Queensland Low Emissions Agriculture Roadmap

2022–2032

Queensland | Good **jobs** Better **services** Great **lifestyle**

Queensland Government

The Department of Agriculture and Fisheries proudly acknowledges all First Nations peoples (Aboriginal peoples and Torres Strait Islanders) and the Traditional Owners and Custodians of the country on which we live and work.

We acknowledge their continuing connection to land, waters and culture and commit to ongoing reconciliation. We pay our respect to their Elders past, present and emerging.

About the roadmap

The Queensland Low Emissions Agriculture Roadmap 2022–2032 (the roadmap) provides a strong framework to achieve a low emissions agriculture sector by reducing production-based emissions and increasing carbon farming. Its strength is its co-design with key industry partners and government.

The roadmap is intended to be a living document, evolving with the needs and ambitions of its partners. The roadmap's preferred futures and actions will be reviewed and refreshed mid-term to reflect the new technologies and market drivers influencing outcomes across the agribusiness supply chains. This roadmap focuses on sector transition, partnering with industry to build the foundations for material action on greenhouse gas (GHG) emissions reduction.

Different industries in the agriculture sector are at different stages of developing and implementing GHG emissions reduction targets. This roadmap has been designed to support industries to deliver against their targets and work towards the Queensland Government commitment of a zero net emissions economy by 2050.

The roadmap drives:
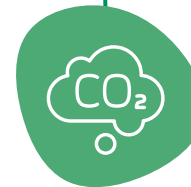
Research, development, and adoption of low emissions production systems

Support for agribusinesses along the supply chain to make climate-informed business decisions through education, training, and skills

Integrated actions across government to support interrelated climate action initiatives

Forewords

Minister's foreword

I am proud to deliver the Queensland Low Emissions Agriculture Roadmap 2022–2032, which is a key pillar in the Queensland Government's climate response. The roadmap will ensure food security and the economic stability of our food and fibre producing regions while actively transitioning to low emissions agriculture.

By 2032 we expect the agriculture, fisheries and forestry supply chains will be well on the way to lower emissions production, with the goal of a net-zero emissions economy by 2050 well in sight.

We will use other strategies from the transport and energy sectors, as well as partnering with non-agricultural industries as an important part of realising carbon-neutral regions and supply hubs.

The roadmap includes case studies highlighting five of the many Queensland agribusinesses already on the journey to lower emissions production.

I would like to thank our key partners AgForce, Queensland Farmers' Federation and the National Farmers' Federation for working closely with the Queensland Government to co-design this roadmap.

Honourable Mark Furner MP

Minister for Agricultural Industry Development and Fisheries and Minister for Rural Communities

Queensland Farmers' Federation foreword

Sustainable agricultural production and sound environmental outcomes must go hand in hand—we cannot have one without the other. In recent years, we have seen Queensland farmers achieve significant advancements in improved water efficiencies, reduced chemical usage, better soil health and stronger biodiversity management.

As the global demand for sustainable supply chains and low emissions production continues, Queensland farmers continue to innovate to respond in meaningful ways that will achieve further environmental outcomes but also safeguard the future of food, fibre and foliage production and maintain viable farm enterprises.

This roadmap will give Queensland farmers a chance to look at what they are doing now, what they might do in future and what might be some of the pathways for them to ensure tangible, long-term sustainability and productivity of their businesses and the industry more broadly.

We are on this journey together and it is critical that we get it right for future generations—a sustainable, viable agricultural industry, sound environmental outcomes and stronger regional communities.

Jo Sheppard

Chief Executive Officer
Queensland Farmers' Federation

AgForce foreword

Queensland producers lead the world in innovation and have a proud history of being able to lift productivity and output in an ever-changing environment to ensure the sustainability of their businesses and the sector as a whole.

Through this roadmap, new technologies and best practice management will ensure ongoing progress across landscapes and supply chains, while cementing Queensland agriculture as a sustainable and globally competitive industry.

Consumers want reassurance that the food and fibre they buy has been grown in an ethical and sustainable way that supports the long-term viability of our unique environment.

The actions in this roadmap, developed in collaboration with industry and government, will help Queensland producers to respond to changing market drivers.

The economic, environmental and social prosperity of our regional communities depends on good environmental outcomes and continuing increases in productivity and production—for this generation and beyond.

We look forward to working with the Queensland Government and industry partners to position our state to achieve long-term food security through supporting sustainable farming and good environmental outcomes.

Michael Guerin

Chief Executive Officer
AgForce Queensland

Current state

The Queensland agribusiness and food sector contributes significantly to Queensland's economy. It has a key role in providing safe, sustainable food to an increasing world population.

