What does Net Zero mean for irrigated and mixed farmers?

DR CASSANDRA SCHEFE

AgriSci

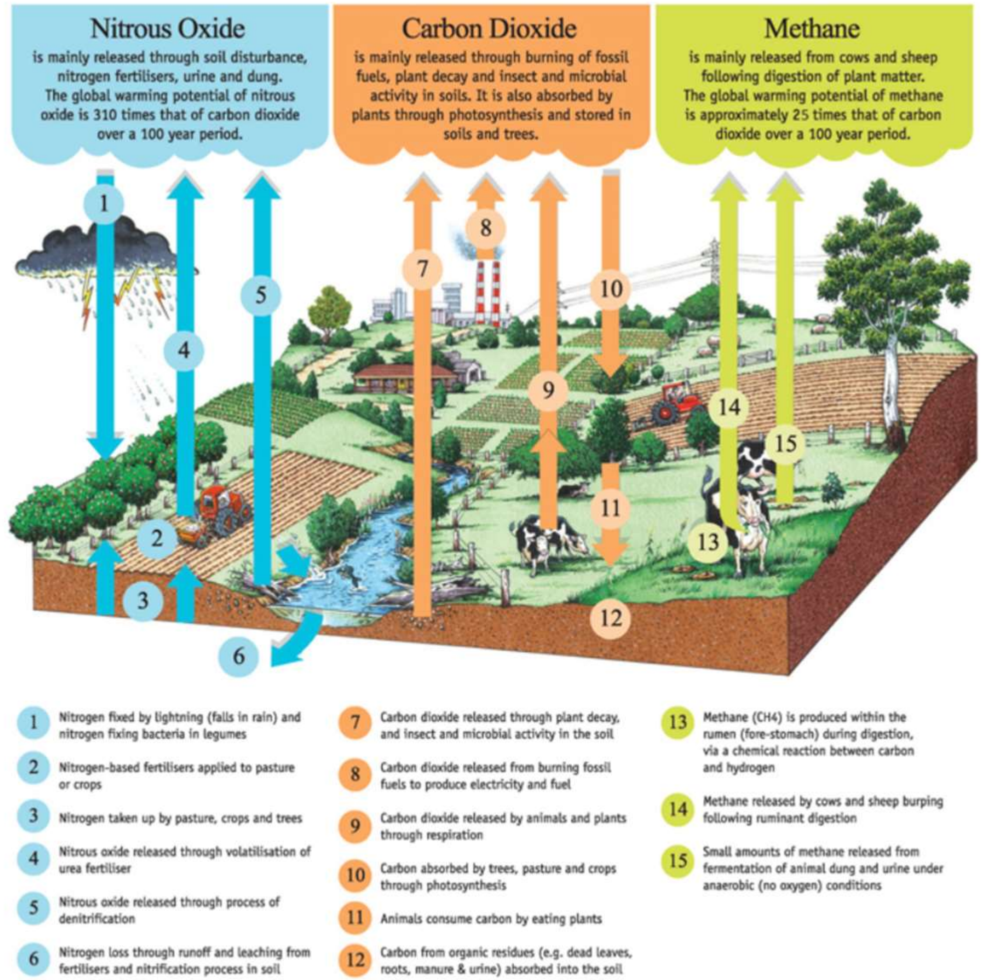
CERTIFIED PROFESSIONAL SOIL SCIENTIST 2020 CPSS Cassandra Schefe

DR KATE BURKE

Outline:

- Emissions and Ag – what is it all about?
- What does ‘net zero’ mean?
- Why is it important?
- What does it mean in regard to our farming activities, our practices and future strategies?
- What can farmers do to prepare, even with incomplete information?

GHG in Ag



Source: Agriculture Victoria

On-farm greenhouse gas (GHG) emissions

Normal soil processes release GHG’s, including mineralisation of nitrogen from the organic matter into plant-available forms

Emissions also due to fertiliser application, especially N fertiliser (importance of delivery options)

Diesel usage is a lower proportion, but important to get it right.

