

Agricultural emissions, current New Zealand policy and opportunities for “Carbon farming”

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Outline

- Agricultural emissions and the carbon cycle
- NZ's emissions
- The Emissions Trading Scheme (ETS)
 - Current principles
 - Changes to the scheme
- Zero Carbon Bill
- What are other countries doing?



Agricultural emissions and the Carbon cycle

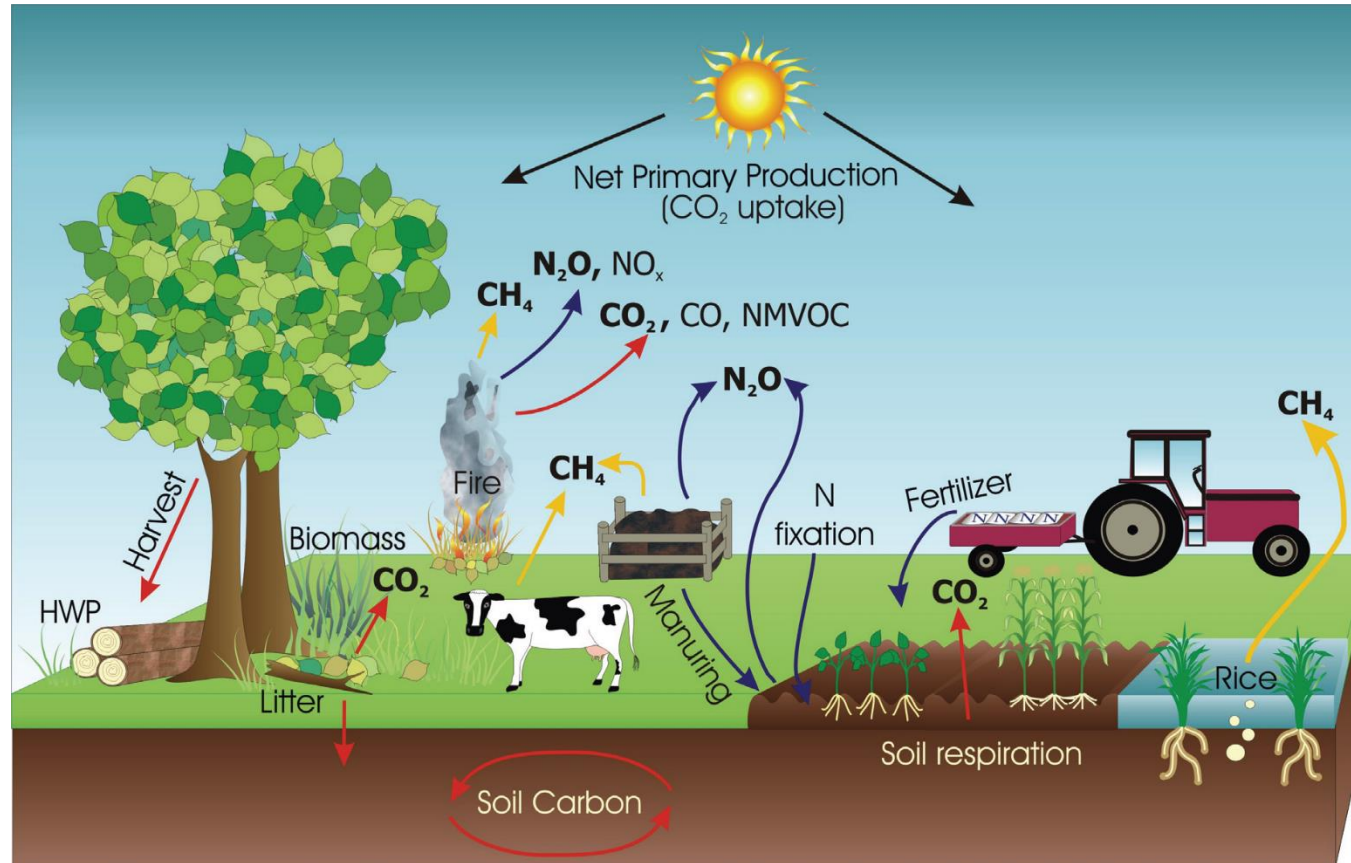


Image: IPCC

Where do livestock emissions come from?

