~~Carbon neutral~~ or low emissions livestock production

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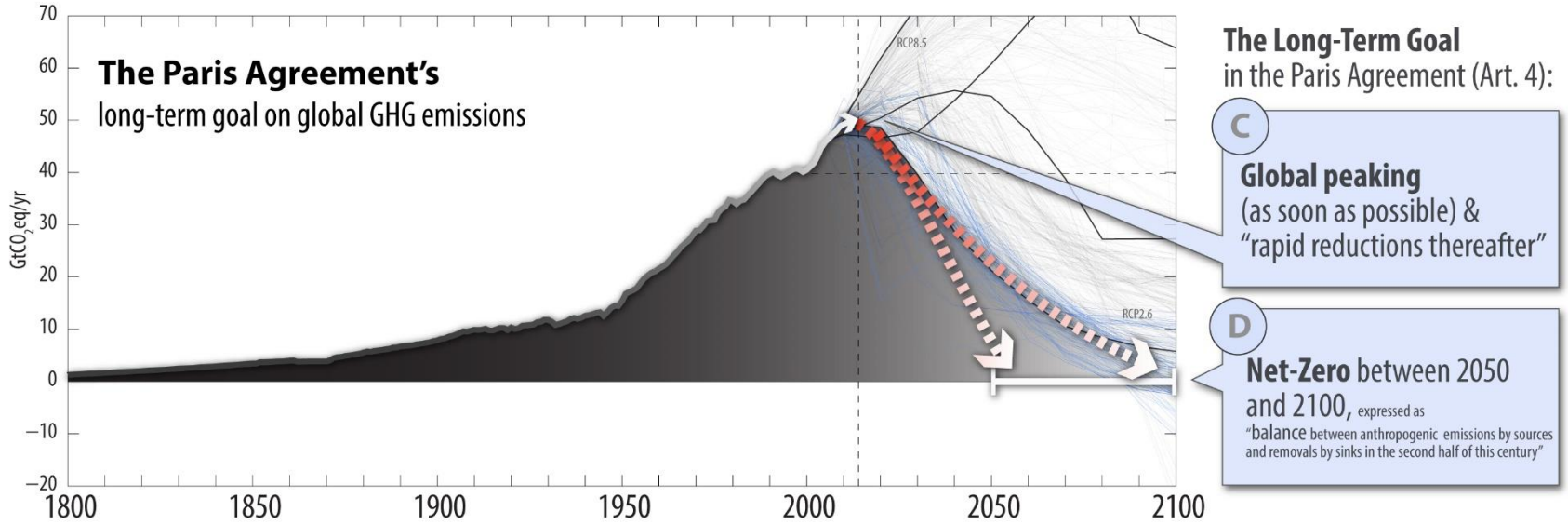
COP21 Paris Agreement



- Reach global peaking GHG emissions as soon as possible
  - Achieve a balance between anthropogenic emissions by sources and removals by 2050
  - COP26 - Increased 2030 ambition

To meet 1.5 ^{0}C, methane must reduce by
- 11-30% by 2030
- 24-47% by 2050

(Arndt et al. 2022)

Source: Malte Meinshausen 2015

Supply chain responses to Paris Agreement

- Fonterra
  - Climate-neutral growth to 2030 for pre-farmgate emissions from a 2015 base year
- Unilever **
  - Reducing the GHG impact of their products by 50% by 2030, compared to baseline of 2010
- Mondelez
  - Reduce absolute GHG from manufacturing 15%
  - 100% renewable energy
- Nestle **
  - Zero environmental impact in our operations
- JBS
  - Net-zero GHG by 2040 and zero deforestation across its global supply chain by 2035
- Heineken
  - Carbon neutral barley-malt supply chain
- Rabobank & NAB
  - Net zero financed emissions by 2050
  - Hold 50% of Australia agri-debt market
- Mars
  - Reduce GHG across our value chain 27% by 2025 and 67% by 2050 (from 2015 levels)
- Kellogg Company **
  - 65% reduction by 2050
  - 100% renewable energy
- Pfizer
  - 60 to 80% by 2050
- Wilmar international
  - 89.72% less GHG from 2013 to 2020
  - 100% renewable energy
- Olam
  - Reduce GHGs by 50% by 2030 both in our own operations and in our supply chain
  - By 2050, we aspire to be carbon positive in operations, requiring a 5% emissions reduction per year from 2031 – 2050
- Cargil
  - Reduce our global supply chain emissions 30% by 2030 and net zero by 2050

