



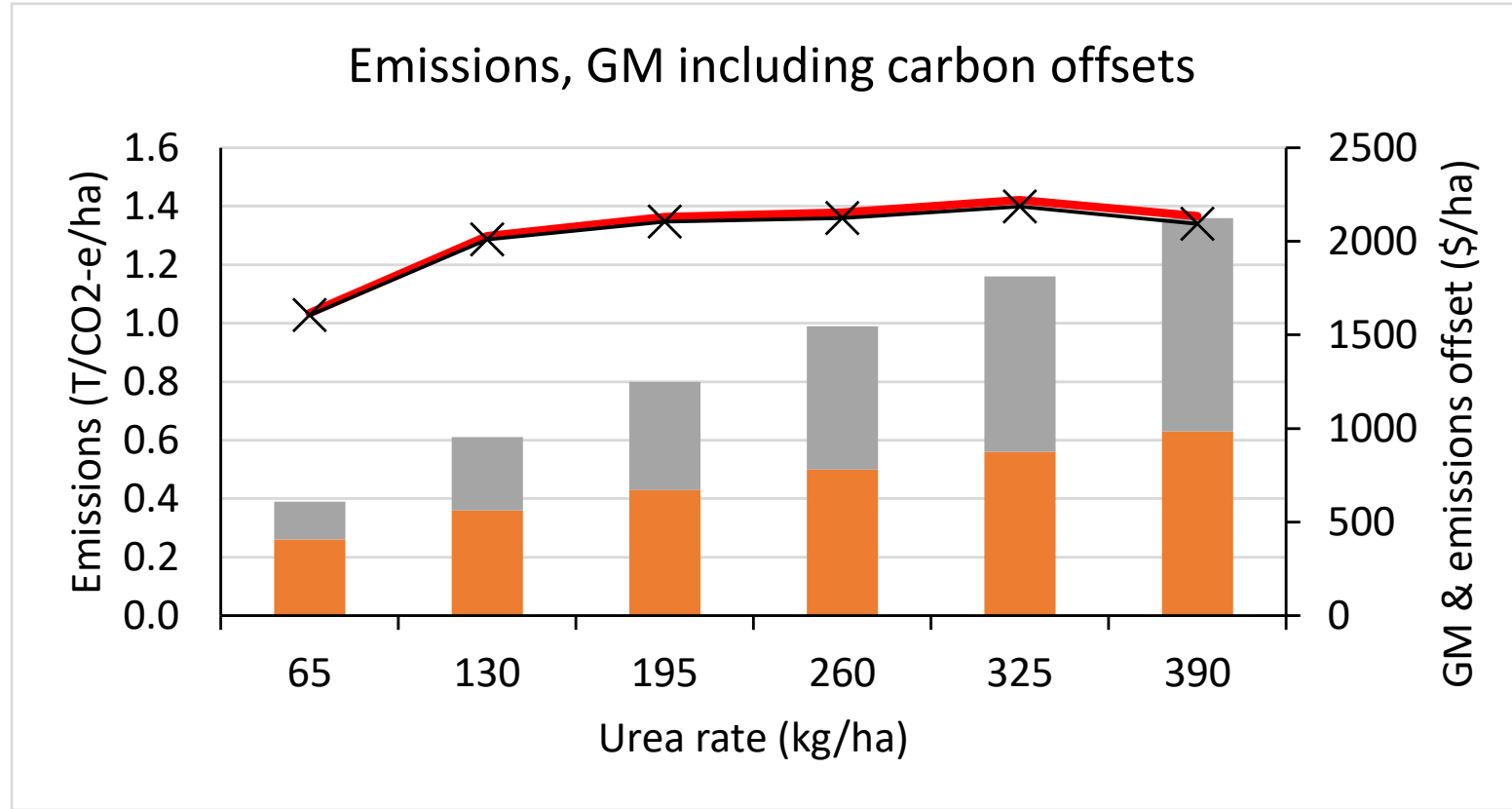
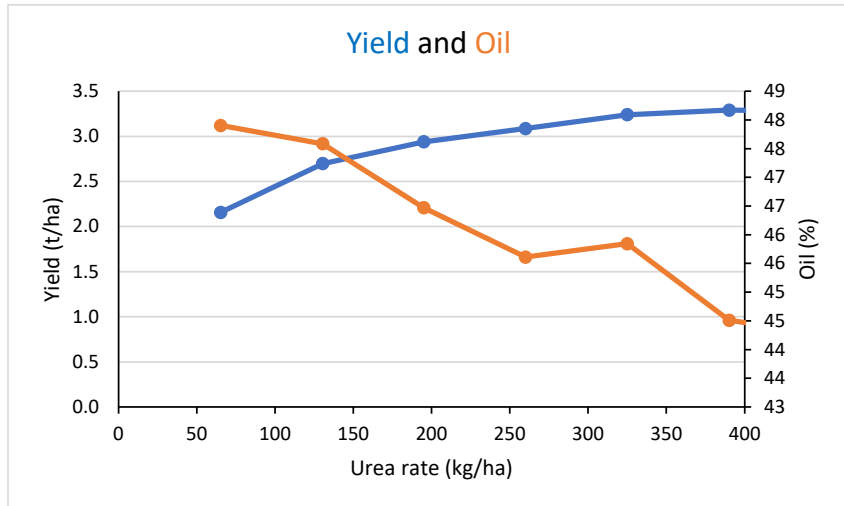
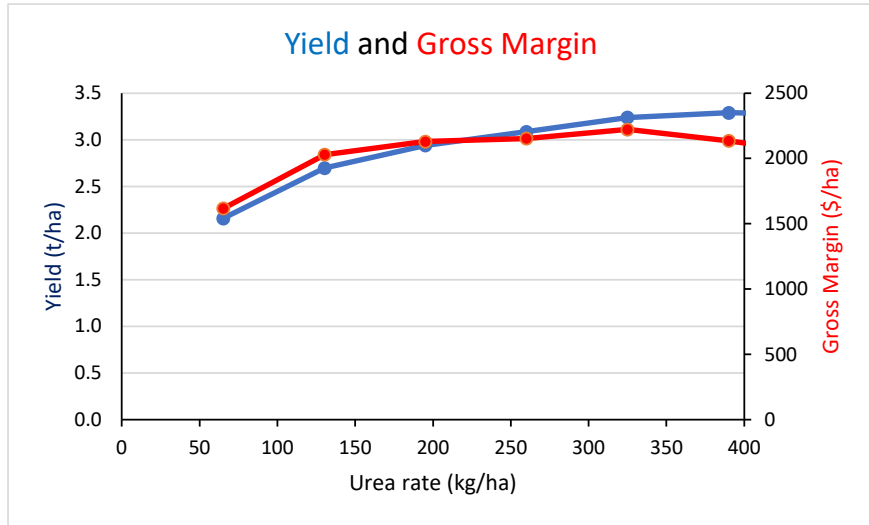
Department of
Primary Industries and
Regional Development