Land use change is important for GHG models (pasture – cropping, cropping – pasture)

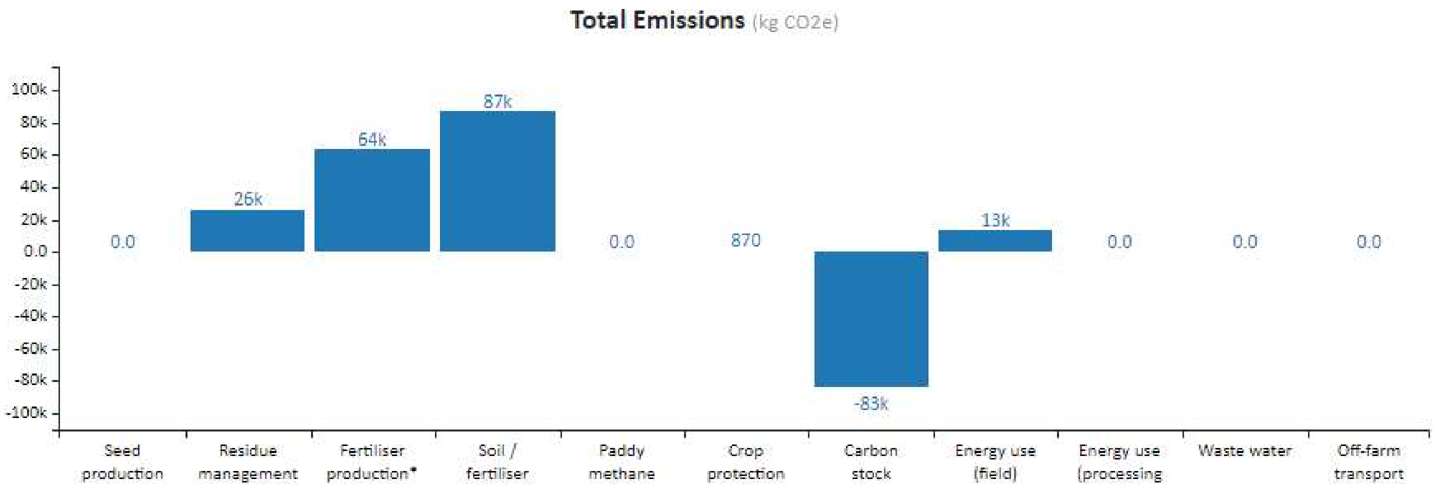
Burning vs trash retention

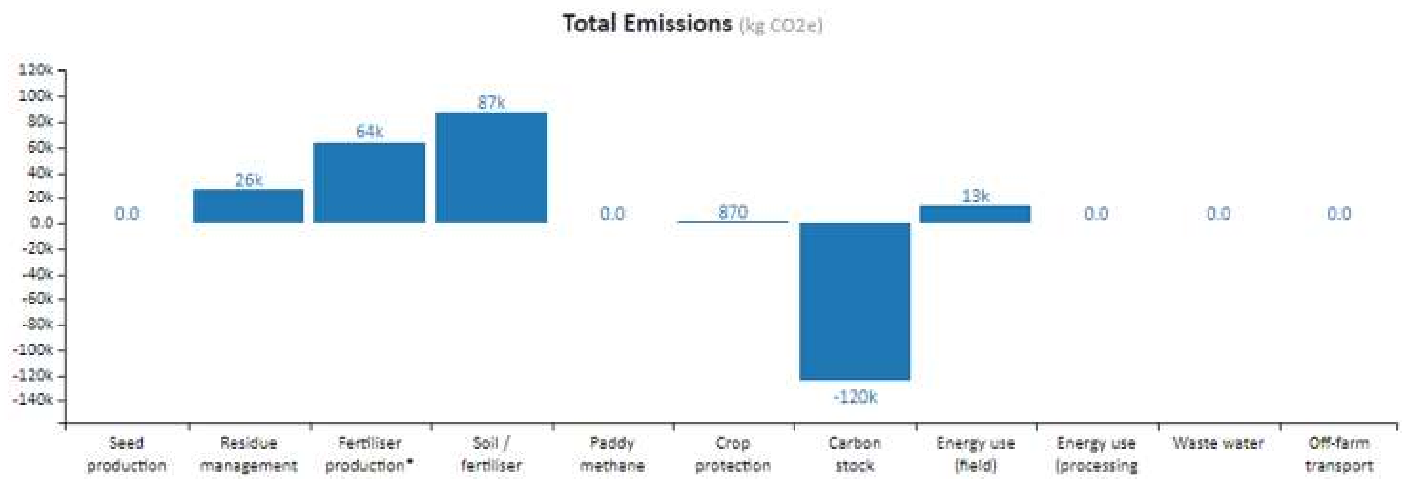
Pasture phases and reduced tillage are key levers in reducing on-farm GHG’s

