

# National Inventory estimates of Agriculture and Land Use GHG emissions 1990-2016



Phillip O'Brien  
Climate Change Unit  
03<sup>rd</sup> April 2020

# Intergovernmental Panel on Climate Change Special Report on Warming of 1.5 Degree

- Every bit of warming matters •
- Every year matters •
- Every choice matters •

# Intergovernmental Panel on Climate Change Special Report on Climate and Land

Land is where we live

Land is under  
growing human  
pressure

Land is a part  
of the solution

But land can't  
do it all

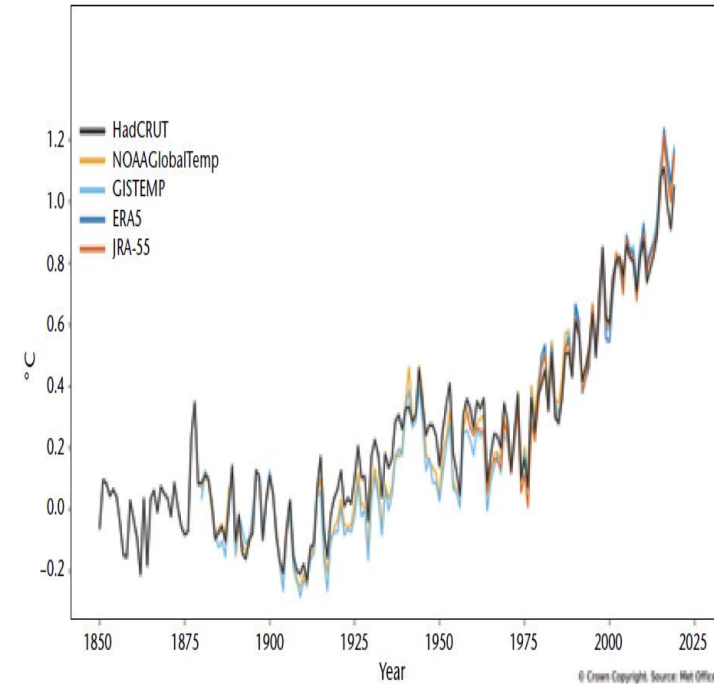
ipcc  
INTERGOVERNMENTAL PANEL ON climate change  
WFP UNHCR

# Global perspective

## Where are we now?

Since pre-industrial times, human activities have caused approximately 1°C of global warming.

- Already seeing consequences for people, nature and livelihoods
- At current rate, would reach 1.5°C between 2030 and 2052
- Past emissions alone do not commit the world to 1.5°C



ipcc

INTERGOVERNMENTAL PANEL ON climate change



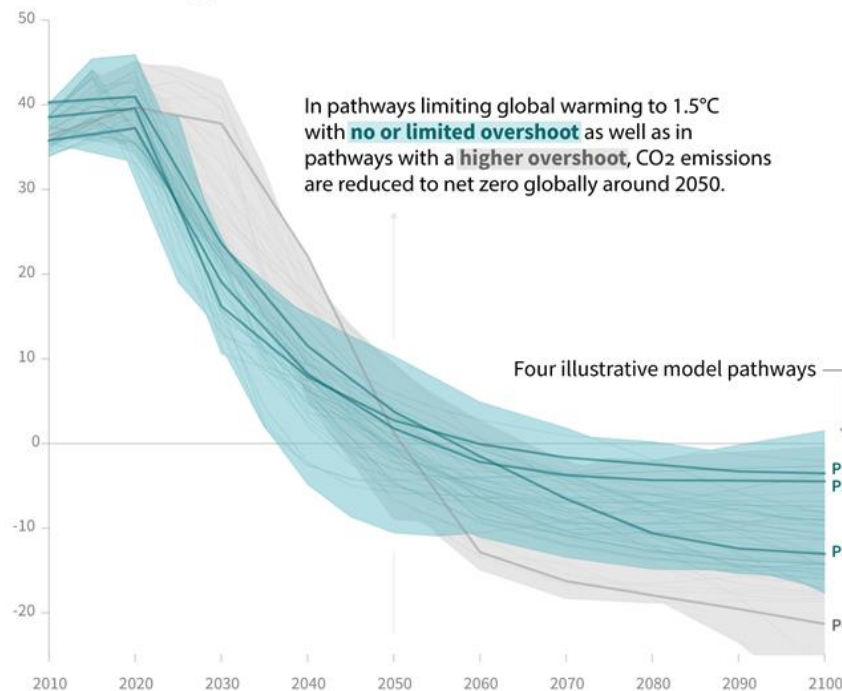
## Greenhouse gas emissions pathways

- Limiting warming to 1.5°C would require changes on an unprecedented scale
  - Deep emissions cuts in all sectors
  - A range of technologies
  - Behavioural changes
  - Increased investment in low carbon options
- We would need to start taking carbon dioxide out of the atmosphere

# Global perspective

## Global total net CO<sub>2</sub> emissions

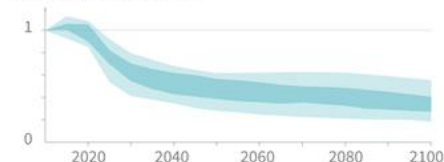
Billion tonnes of CO<sub>2</sub>/yr



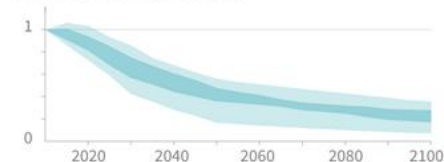
## Non-CO<sub>2</sub> emissions relative to 2010