Protect
Grow
Innovate

Agriculture and Emissions

Jackie Bucat

Nitrogen for very early sown canola at Xantippe in 2022



- Manufacturing
- On farm
- Gross margin
- GM-offset value

\$850/t canola
\$1250/t Urea

Benefits of farm carbon account



Do it for the world



Do it for Albo

1. Customer pull- premium value
2. Customer pull- market access
3. Supplier push- suppliers start to request farm carbon accounts to mitigate climate change risk for their businesses

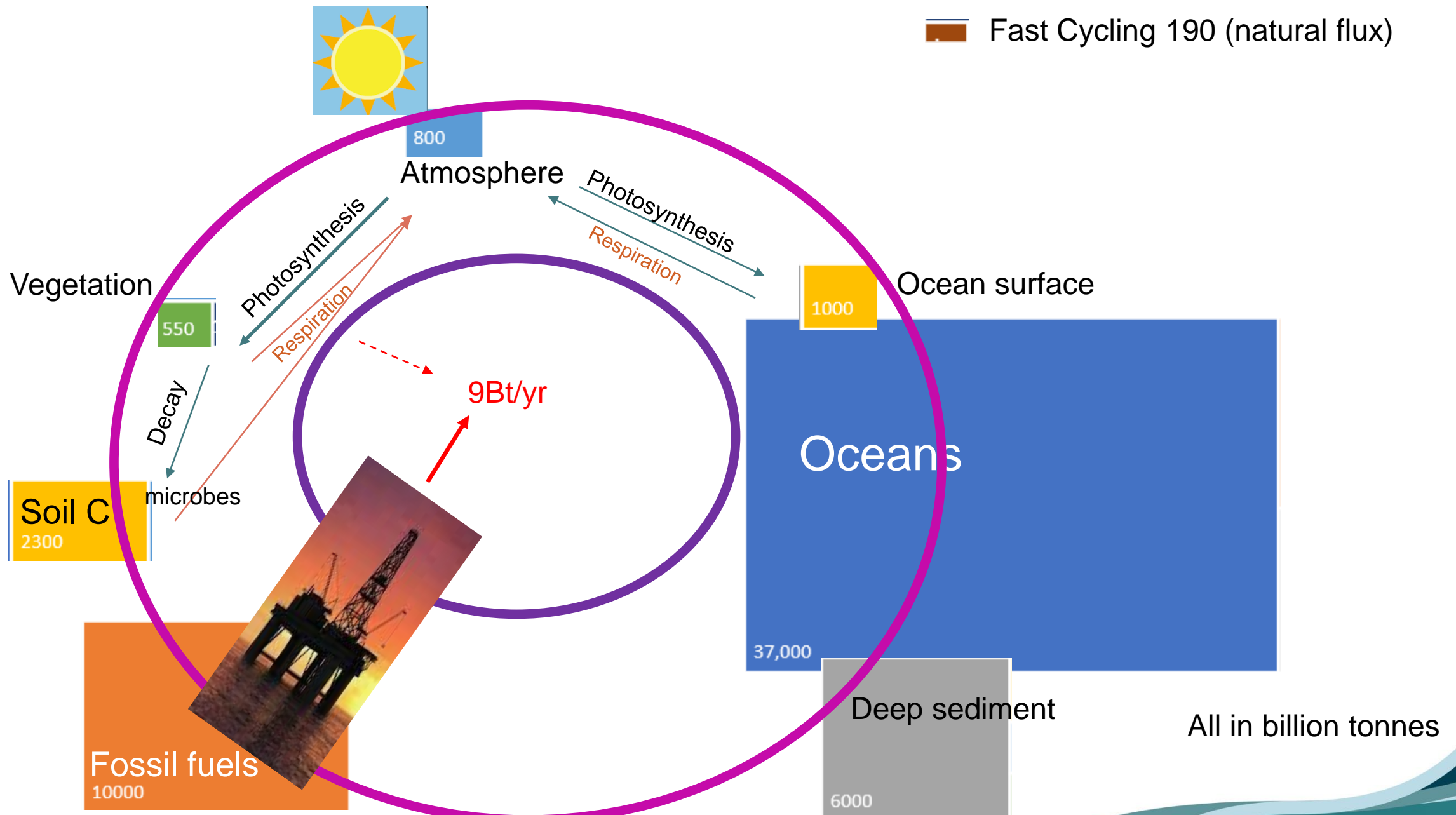


Do it for your farm business

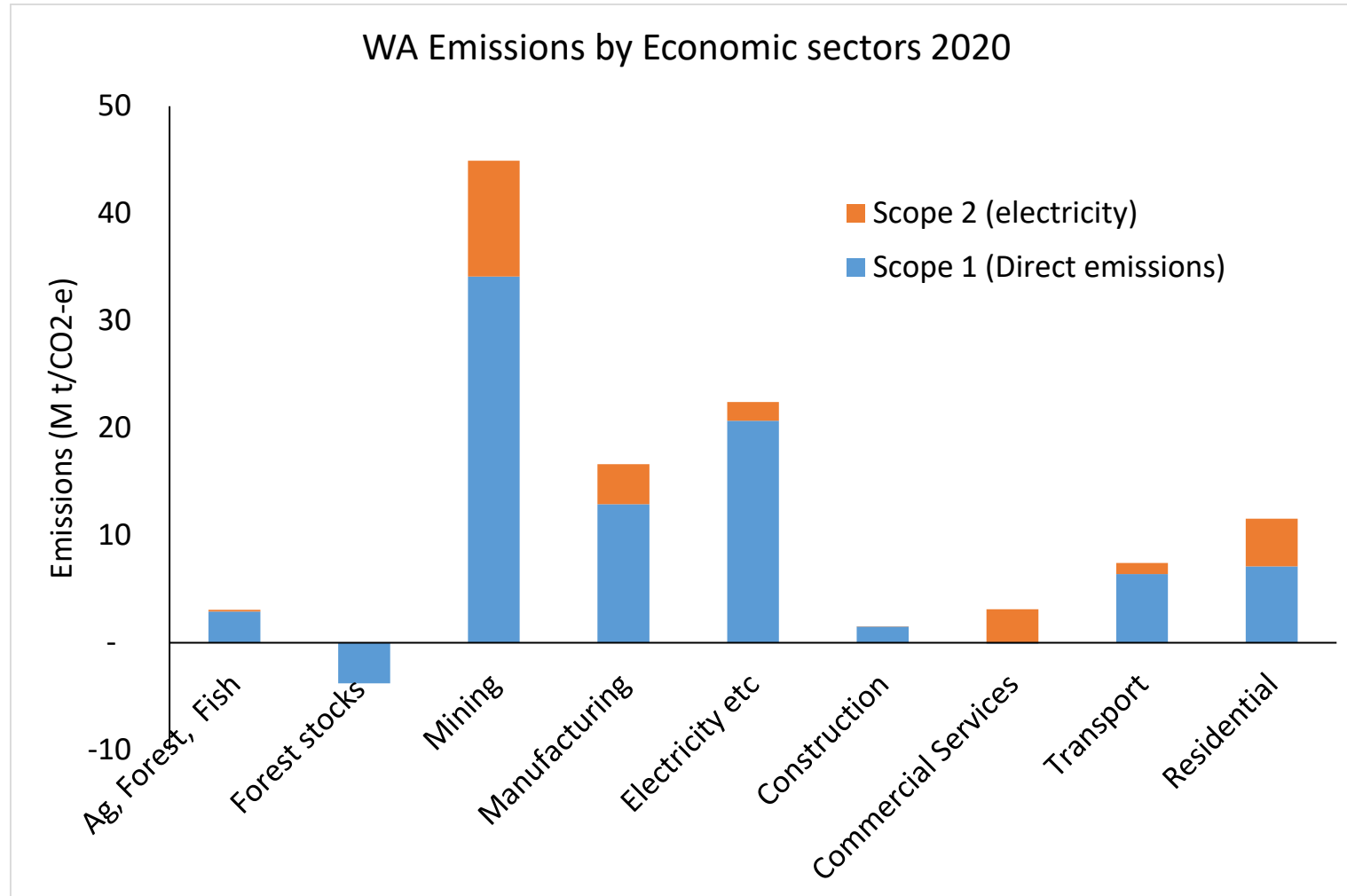
Measure your emissions in Agriculture

1. Context
2. Anomalies in agricultural emissions reduction
3. Close look at agricultural emissions
4. Opportunities to reduce emissions on-farm
5. Measure your emissions with the Grains-GAF tool

Most agricultural emissions are part of fast cycling system

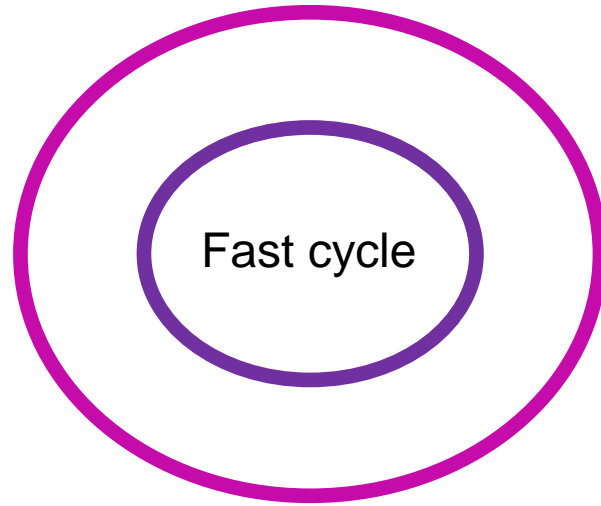
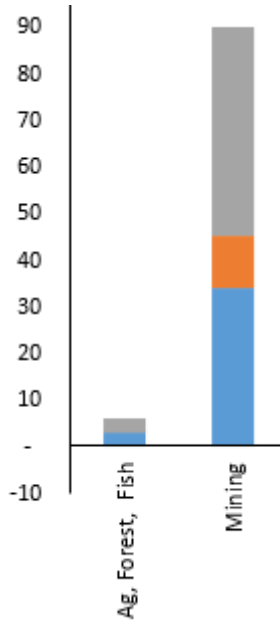