Methane

Enteric fermentation

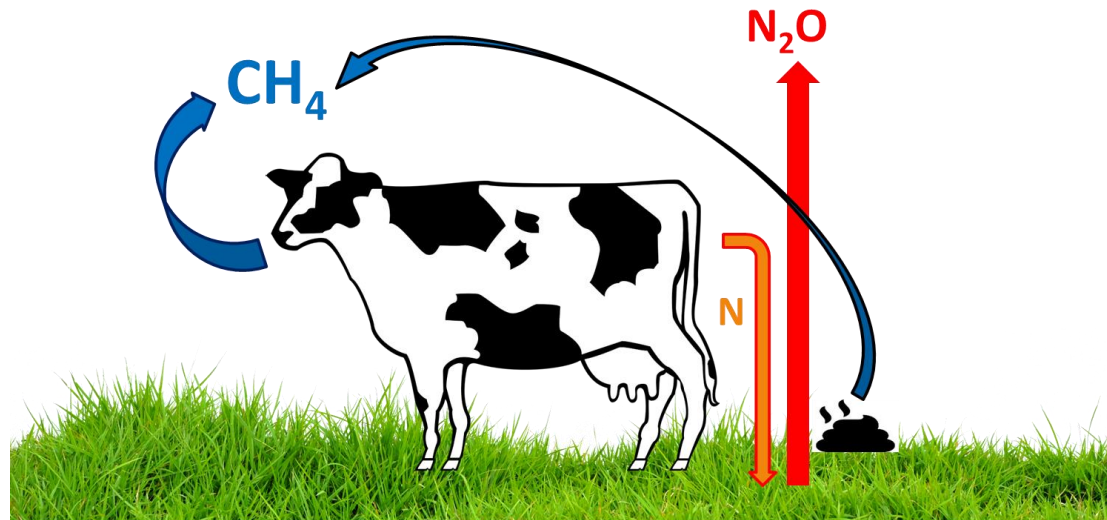
Stored and deposited animal wastes

Nitrous Oxide

Pasture deposited animal wastes

Manure management

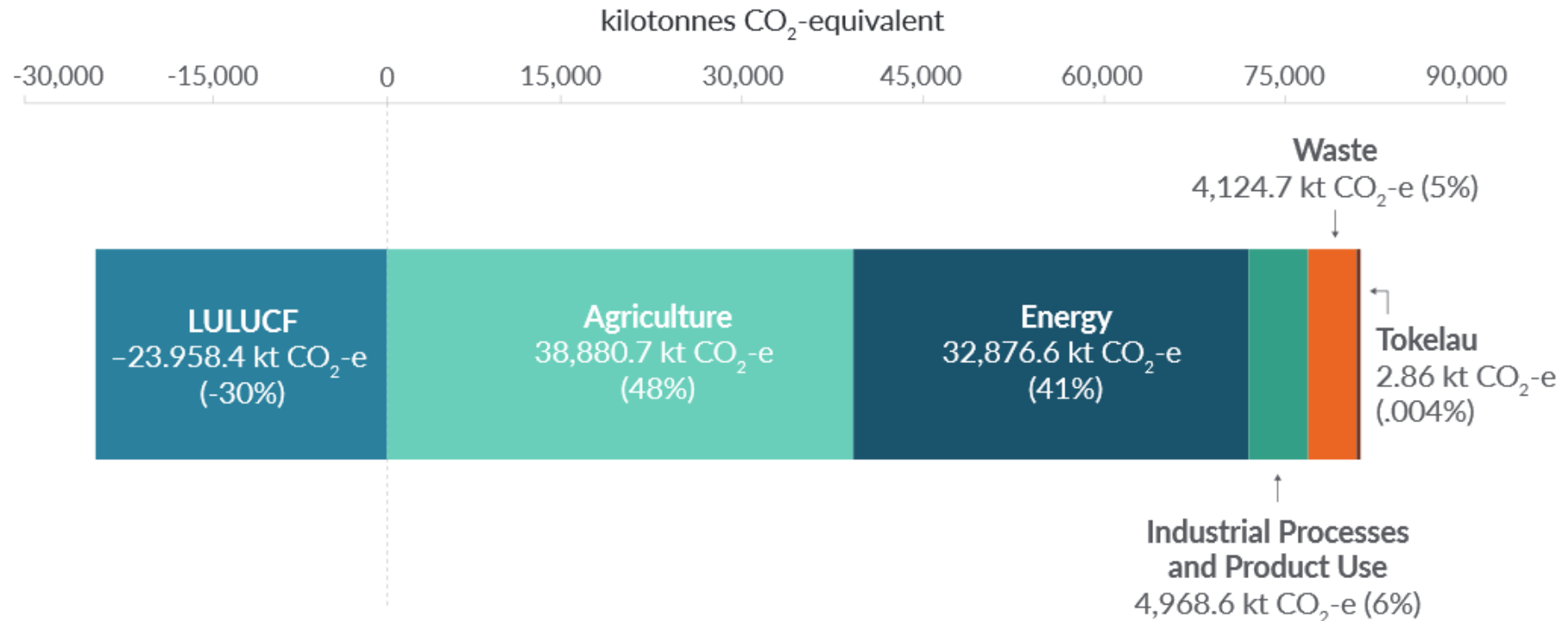
N fertiliser



| <u>Ruminant</u> | <u>Number (2017)</u> |
|-----------------|----------------------|
| Sheep | 27,370,000 |
| Beef | 3,610,000 |
| Dairy | 6,470,000 |
| Deer | 850,000 |

Copyright © 2010 New Zealand Agricultural Greenhouse Gas Research Centre