Emissions of non-CO<sub>2</sub> forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

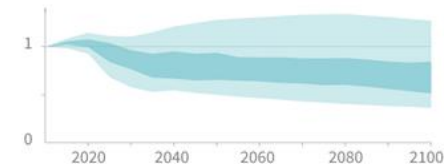
### Methane emissions



### Black carbon emissions



### Nitrous oxide emissions



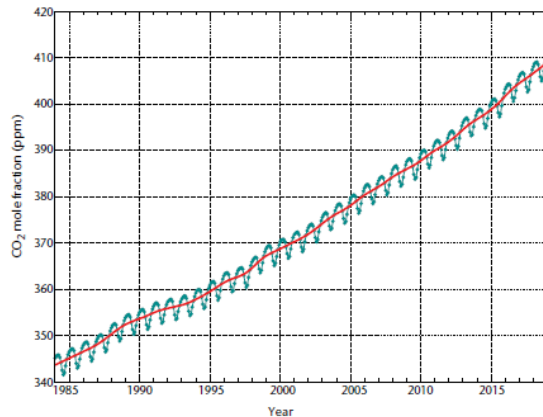
CO<sub>2</sub> emissions are negative  
CH<sub>4</sub> and N<sub>2</sub>O emissions reduce



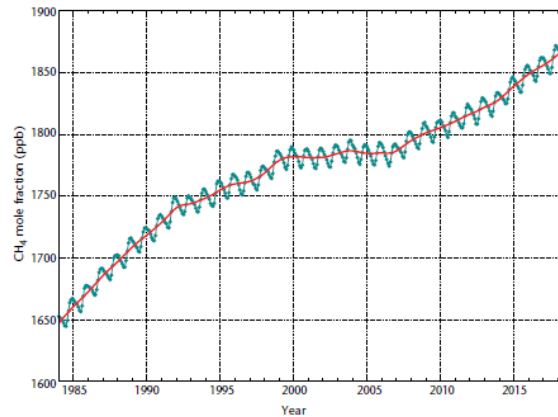
# Global perspective

- The concentration of the major GHGs in the atmosphere is increasing (WMO, 2019)

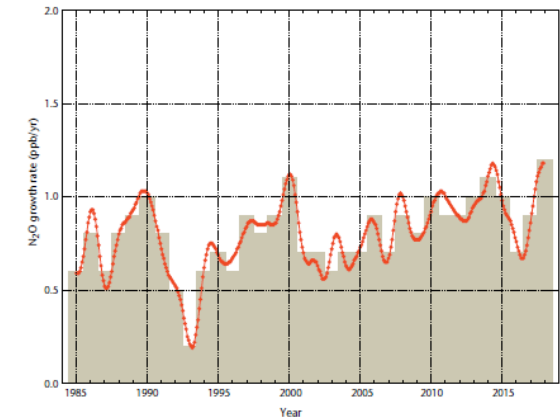
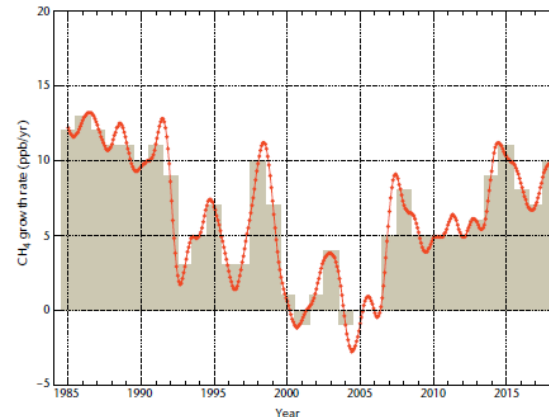
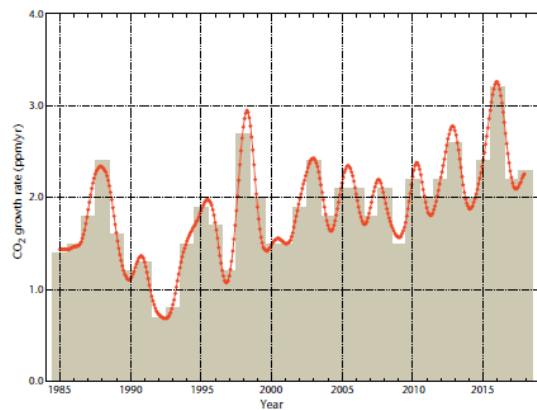
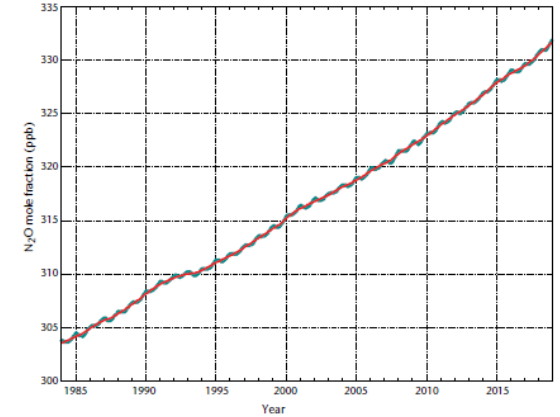
## Carbon Dioxide