Most WA emissions from mining, manufacturing and electricity



NB: Scope 3 emissions not included

Emissions Reduction Anomalies in Agriculture

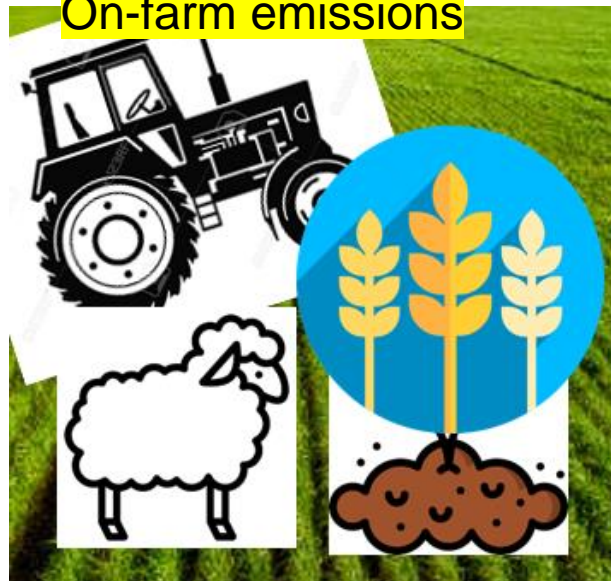


Scope 1 Emissions



What you are responsible for

On-farm emissions



Scope 2



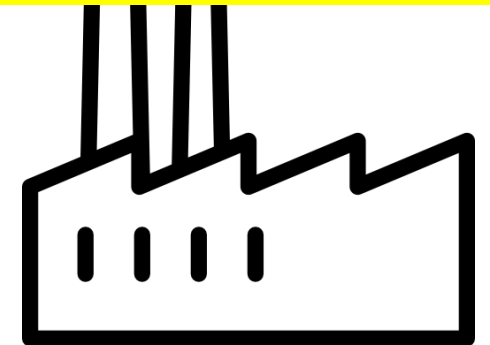
Electricity

Scope 3



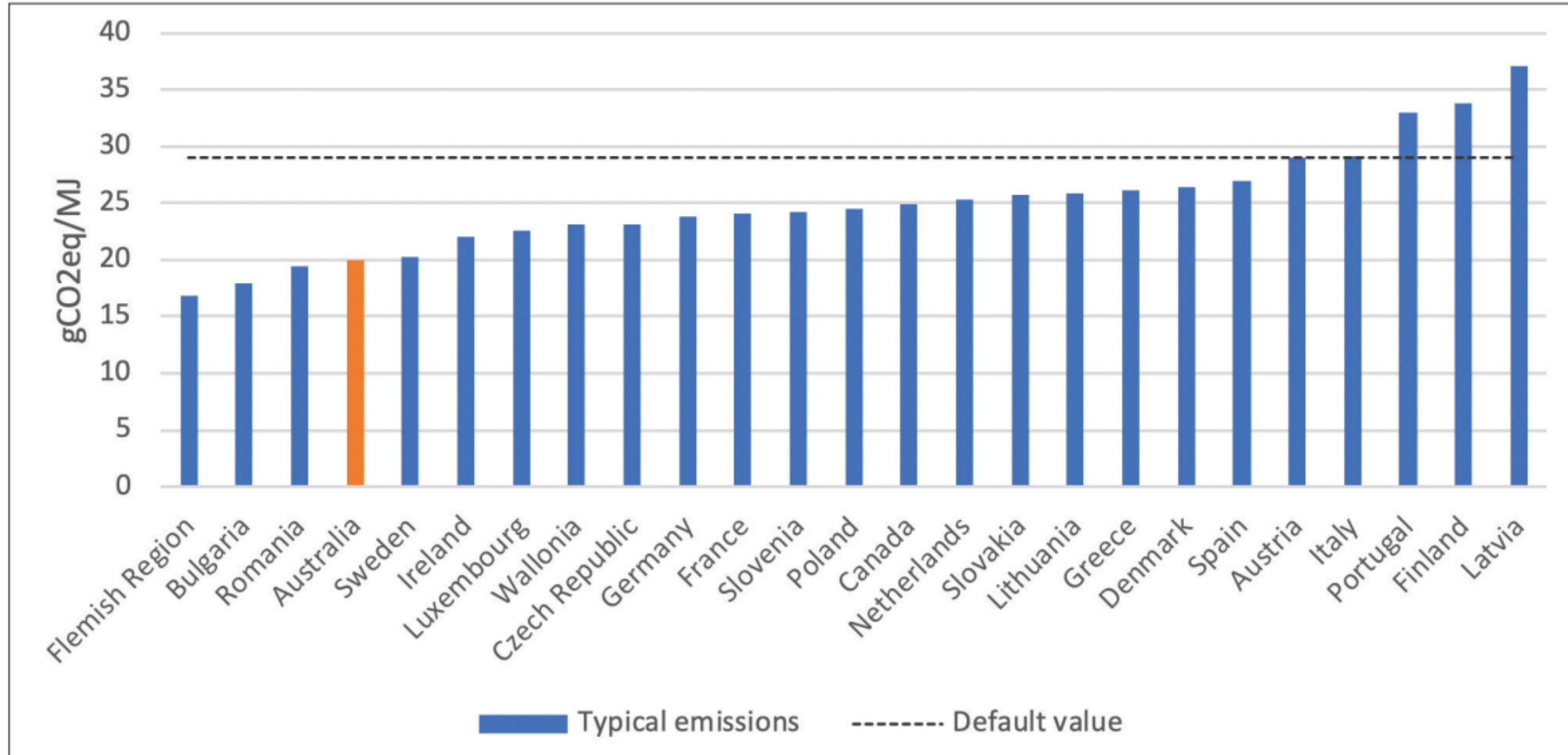
Everyone else doing everything else along your supply chain

Commonly only pre-farm emissions in carbon accounts



Australia has low emissions from canola production

Value of carbon measured grain



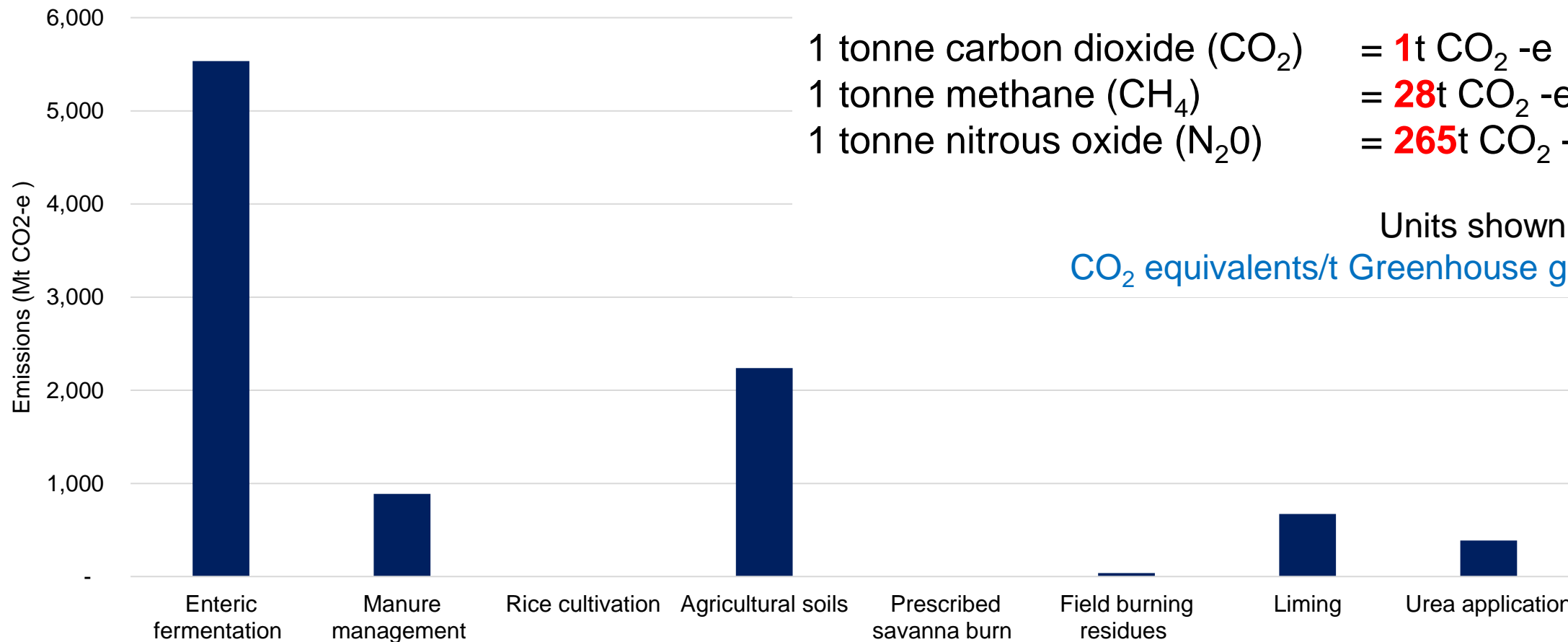
Source- AOF factsheet, Australian Canola and the EU Biodiesel Market
Data- European Commission (2018)

WA Agriculture sector emissions

Not all gases warm the same

1 tonne carbon dioxide (CO₂) = **1t** CO₂ -e
1 tonne methane (CH₄) = **28t** CO₂ -e
1 tonne nitrous oxide (N₂O) = **265t** CO₂ -e