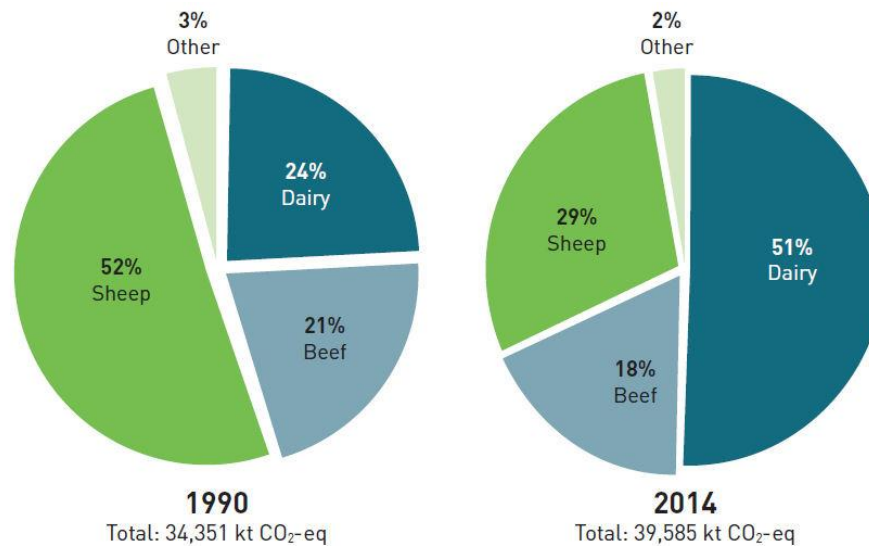
New Zealand's emissions profile in 2017. This graph shows how much each sector contributed to our greenhouse gas emissions



Note: Net emissions from the LULUCF sector are expressed as a negative number because the sector removes more greenhouse gases from the atmosphere than it emits.

https://www.mfe.govt.nz/sites/default/files/media/Climate%20Change/final_greenhouse_gas_inventory_snapshot.pdf