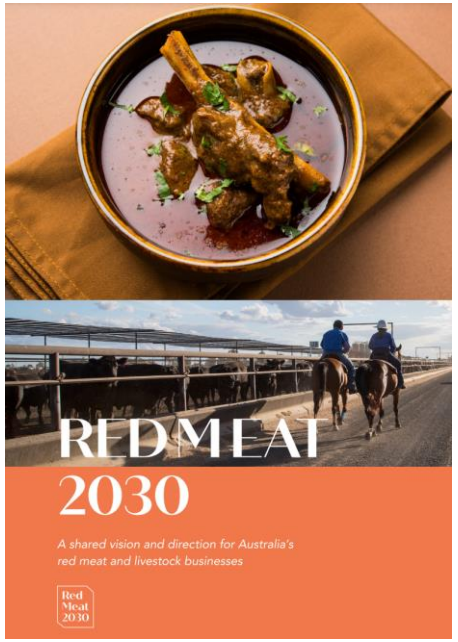
**committed to increasing plant-based protein

- Of the 100 largest economies 69 are companies and 31 are countries
- **70% of Australian farm produce is exported**

Source: Company sustainability reports https://oxfamapps.org/fp2p/the-worlds-top-100-economies-31-countries-69-corporations/

Industry & Market Drivers: Livestock Industry Responses

- Australian Red Meat Industry (RMAC 2030 strategy)
  - *Australian red-meat can be carbon (climate?) neutral by 2030 (CN30)*
- Mato Grosso do Sul, “MS carbon neutral” initiative
- New Zealand
  - Net zero by 2050
  - Non-zero methane target
    - Up to 47% by 2050
  - All farms required to complete a carbon audit by 2022
    - Research levy on methane
- California SB 32
  - 40 % less methane by 2030 over 1990
- Global Methane Pledge at COP26
  - 30% less methane by 2030 by 105 countries (plus Australia)



How will the supply chain achieve their targets?

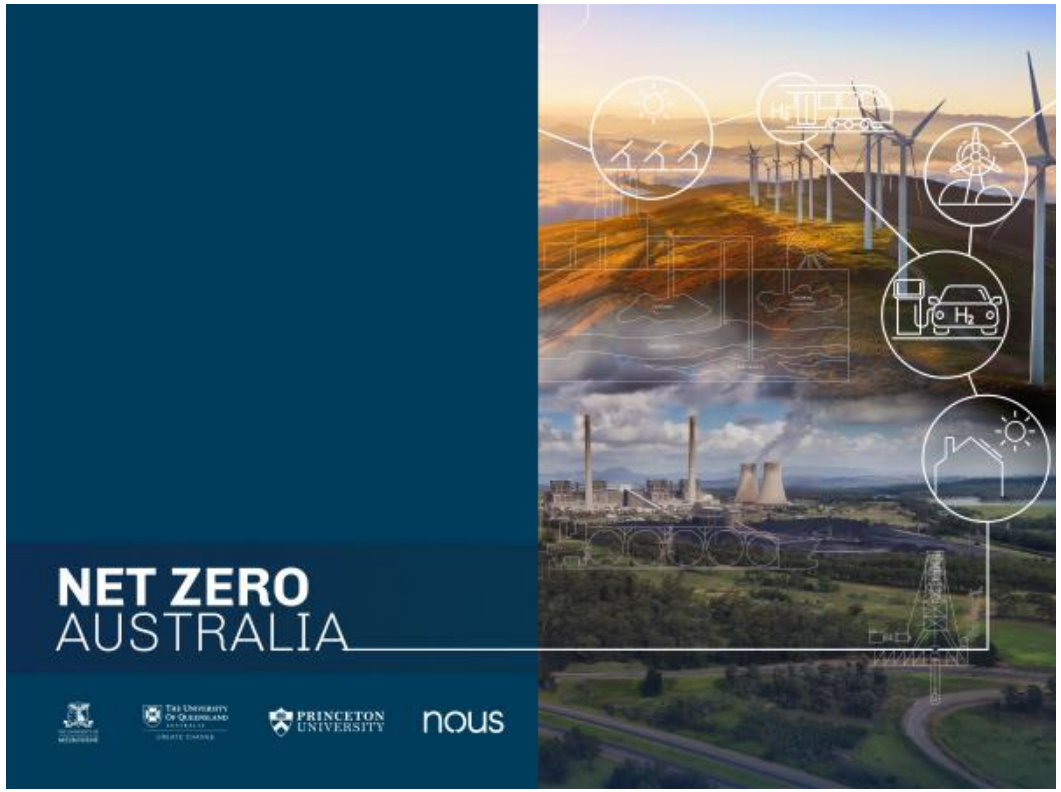
- Supply chains will need to meet their targets
- All suppliers will conduct GHG audit
  - Data sent to supply chain buyer
- Purchaser starts buying at lowest GHG intensity
  - The higher GHG they purchase costs them more carbon offsets