Reducing inputs (such as fertiliser) needs to be considered in context of NUE

Contribution of animals based on emissions-over-time – reduced time, reduced emissions

Importance of soil C in ‘offsetting’ on-farm emissions





Wheat Emission results (5 t/ha):

At 1% C
Conventional till => No till
80kg MAP/ha
300kg urea/ha

Total emissions: 108.34K kg CO_2e
Per hectare: 1.08K kg CO_2e/ha
Per tonne: 216.68 kg CO_2e/t

At **1.5% C**
Total emissions: 68.05K kg CO_2e
Per hectare: 680.51 kg CO_2e/ha
Per tonne: 136.10 kg CO_2e/t

37% reduction (ha & tonnes)

Value of soil health for productivity

The **MOST** limiting factor

Nutrition for animals, plants and microbes – 3x win

What's good for plants = good for microbes = good for GHG reduction

Any limitations to plant function also limits microbial function and soil carbon
- Soil physical constraints (waterlogging, compaction, dispersion, hydrophobic soils)
- Soil chemical constraints (pH/acidity, plant nutrition – N, P, S, K, micro's etc)

All food production results in net export of nutrients and alkali from farm

Sustainable food production relies on replacement (if not replacing, system is mining)

Carbon is a net product of the system

Spotlight on Irrigated Ag

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Greater biomass and yield potential – greater chance of soil or other productivity constraints reducing yield potential (as water is not limited)

Yields are greater, but inputs are greater also.