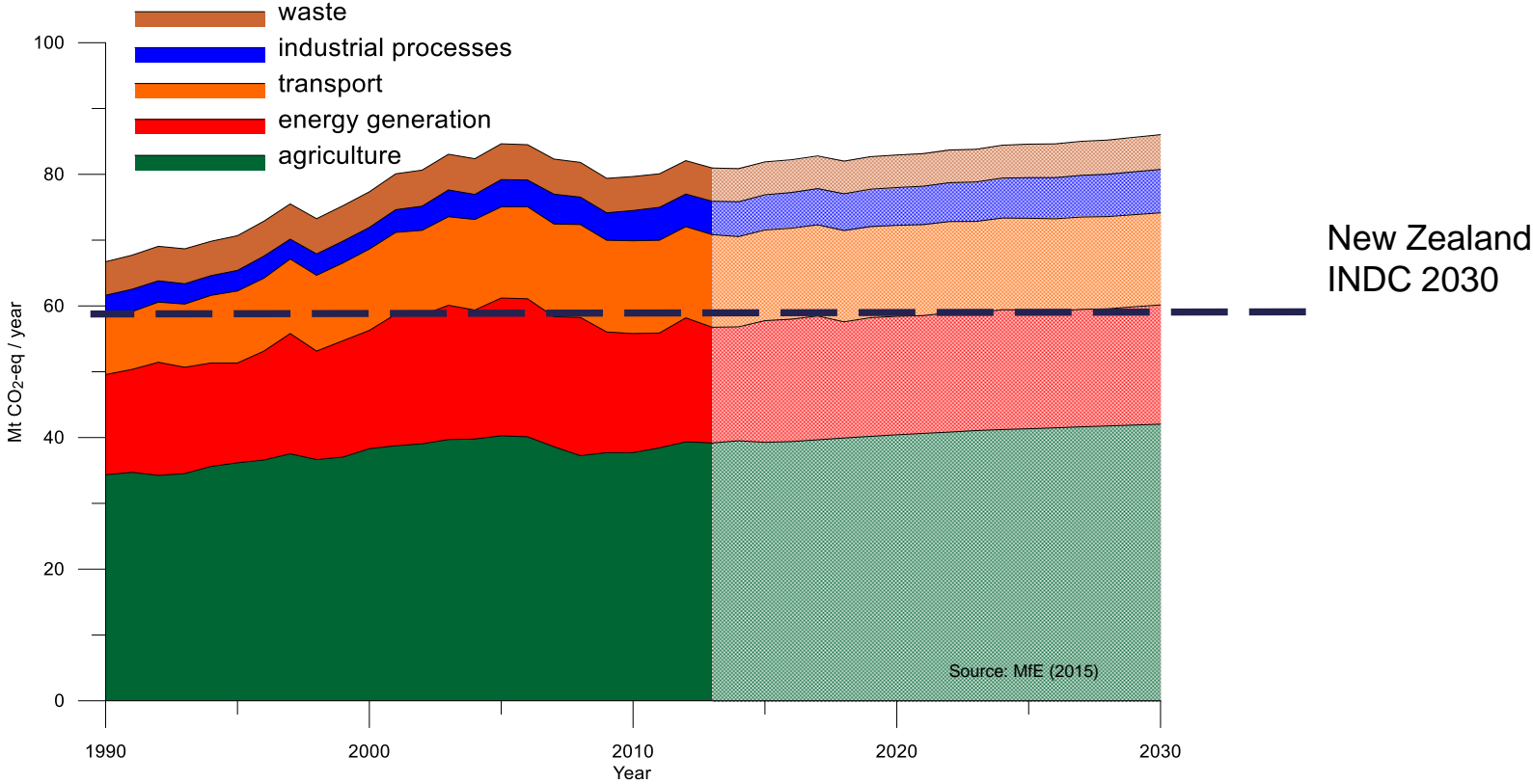
- Between 1990 and 2017 agricultural emissions increased by 13.5%
- Driven by doubling of dairy production and 650% increase in N fertiliser application
- Partially offset by decline in sheep and beef production