## Methane

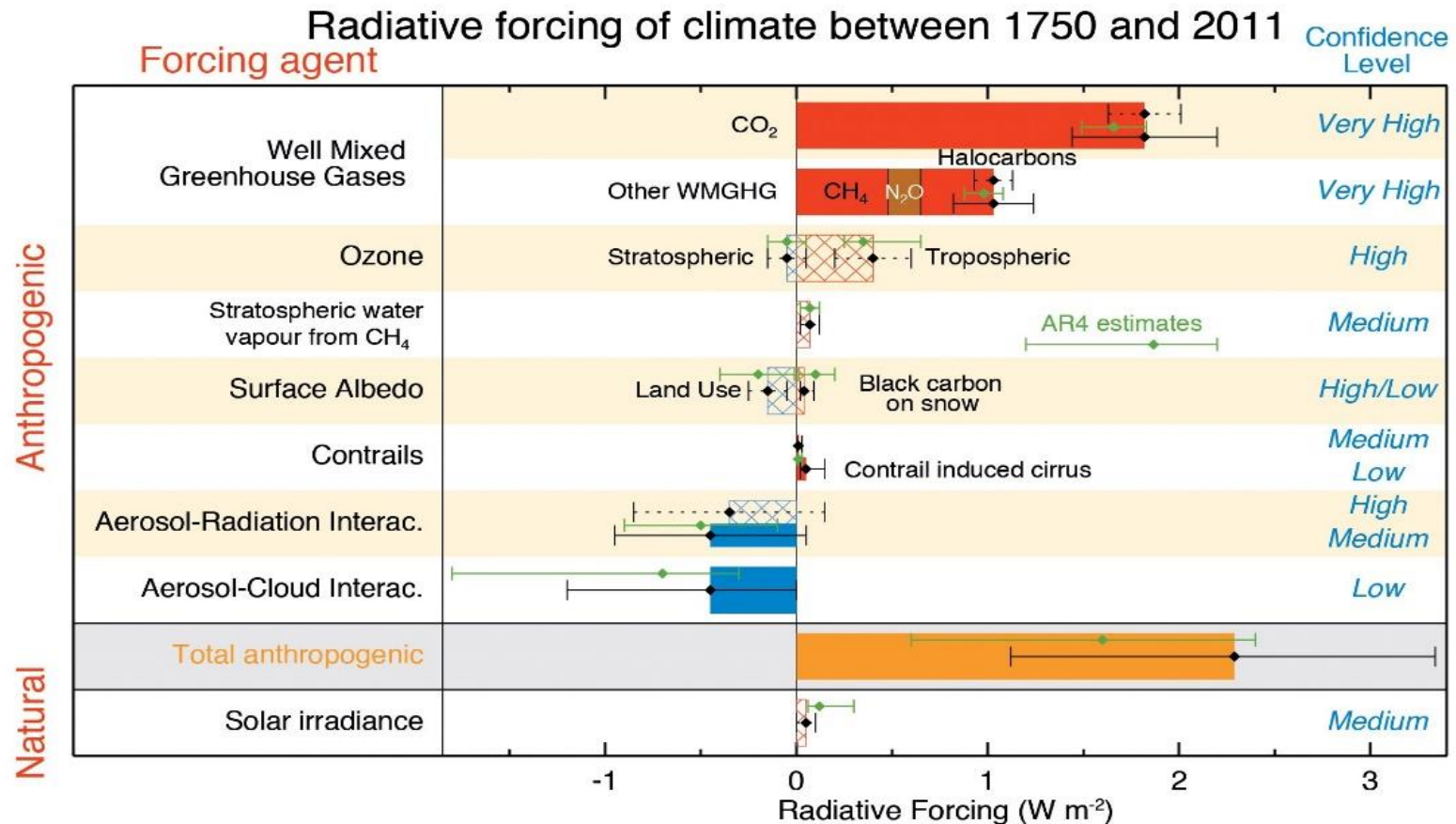


## Nitrous Oxide



# Global Perspective

- Extra energy leading to warming
- Approx 30% due to  $\text{CH}_4$  and  $\text{N}_2\text{O}$