Risk attitude towards inputs including N

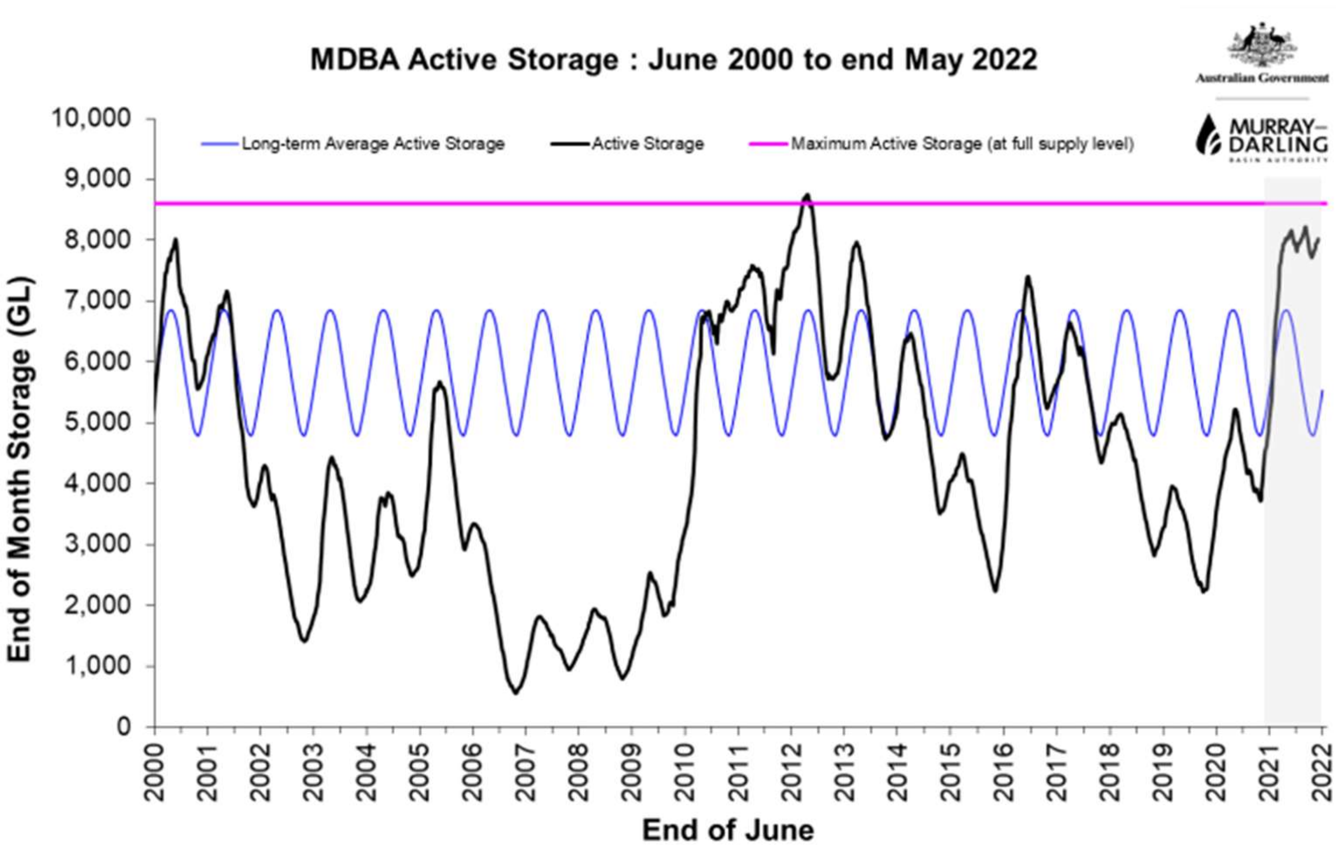

Figure 2 – MDBA active storage, June 2000 to end May 2022. This graph shows the sum of active storage in Dartmouth and Hume Reservoirs, Lake Victoria and the Menindee Lakes. Menindee Lakes only contributes to MDBA active storage when the storage volume is available as a shared resource.

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"Scope 3"

All emissions associated with the production of commodities. For food companies, it is the emissions associated with production of raw ingredients, eg corn production

Scope 3 can comprise up to 70-80% of total food footprint.

This means that even if companies reduce their energy usage in manufacturing facilities, the total emission footprint associated with an end product does not drop substantially.

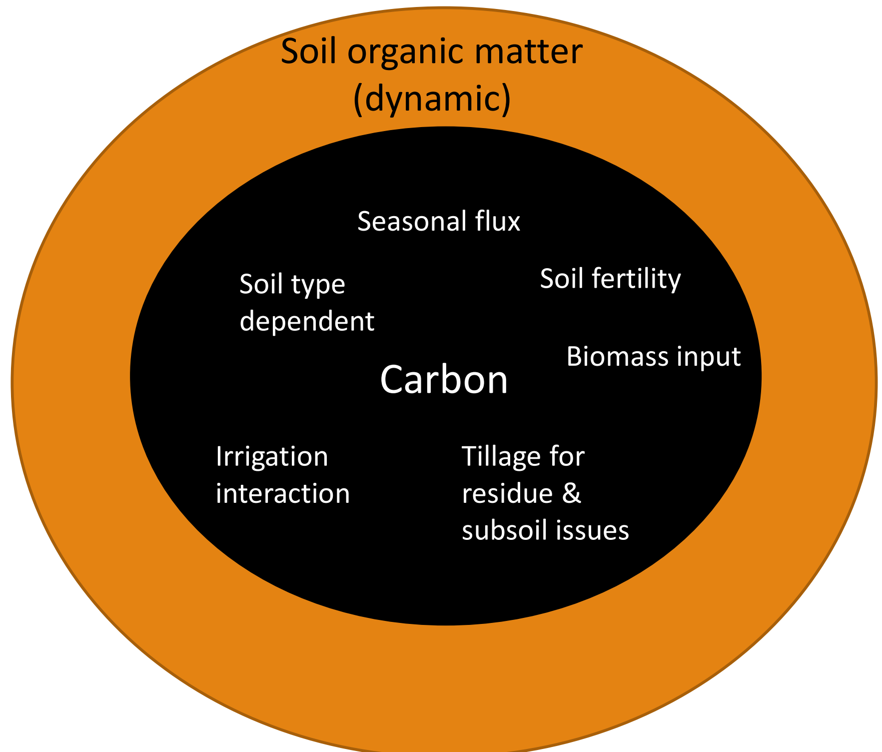
(For a farmer, Scope 3 emissions are the production of fertilisers, pesticides etc)

EVERY COMPANY WILL HAVE SCOPE 3 REDUCTION COMMITMENTS

A very young Carbon market

Demand	Supply
Commitment to net zero 2050	*Forestry*
Market demand-social license	Agriculture
Carbon offset demand	Additionality restrictions
Regulated and unregulated	Farmer holds risk
Carbon aggregators/entrepreneurs	
Regulated and unregulated *25 to 100 year commitment*	Carbon
Legal covenants	