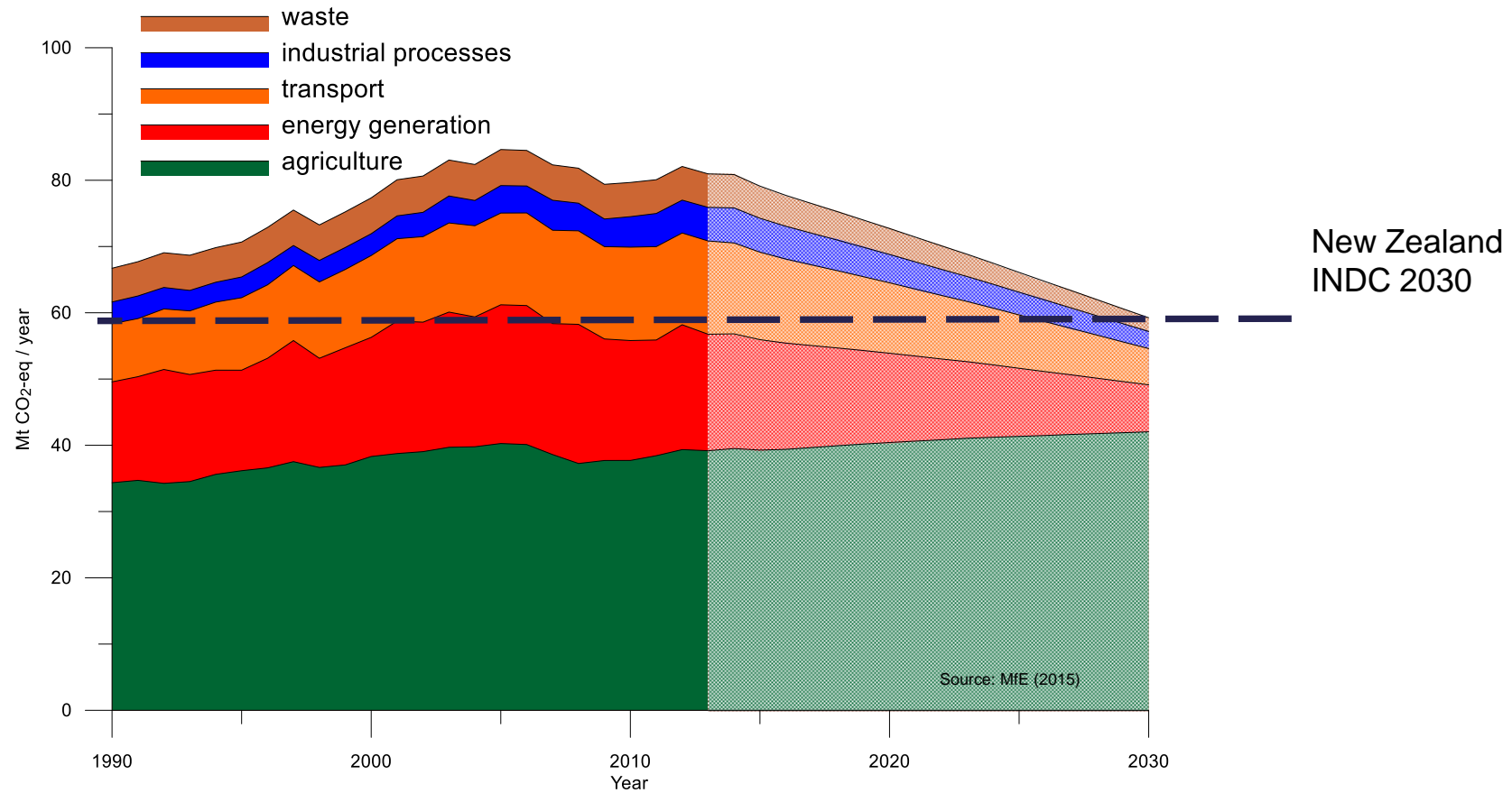
Relative contributions of key agricultural sectors to total agricultural emissions from 1990 to 2014⁵.

Source: New Zealand's Greenhouse Gas Inventory 1990-2014.

