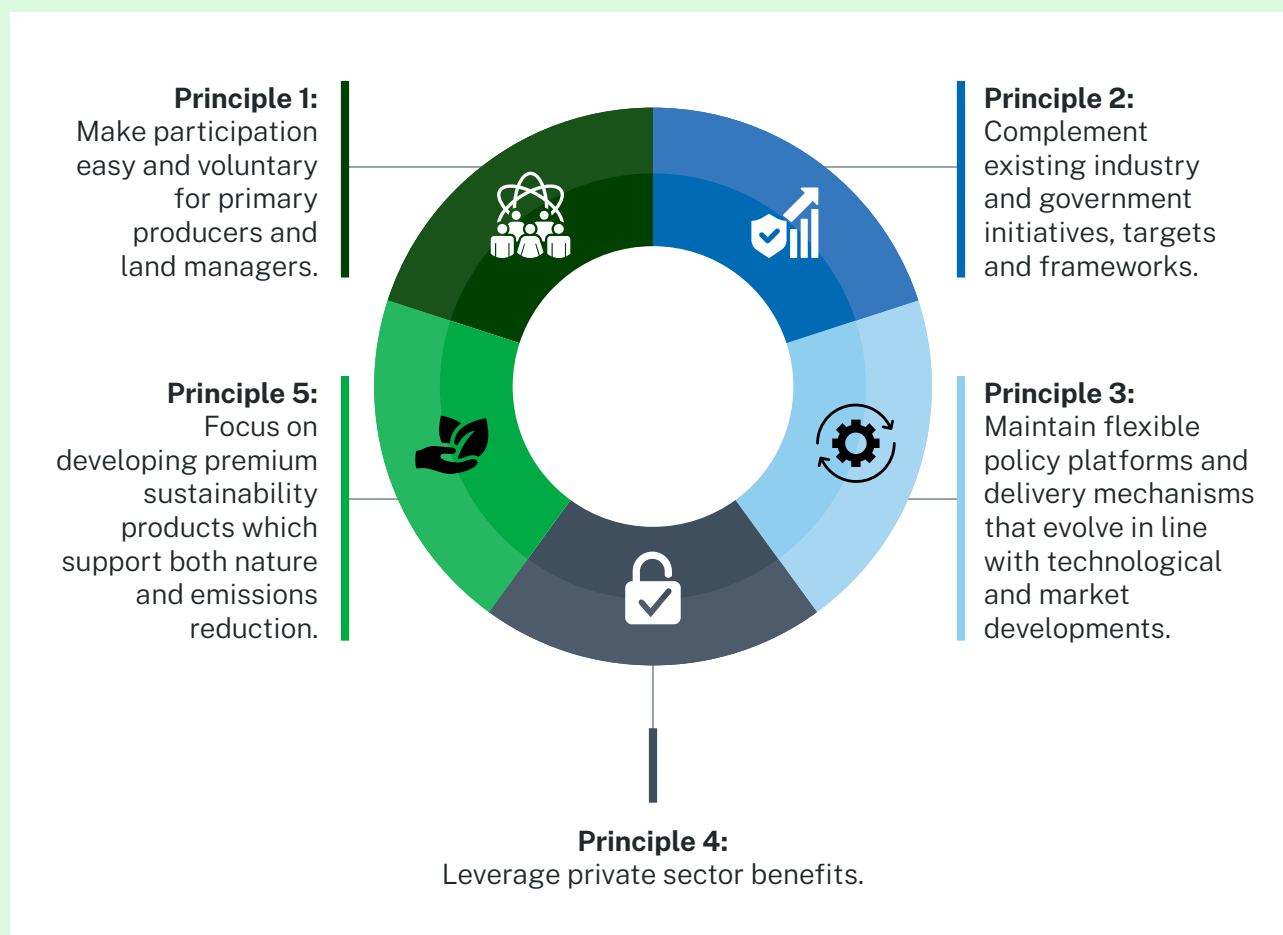
The development of low emissions agricultural products, practices and technologies is in its early stages. As these practices become commercial, there is a need to build awareness, skills and capacity along the value chain. This is necessary for farmers and land managers to understand the opportunities and costs associated with different low carbon approaches and for other participants in the value chain to understand and trust the outcomes, including consumers, retailers and investors.

