
Calculating Carbon Emissions in Western Australia's Grains Industry

Findings from the Carbon Neutral Grain Pilot Project – a research partnership between Co-operative Bulk Handling (CBH Group), regenerative food and agriculture company: Wide Open Agriculture (WOA) and the Department of Primary Industries and Regional Development (DPIRD)



Photo by Lleyton Curtin courtesy of CBH Group

Western Australia's (WA) grains industry faces increasing pressure to reduce its carbon emissions to help meet Australian reduction targets of 43% by 2030.

International shipping, food and feed supply chains have started to assess and reduce emissions at all stages of the supply chain. Sustainability and carbon accountability under schemes such as the International Sustainability and Carbon Certification (ISCC) is becoming increasingly important for major export grain customers. It is also likely that evidence of carbon emission reduction measures and climate resilience will become a lending requirement

by the Australian financial sector and part of standard farm business financial reviews.

However, the measurement of farm-level Greenhouse Gas (GHG) emissions is not standardised. Understanding farm baseline emissions will also provide better investment insight into any new income diversification and additional environmental activities such as carbon and biodiversity farming projects.

Project background

The Carbon Neutral Grain Pilot project is an important first step in understanding how to achieve a low-carbon future for WA grain growers.

The project collected GHG emissions data over the 2020/2021 period from 36 cropping enterprises growing wheat, barley, canola, oats and lupins located in four port zones and the wheatbelt region. The project covered 152,000 hectares and 417,000 tonnes of grain in total.

A broad range of supply chain stakeholders contributed to the project including growers, several self-identified 'regenerative' growers, corporate croppers, farm business advisors, banks, fertiliser companies, Meat & Livestock Australia (MLA), Grains Research and Development Corporation (GRDC) and DPIRD. The project has produced baseline emissions data and compared GHG calculators so that grain growers and industry can confidently assess their on-farm carbon footprint.

Project findings

Emissions sources

Emissions are classified as Scope 1, 2 and 3:



Scope 1: All emissions on-farm from agricultural activity



Scope 2: Emissions from the production of purchased electricity



Scope 3: All emissions associated with producing inputs such as fertilisers, herbicides, services etc.

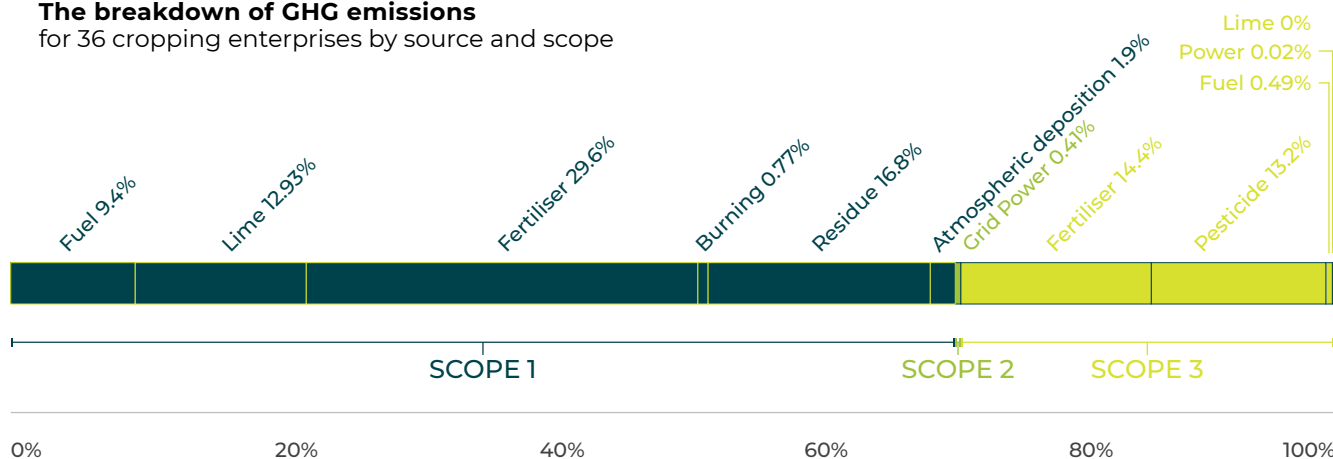
The project found that more than 70% of all GHG emissions are from Scope 1 on-farm operations sources. Fertiliser and crop residue contribute more than 50% of these emissions.