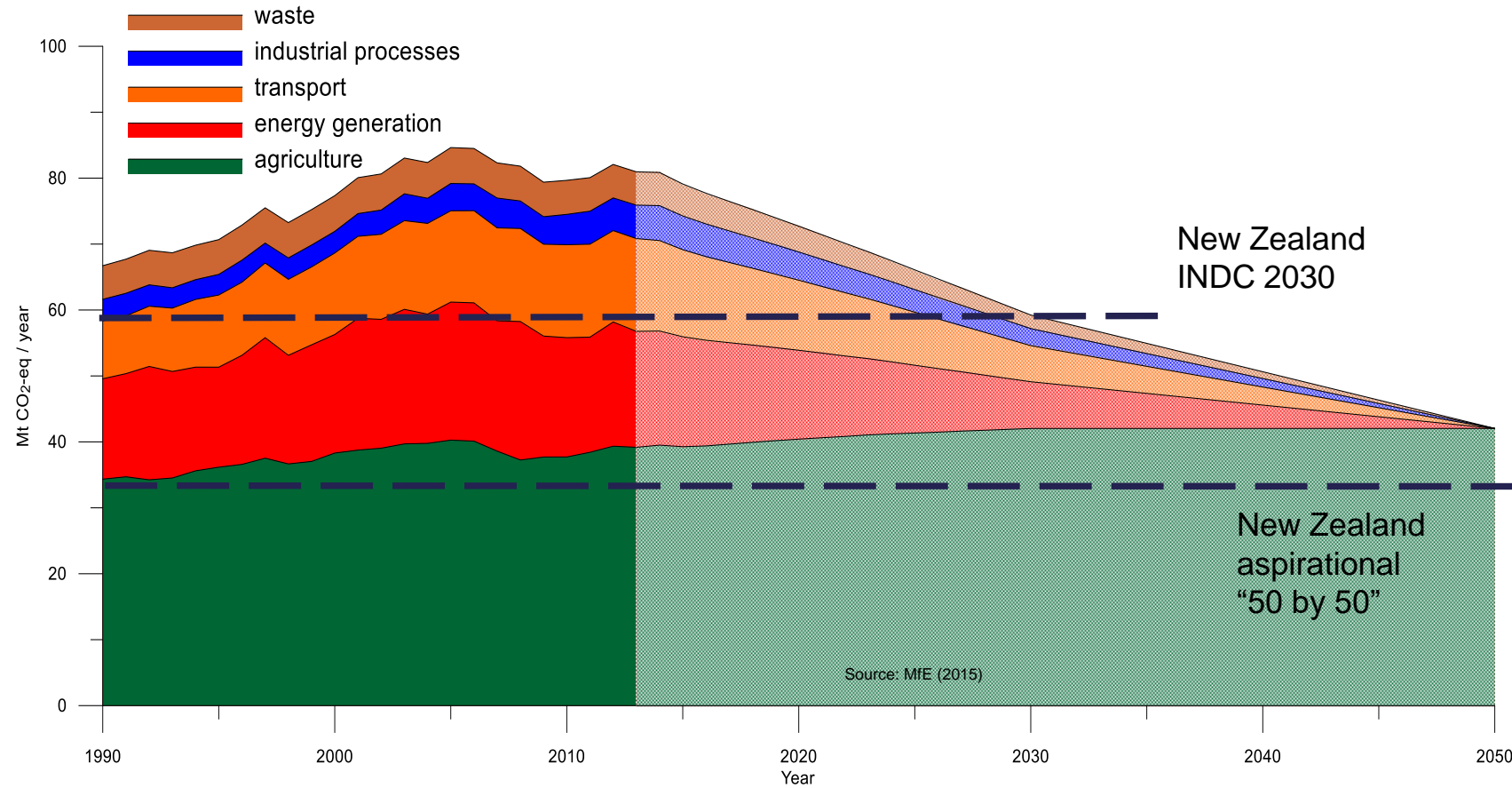
NZ emissions are expected to increase on the back of growing economy and global demand



If agriculture does not make a contribution....



Agriculture becomes even more dominant if other sectors mitigate strongly



What can agriculture do?