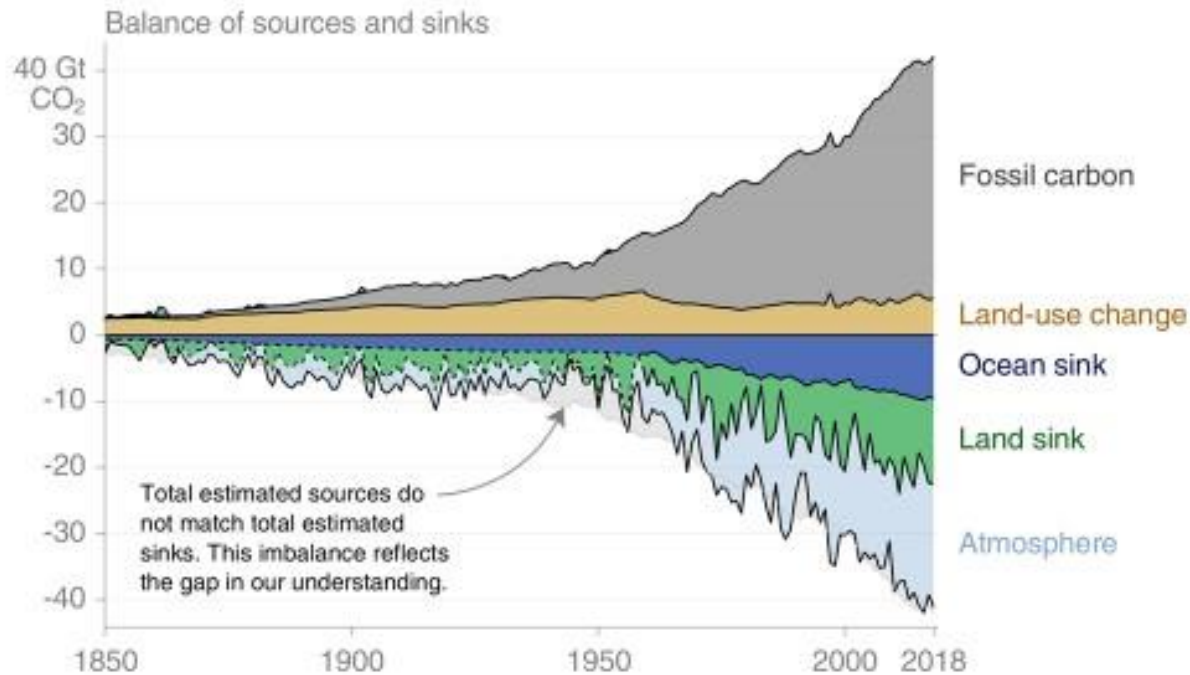


# Global Perspective



## Global carbon budget

Carbon emissions are partitioned among the atmosphere and carbon sinks on land and in the ocean  
The “imbalance” between total emissions and total sinks reflects the gap in our understanding



© Global Carbon Project • Data: CDIAC/GCP/NOAA-ESRL/UNFCCC/BP/USGS

Source: [CDIAC](#); [NOAA-ESRL](#); [Houghton and Nassikas 2017](#); [Hansis et al 2015](#); [Joos et al 2013](#); [Khatriwala et al. 2013](#); [DeVries 2014](#); [Friedlingstein et al 2019](#); [Global Carbon Budget 2019](#)

## Fate of anthropogenic CO<sub>2</sub> emissions (2009–2018)



34.7 GtCO<sub>2</sub>/yr  
**86%**



**14%**  
5.5 GtCO<sub>2</sub>/yr

17.9 GtCO<sub>2</sub>/yr  
**44%**



**29%**  
11.5 GtCO<sub>2</sub>/yr



**23%**  
9.2 GtCO<sub>2</sub>/yr



Budget Imbalance:

(the difference between estimated sources & sinks)

**4%**

1.6 GtCO<sub>2</sub>/yr

# Global Perspective

## GLOBAL METHANE BUDGET



TOTAL EMISSIONS

558  
(540-568)

TOTAL SINKS

548  
(529-555)

CH<sub>4</sub> ATMOSPHERIC  
GROWTH RATE  
**10**  
(9.4-10.6)

105  
(77-133)

188  
(115-243)

34  
(15-53)

167  
(127-202)

64  
(21-132)

515  
(510-583)

33  
(28-38)

Fossil fuel  
production and use

Agriculture and waste

Biomass  
burning

Wetlands

Other natural  
emissions

Geological, lakes, termites,  
oceans, permafrost

Sink from  
chemical reactions  
in the atmosphere

Sink in soils

### EMISSIONS BY SOURCE

In million-tons of CH<sub>4</sub> per year (Tg CH<sub>4</sub> / yr), average 2003-2012

Anthropogenic fluxes

Natural fluxes

Natural and anthropogenic



# The national perspective

- The emissions inventory is submitted to the UN in Mid-April
- Figures presented here are provisional
- Do not cite
- The projections of the impact of the measures in the Climate Action Plan are not available yet