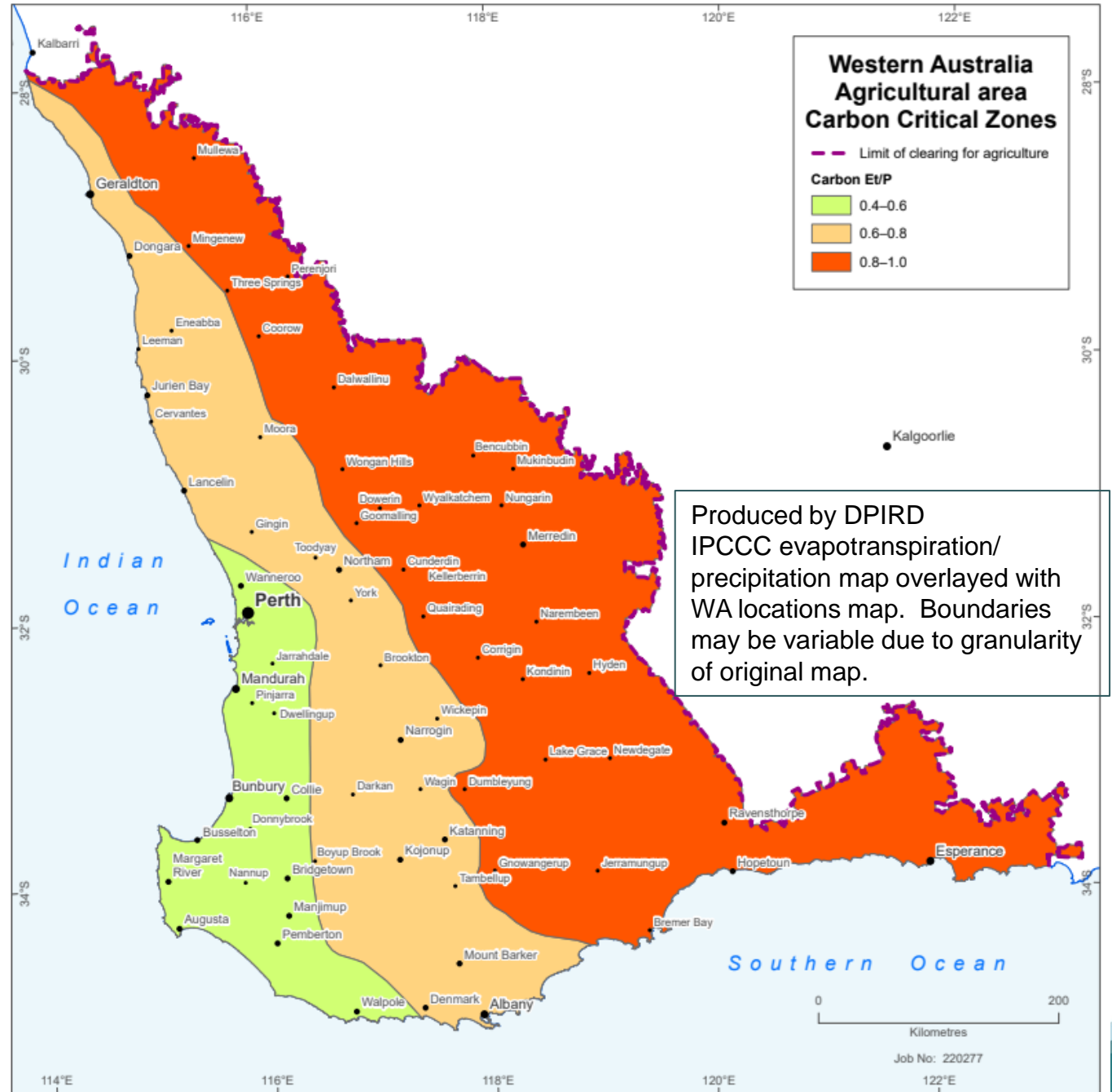
Units shown in
CO₂ equivalents/t Greenhouse gas



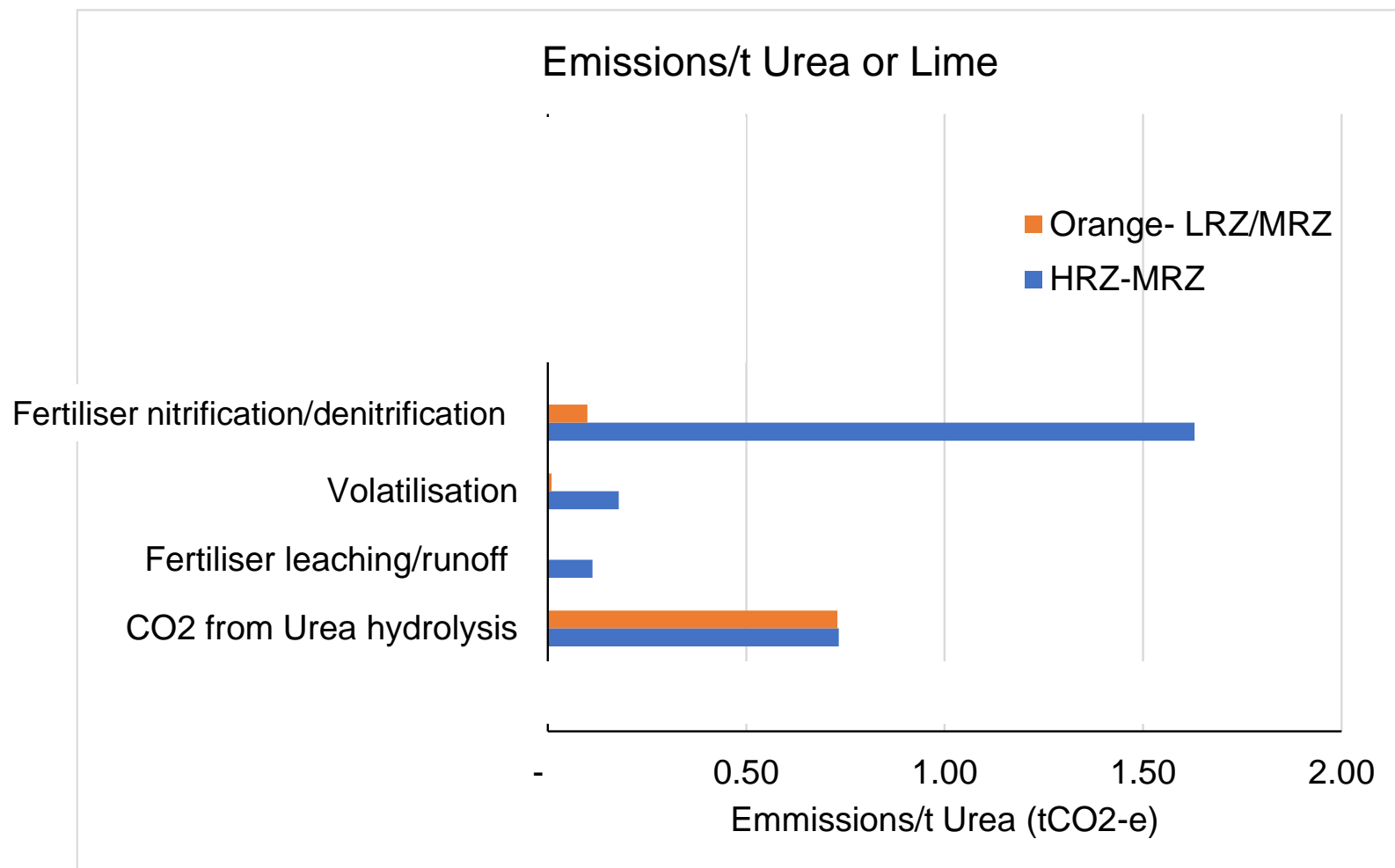
Soil emissions lower in red zone

N₂O emission lower where evapotranspiration is at least 80% of precipitation

- Greatly reduced nitrification/denitrification
- Nil leaching and runoff
- Lower volatilisation