The other emissions come from Scope 3 pre-farm sources and 95% of these emissions are generated during the production of fertilisers and herbicides/pesticides used on-farm.

Scope 2 emissions were negligible at the on-farm stage of crop production.

The breakdown of GHG emissions

for 36 cropping enterprises by source and scope



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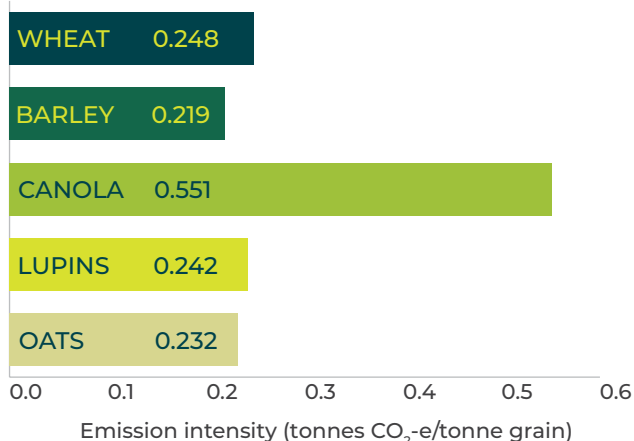
Photo courtesy of CBH Group

Emissions intensity

GHG emissions intensity is a measure of the amount of GHG emissions per tonne of product. It provides a valuable productivity, efficiency and investment measure for farm management decisions.

The project found that wheat, barley, lupins and oats emit between 0.219 and 0.242kg CO₂-e per tonne of grain, whereas canola emits more than double this, at 0.551kg CO₂-e per tonne of grain. This is mainly due to higher fertiliser inputs and lower yields.

The GHG emissions intensity for crop types across all enterprises in tonnes of CO₂-e per tonne of grain.



Emissions calculators

With the help of the calculator developers, the pilot assessed the three leading online on-farm GHG emissions calculators for Scope 1, 2 and 3 emissions:

- **PICCC Grains-GAF** – is produced by the Primary Industries Climate Challenges Centre at the University of Melbourne and was found to be the most user-friendly, accurate and reliable measurement mechanism. The calculator is free, easy-to-use, reliable, fully aligned to the International Panel on Climate Change (IPCC) and Australian National Greenhouse Gas Inventory (NGGI), and suitable to WA climate conditions. PICCC has additional GHG calculators for livestock.
- **CSIRO FarmPrint** – is suited to WA conditions and fully aligned with national and international regulations. However, it is not currently publicly available and is under commercialisation.
- **Cool Farm Tool** – provides a quick overview of GHG emissions. However, it is not currently aligned to the IPCC or the NGGI. It is also Northern hemisphere-based and therefore any results are not specific to WA conditions.

All three calculators will work out enterprise GHG emissions. It is important to use the calculator that most suits the farm enterprise conditions.



GHG emissions intensity provides a valuable productivity, efficiency and investment measure for farm management decisions.

*Photo courtesy of
FORM via CBH Group*



Photo by Nancy Dewar courtesy of CBH Group

GHG emissions should be measured over at least two years, as emissions fluctuate annually depending on:

- seasonal rainfall
- temperatures
- crop rotation
- yield
- crop residues
- disease
- nitrogen and fertiliser management approaches
- lime
- chemical and fuel use.

Cost to offset emissions

In order to give some sense of the relative costs in becoming carbon neutral, the project used a median price for carbon credits of AUD \$31.36 per tonne CO₂-e (based on prices in May 2022) and found that the average cost to offset the grain emissions is \$10.03 per tonne of grain produced or \$27.24 per hectare.

Next steps

It is important to understand the significance of life-cycle-analysis GHG emissions for farm enterprises. WA grain growers are encouraged to start using GHG calculators to measure their emissions.

This pilot project has been part of CBH and WOA's ongoing research into sustainable grain growing and part of the DPIRD Emissions Reduction Program. The research will continue with CBH, WOA, DPIRD, GRDC and other industry partners improving the data sets and analysis and working towards achieving a low-carbon future for WA grain growers.

See the project website for more information: agric.wa.gov.au/carbon-neutral-grain-pilot-project

Access the calculators:

- PICCC Grains-GAF piccc.org.au/resources/Tools
- Cool Farm Tool coolfarmtool.org



Scan this QR code to read the full report.

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