

# ZERO NET EMISSIONS

## Agriculture CRC



A multi-stakeholder approach to transitioning Australian agriculture to net-zero, healthy, resilient, and profitable food systems by 2040.



# OUR VISION

## Exceeding emissions reduction targets, growing market access, and creating industry value.

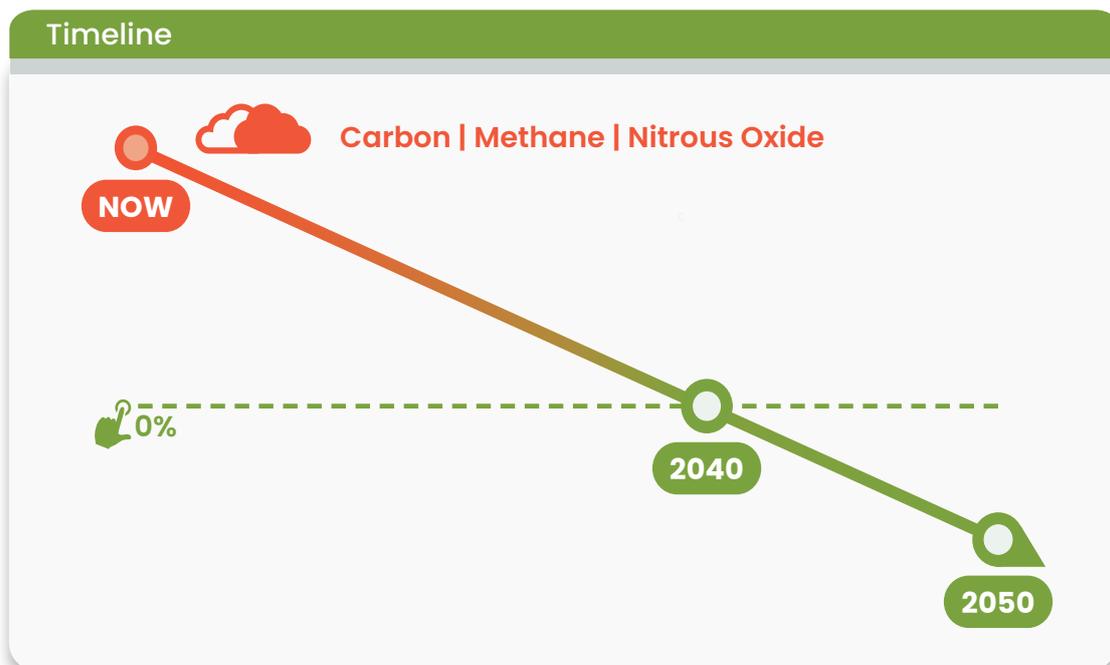
The Zero Net Emissions from Agriculture Cooperative Research Centre (ZNE-Ag CRC) aims to catalyse industry, community, and government action to achieve Zero Net Emissions from agriculture by 2040, and below zero net emissions by 2050.

Agriculture directly contributes 14 percent of Australia's national emissions. Our goal is to ensure Australia's agricultural industries keep growing, enhance their market access internationally and domestically while they simultaneously achieve ZNE by 2040, and exceed international emissions reduction targets by 2050. In its position at the interface of land and environmental management issues, agriculture plays a key role in Australia's pathway to ZNE as it possesses the ability to assist other industries to meet and exceed their commitments.

Australia's agricultural industries have long been at the forefront of harnessing science and innovation to build resilience in agricultural systems in the face of climate and disease threats, to reduce emissions, safeguard market access, and increase industry value. Closely associated with agriculture, the bioeconomy uses renewable biological resources to produce not only food, but also materials and energy, enabling resource-efficiency that assists the transition to a decarbonised economy.

Despite the best efforts of forward thinkers across Australian agriculture, the climate is changing in ways that will continue to disrupt growing conditions and our ability to compete on international markets without innovation and the adoption of large scale science and technology-driven solutions.

This CRC will coordinate key players among industry, government and research partners nationally to create and deliver on large projects by integrating world-leading research and industry expertise in plant and animal science, engineering, computing and economics with disruptive technologies to achieve massive emissions reductions that are not possible when agricultural and other associated industries operate in isolation. By boosting production potential in a sustainable and resource-efficient way, we support Australian agricultural industries in reaching their emissions goals while enhancing our food and agricultural sovereignty, and increasing our market access to current, and potential export markets.



# WIN-WIN-WIN

The ZNE-Ag CRC's Win-Win-Win strategy is designed to ensure Australia's agricultural sectors increase their economic viability, profitability and long term asset building as they simultaneously implement strategies and actions to meet and exceed emissions reduction targets.