Urea emissions



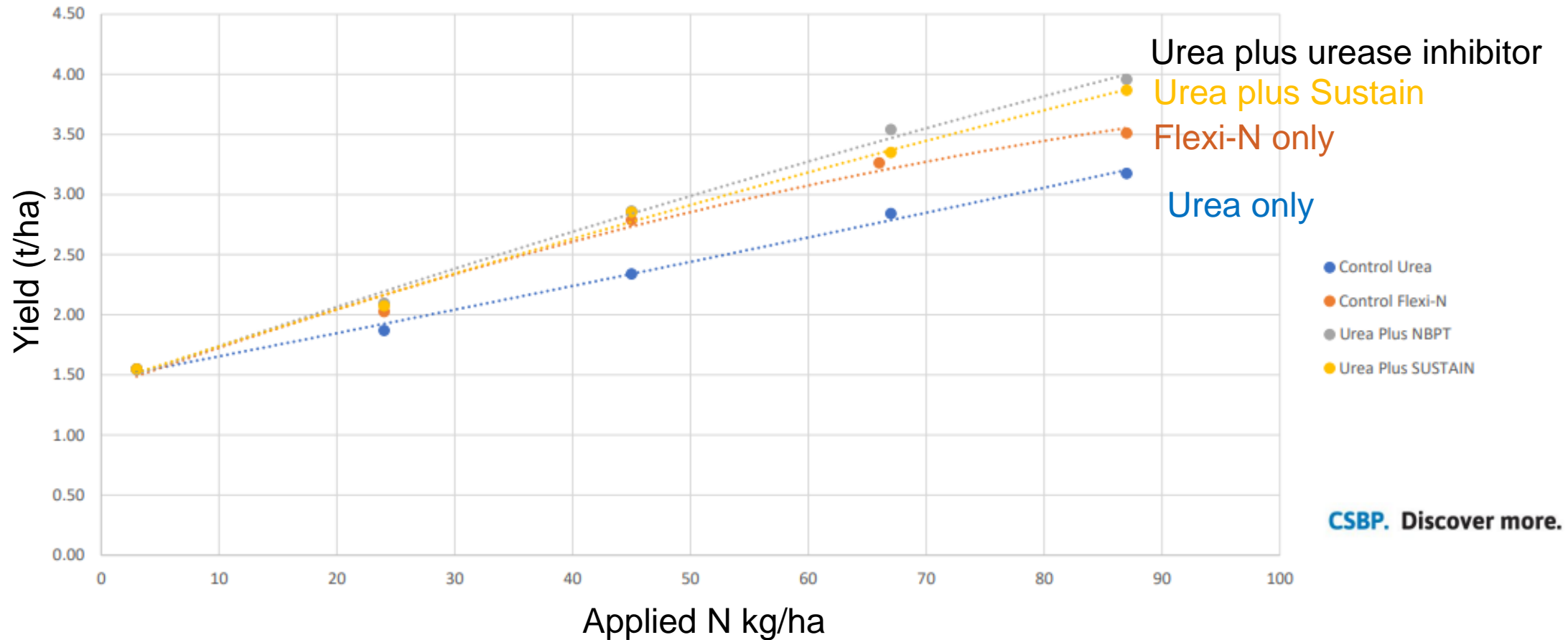
Opportunities to reduce emissions in WA

Activities to reliably reduce emissions	Co-benefits/ likely intensity reduction (higher productivity)
<ol style="list-style-type: none">1. Minimum/zero tillage (less fuel)2. Controlled traffic (less fuel)3. Reduce N fertiliser with better match to needs<ul style="list-style-type: none">• Variable rate• Timing to crop demand• legume crop/manure and pasture rotations• slow release/reduced emission N fert4. Using N fertilisers other than urea5. Claying light soils (increase C storage)6. Use inputs with lower carbon footprint	<ul style="list-style-type: none">• Stubble retention• Lime• Strategic tillage• Sustainable rotations (good weed control, disease management)

Lower emission fertilisers emerging

Need emission reductions quantified as well as productivity

Urea SUSTAIN and NBPT showing significant efficiencies over Untreated Urea
Three Springs 2022



Recommended Farm Carbon Accounting Tool

Grains-GAF Greenhouse Accounting Framework

Crop data input page

Download grains-GAF at
[//piccc.org.au/resources/Tools.html](http://piccc.org.au/resources/Tools.html)

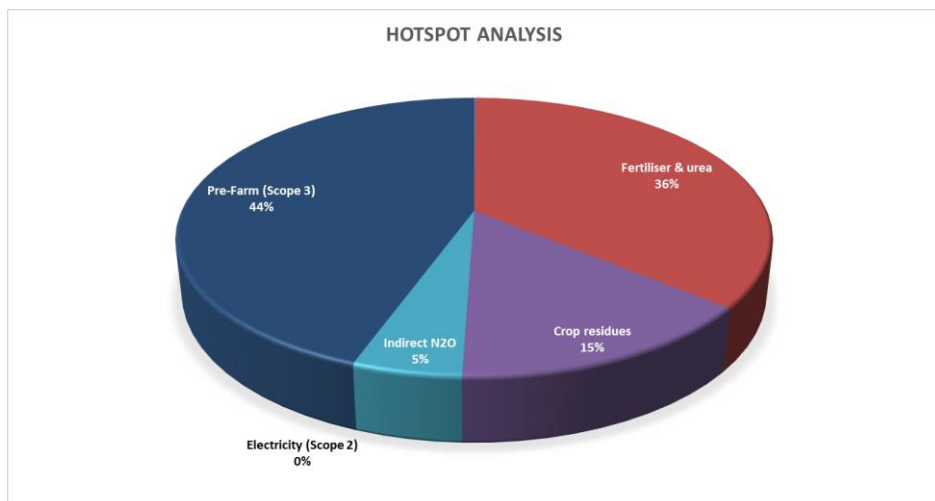


Enter your farm data		
Choose your region in Australia	SW WA	▼
Farm cropping details		
Farm cropping details	Wheat	▼
Production System	Non-Irrigated Crop	▼
Is the crop in orange zone? (Ref Map. 1)	No	▼
Average grain yield	3.00	t/ha
Area sown	1500	ha/farm
MAP Application	30	kg product/ha
DAP Application		kg product/ha
SOA Application		kg product/ha
Urea Application	100	kg product/ha
Single Superphosphate		kg product/ha
Urea-Ammonium Nitrate (UAN)		kg product/ha
Mass of Lime Applied	500	total tonnes/crop
Fraction of Lime as limestone vs dolomite	100%	Limestone/dolomite
Fraction of the annual production of crop that is burnt	0%	ha/total crop ha
Annual Diesel Consumption		litres/year
Annual Petrol Use		litres/year
Annual Electricity Use (State Grid)		
	4000	
If some renewable energy is used, what % of total electricity use is drawn from this source?	0%	
Allocation of total electricity use to each crop	20%	20%
General Herbicide/Pesticide use	6	kg a.i. per farm
Glyphosate use	3	kg a.i. per farm