# National Inventory estimates of GHGs All Sectors 1990-2018

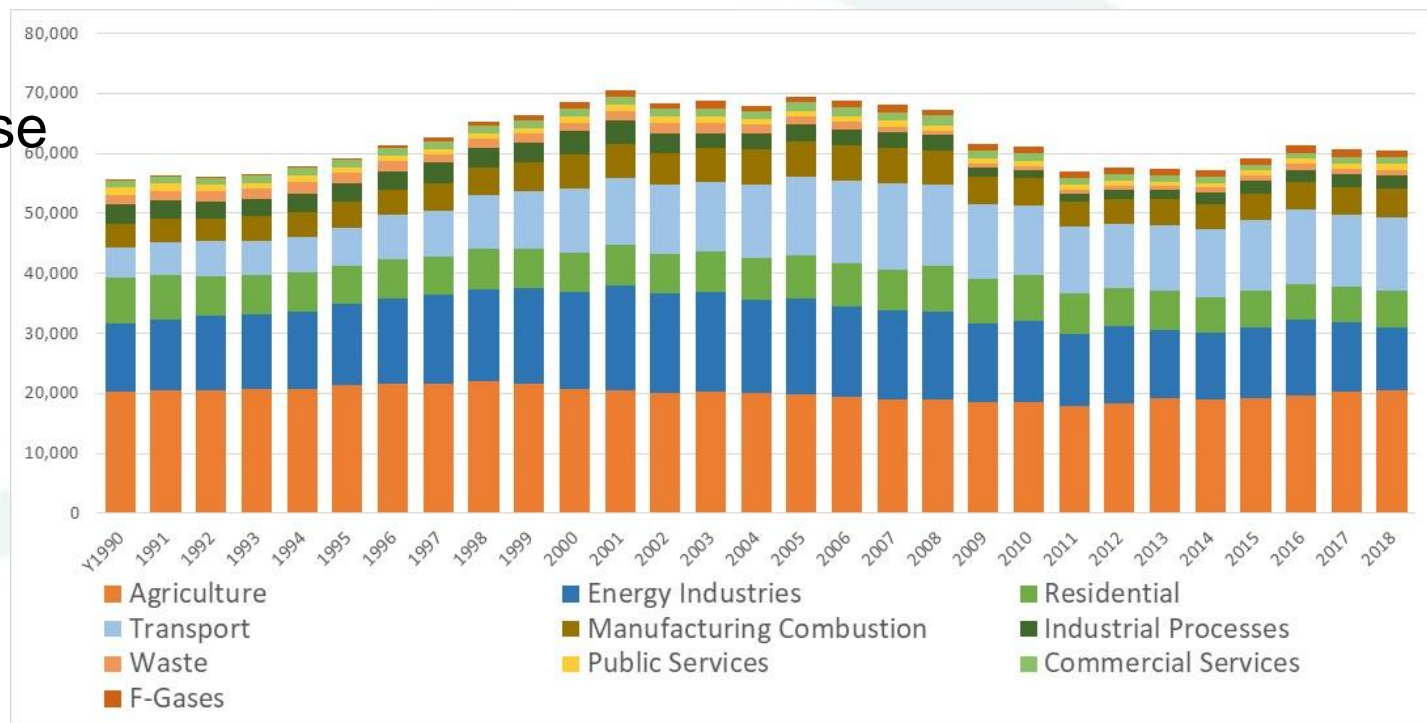
A little good news

Large decrease Electricity

+9.2% 1990

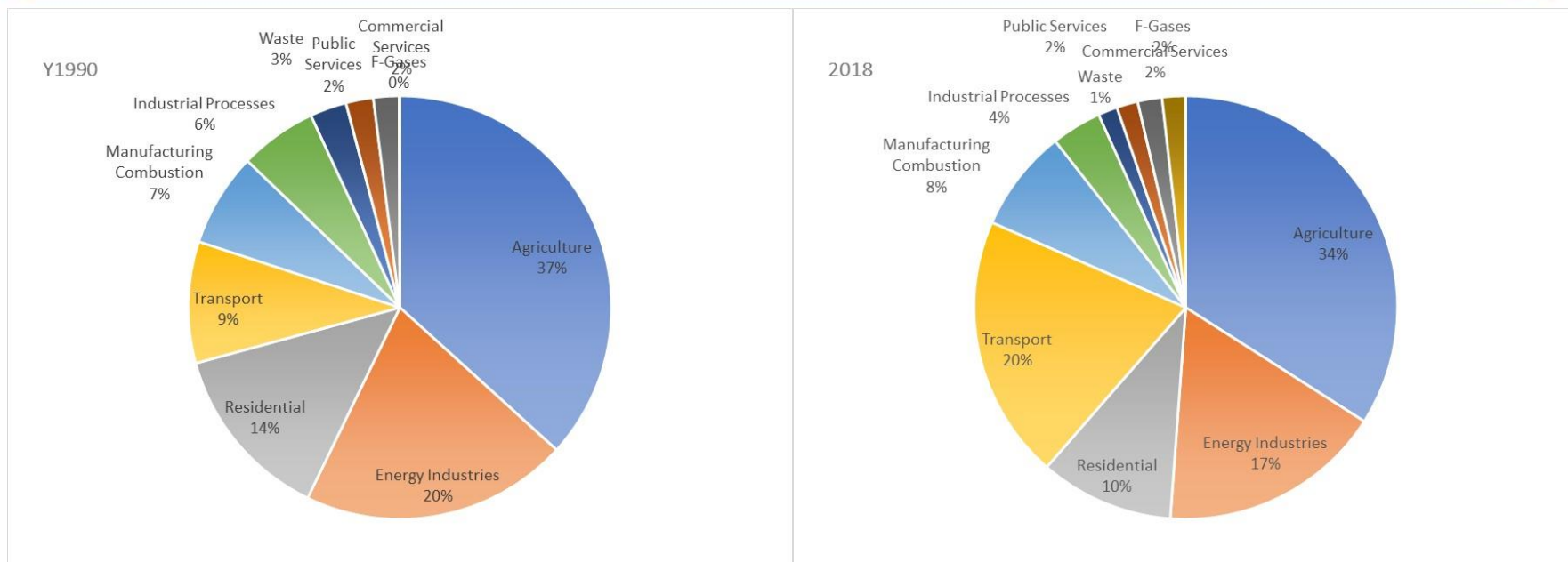
-13% 2005

-0.2% 2017





# National Inventory estimates of GHGs All Sectors 1990-2018



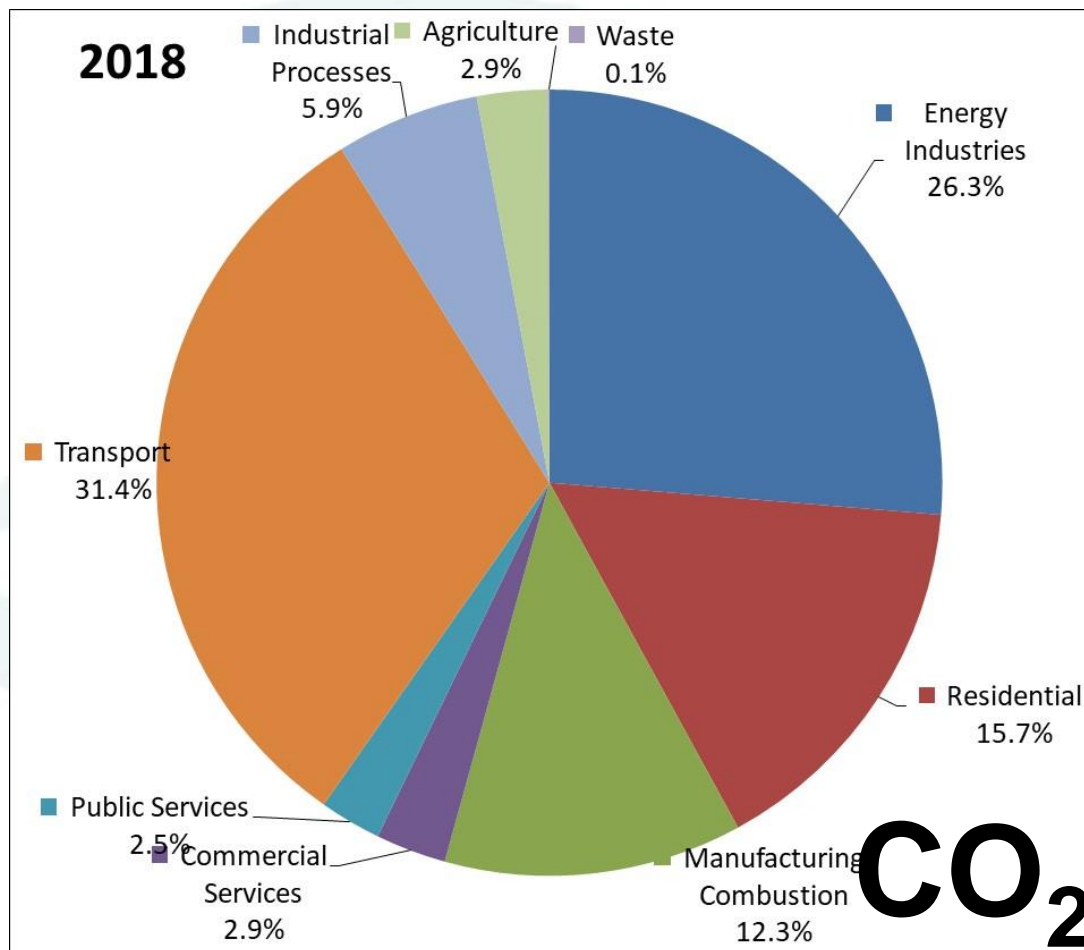
