



Agriculture and clean energy



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, while lowering on-farm emissions.

The CEFC is an active financier to agribusiness, working closely with the sector Australia-wide.

CEFC investments are about bringing the benefits of one of our newest industries – clean energy – to one of our most established – agriculture. And the benefits are substantial. Clean energy means more efficient energy use, improved productivity and a lower emissions profile for the farm sector.

>250,000

jobs

Australian agribusiness





S% 85 GDP farming

farming enterprises

Source: Australian Bureau of Agricultural and Resource Economics and Sciences 2016-2017

Transforming Australian agriculture with clean energy

Transforming Australian agriculture with clean energy is a practical guide for farmers produced by the CEFC, the National Farmers' Federation and the University of Southern Queensland Centre for Agricultural Engineering.

The guide brings together information on proven and emerging technologies and

outlines how each can be used to reduce on-farm energy consumption and lower emissions for Australia's agricultural sector.

This CEFC industry snapshot brings together key elements from the guide. To download a full copy of *Transforming Australian agriculture with clean energy*, please visit **cefc.com.au**



Agriculture, energy and emissions

Agriculture-related emissions – which represent around 13 per cent of Australia's national emissions – are expected to accelerate in the coming years, driven by growing global food demand and the increasing use of on-farm machinery.

Energy is already one of the Australian agriculture sector's fastest growing costs, with high rates of technological innovation and mechanisation driving growing demand for grid electricity and diesel fuel.

This energy demand contributes to material levels of farm-based greenhouse gas emissions, whether through indirect emissions related to energy consumption, or direct emissions related to animal production, fertiliser use and soil management.

While energy consumption patterns vary across farming enterprises and production systems, there are significant opportunities for farm operations to immediately reduce energy consumption as well as lower energyrelated emissions.

The challenge for the sector is to understand the available technology options, the appropriate scale of the investment and the potential emissions.



Where to act

Conduct an energy audit

| • | Energy audits are an important first step to gaining a better understanding of current energy use and helping prioritise energy-related investment decisions | On-farm energy assessments identify where energy can be saved and whether investment in new technologies and practices can be beneficial. Assessments consider energy use across electricity, gas and diesel and identify opportunities to improve output per unit of energy, as well as the potential to switch to lower cost renewable energy. |
|---|--|---|
| 0 | Generate your own energy | |
| Ζ | The farm sector is ideally suited to produce renewable energy and alternative fuels, including solar PV, small-scale wind and bioenergy, and to benefit from on-site energy storage solutions. | Energy storage can reduce farm reliance on network electricity, reduce the need for network connection upgrades and provide cost-effective backup power. Declining battery and solar PV costs are increasingly cost-competitive, especially where grid connection costs are high. |
| Z | Upgrade vehicles and machinery | |
| 3 | Clean energy solutions for tractors, ancillary equipment and vehicle upgrades are easily applied and can have relatively low capital expenditure. These technologies are particularly suited to cropping systems, with most savings coming from reduced fuel use and increased operational efficiency. | Turbochargers and superchargers increase engine efficiency by compressing air intake. Changing fuel mapping through the engine control unit can improve fuel efficiency, while an auxiliary power unit can be used for accessories such as fans, refrigerators and air conditioners. |
| 4 | Improve irrigation and pumping | |
| | Energy efficient irrigation and water management practices can improve water use through a range of technologies, including variable speed drives and solar-powered pumping. | Measurement tools such as flowmeters, infield sensors and soil moisture probes are used to match the amount of water applied to the field with the requirements of crops and the water holding capacity of the soil. Variable speed drives can alter electrical motor speeds to cut electricity use by up to 60 per cent. |
| Г | Consider buildings, heating and cooling | |
| ວ | Farm buildings, processing technologies and heating and cooling equipment can be energy intensive, impacting energy costs right across the farm operation. | Heat generated from the normal operation of equipment can be recovered through heat pumps and thermo-electric and liquid heat exchangers. Waste heat can be used for electricity generation, refrigeration and air conditioning or recycled back into processes such as boilers and heating and cooling plants. |
| 4 | Capture the benefits of precision agriculture | |
| 0 | Advice from equipment suppliers and industry specialists is recommended to achieve the maximum benefits of precision agriculture techniques | Precision agriculture offers opportunities for improved energy efficiency and productivity. This can include technologies that calculate the optimal quantity, timing and location of farming inputs, such as variable rate controllers, GPS, yield monitors, crop sensors and soil sensors. |
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Consider emerging technologies

Emerging technologies offer exciting opportunities for enhanced on-farm management practices, with the potential to capture energy savings through the use of sensing technologies, robotics, autonomous vehicles and more. Enabling farmers and businesses to gather more information on crop, equipment and environmental conditions is vital to more efficient farming practices. Long-range wireless communication can control gates, pumps and other equipment remotely over long distances, and sensors or nodes can remotely detect water, soil and plant health.



Harvesting clean energy benefits

The CEFC has a strong association with the agribusiness sector in Australia. Through our co-finance programs, we support investment in smaller-scale transactions to enable farmers to benefit from clean energy technologies while lowering their carbon footprint.

The agribusiness sector is the largest single user of these co-finance programs, with agricultural technologies accounting for 33 per cent of projects financed to 31 December 2019, drawing on more than \$370 million in CEFC finance.

Projects financed include updates to energy efficient on-farm equipment; improvements to on-farm buildings; energy and water efficient irrigation equipment; and the installation of small-scale solar generation. The co-finance programs are an efficient and effective way to encourage investment in clean energy technologies, incentivising borrowers to preference best-in-class clean energy assets when considering new equipment purchases.

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.