Queensland's primary industry commodities were forecast to be $23.66 billion in 2021–22, and account for approximately 10% of Queensland's overseas exports. The industry employs more than 372,000 people across the agribusiness supply chain.

Industry and government are committed to reducing GHG emissions and increasing carbon capture in the landscape. This is the expectation of domestic markets and Australia's global trading partners. Key trading partners are committing to carbon import tariff mechanisms. Food manufacturers and retailers are working towards carbon-reduction targets.

Today's consumers want food that is sustainable and ethically produced. Carbon-neutral branded products currently attract a price premium. Consumer trends suggest in the future there will likely be an expectation that all food products will be low or carbon neutral. Investments in drought resilience and climate adaptation measures have expanded to increasingly focus on limiting the sector's GHG footprint and streamlining production efficiencies.

Agriculture's emissions

Agriculture operates within the natural environment, and its GHG emissions come from biological, energy and manufactured sources. At over 80%[1], Queensland has the highest proportion of land area in Australia managed for agriculture and the largest area of agricultural land of any Australian state or territory. Agriculture's major emission sources include methane from ruminant animals like cattle, sheep and goats; manure management; nitrous oxide from applied fertiliser use and land use emissions. In 2020, the agriculture and land sector emissions totalled approximately 32 million tonnes of carbon dioxide equivalent, or about 20% of Queensland's emissions (Figure 1). This equates to a reduction of 67% since 2005.

As Queensland has the largest beef cattle herd in Australia and beef is a major export, it is not surprising that livestock emissions form the largest portion of agriculture emissions. Significant technological intervention is required to interrupt natural biological processes and reduce methane emissions from ruminant animals.

Queensland emissions by sector 2020 (MtCO2e)

- Fugitive fuels 13.59%
- Waste 1.72%
- Industrial 3.62%
- LULUCF 7.83%
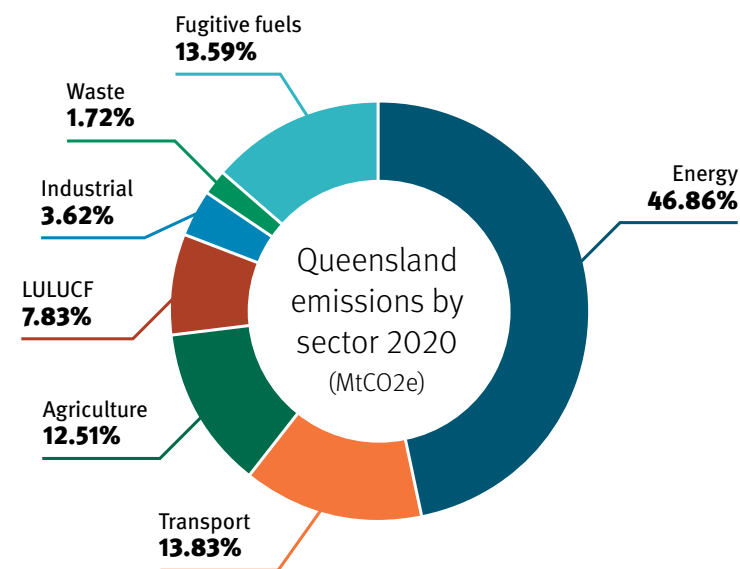- Agriculture 12.51%
- Transport 13.83%
- Energy 46.86%

Figure 1

State and territory greenhouse gas inventories: 2020 emissions, Department of Industry, Science, Energy and Resources 2022.

1   Australian Bureau of Statistics, Land Management and Farming in Australia 2016–17.

Taking action now—the benefits

Economic analysis shows that the cost of acting now is significantly lower than it will be if we delay this transition, even by only a few years.

Action to lower production-based agriculture emissions whilst lifting production and nurturing our natural environment will ensure Queensland's agriculture sector continues to prosper.

Consumer trends for plant proteins and flexitarian diets are providing new market opportunities for Queensland food and fibre chains.

Queensland produces almost 1% of the world's agricultural exports. GHG trade protocols by our leading trade partners will continue to facilitate opportunities for sustainably produced high-value premium products. Key existing and potential trading partners such as the European Union, South Korea and the United States of America are investigating carbon trade mechanisms. By transitioning to a lower emissions production system and increased landscape carbon capture, the Queensland agricultural sector will be better prepared to demonstrate recognisable credentials in future trade negotiations.

Working together

To meet this challenge, the roadmap has been co-designed with industry peak bodies, research organisations and service providers, state and local government, Natural Resource Management groups, the corporate agribusiness sector, and other key stakeholders such as leading Queensland food and fibre producers and agriculture supply chain businesses.