Recommended Farm Carbon Accounting Tool

Grains-GAF Greenhouse Accounting Framework

Some results



Grains Greenhouse Accounting Tool

Crop	Wheat	
Outputs	t CO ₂ e/farm	
Scope 1 Emissions (on-farm)		
CO ₂ - Fuel	0.1	
CO ₂ - Lime	0.4	
CO ₂ - Urea	28.6	
CH ₄ - Field burning	0.0	
CH ₄ - Fuel	0.000	
N ₂ O - Fertiliser	3.8	
N ₂ O - Atmospheric Deposition	0.4	
N ₂ O - Field Burning	0.0	
N ₂ O - Crop Residues	14.3	
N ₂ O - Leaching and Runoff	0.0	
N ₂ O - Fuel	0.0	
Scope 1 Total	48	

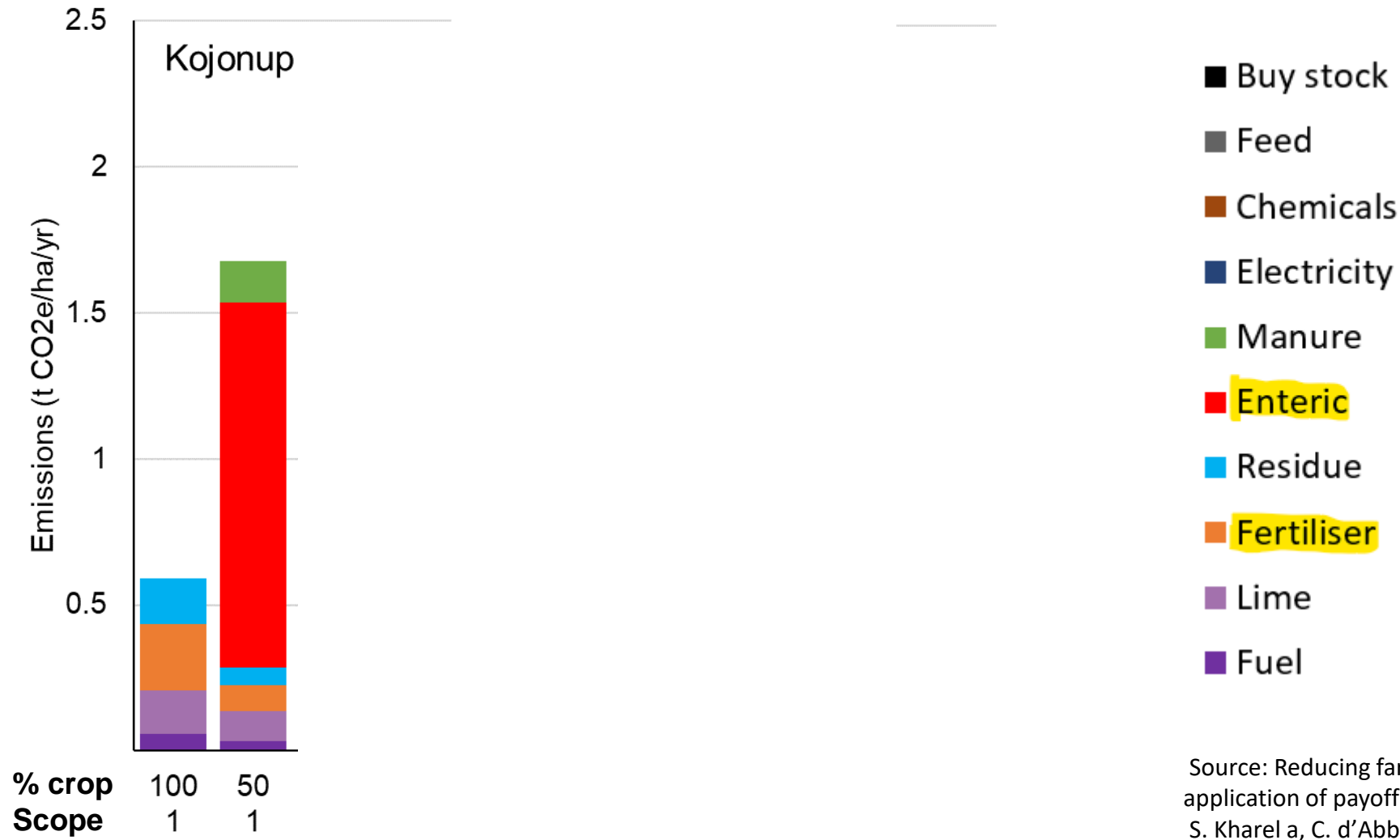
Scope 2 Emissions (off-farm)		
Electricity	0.0	
Scope 2 Total	0.0	

Scope 3 Emissions (pre-farm)		
Fertiliser	72.1	
Herbicides/pesticides	0.2	
Electricity	0.0	
Fuel	0.0	
Lime	0.0	
Scope 3 Total	72	

Download grains-GAF at
[//piccc.org.au/resources/Tools.html](http://piccc.org.au/resources/Tools.html)