### **A critical mass of low carbon projects**

One of the best ways to build trust in technologies and practices is for farmers and land managers to see real examples of low emissions practices in action and delivering financial benefits. This will help build confidence and demonstrate that these new practices can be adopted. It also confirms they deliver the benefits that research suggest, and they can be integrated into productive farm businesses.




## Design Principles



## Focus areas and key actions

There are three focus areas to the Primary Industries Productivity and Abatement program.

-  **Develop market and industry foundations**
-  **Build critical mass and capacity**
-  **Accelerate natural capital investment through financial partnerships.**



## Focus area 1: Develop market and industry foundations – \$52 million

### Data, metrics and market enablers

The focus of this program is to drive action to reduce and store carbon emissions and improve biodiversity. This requires trust in the outcomes of that action. To build that trust, we will:

- develop trusted and actionable data sets, methods and metrics, frameworks and tools for easy and cost-effective assessment of biodiversity and carbon outcomes
- facilitate a transparent and functioning market using robust and transparent information to create economic value.

### Action 1:

#### Develop trusted data sets, methods and metrics, frameworks and tools

We will improve the accuracy, transparency and robustness of data, metrics and frameworks to underpin strong market activity. These measures will:

- help farmers and land managers measure outcomes and prove their environmental credentials
- provide consumers, buyers and retailers of agricultural products with the certainty they need to inform their purchasing decisions
- provide financiers and investors with the information they need to align their investments with their corporate risk and ESG objectives.

We will achieve this by:

- **using existing government datasets** to measure carbon and biodiversity baselines. For example, relating to vegetation, soil, land use change and

other environmental accounts. Existing delivery mechanisms, such as the Sharing and Enabling Environmental Data (SEED) portal may also help to combine this data and make it accessible

- **developing new data products** that can increase confidence and reduce transaction or measurement and verification costs
- **identifying data needs and sources for co-benefits** such as productivity, social benefits, drought resilience. These data and metrics are less developed and require careful consideration across a multi-disciplinary stakeholder group
- **developing frameworks for co-benefits** that balance scientific rigour and accessibility for landholders and meet the needs of institutional investors as a stepping-stone to full natural capital accounting
- **developing a suite of agreed metrics** supported by trusted data and methods for use in natural capital accounting and investment by working with stakeholders across finance, accounting, agriculture and land management
- **developing information products and tools** that distil data into outputs for use by land managers and investors. For example:
  - Natural Capital Evidence Bank to provide data, metrics and standards to the marketplace
  - digital tools for use in on-farm land use planning which incorporate carbon, biodiversity and productivity information on different options available to farmers.

We will do this in a number of ways including by: supporting existing development initiatives to working with partners including through industry collaborations and forums, undertaking work directly and commissioning experts to develop the relevant tools or intellectual property.

We will take an adaptive approach which recognises:

- the legitimising role government can play
- expertise from within and outside of government
- existing work which is already underway
- the need for metrics and frameworks to be readily adopted by land managers and trusted by value chain actors.

### **Action 2: Facilitate a transparent and smoothly functioning market to create economic value**

Strong markets for environmental outcomes and sustainable goods will deliver important economic benefits to farmers and land managers. Our activities to enable these markets will include:

- building a **pipeline of demand** for NSW carbon and premium carbon by:
  - exploring offtake agreements with potential purchasers such as businesses and government agencies with net zero commitments
  - educating offset purchasers on the different types and qualities of offsets to shift demand away from cheaper offshore credits
- establishing an active secondary market by enabling trade between environmental market participants such as supporting the **development of trading platforms** which match up buyers and sellers and increase market transparency

- accelerating existing initiatives to **measure and report on sustainability** indicators in the land sector
- establishing the platforms to link producers with sustainability credentials to purchasers with sustainability commitments.