This has enabled a coordinated sector-wide partnership approach.

The sector understands transformative change is possible across the supply chain as new technologies come online. However, no sector can make these system changes alone.

By working together, we will deliver a lower emissions production system that will strengthen Queensland agriculture's environmental and social credentials to help secure long-term economic and social prosperity across regional Queensland.

Our vision

The Queensland agribusiness sector is a world leader in low-carbon production and supply chains.

Meeting our commitment

The Queensland Government is committed to reducing Queensland's GHG emissions by:

- 30% reduction on 2005 emissions by 2030
- powering Queensland with 50% renewable energy by 2030, 70% by 2032 and 80% by 2035
- zero net emissions by 2050.

The roadmap builds on this commitment by outlining:

- technologies and policies needed to facilitate a measured and continued decline in production-based GHG emissions
- practices producers can adopt now to manage their GHG footprint and position their business to capitalise on low emissions technologies as they become viable.

Together these actions will drive agribusinesses and the supply chain towards the zero net emissions economy 2050 target.

Defining our actions

To drive progress towards achieving our vision, actions across five focus pathways have been identified:

Livestock emissions

Cropping and horticulture emissions

On-farm energy opportunities

Carbon farming and landscape management

Regions and supply chains.

However, agricultural production needs a connected system of holistic management approaches incorporating actions across all five pathways to maintain the required balance between healthy production, soils and the environment. Effort is needed to deliver against all actions within the pathways to lower sectoral emissions and maintain environmentally sustainable production.

Building on government and industry activity

The sector plays a vital role in the Queensland Climate Action Plan 2020–2030 and Queensland's and Australia's zero net emissions economy by 2050 target.

Achieving real carbon reductions in the agriculture sector requires strong partnerships between industry, governments, research providers and the community. In 2022–23 the Queensland Department of Agriculture and Fisheries will manage a research, development and extension investment of over $140 million, partnering with the Australian Government, Research and Development Corporations and leading research institutions including the Queensland Alliance for Agriculture and Food Innovation.

This investment supports the government and its partners to be agile and adapt to current and emerging challenges and opportunities in Queensland's livestock, aquaculture, cropping, horticulture, forestry, timber and food processing industries. Responding to and managing climate change and its impacts is a key part of this investment. Flagship programs such as the Drought and Climate Adaptation Program and investment into modern, sustainable production systems are delivering climate action head-on.

The roadmap builds on and supports the current commitment by producers and industry, and connects to other government strategies to take Queensland towards the zero net emissions by 2050 target.

Industry commitments:

- Australian red meat industry's pledge to be carbon neutral by 2030 (CN30)
- AgCarE, developed by AgForce to evaluate producers' natural capital
- Hort360 Climate Risk Management module developed by Growcom
- Australian Pork Ltd has committed to be carbon positive and zero waste by 2025
- Coles has committed its business to be carbon neutral by 2050
- Woolworths has committed to a new sustainability plan by 2025
- Cotton Australia's MyBMP contains modules addressing fertiliser, energy and water efficiency, carbon sequestration and GHG emissions
- SmartCane BMP Pathway to Sustainable Sugar module includes the monitoring of GHG emissions and energy efficiency
- The National Farmers' Federation is developing an Australian Agriculture Sustainability Framework
- The Australian Forest Products Association has committed to deliver 18Mt CO_2e sequestration from plantations and managed native forests.
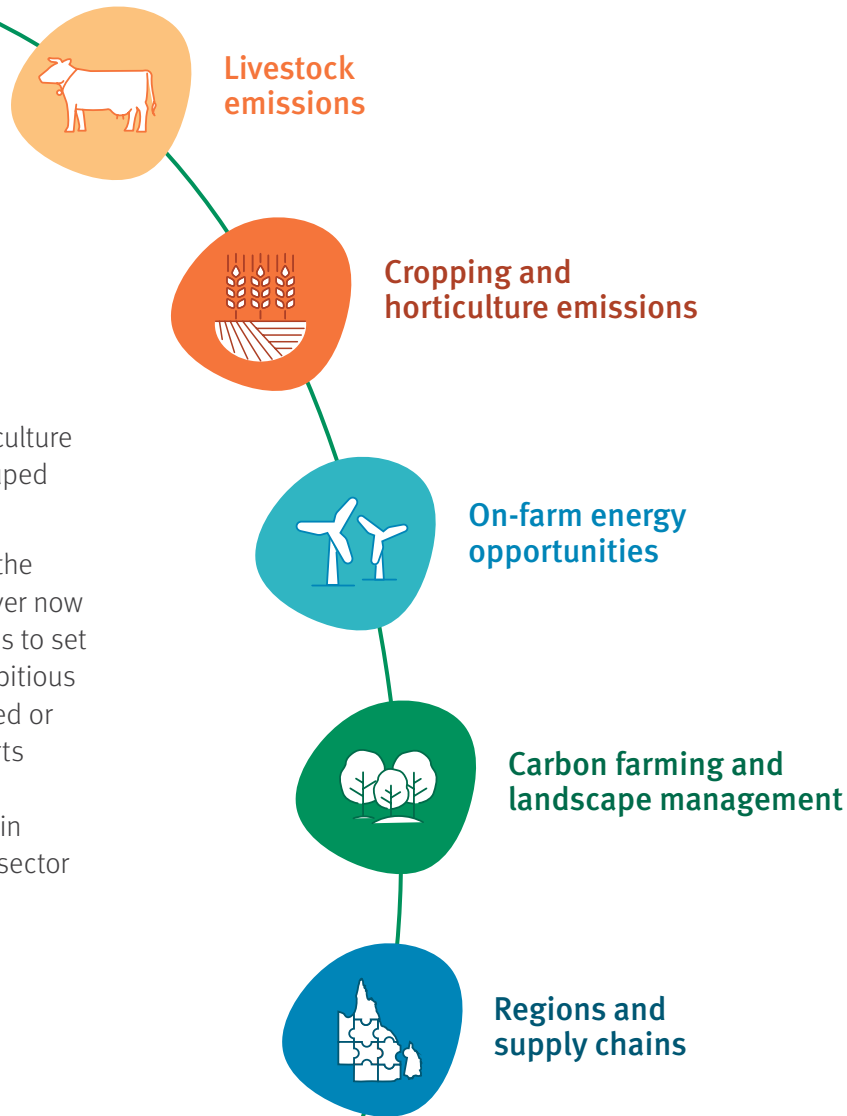
In delivering the roadmap, government and industry will seek to maximise opportunities for the agriculture sector and its supply chains in the delivery of other key **Queensland Government emissions-reduction strategies including:**