- Agriculture remains the largest share of emissions 34%
- Transport has overtaken Electricity Generation as the 2<sup>nd</sup> largest



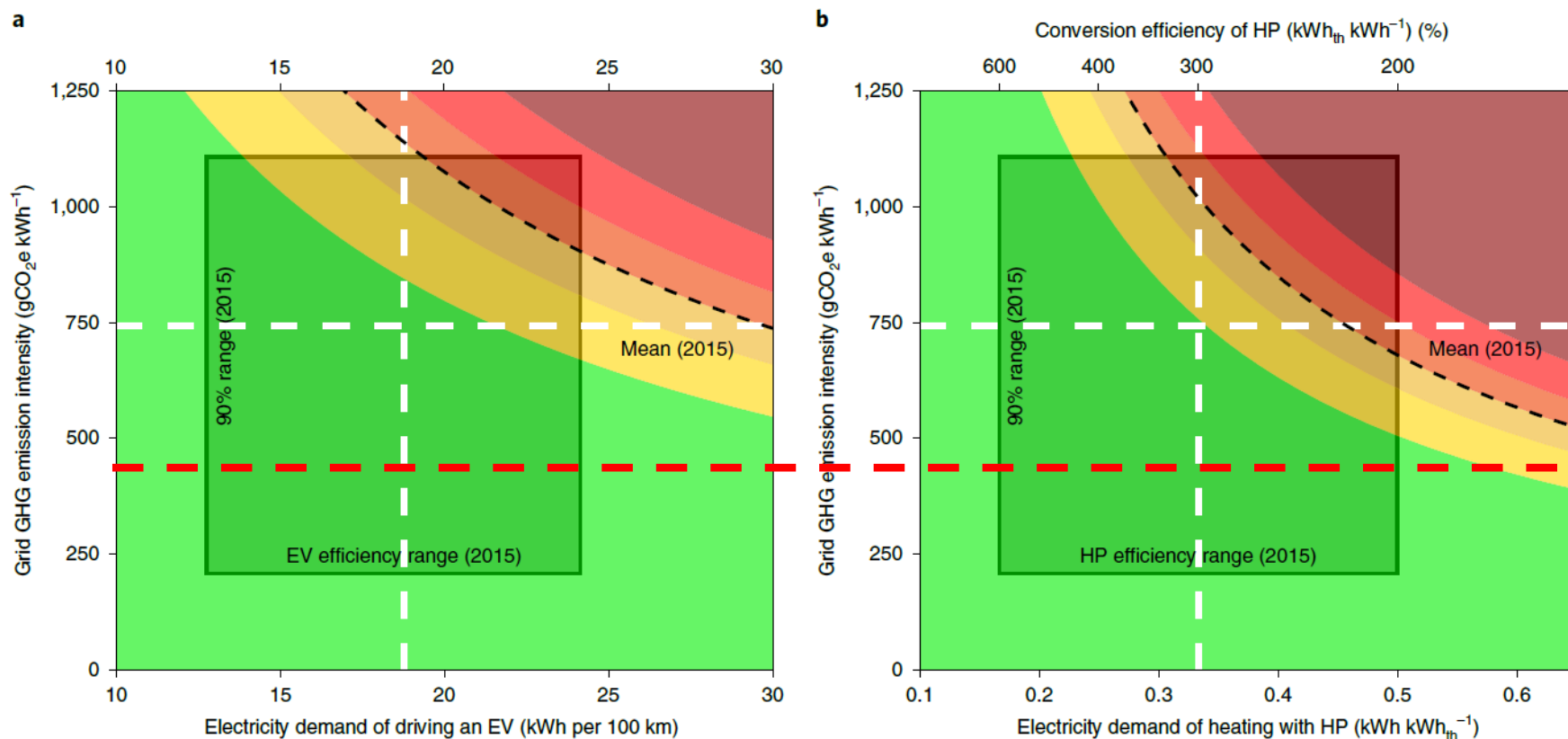
# Carbon Dioxide emissions by Sector

- Direct Fossil Fuel use
- Exclude impact of land use

Indirectly agriculture and the wider rural economy impact emissions in the other sectors



