Reducing fossil fuel emissions

Strategies to reduce greenhouse gas emissions

Fact sheet 5 of 6

Carbon dioxide interventions

Carbon dioxide (CO_2) is the most produced greenhouse gas and can be generated in a variety of ways, including the burning of fossil fuels to produce heat, electricity and fuel and plant decay. It is also released by animals through breathing.

Reducing the production of CO_2 – by changing fertiliser or energy generation – can help reduce overall greenhouse gas emissions.

Fossil-fuel CO_2 interventions can be used in conjunction with other greenhouse gas abatement strategies to reduce total dairy farm emissions.

The term, fossil-fuel carbon dioxide interventions, refers to the strategies that are used to reduce on-farm CO_2 emissions. The fossil-fuel CO_2 interventions analysed in the 2022 report included:

- On-farm energy use and renewables.
- Electric tractors.
- Carbon neutral fertilisers.

On-farm energy use and renewables

This refers to energy derived from the on-farm natural resources that replenish at a higher rate than they are consumed. For example, solar and wind. It involves an upfront capital investment in infrastructure and several years payback period.

It is possible to generate renewable energy on-farm now. The decreasing cost of batteries, to store energy for back-up power, could also assist with adoption of this technology.

A reduction in power bills and energy security underpins the financial benefit derived from generating renewable energy on-farm. Dairy farms rely on energy and have been susceptible to power price volatility and insecurity.

KEY POINTS

Grid electricity use, diesel and embedded emissions in purchased products – the sum of all emissions required to bring a product to market – contribute to 23% of on-farm emissions

Carbon dioxide (CO_2) from a variety of sources, contributes to a farm's total greenhouse gas emissions

Diesel fuel and grid electricity make up 8% of dairy farm emissions

Purchased fertiliser accounts for 3% of dairy farm emissions, with the rest of the emissions a result of buying grains, concentrates and forages (10%)

Use of interventions that reduce carbon dioxide emissions typically result in cost savings

Fossil fuel CO_2 interventions include on-farm energy generation, renewable energy, electric tractors, and carbon neutral fertilisers

The use of carbon neutral fertilisers, on-farm energy generation and renewable energy were assessed

These interventions were found to reduce some CO_2 emissions with on-farm energy and renewable energy offering a payback to the dairy farm business

DELIVERING for DAIRY

Counteracting both business risks makes on-farm renewable energy an attractive business proposition. The fact it also contributes to reducing CO_2 emissions is a bonus. Practically, on-farm renewable energy can also ensure consistent power supply during inclement weather. Adding batteries, to store back-up energy, adds to energy security and stability.

The amount of CO_2 emissions that can be reduced will vary with the amount of renewable energy that can be generated and used on-farm or purchased through the electricity grid.

Modelling has shown on-farm energy and renewable energy abated a substantially smaller amount of CO_2e than other intervention options, but it was one of only a few analysed interventions analysed that generates a direct financial benefit for dairy farms.

For guidance on understanding renewable energy options and return on investment for your farm business, refer to Dairy Australia's **energy resources**.

Electric tractors

The availability of electric tractors will be limited in the next decade and questions remain about their suitability for powerful farm work. Electric tractors may reduce total farm emissions, save on fuel costs, decrease fumes and potentially – thanks to self-driving technology – reduce labour requirements.

There are a lot of questions associated with electric tractors. These include: the payback period on the investment, the energy required to charge the tractor, how long the charge will last, the cost of the tractor, diesel savings, maintenance requirements, future trends in petrol and electricity pricing.

Also, more needs to also be understood about the functionality of the electric tractors currently on the market and how they could be used in practical on-farm applications.

Carbon neutral fertilisers

This refers to fertilisers that are manufactured with renewable energy. The primary benefit from carbon neutral fertiliser is the reduction in CO_2 emissions; however, the expected lower cost of the product, compared to conventional fertilisers, is expected to be a significant co-benefit.

The specific on-farm CO_2 emissions reduction because of carbon neutral fertiliser is unknown.

Carbon neutral fertilisers could be a cheaper option for dairy farms if they were produced at a lower cost and retailed for less than conventional fertiliser. But their limited availability during the next decade could limit the potential benefits of this product for farm businesses.

Calculating the value of emission reduction strategies

- A review commissioned by Dairy Australia has estimated the costs and effectiveness of different greenhouse gas emission reduction strategies across the Australian dairy farm industry as a whole, based on the most recent information available.
- Each strategy was analysed for its ability to reduce the total greenhouse gas emissions (mitigation potential). The cost of this action was calculated per tonne of carbon dioxide equivalent or CO_2e.
- Combining the mitigation potential and the cost of the reduction paints a picture of the value for money that each strategy could deliver.
- This information will be used to guide research and investment decisions.
- This fact sheet and others in the series provide a summary of the information from research most relevant to individual farmers. They provide a useful starting point for farm businesses looking to understand their options. Farm businesses will need to do further analysis to figure out which option(s) are appropriate for their own business.

Technologies to use renewable energy to manufacture urea and other nitrogen fertilisers are available, but uptake has been low. That's because many dairy farm businesses have opted to supplement conventional fertiliser with 'green options', which cost less to produce and deliver a similar result. Modelling suggests that carbon neutral fertilisers are expected to contribute more to on farm greenhouse gas emissions reduction in the next 10 to 20 years as this industry scales.

The timeline for scaling the production of carbon neutral fertiliser as well as the cost of this product remains uncertain.

There are also questions about the role of precision agriculture in assisting with the adoption of carbon neutral fertiliser and what this would mean for its role as an on-farm emissions abatement intervention. The availability and effectiveness of 'green' fertiliser could also affect the adoption of carbon neutral fertiliser.

FURTHER INFORMATION

This fact sheet is one of a series:

1 Reducing dairy's greenhouse gas emissions
2 Reducing rumen emissions
3 Reducing manure emissions
4 Reducing nitrous oxide emissions
5 Reducing fossil fuel emissions
6 Storing more carbon.

You can find these on the Dairy Australia **website**.

Dairy Australia Limited ABN 60 105 227 987
E enquiries@dairyaustralia.com.au
T +61 3 9694 3777
F +61 3 9694 3701
dairyaustralia.com.au

5457.1 | Aug 2023