- Queensland Hydrogen Industry Strategy
- Queensland's Zero Emissions Vehicle Strategy 2022–2032 and Action Plan 2022–2024
- Land Restoration Fund
- Queensland Natural Capital Fund
- Queensland Resources Industry Development Plan
- Climate Positive Brisbane 2032 Olympic and Paralympic Games
- Queensland Energy and Jobs Plan
- Queensland AgTech Roadmap 2023–2028
- Queensland Renewable Energy Zones
- State Infrastructure Strategy 2022
- Queensland Workforce Strategy
- Innovation for a Future Economy: 2022–2032 Roadmap
- Queensland Biofutures 10-year Roadmap and Action Plan
- The *Buy Queensland* approach.

Actions under the roadmap

Our actions to meet the lower agriculture emissions roadmap vision are grouped under five pathways.

Not all actions will be delivered at the same time. Some are ready to deliver now and will be key foundational actions to set the course for potentially more ambitious initiatives including those connected or reliant on outcomes from other parts of the system. What is important is the commitment to deliver actions in partnership across the agriculture sector towards a common goal.

Livestock emissions

Cropping and horticulture emissions

On-farm energy opportunities

Carbon farming and landscape management

Regions and supply chains
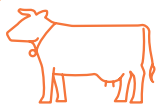
The actions are categorised as either:

How we will work together

Governments and industries working together to deliver research and tools to help manage the changes needed.

What you can do now

Actively preparing for and implementing practice change to manage the risk to individual businesses.

Livestock emissions

Actions under this pathway focus on technologies and options to reduce methane emissions from the red meat and dairy sectors and other livestock industries, including pork, poultry and aquaculture. Livestock emissions predominantly come from methane emitted by ruminant livestock such as cattle, sheep and goats. Pigs, poultry and aquaculture also play an important role in reducing agriculture's overall emissions.

The CSIRO estimates that by 2030, the actions under this pathway could help reduce livestock GHG emissions by 4.5–8 million tonnes of CO_2e each year[2].

2   CSIRO, Michael Battaglia, Peat Leith, Jody Bruce, Katie Ricketts, Steve Brodie, Maren Strachan. January 2022.
    Prepared for the Queensland Department of Agriculture and Fisheries.

Our preferred future

Increasing improvement in the GHG emissions intensity of livestock production in kg CO_2e/kg of product and be more efficient than our leading global competitors.

Minimum 80% of grazing production lands in B condition or better as defined in the ABCD Land Condition Framework.

How we will work together

Led by industry, supported by government:

- Benchmark the GHG intensity of Queensland's major livestock commodities in a global context.