# Aside on Electric Vehicles and Heat Pumps



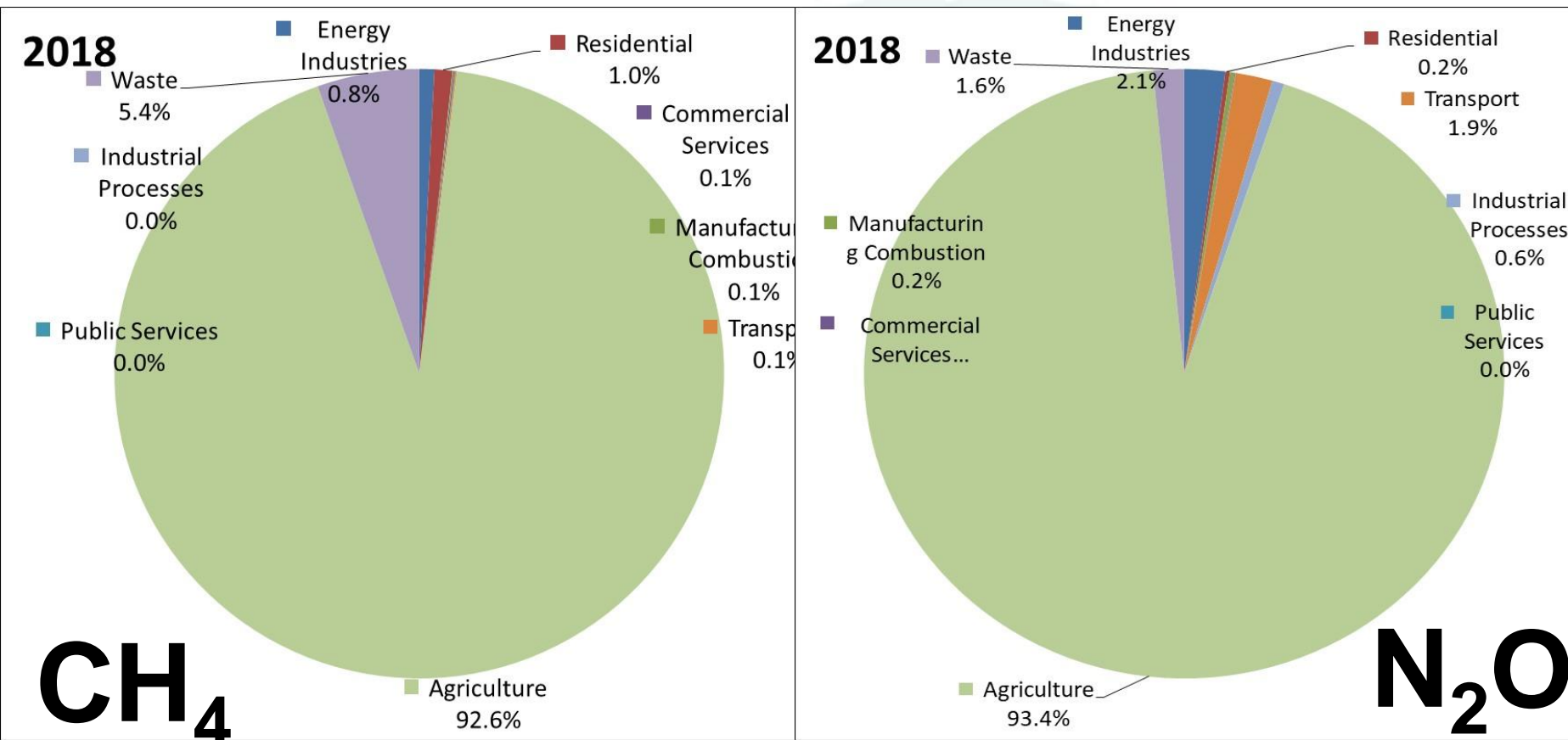
Resulting life-cycle GHG emission intensity of EVs/HPs is



of that of newly sold petrol cars/fossil boilers in 2015 (distribution of average global sales)