## Figure 1: Win-Lose

Emissions reduction is often seen as a cost burden that creates a trade-off against the economic imperatives that drive productivity, profitability, growth and asset building, perceived as a win-lose situation. The pathway to ZNE is therefore seen as a balancing act between global emissions reduction: Carbon dioxide, methane and nitrous oxide and the economic imperatives: Ag industry value of \$100 billion by 2030, food and ag sovereignty and market access.



Zero net emissions by 2040. Exceeding global emissions reductions targets by 2050.

Market access now and ongoing

Growing Ag to \$100 Billion by 2030



## Figure 2: Win-Win-Win

In contrast, the CRC will harness and coordinate opportunities to break the nexus: Creating win-win-win through rapid research, development and adoption of science and technology-led solutions at scale driven by our industry and government partners - taking us beyond the trade-offs.

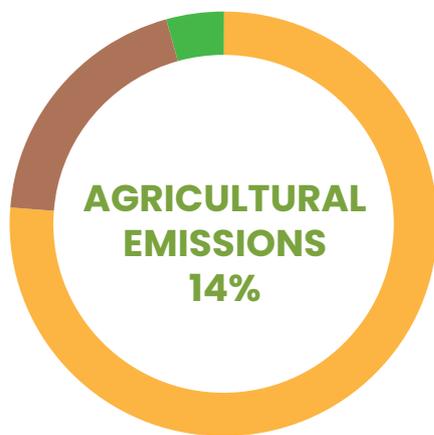
# OUR CHALLENGE

## Unlocking production potential in a sustainable and resource-efficient way

COP26 in 2021 secured near-global net zero emissions commitments from 153 countries and future strengthening of mitigation measures by 2050 and over 100 countries committed to reducing global methane emissions by 30 percent by 2030. Two months later, the Intergovernmental Panel on Climate Change (IPCC) declared a code red for humanity, calling for rapid emissions reduction to occur by 2035.

Many Australian agricultural industries are already committed to these goals. For example, the National Farmers Federation (NFF) adopted a zero net emissions goal for the sector by 2050, and Meat & Livestock Australia (MLA) has set the ambitious carbon neutrality target by 2030. At the same time, NFF is committed to the strategic goal for agricultural producers, agribusinesses and supply chain participants across Australia to raise our agricultural sector value to \$100 billion per annum by 2030, with exports accounting for 70 percent of this value. These goals can be highly compatible, for instance visible action on climate will ensure international markets remain open to our agricultural product and new domestic and international markets for high value products will be created.

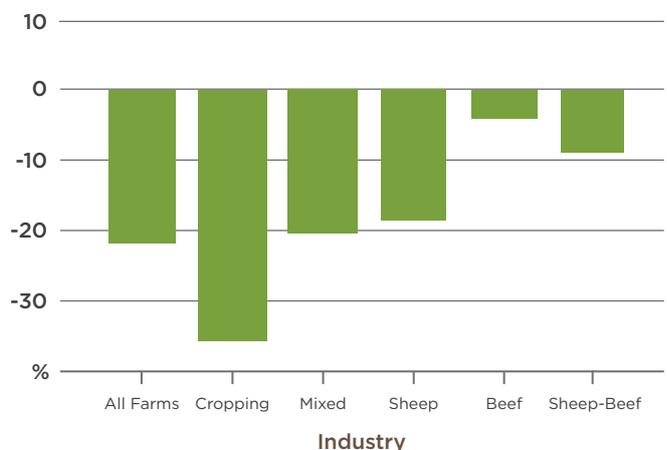
The COVID-19 pandemic has highlighted how critical food and agricultural sovereignty is for Australia, and supply chain disruptions, higher fertiliser prices and extreme weather events will continue to be challenges. The scale of the problem requires both incremental and radical solutions, using all the tools at our disposal, as our continued access to both domestic and international markets depends on evidenced climate response. Enhanced farming practices, crop and animal genetics and soil management, as well as pre-farm and post-farm gate innovations can help to meet these challenges. Intensification of farming practices such as protected cropping are compatible with climate and resource-sensitive movements such as regenerative agriculture.



▶ Agriculture contributes 14% of Australia's national emissions.

-  **77% Methane**  
(Livestock)
-  **19% Nitrous Oxide**  
(crop residue burning and fertiliser use)
-  **4% Carbon Dioxide**  
(Lime and urea use)

**Impact of emissions and climate change- Effect of post-2000 climate on average annual profits:**



Modelled profits 2000 onwards relative to profits under seasonal conditioning from 2050-1999, all else equal. Source Hughes et al 2019 ABARES



## OPPORTUNITY

Much of the emissions focus nationally has been on defining and meeting targets. Agriculture and land management more broadly has the potential to drive down emissions within its own sectors, and across other sectors such as manufacturing. ZNE-Ag CRC will provide the tools for our industries to engage with, and leverage such regulatory, compliance and policy systems and frameworks, offering substantial economic, social, and environmental benefit. Through the Cooperative Research Centre Program, we will provide incisive input to policy formulation as an integral part of the adoption and implementation of solutions.