t CO_2e/t LWT

8 10 12 15 18 20 22 25

Key Conclusion from Net Zero Australia plan

- Agriculture will need to **inset** ALL their own soil and tree carbon
  - Maintain supply chain access post 2030
- There are no surplus offsets in agriculture!

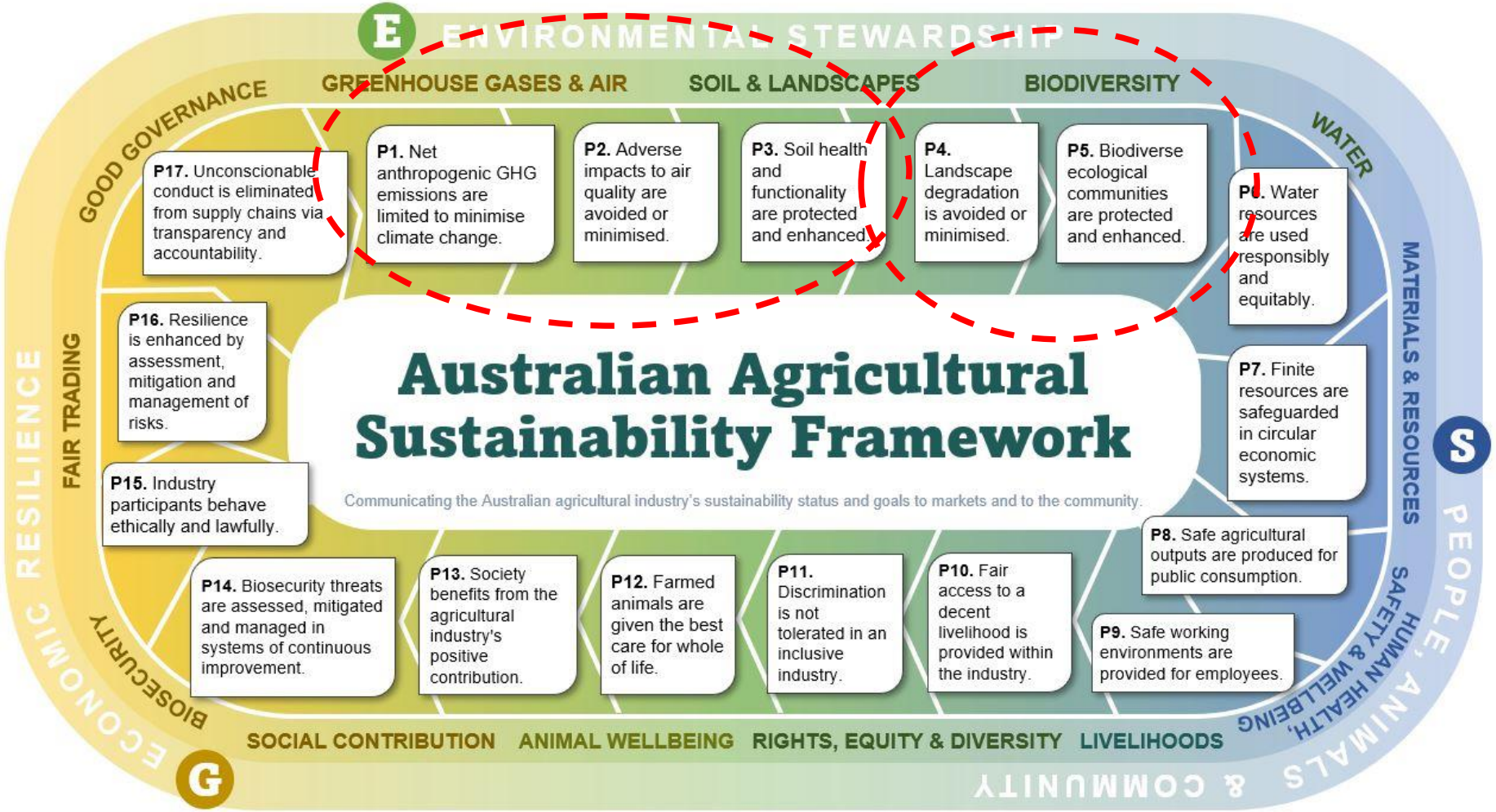


Marketing Carbon Neutral or Carbon Credits

- To 2030
  - Access to premium markets
    - e.g. carbon neutral wool
- Post 2030
  - Future compliance with supply chain targets
    - **Insetting** not offsetting
  - Carbon credits only allowed in
    - “hard to abate” sectors

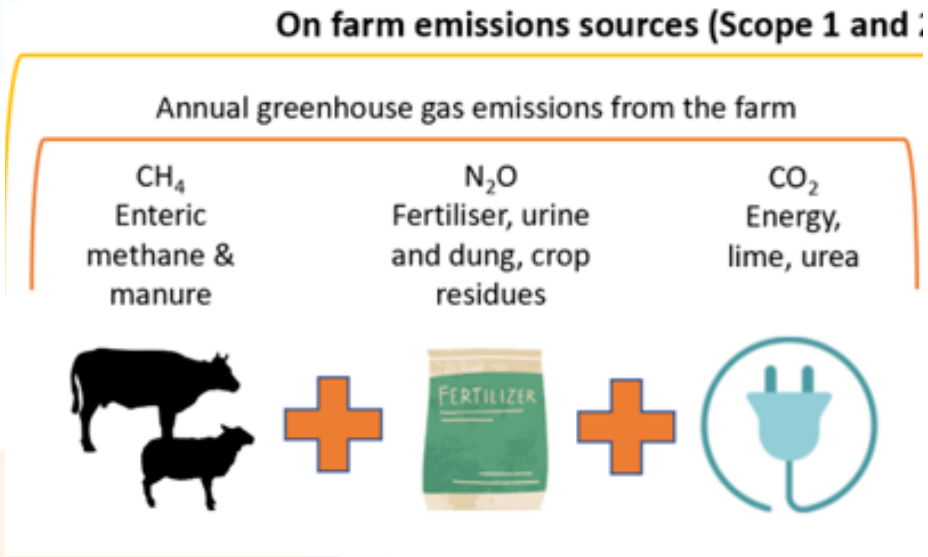
- Fundamental difference between
  - Carbon sequestration offset
    - Finite accumulating stock
    - Will need these stocks as an INSET
  - Emissions avoidance offset = flux
    - Could sell these up to the day neutrality is required

The Australian Agricultural Sustainability Framework



https://www.farminstitute.org.au/the-australian-agricultural-sustainability-framework/

Carbon Accounting: The concept



Source: Agriculture Victoria

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Potential for net zero?

- Chicken meat