- Invest in and support research, commercialisation and adoption of novel forages and dietary supplements that reduce methane production in the red meat and dairy industries.

- Support enterprises to achieve climate-neutral verification.

- Investigate and raise awareness of First Nations rangelands management techniques that can be incorporated into grazing management systems.

- Investigate an easy-to-navigate platform for producers to access information and decision-support tools for low emissions practices and technologies, including GHG calculators.

Led by government, supported by industry:

- Deliver education and training programs for producers and agriculture service providers on low emissions production systems.

- Proactively work with the Australian Government and international market partners on the development of low emissions trade policies.

What you can do now

- Maintain active awareness about developments in methane reduction options in stock feed and the cost effectiveness of reducing herd/flock GHG footprint.

- Start to introduce methane reduction stock feeds and supplements when commercially available.

- Keep track of GHG emissions through reliable calculators, factoring in reduction credits.

- Adopt breeder selection, herd/flock management and manure management practices that can lead to an incremental reduction in GHG emissions.

- Undertake an enterprise-level GHG footprint analysis using available calculators to establish an understanding of your baseline and areas of emissions reduction focus.

- Maintain awareness of emerging domestic and export market trends and policy signals relating to product marketability and enterprise sustainability credentials to inform business decisions.

- Maintain awareness of, and where appropriate, incorporate First Nations rangelands management techniques that lower emissions associated with grazing management systems.

- Explore opportunities for carbon-neutral verification.

AACo is tackling emissions head on

As one of Australia's largest beef producers, the Australian Agricultural Company (AACo) is delivering a range of practices to reduce emissions.

AACo is working with Sea Forest, Meat & Livestock Australia, the University of New England and the University of Queensland to fast track the development of the red algae *Asparagopsis* as a feed additive for commercial application to reduce methane emissions from long-fed cattle in feedlots, starting with an in-situ trial of 80 cattle. This is the first time *Asparagopsis* has been tested in long-fed cattle such as Wagyu. This is the essential first step in taking this ground-breaking science from research to real world application at scale, with results expected in the first half of 2023.

Work is also underway to drive carbon sequestration in our landscape by developing an industry leading method for measuring, managing and forecasting soil carbon sequestration by satellite that will bring down the cost barrier for participation in soil carbon markets.

For three years, AACo has also registered activities under the Emissions Reduction Fund *Beef Cattle Herd Management* methodology. Herd management projects can reduce the emissions intensity of beef cattle production by reducing cattle emissions per kilogram of liveweight produced. Improving cattle productivity, reducing the average age of a herd, reducing the proportion of unproductive animals in the herd or changing the number of animals in each livestock class in the herd are all example activities under the methodology. In 2022, AACo achieved 87,427 tonnes of CO_2 equivalent carbon abatement under this method.

AACo is also focused on reducing its reliance on fossil fuels, committing to converting all diesel-powered bores to solar power by 2024, improving the efficiency of its fleet of vehicles, and developing a roadmap for the transition to renewable energy for all stations.

AACo's ongoing commitment to better understand and reduce its carbon emissions is detailed in the **Sustainability Report 2022**.

Cropping and horticulture emissions

The main GHG emissions from cropping and horticulture production are nitrous oxide (N_2O) emissions from on-farm fertiliser application and embedded emissions in fertiliser products. Emissions relating to the use of some pesticides, fumigants and refrigerants must also be managed. Actions under this pathway focus on soil health opportunities and the development of low or no emissions fertilisers. These actions will complement other key Queensland initiatives such as the Reef Water Quality Improvement Plan and industry-led soil health strategies.

The CSIRO estimates that by 2030 the actions under this pathway could help reduce cropping and horticulture GHG emissions by 1.2 million tonnes of CO_2e each year[3].

3   CSIRO, Michael Battaglia, Peat Leith, Jody Bruce, Katie Ricketts, Steve Brodie, Maren Strachan. January 2022.
    Prepared for the Queensland Department of Agriculture and Fisheries.

Our preferred future

Increasing improvement in the GHG emissions intensity of cropping and horticulture commodities in kg CO_2e/kg of production and be more efficient than our leading global competitors.

At least 80% of cropping and horticulture production lands managed at industry best practice within an agreed industry management framework.

How we will work together

Led by industry, supported by government:

- Develop improved information infrastructure to support increasingly sophisticated decision-support tools, including soils information and seasonal climate variability projections.

- Undertake GHG lifecycle analyses for Queensland's major crop commodities based on internationally accepted standardised frameworks.

- Invest in research and demonstration projects for enhancing and managing soil health to minimise fertiliser demand, including increasing soil organic matter and sustainable production strategies.

