



Australian Government



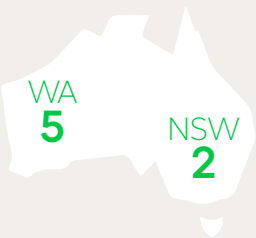
Clean energy and Australian agribusiness

How can clean energy technologies benefit Australian agribusiness? This report provides some practical insights, drawing on the work of the CEFC, MIRA and the CSIRO.



Assets

Large-scale integrated farming operations



Dryland cropping

Wheat, barley, canola, pulses

80,000 hectares

Converting areas of low quality pasture into highly productive cropping farmland

The goal

- Deliver on-farm energy efficiency and sustainability
- Reduce energy intensity on a per unit of production basis, to lower carbon emissions
- Deliver improved operational, financial and environmental efficiencies
- Share insights across Australian agribusiness

The investors

The **CEFC** finances clean energy and energy efficiency improvements across the economy, including in the agricultural sector, to help lower Australia's carbon emissions.

MIRA, through the portfolios it manages, has a strong track record in agriculture, farm management and commodity production. It has managed a significant portfolio of farmland in Australia for more than a decade, across a range of production environments, to further energy efficiency and sustainability practices in the sector.

On-farm operations are delivered by **Viridis Ag**, which seeks to deliver real sustainability through innovation, benchmarking and influencing farm production systems and post-farmgate initiatives. Reduced energy and emissions are key performance indicators. Viridis means green in Latin.

The **CSIRO** is contributing expert analysis and supporting efforts to share clean energy learnings across the farming sector.

The investment

CEFC investment of \$100 million in an agricultural portfolio managed by Macquarie Infrastructure and Real Assets (MIRA), with best practice agricultural measures developed alongside the CSIRO.

Working with the CSIRO

The specialist Energy, Emissions and Efficiency Advisory Committee – 3EAC – draws on the skills of the CSIRO, MIRA and the CEFC to support the development of new on-farm standards for improved energy efficiency and overall emissions reduction.

It is also developing clean energy models for broader use in the farming sector. These are long term programs which will draw on the real-life experience and performance of measures implemented across the MIRA portfolio. The 3EAC meets quarterly and has confirmed its key objectives under three Impact Pathways.

3EAC impact pathways

1

Reduce emissions intensity

Agriculture is a significant contributor to Australia's total greenhouse gas emissions. With an initial focus on row cropping, the 3EAC goal is to reduce GHG emissions per unit of agricultural production, including emissions of inputs.

2

Improve the natural resource base

The natural resource base of on-farm capital is the stock of soil, water and biodiversity resources that underpins the long-term resilience and sustainability of agricultural practices. The 3EAC is focused on improvements across these areas.

3

Increase market access/value

The 3EAC seeks to realise the benefits of low GHG agricultural production in domestic and international markets.

The Grange, Geraldton

Located near Geraldton in Western Australia, The Grange is a single aggregation of more than 14,000 arable hectares of dryland cropping of barley, canola, lupins and wheat. Soil types include clay loams (river flats), yellow sand plains, gravelly ridges and deep white sands.

Acquired by Viridis Ag in January 2018, the property has benefitted from extensive land improvement processes.

The installation of controlled traffic farming systems is supporting the variable rate application of inputs across the farm, reducing energy consumption.

A focus on a zone approach to farm management is reducing energy use and lowering emissions per unit of production, while supporting a higher gross margin per unit of production.

Assessing potential yield improvement

Based on its extensive farm management experience, MIRA anticipates the following factors in assessing potential yield improvements:

- Post correction of underlying constraints, input costs are targeted to match specific productivity of soil zones across a paddock
- Initial one-off step change in yield, of 0.5-1.0 tonne per hectare, achievable on highly responsive soil types
- In following years, target compound annual productivity growth of 1.5-2.0 per cent
- Payback is typically within five years, depending on the base level of productivity, weather, and the availability of capital to complete improvements simultaneously
- Co-op models can spread machinery and initial land improvement costs.

Sharing progress and insights

Viridis Ag works with the local communities in which it operates, contributing to field days and other activities.