A Farmer



Carbon for *systems* OR Carbon for *sale*

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- Lots of focus on soil C, and the perceived value of C trading to farmers. But…
- All soils have a threshold of soil carbon, based on their climate, soil type and management. Many good farmers are already on the high/wrong end of the curve, with limited potential to increase (with increased variance and risk)
- Increasing pressure (or incentives) for farmers to demonstrate 'carbon neutrality' or a negative C footprint in order to sell commodities into various markets. This means that rather than sell these credits to third parties, it may become attractive for farmers to retain these to offset their own system emissions.
- A farmer cannot sell a carbon credit to a third party (ACCU or voluntary market) and then also report on their emission footprint (and reductions in that footprint) through their supply chain. That is considered to be *double-dipping* against the same bank of soil carbon and production-related emissions.

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- Total emissions MINUS Total *offsets* = Net emissions
- Concept: if Net emissions is either zero, or negative, farmer can report they comply with *Net Zero*
- Farm System Approach: Considers whole farm, including tree lots, pasture systems, grain and hay production fed to animals on-site etc
- Commodity Approach: Only considers the inputs and offsets within a discrete area used to grow certain crops

- But – no common agreement on methodology at this time … so…

So what do we do now? Attitude & Perception

Awareness: stay informed

Acceptance: it is what it is

Action: plan ahead

So what do we do now – practical action?

Action: plan ahead

Capex plan for energy efficiency

Productive healthy soils

Systems, processes and record keeping

Farming is the art of decision making with incomplete information

Best bet strategies

Best bet strategies

- Focus on profitable, sustainable farming systems
- Identify the most limiting constraints to productivity
- Maintain diversity of rotations and enterprises (manage risk)
- Keep good records! Practices and inputs
- If soil testing, record GPS locations
- If not soil testing, consider establishing some baseline monitoring sites for C and nutrients
- Identify some big levers of GHG emissions, which are likely also levers for productivity
- Consider expanding contribution of legume-derived N into the system

Nitrogen is the largest single emission factor	Carbon is the largest single emission *offset* factor

What to do about net zero? – summary

- Understand your supply chain
- Start asking the questions around, will being able to demonstrate 'net zero' future-proof my market access?
- Premiums vs market access
- Does sharing your information through the supply chain reduce your ability to capture whole of system net zero in future? – Read the fine print
- Data ownership and sharing – know what you are getting into

Resources

https://agriculture.vic.gov.au/climate-and-weather/understanding-carbon-and-emissions/making-cents-of-carbon-and-emissions-on-farm

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Production Management Challenge	Rotation Solutions
Previous crop type	Solutions
Each crop leaves its own mark: weed burdens, root disease, foliar disease, soil fertility ups and downs.	A logical crop sequence that manages the risks.
Weed spectrum including herbicide resistance	
70 (82%) of 85 growers surveyed by Birchip Cropping Group indicated that weeds highly influenced crop choice. Broadleaf weeds built up if too many broadleaf crops are grown in a few seasons. Over-exposure to cereals means more grass weeds. Continual use of the same herbicide chemistry over several years inevitably results in herbicide-resistant weed population (Birchip Cropping Group, 2018) s.	Rotate to crops that allow different herbicide chemistry Minimise seed bank increases through hay crops, chemical fallow or green/brown manure cover crops or a pasture phase.
Root and foliar disease risks	
Some soil-based organisms infect crop roots of susceptible species and cause yield loss. Examples include take-all, cereal cyst nematode and root lesion nematode. Foliar disease pathogens carry over from season to season in either the soil, on old crops, or in the air. Growing the same crop back-to-back increases the risk of infection.	Rotating away from the crops that may be affected, variety resistance and removing host weeds all contribute to minimising the impact.
Paddock fertility	
Soil nitrogen levels can influence crop choice when nitrogen levels become too low.	Legume, grain, hay or green manure crops top up the organic nitrogen pool. Legumes provide between 10 and 20 kilograms of nitrogen per ha per tonne produced. This can equate to $60 to $300 per hectare of nitrogen contributing to the following crop.
Available soil moisture	
Available water is an obvious and major factor driving grain production in dryland farming systems. Available soil moisture is determined by previous crop type, out of season weed control and out of season rainfall.	Crops such as canola, with a higher water demand, make up more of the rotation in medium and high rainfall regions than in a lower rainfall area. Long fallow (not growing a crop for a season to conserve moisture) is an underrated risk management strategy.