- 1) further increases in animal productivity and farm efficiency & implementation of known technologies
- 2) additional technologies that directly seek to reduce emissions
- 3) constraints on the level and types of agricultural activity and movement towards low-emitting land uses



On-farm options to reduce agricultural GHG emissions in New Zealand

Andy Reisinger, Harry Clark, Phil Journeaux, Dave Clark, Greg Lambert



How to reduce agricultural emissions?

- Nitrous Oxide (N₂O)

- Reduce amount of N excreted (eg. Through diet)
- Targetted and efficient N fertiliser application
- Increase N use efficiency (eg. Grazing management or N inhibitors)
- Avoid soil conditions that favour denitrification (eg. Improve drainage and avoid compaction)
- Many co-benefits



How to reduce agricultural emissions?

- Methane (CH₄)

- Reduce animal numbers
- Methane vaccines
- Feed additives
- Forage/feed composition
- Efficiency



New Zealand's (current) approach to emissions reduction

- An evolving situation!
- Currently Emissions Trading Scheme (ETS) main tool for reducing emissions
- Doesn't include agriculture
- Trees



What is currently eligible for Carbon credits under the ETS

Eligible

- Forests planted after 1990
- Greater than 1ha, wider than 30m, potential to reach 5m at maturity

Not eligible

- **Individual trees and shelterbelts:** data and measurement ability (but these criteria could be refined - but could then also work the other way for tree removals)
- **Soil carbon:** insufficient evidence
- **Grass** does not sequester Carbon as it is short-lived



Soil Carbon

- Variable and complex:

- Different soil types store different amounts of C
- Variation even within a single paddock
- Each layer (horizon) will store different amounts of C



- Measured through sampling, modelling and gas exchange measurements
- As well as soil type, land use, management and climate affect C storage
- In current inventory calculations, C changes only through landuse change

New Zealand policy and mechanism development

- Zero Carbon Amendment Bill:
- Reduce emissions of biogenic methane within the range of **24–47 per cent below 2017 levels by 2050** including to **10 per cent below 2017 levels by 2030**.
- Call for public submissions later in year
- Interim Climate Change Committee report on how surrender obligations could best be arranged if agricultural methane and nitrous oxide emissions enter into the NZETS.
- Delivered its reports, including evidence, analysis and recommendations to Government on Tuesday, 30 April 2019. The Government will release the reports once it has had the opportunity to consider them and prepare a response.
- Watch this space...