The Grange is an active member of the local Mingenew Irwin Group (MIG), which brings together around 200 businesses across approximately 320,000 hectares of farm land within the surrounding shires of Mingenew and Irwin.

The MIG was formed in 1994 to support locally-driven research and development activities. It has delivered some 70 trials, and up to 350 people have attended field days. Farm practices trialled on The Grange are shared with MIG.



Improving on-farm soil quality

Viridis Ag seeks to convert any land that was previously low quality pasture into land that can be used for cropping, to further improve previously cropped land by removing compaction, correcting pH and, where required, spading.

In doing so it uses a soil amelioration process based on proven techniques across its agricultural platform. These initiatives reduce on-farm energy consumption – and associated carbon emissions – through the more efficient use of machinery and other inputs.

Soil treatment is not “set and forget”: it requires continuous monitoring and adjustment to drive sustainable high performance. The first year of investment is about creating a platform for the future.

Soil amelioration builds resilience for seasonal shocks, including drought, flood, heat and cold. Measures such as stubble cover keep moisture in the soil, improving water use efficiency. Soil improvement and stubble retention also provide protection for seedlings, delivering soil stability (less erosion) and building soil organic matter to provide a base habitat for soil microbiology, potentially reducing the need for fertiliser over time.

Achieving pH correction

1

Requires programmatic rather than seasonal approach, so that pH is addressed across multiple years and throughout the long term rotation of the farm operation.

2

Use of variable rate fertiliser to match specific soil requirements following initial correction of pH and removal of compaction issues.

3

Some soil types require investment in large-scale deep ripping and spading, as well as correcting any significant upfront pH issues.

4

Once soil is corrected, farmers can maximise the benefits of new technology for enhanced farm management more broadly.

Addressing soil compaction

1

Requires systematic farm-wide approach.

2

Influenced by seasonable factors: less compacting in a dry year and more compacting in a year of higher rainfall.

3

Impacted by the use of heavy machinery and conventional ploughing techniques prior to the availability of GPS-enabled tillage techniques.

4

Controlled traffic systems create permanent wheel tracks, helping ensure the cropping land (between the runs) does not get compacted by the operation of heavy farm machinery.



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The fundamentals of high yielding, profitable and greener, more efficient production involves adopting new technologies and embracing best practice precision farming techniques to achieve environmental benefits, while maximising soil health and productivity.”

Viridis Ag

Clean energy and agriculture

Agribusiness plays a critical role across the Australian economy, with a well-earned reputation for quality produce, innovative production methods and local employment opportunities – whether producing for the domestic market or extending into the highly competitive global market.