- Support development of green fertiliser options, with a particular focus on green cover crops and green ammonia production.

- Continue exploring and capitalising on new cropping and market opportunities that contribute to carbon emissions reduction targets, for example feedstock for plant-based proteins, biofuels and bioplastics.

Led by industry, supported by private business:

- Develop enterprise-level nitrogen baselines and provide scientifically supported advice on the application of low emission fertiliser practices.

Led by government, supported by industry:

- Support research and demonstration projects for slow-release nitrogen fertilisers with a view to increasing adoption and improving cost efficiencies.

- Investigate an easy-to-navigate platform for producers to access information and decision-support tools for low emissions practices and technologies, including GHG calculators.

- Raise awareness through education and training programs for producers and agriculture service providers on low-emission production systems and transition planning.

- Investigate how best management practices can be rewarded in emerging environmental markets for whole-of-landscape benefits.

Led by private business, supported by industry:

- Facilitate commercial-scale projects composting agricultural waste for fertiliser and soil ameliorants.

What you can do now

- Maintain awareness of green fertiliser options, efficacy and cost effectiveness in reducing GHG emissions from cropping activity.

- Use nitrogen calculators to develop an enterprise-level plan for nitrogen management.

- Use soil carbon assessment tools to develop an enterprise-level plan to improve soil health.

- Undertake an enterprise-level GHG footprint analysis using available calculators to establish an understanding of your starting position.

- Maintain active awareness of improvements in soil carbon assessment technologies, particularly relating to reductions in costs and complexity.

- Maintain awareness of emerging domestic and export market trends and policy signals relating to product marketability and enterprise sustainability credentials to inform business decisions.

HortCarbon Info— calculating and reducing horticulture emissions

In August 2022, the Queensland Government launched HortCarbon Info—a web-based decision support tool to provide Queensland horticulture businesses a free and accurate way to calculate their on-farm GHG emissions. Calculations consider electricity, fuel, fertiliser, dolomite and lime, crop residues, refrigeration leakage and on-farm waste.

HortCarbon Info also contains additional information to help farm business managers better understand options to reduce and/or offset their GHG emissions by learning more about carbon sequestration options such as forestry and soil carbon, and where emissions (scope of emissions) occur in the supply chain and relevant emission factors. Farmers can compare carbon footprints and profit margins for multi-location farm businesses. The generated reports are easy to understand with information presented both graphically and tabularly.

Importantly, GHG emissions are also calculated per hectare, per full-time job, per tonne of food sold, and per $ million turnover, meaning HortCarbon Info results can be used to enhance Queensland horticultural businesses' environmental reputation and assist in business planning.

Several farmers within the Lockyer Valley and the Granite Belt have trialled the new tool with great results and have been able to see what crops were the most energy dense, allowing fine-tuning of future business planning decisions.

HortCarbon Info analysis reports are confidential, and the web tool can be accessed for free at **longpaddock.qld.gov.au/dcap/horticulture-industry**.

On-farm energy opportunities

There are many opportunities for farm businesses to benefit from the emerging technologies being developed in the transport and energy sectors. The use of solar powered equipment such as pumps, zero-emission farm vehicles, and local or regional microgrids to share energy generation are already starting to penetrate the market.

The acceleration of technologies such as peer-to-peer energy sharing, microgrids and smart metering, alternative fuels and energy efficient machinery will provide increasing options for producers to optimise their production systems. The layering of different energy and fuel technologies as these sectors continue to evolve could have a transformative change in the agribusiness supply chain in achieving decarbonisation ambitions.

Actions under this pathway focus on on-farm investment in renewable energy options. The CSIRO estimates that by 2030, actions under this pathway could help reduce energy emissions by 150,000 tonnes of carbon dioxide equivalent per year[4].

4   CSIRO, Michael Battaglia, Peat Leith, Jody Bruce, Katie Ricketts,
    Steve Brodie, Maren Strachan. January 2022.
    Prepared for the Queensland Department of Agriculture and Fisheries.

Our preferred future

On-farm energy intensity of production (kWh/unit of production) for each enterprise is trending below baseline levels.

How we will work together

Led by industry, supported by government:

- Promote or develop information and education tools for producers to better understand renewable on-farm energy options, including cost and efficiencies, and how to prepare their on-farm infrastructure to connect to new energy opportunities as they become available, for example solar and wind, anaerobic digesters and hydrogen fuel.

Led by government, supported by industry:

- Engage across the major energy and fuel programs to maximise opportunities for agricultural production and the agriculture supply chain, such as the Queensland Energy and Jobs Plan and Queensland's Zero Emissions Vehicle Strategy 2022–2032.