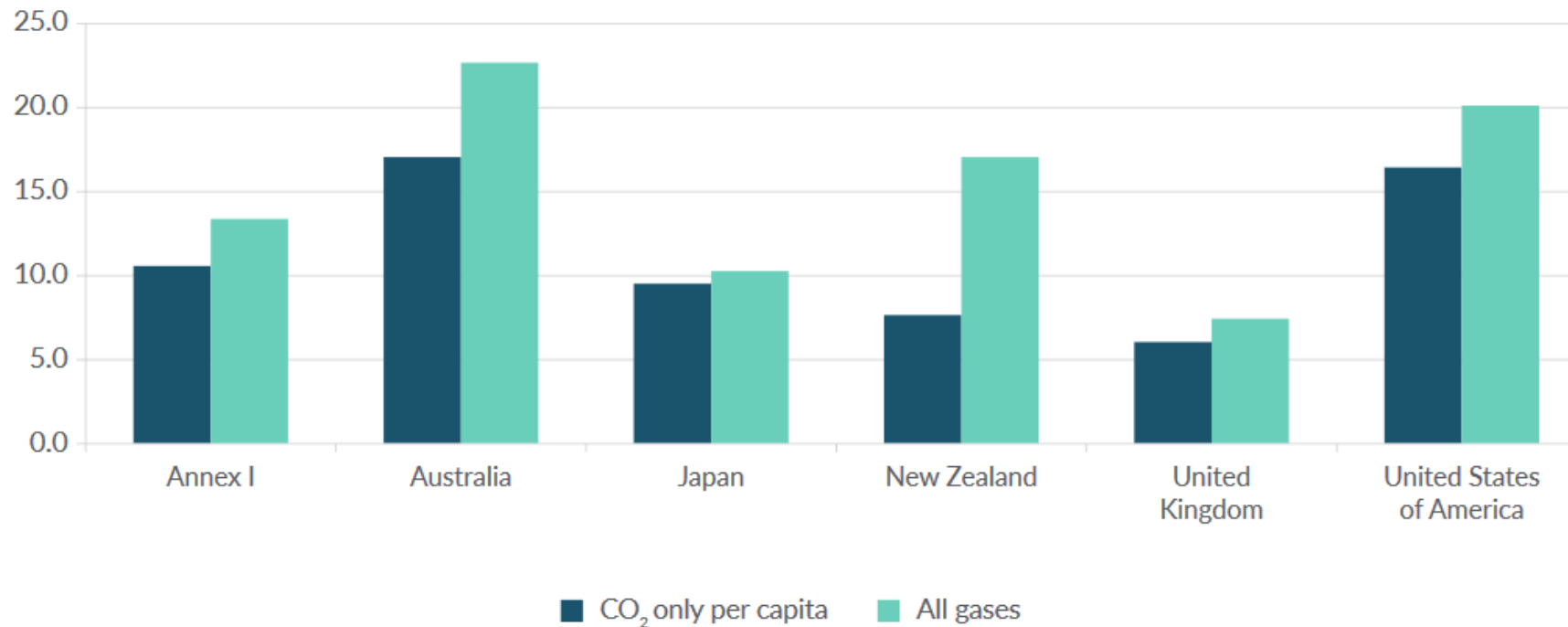


How are other countries tackling their agricultural emissions?

- Looking at NZ for leadership
- Agricultural emissions not so important for other developed countries (other than Ireland) as agriculture makes up much less of their total emissions

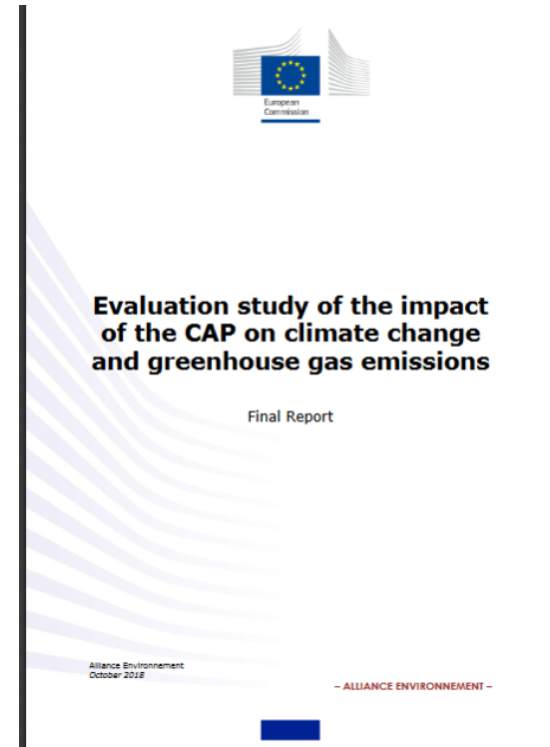


International comparisons for per capita emissions in 2016



Other countries

- Some incentives through agricultural policy (e.g. Common Agricultural Policy)
- Extension
- No pricing of agricultural emissions elsewhere yet



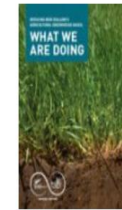
Further resources

- New Zealand Agricultural GHG Research Centre www.nzagrc.org.nz
- Pastoral GHG Research Consortium <https://www.pggrc.co.nz/>

FACTS & FIGURES



Methane inhibitors



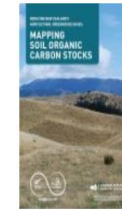
What we are doing
(edition 2)



How we measure emissions
(edition 2)



Agricultural GHG research
funding in New Zealand



Mapping soil organic carbon
stocks



Efficiency in the whole farm
system



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