## GOAL DELIVERY

ZNE-Ag CRC will create large scale action through integrated frameworks to accelerate industry-led research, development, adoption and commercialisation of science and technology-based solutions at scale.

As reflected in the CRC structure and program design, the efforts are co-designed with industry and government partners and focussed on where the most benefit can be achieved,

**ZNE-Ag CRC has three Research Programs and a fourth cross-cutting Education, Training and Adoption Program:**



# The ZNE–Ag CRC Research Programs

## Research Program 1: Plant Production Systems (nitrous oxide and CO<sub>2</sub>)

Plant production for food and fodder as well as non-food products contributes 22 percent of Australia's direct agricultural emissions (excluding land use change and supply chain emissions such as fertiliser production). Of that, nitrous oxide, mostly from fertiliser management contributes 83 percent and CO<sub>2</sub> from other management interventions 17 percent. Emissions are not restricted to field crops and pastures. Horticultural systems have a major role to play in achieving net zero goals. In addition, plant production systems have the potential to not only reduce emissions, but sequester carbon in soil or biomass, not only for carbon capture but for better soil management and yield.

## Research Program 2: Animal Production Systems (methane and CO<sub>2</sub>)

Emissions from animal production account for 78 percent of Australia's agriculture emissions. Most of that is methane from enteric fermentation (88 percent), the rest methane and CO<sub>2</sub> from manure management. Technological advances such as feed supplements could reduce enteric CH<sub>4</sub> emissions, but applications are currently focussed on feedlots and intensive dairy systems. Given that pasture systems account for 90 percent of production, novel animal and plant genetic and management approaches will be required to restrict CH<sub>4</sub> production, and a whole of system approach to tap into the sequestration potential in large pasture-dominated landscapes is needed.

## Research Program 3: Circular Economy, Supply Chains and Market Access

Agricultural systems extend beyond the farm across the entire supply chain. We are limiting the CRC's scope to those key elements of the production system most closely linked to on-farm production and emissions - energy and transport evident in the supply chains that distribute primary product. We will especially focus on opportunities to create circular economy approaches.

Our access to key international markets is increasingly bound to our climate response and performance. With 70 percent of agricultural products exported, our climate credentials need evidence of immediate action on emissions well before 2030, 2040 or 2050.



## Education, Training and Adoption

The solutions that will most impact our agriculturally-driven GHG emissions, particularly methane emissions from livestock production systems, will require large scale, complex science-driven, but commercially-enabled solutions. The faster these solutions progress through their development pipelines and are adopted, the more cumulative impact on emissions these will have up to 2050.

The CRC will create a national education and training program offering a suite of short, applied courses co-created with our industry, government and university partners and directly delivered to producers and supply chain participants through national platforms. This will also be a mechanism for driving the adoption of emission reduction activities, methods and initiatives (including but beyond our specific science and technology projects through engagement, exchange, field days, and through our training hub partners such as the AgTech and Logistics Hub in Toowoomba).

## Why Become a Partner?

- Access to at least \$175 million in cash and in-kind resources over 10 years;
- Opportunity to build your network and engage with other like-minded organisations;
- Be branded as an innovative organisation that supports Australia in reaching its national priorities;
- Address larger problems facing your organisation that are not able to be addressed without a collaborative effort;
- Opportunity to work with some of the world's best researchers in areas such as agriculture, sustainability, technology, business and supply chains;
- Access to post graduate and PhD candidates to support your organisation through co-working arrangements;
- Influence in the re-design of vocational and higher education courses that will shape the future workforce;
- Opportunity to work with people living in regional and rural communities to help accelerate the transition to lowering emissions at a local level.

Partners can join the ZNE-Ag CRC at any time during the bid phase. However, we encourage you to engage early on influence the research agenda, and to optimise the opportunity to leverage your contributions with requested grant funding.

## Bid timeline



## About the CRC program

The Cooperative Research Centres (CRC) Program is funded by the Australian Government Department of Industry, Science, Energy and Resources, and provides grant funding for up to 10 years.

Since its inception in 1990, the CRC Program has committed \$4.6 billion in funding to support the establishment of more than 221 CRC grants and 76 CRC-P Grants - a total of 297 collaborations funded over the program's lifetime. The program aims to:

- Improve the competitiveness, productivity and sustainability of Australian industries, especially where Australia has a competitive strength, and in line with government priorities;
- Foster high quality research to solve industry-identified problems through industry-led and outcome focused collaborative research partnerships between industry entities and research organisations;
- Encourage and facilitate small and medium enterprise (SME) participation in collaborative research.
- CRCs are established as independent entities, and are governed as incorporated companies limited by guarantee.

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THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA

CREATE CHANGE