What you can do now

- Maintain active awareness of developments in alternative fuels and electricity infrastructure, including substitutability and cost effectiveness at reducing GHG emissions.

- Develop an enterprise-level plan for introducing renewable energy and storage opportunities that increase energy efficiency and complement production systems as they become commercially viable, for example solar pumps, PV rooftop solar and battery storage.

- Build an enterprise-level understanding of the costs/savings and GHG impact of different renewable energy options to support decision-making and investment.

- As soon as possible, undertake an enterprise-level energy efficiency and GHG footprint as a baseline for tracking improvements and response to planned business decisions.

Coolmunda Olives energy audit leads to big energy savings

Coolmunda Olives is a horticulture farm located in Inglewood that underwent an energy audit through the former Energy Savers Program to find out its energy consumption and recommend improvements. The business has 8,000 trees and produces table olives and olive oil. The farm is irrigated year-round using water from a nearby dam. Infrastructure contributing to energy consumption includes a large packing shed and a centrifugal dam pump.

The audit recommended replacing the dam pump to improve efficiencies and installing a ground mounted solar system up to 16.5 kW in size at the dam pump. It was expected these changes would result in an annual energy saving of 32,700 kWh, 26.3 tonnes of avoided CO_2 and annual cost savings of $13,500.

Coolmunda Olives installed a 25.74 kW ground-mounted, grid-connected solar system at the pump site and achieved a 36,753 kWh annual energy saving, 29.8 tonnes of avoided CO_2 and annual cost savings of $4,556. This equates to a 123% energy saving for the business!

An energy audit is a great way for agribusinesses to assess how they can reduce their energy use, costs and carbon emissions. Read about other farms that are saving money on their power bills and avoiding CO_2 emissions on the **Queensland Farmers' Federation website**.

Carbon farming and landscape management

This pathway offers many opportunities for the agribusiness sector to capture carbon and take a holistic approach to improving landscape health. Private forestry and silvopastoral systems (balancing pasture and timber production in grazing systems) provide an opportunity to use planted trees and responsibly managed native vegetation to realise economic and environmental co-benefits within traditional agricultural production. Emerging environmental markets provide incentives for land managers to build carbon farming into their business model. Landscape health, biodiversity and ecosystem services are becoming increasingly recognised for their market value, not just in environmental markets, but also in recognising the importance consumers place on these values.

Demonstrating holistic landscape management and sound vegetation management and retention strategies are increasingly necessary to ensure continued access to key markets that meet consumer needs. Sustainably produced timber products offer a low GHG alternative to concrete and steel in construction projects and can offer long-term carbon storage.

Actions under this pathway focus on opportunities for the agriculture sector to capture carbon in natural sinks and improve landscape health.

The CSIRO estimates that by 2030 the actions in this pathway could help remove up to 19 million tonnes of GHG emissions per year[5].

5   CSIRO, Michael Battaglia, Peat Leith, Jody Bruce, Katie Ricketts, Steve Brodie, Maren Strachan. January 2022.
     Prepared for the Queensland Department of Agriculture and Fisheries.

Our preferred future

Enterprises to have a portfolio of realised or potential carbon farming projects that are eligible to be included in enterprise and industry level GHG (carbon) accounts.

How we will work together

Led by industry, supported by government:

- Develop an information and education portal that provides information for producers to better understand their options for incorporating carbon farming into their production system, and the complexities of environmental markets so producers can make independently informed decisions, supported by case studies of successful project design.

- Through the National Soils Strategy, support advances in soil carbon measurement and data verification, including alternative methodologies to improve cost efficiencies.

Led by government, supported by industry:

- Actively engage with the Clean Energy Regulator to increase carbon farming options for agricultural producers.

- Identify opportunities to de-risk carbon farming projects by providing regulatory certainty for investment and management of the landscape.

- Develop practical guidelines and support for the establishment of silvopastoral systems to optimise both timber and livestock production, at the same time providing GHG sequestration and biodiversity benefits.

- Upskill agriculture service providers to provide high quality, tailored advice on integrating carbon projects into agribusinesses, including the relative merits of selling or retaining Australian Carbon Credit Units.

- Undertake GHG lifecycle analyses for Queensland's major forestry systems based on internationally accepted standardised frameworks.

What you can do now

- In partnership with trusted advisors, maintain active awareness of developments in environmental markets, soil carbon technologies and private forestry/silvopastoral opportunities.

- Develop an enterprise-level plan for building in carbon capture projects in soils and native vegetation using standardised assessment tools to support business decision-making.

- Establish or maintain an enterprise-level GHG 'offset' account as appropriate to your business model.