  - 3 to 5 kg CO_2e/kg LWT
- Pigs
  - 4 to 7 kg CO_2e/kg LWT
- Cropping
  - 0.10 to 0.75 kg CO_2e/kg grain
  - 0.18 - 0.25 t CO_2e/ cotton bale (?)
- Dairy
  - 8 to 21 t CO_2e/t MS
- Beef
  - 11 to 18 kg CO_2e/kg LWT
- Sheep
  - 6 to 8 kg CO_2e/kg LWT
- Wool
  - 21 to 28 kg CO_2e/kg wool
- Wine
  - 0.6 to 4.7 kg CO_2e/L

- Pigs and poultry
  - Manure management
  - Renewable energy
- Dairy and feedlots
  - 50% is possible
- Extensive grazing
  - 10-20% may be possible
- Wine & perennial hort
  - 100% achievable
- Annual cropping
  - 50% is possible

Wiedeman *et al.* (2015); Browne *et al.* (2011); Alvarez-Hess et al. (2019); Abbott *et al.* (2016)

Three important steps for industry

- Know your baseline
  - A basic farm carbon audit *(or at least know what data to keep)*
  - Supply chain targets are **NOT** requiring your farm to be **zero by** 2030
- Plan the first steps
  - Start with the 'Do-now' / no-regrets strategies
- Carbon credits trading vs low carbon (cannot do not both!!)
  - Get independent advice
  - You may need to **INSET** all your carbon access your supply chain after 2030!

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