We will partner with other governments, industry groups, academia and other non-government organisations to ensure that the products delivered complement existing work and is fit-for-purpose for producers, consumers, purchasers and financiers.

### **Action 3: Common infrastructure and industry foundations**

Because many of the technologies and practices required to reduce emissions are still emerging, much of the NSW's common and supply chain infrastructure is still to be developed. For example to support the production of feed additives for livestock, there may be a need to develop seaweed production facilities and hatcheries. Common infrastructure could also include the development of measurement infrastructure which reduces the cost of demonstrating biodiversity and carbon outcomes.

The NSW Government will run periodic expressions of interest (EOI) processes for strategic common or supply chain infrastructure which:

- reduce the cost of realising the economic value of improving environmental outcomes including biodiversity and carbon
- accelerates the bringing to market of new low carbon technologies and practices.

These EOI processes will include both calls for proposals to deliver strategic infrastructure and open calls for proposals.





## Focus area 2: Build critical mass and capacity – \$72 million

This focus area will provide incentives for land managers to take early action on high priority projects. It will also help build the capabilities of farmers and land managers, buyers and financiers in the agricultural value chain.

### Action 4:

#### High impact projects and partnerships

We will provide **financial support for priority projects** which help to:

- build a critical mass of carbon abatement projects in the primary industries and land sector
- demonstrate at scale the potential of agricultural practices and technologies which reduce or sequester carbon emissions and enhance natural capital
- demonstrate new approaches to deliver economic value to land managers using low carbon and net positive biodiversity practices
- bring high profile low or zero carbon products to market that demonstrate and highlight the opportunities.

A **competitive fund will provide grants** to support priority projects, including those which:

- demonstrate productivity impacts of abatement activities through on-ground implementation and monitoring
- combine abatement with other benefits, such as environmental, social or cultural benefits
- pilot or demonstrate value stacking opportunities (e.g. carbon and biodiversity credits) or new approaches to accessing carbon markets (e.g. through novel approaches to aggregation).

We will also seek EOIs for **high impact partnerships** that deliver on strategically

important challenges identified by government. These partnerships will be built with organisations that have objectives aligned to the program, influence within the sector and the ability to drive change in the way land is managed in NSW.

By investing in these projects, we will build a portfolio of on-ground demonstration sites where carbon projects are integrated with farming and other land management practices. Funded projects will be required to share their learnings and outcomes to build confidence and skill in abatement activities.

### Action 5:

#### Capacity building

We will work with trusted partners to help build the awareness, capability and expertise of farmers and land managers around carbon management and emissions abatement opportunities. We will also support farmers and land managers to identify the multiple benefits that could be achieved through abatement projects including increased productivity, environmental benefits and more.

We will do this by:

- **partnering with existing extension networks** (government and non-government) to deliver education and coaching
- providing **access to demonstration sites**, case studies and exhibitions at field days
- building a **digital ‘Community of Practice’** where land managers can access online learning, expert directories, detailed project and financial insights, and a virtual connection to on-ground projects
- building the capacity of **trusted intermediaries** to provide advice on carbon projects and markets. For example, farm business advisors, agronomists, banks and legal advisors.

### **Action 6: Sustainability in agriculture forum**

The NSW Government will establish a forum to increase sustainability in agriculture, bringing together representatives across the sector to highlight sustainability leadership and foster collaboration. This group will include experts from research institutions, large producers and processors, industry associations, purchasers of agricultural products and financiers of agricultural products. The forum will provide an opportunity to build collaboration and partnerships. It will also provide a channel for government to listen to the sector, making sure we adapt to shifting market

contexts and continue to deliver high impact interventions.

We will also establish a platform for participants in primary industry value chains to voluntarily pledge to emissions reduction and biodiversity goals. This will place a particular focus on goals that align with the ambitious objectives already set by industry. This mechanism will create momentum for sustainability practices and will help participants market their sustainability credentials. Participants will need to agree to minimum reporting and governance arrangements on their pledges, appropriate to the size of their business.