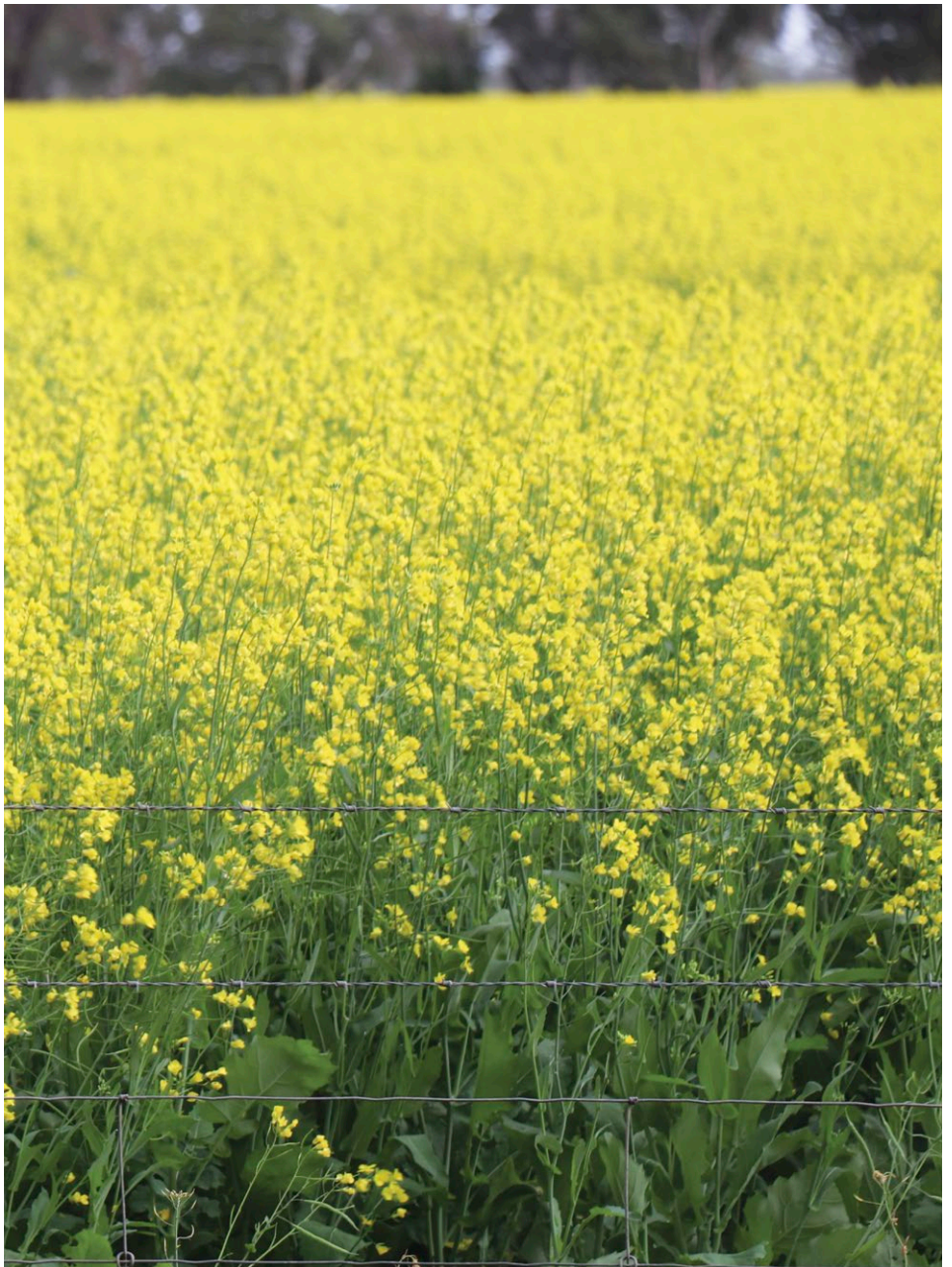
This track record makes agribusinesses ideally-suited to capitalise on the growing wave of energy efficient and clean energy technology.

The CEFC has a strong commitment to extend the benefits of clean energy and energy efficiency to Australia's farm sector, recognising the significant opportunity for agribusinesses to transform their operations by maximising energy efficiency and installing renewable energy.

In addition to our \$100 million investment with a MIRA managed agricultural portfolio, we have invested in excess of \$260 million in more than 1,100 smaller-scale agriculture projects Australia-wide.

This finance has facilitated new investment in a range of clean energy technologies to reduce energy consumption and lower emissions – from solar PV to lower emissions farm equipment, energy efficient machinery upgrades and improved irrigation pumps to reduce water and fertiliser use.

In addition, we continue to finance investments in smaller-scale bioenergy and energy-from-waste opportunities in the agriculture sector.



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Good farming practice for us is about taking the best farming systems that are available and implementing them to ensure the long term sustainability of the property and its operations.”

Sean O'Reilly,
Head of Crop Australia, MIRA

About the CEFC

The CEFC has a unique mission to accelerate investment in Australia's transition to net zero emissions. We invest to lead the market, operating with commercial rigour to address some of Australia's toughest emissions challenges. We're working with our co-investors across renewable energy generation and energy storage, as well as agriculture, infrastructure, property, transport and waste. Through the Advancing Hydrogen Fund, we're supporting the growth of a clean, innovative, safe and competitive hydrogen industry. And as Australia's largest dedicated cleantech investor, we continue to back cleantech entrepreneurs through the Clean Energy Innovation Fund. With \$10 billion to invest on behalf of the Australian Government, we work to deliver a positive return for taxpayers across our portfolio.