- Within your business model, determine an acceptable balance between carbon credits sold and carbon credits retained for future market positioning.

Goondicum
manages its emissions

Goondicum Station in Central Queensland is producing grass-fed, EU-accredited Brangus beef cattle while running a carbon farming project.

Goondicum Pastoral Company is regenerating parts of its property where vegetation has previously been suppressed and managing the timing and extent of grazing. These activities increase carbon abatement and storage and prevent the release of emissions from clearing native vegetation, earning Goondicum's landholders Australian Carbon Credit Units (ACCUs).

Goondicum has a contract to sell a percentage of its credits to the Queensland Government's Land Restoration Fund (LRF). The LRF pays a premium for credits from carbon projects like Goondicum that deliver environmental and social benefits in addition to storing carbon. The LRF requires the environmental co-benefits to be verified through the Accounting for Nature® Framework for the premium to be paid on-top of the ACCU price.

Landholders may retain all or some of their ACCUs to offset their own emissions or sell later. Once an ACCU is sold it can't be used to offset a farmer's own emissions.

The co-existence of grazing and regenerative agriculture has made Goondicum Station profitable, even with less cattle per hectare compared to 25 years ago.

Goondicum works with key partners GreenCollar, Accounting for Nature and the Burnett Mary Regional Group.

Find out more about Goondicum Pastoral Co. at **goondicumpastoralco.com.au**.

Regions
and supply chains

Regional demonstrations of low-emissions practices and technologies can help businesses see the value in embedding these within their own farm businesses. Creating opportunities to integrate carbon-neutral projects requires alignment to the particular region's strengths and existing investments. For example, a renewable energy hub could facilitate new industrial development in the region underpinned by circular-economy principles. Building new hubs of activity can attract financial, human and social capital whilst achieving cross-sectoral decarbonisation. This helps ensure that environmental and social credentials are being captured holistically.

New low emissions industries and supply chains can be further supported through policies such as the Queensland Government's *Buy Queensland First* commitment.

Actions under this pathway focus on creating new opportunities for the integration of carbon neutral projects across different sectors and through the supply chain.

Our preferred future

Carbon neutral on-farm and supply chain projects being implemented in all regional planning areas across Queensland.

How we will work together

Led by industry, supported by government:

- Investigate and support the development of financial instruments to unlock global private sector investment into agribusiness.

Led by government, supported by industry and private business:

- Identify strategies and partner with proactive private business to progress decarbonisation of Queensland food and fibre supply chains through regional pilot projects that may include transport, manufacturing, processing and waste management and reuse.

- Support place-based approaches for the development and planning of zero net emissions precincts and supply chains.

Maleny Dairies sets sights on carbon positivity

After participating in the Queensland Government-funded ecoBiz program in early 2021, Maleny Dairies made a commitment to become Queensland's first carbon-positive dairy.

Maleny Dairies has been part of the Australian Climate Active accreditation program since 2020. It continues to implement innovative solutions to improve sustainability and reduce its carbon footprint, including through energy and waste. The factory applies lean manufacturing principles to maximise productivity while simultaneously minimising waste within all operations.

This iconic Queensland business is working with key stakeholders across the supply chain, reviewing its procurement and supply strategies to ensure sustainability, and partnering with equally sustainability conscious companies. Environment, social and governance (ESG) opportunities are also front of mind at the family-owned farm, investing in technology solutions to improve sustainability and animal welfare. This year, solar-powered GPS ear tags are being trialled to remotely monitor animal health and welfare. The farm has also modified its insemination program to ensure most calves are born female, adding to the dairy herd.

Maleny Dairies has also recently conducted workshop sessions with its suppliers on developing ESG paddock-to-plate marketing opportunities. This foundational work will set the direction of the business for years to come. Find out more about Maleny Dairies at **malenydairies.com**.

Keeping track of progress

This roadmap is intended to be a living document, evolving with the needs and ambitions of its partners. An implementation plan will be developed to focus delivery of the roadmap and its actions. The implementation plan will be reviewed annually by industry and government and refreshed as new technologies and initiatives are identified.

The 'Our preferred future' statements have set goals of agriculture's future over the next ten years and beyond. The roadmap's preferred futures and strategic actions will be reviewed mid-term and refreshed as required to reflect the new technologies and market drivers influencing outcomes across the agribusiness supply chains. This process will ensure the roadmap remains current and relevant to the sector.

Refreshed actions will reflect the effort needed to fast track our progress towards the 2050 zero net emissions economy target and ensure the ongoing profitability of the sector.
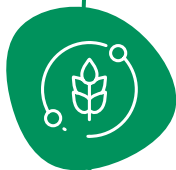
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