### **Focus area 3: Accelerate finance for natural capital and low carbon farming – \$1 million**

#### **Action 7: Accelerating natural capital investment**

Natural capital finance offers a real opportunity for farmers and land managers to reduce their cost of capital. This is because sustainable farming practices can help reduce business risk and enable businesses to access deeper capital pools.

At the same time as landholders are seeking to improve their returns, there is significant demand from investors for nature-positive investment opportunities. Well-designed financial instruments allow land managers to engage with investors keen to achieve nature-positive outcomes. This will mean improved access to finance for land managers and a de-risked portfolio for investors.

NSW Government is keen to accelerate the impact of natural capital investment in our primary industries and land sector. This will mean investment is scaled-up and occurs sooner, helping us deliver on multiple priorities including building productive and resilient regions alongside environmental outcomes.

This focus area will facilitate a dialogue with the financial sector and encourage the creation of new instruments to value and build natural capital in NSW. It will explore the potential to partner with financial institutions to invest in natural capital and low carbon farming. Accelerated investment in natural capital will deliver outcomes for land managers, financial institutions and for NSW as a whole.

## Case study

## The on-farm carbon advice project – an early outreach initiative under Action 5

The on-farm carbon advice project is an early outreach initiative that will facilitate farmers' access to industry-relevant carbon services; provide practical and relevant advice and tools to help them make more informed decisions about entering carbon markets, or undertaking carbon management activities.

Whole farm carbon management has been identified as a significant opportunity for abatement in NSW. Through partnership with NSW Department of Primary Industries, this pilot project will unlock a pipeline of abatement which enhances business resilience and farm productivity. It will result in:



Practical help for farmers to identify, calculate, and verify carbon opportunities on their farm.



Farmers being able to integrate carbon management into farm business planning and on-ground decision-making.



An increased number of farm-based abatement projects in NSW.



Extra income for farmers from established carbon markets.



Farmers being able to demonstrate on-farm carbon performance.

This project will initially support a targeted cohort of interested farmers, with the potential to expand in the future.

The project will offer:

1. Whole farm planning service to provide farmers with practical knowledge and examples of how to implement carbon abatement projects. It will use on-farm demonstration sites to provide real-world examples of how to integrate abatement activities with primary production. It will also engage with interested farmer groups to enable them to undertake whole farm carbon planning, build their understanding of abatement opportunities and highlight the interaction between abatement and productivity.
2. Concierge service to identify carbon abatement projects coming out of the whole farm planning service that are suitable for generating carbon credits. The concierge service will facilitate access for farmers to carbon markets by working with carbon project developers and, potentially, with purchasers of offsets in addition to the Emissions Reduction Fund.
3. Capturing all abatement that occurs on farm by developing protocols to measure and verify abatement activities beyond those we can already capture. This will allow farmers to create a more complete view of carbon stocks and flows on-farm and recognise the impact of smaller-scale activities.



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# How to get involved

The primary industries and land sector has enormous potential to decarbonise in ways that create jobs, support economic growth, diversify our regional economies and create more choice for businesses.

This program, part of the Net Zero Plan, marks a strengthening of joint efforts between the NSW Government, the primary industries and land sector and the finance sector to capture the substantial economic opportunities available through strong environmental action.

We look forward to working with farmers and land managers, Aboriginal land managers and organisations, peak bodies and industry associations, agribusinesses, carbon project developers, financiers and investors, researchers, community and not-for-profit groups and the general public.

We will be engaging with interested stakeholders over the coming months to implement this high impact work, including seeking applications for funding for a range of initiatives.

To be the first to receive updates on these opportunities, including funding rounds and the process for consultation visit [www.energysaver.nsw.gov.au/netzeroland](http://www.energysaver.nsw.gov.au/netzeroland) and register your details.



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# Growing NSW's primary industries and land sector in a low carbon world



## For more information

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