Jackie Bucat | DPIRD

Less difference crop vs mixed farming when scope 3 (manufacturing) included

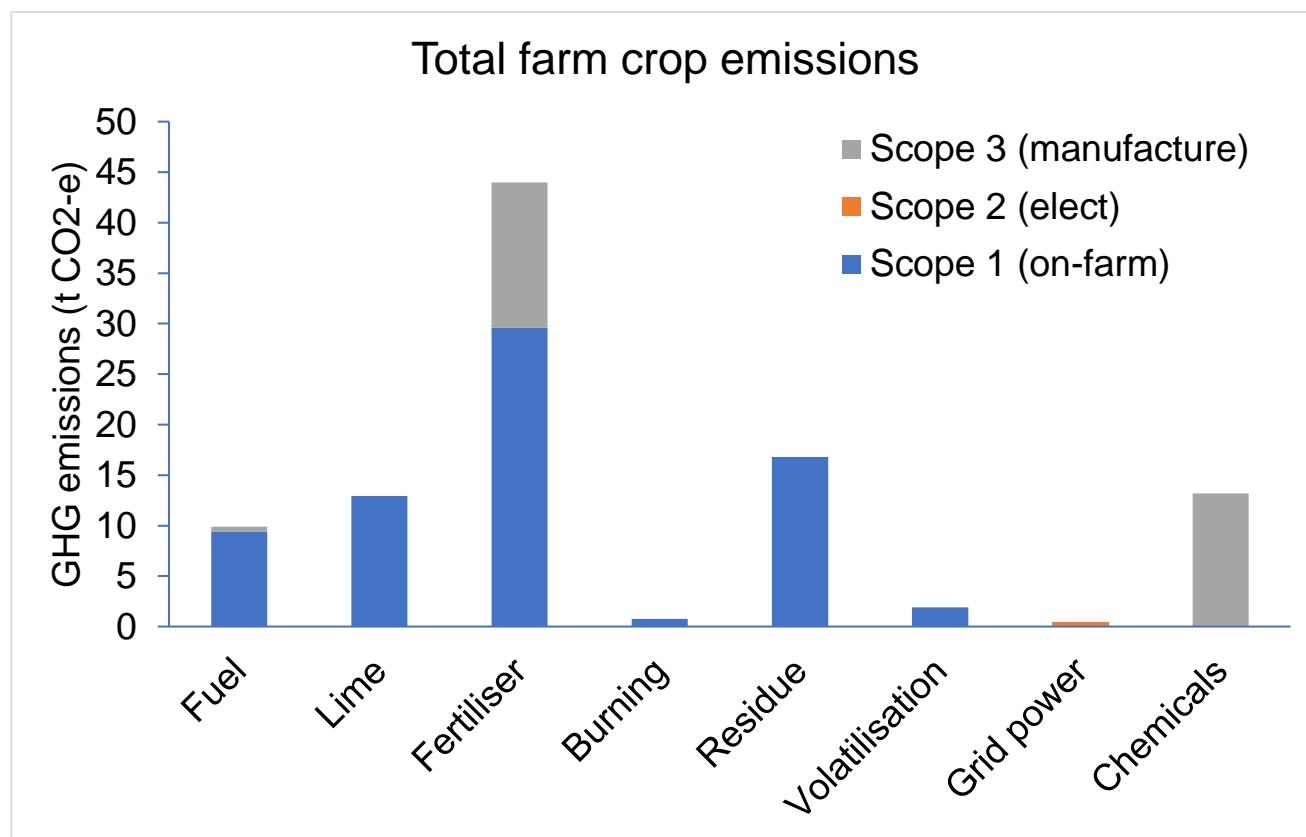


Source: Reducing farming system emissions via spatial application of payoff functions
S. Kharel a, C. d'Abbadie a, A. Abadi a, R. Kingwell

Total farm crop emissions

3,700 t CO₂-e average total cropping emissions
(source: Carbon neutral grain pilot project report)

Average offset cost of \$10/t grain or \$25/ha



Emissions (CO₂-e/t)

Canola 0.55

Wheat 0.25

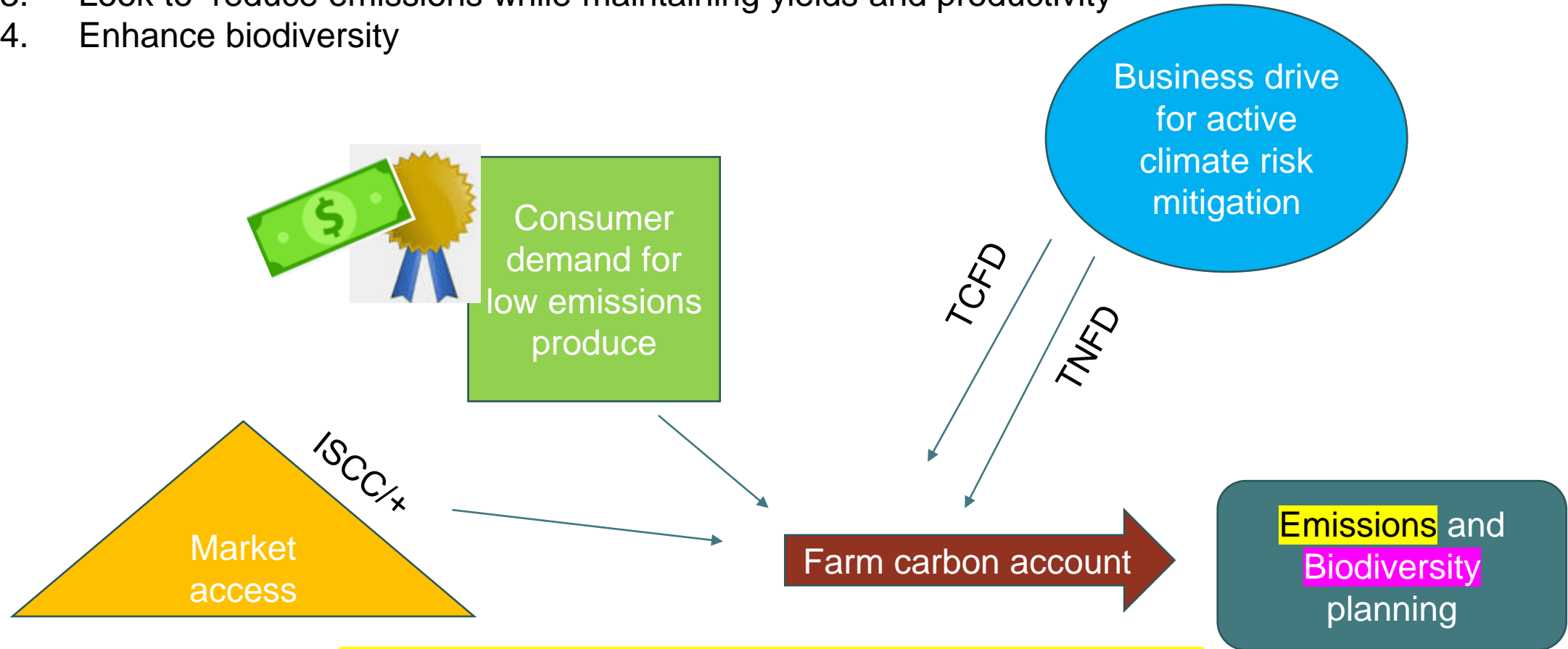
Calculating Carbon Emissions in WA's Grain Industry

Findings from the Carbon Neutral Grain Pilot Project – a research partnership between CBH Group, Wide Open Agriculture and the Department of Primary Industries and Regional Development (DPIRD)

agric.wa.gov.au/sites/gateway/files/Carbon%20Neutral%20Grain%20Pilot%20Report_0.pdf

Do it for your farm business

1. Engage with carbon debate
2. Count your emissions (Promote and assist your clients)
3. Look to reduce emissions while maintaining yields and productivity
4. Enhance biodiversity



May not have access to premium markets or need it for suppliers yet but be carbon ready and relaxed.

Thank you

dpiird.wa.gov.au    

Important disclaimer

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