Red line is the GHG intensity of Ireland Electricity in 2019

# Methane and Nitrous Oxide emissions by Sector



# EU Climate and Energy Package

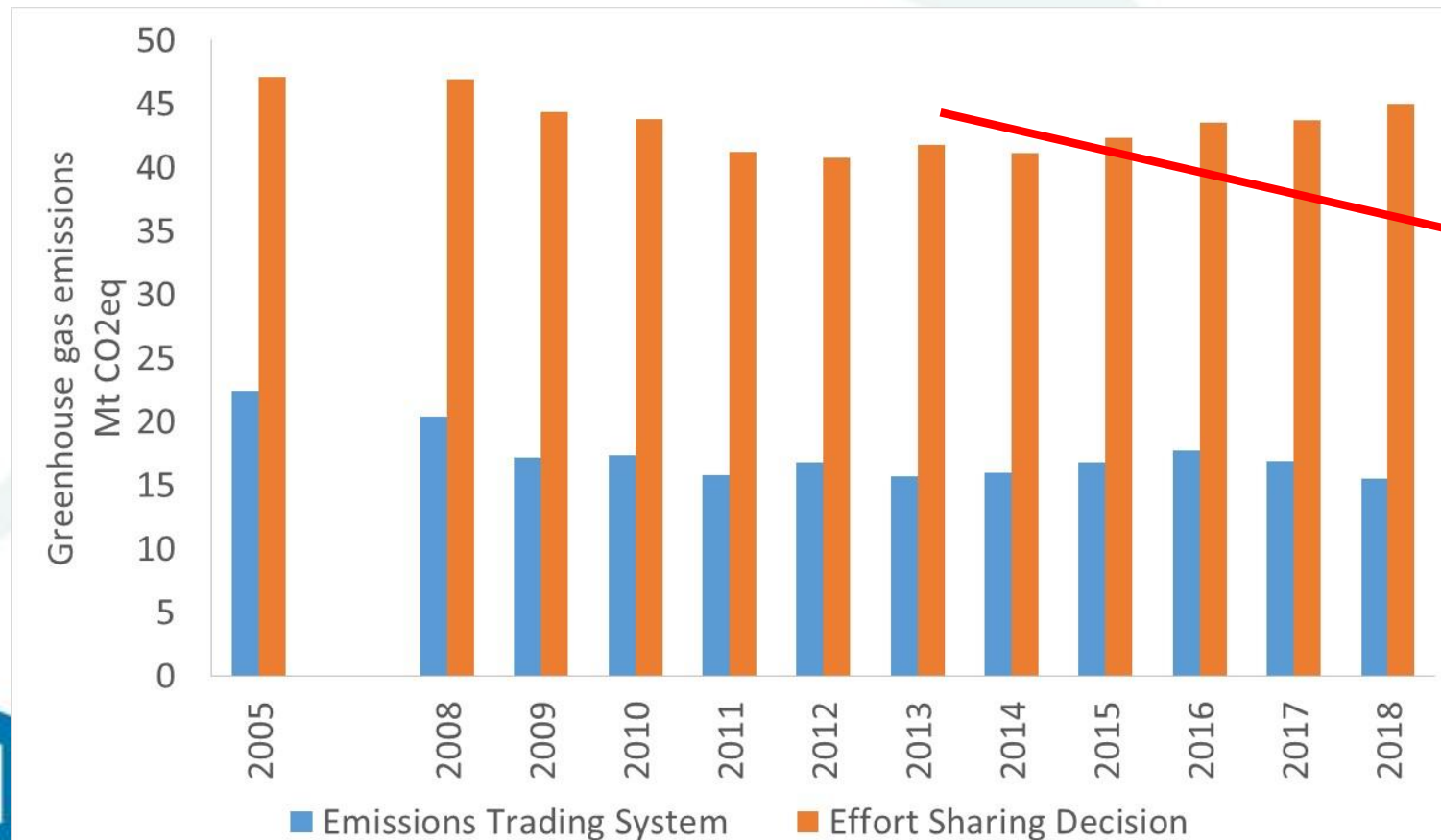
## ETS and ESD(R)

- Ireland's response to climate change is framed in the context of the EU's collective response
- Three Pillars
  - Emissions Trading System: Large Industry, Power generation ~45% of EU approx. 26% of Ireland's emissions, ~ 100 facilities  
Businesses auction for a limited number of allowances to emit GHGs.
  - Effort Sharing Decision (Regulation): Agriculture, Transport, Residential/Commercial Heat, Waste etc.  
Each Member State has a target for emissions reduction  
Ireland: 20% by 2020 relative to 2005  
30% by 2030 relative to 2005
  - LULUCF decision: from 2021 onwards, a limited amount of the sink achieved in land use can be used to meet the ESR target

# EU Climate and Energy Package

## ETS and ESD(R)

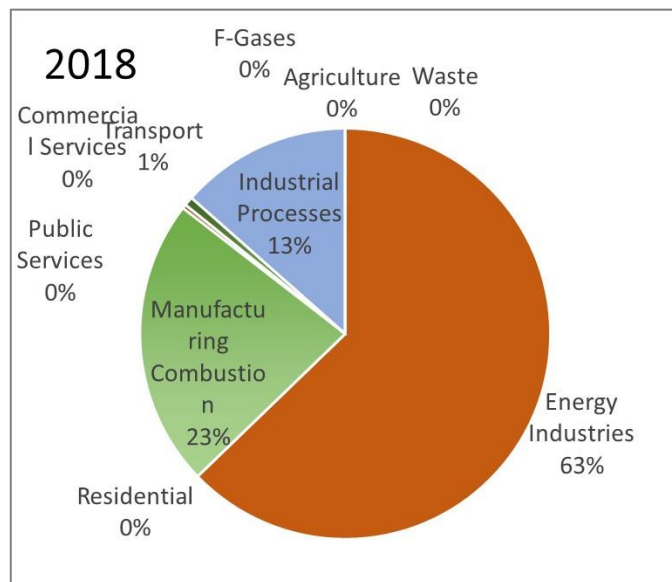
- The Emissions Trading System covers just 26% of total national emissions, down from 32% in 2005



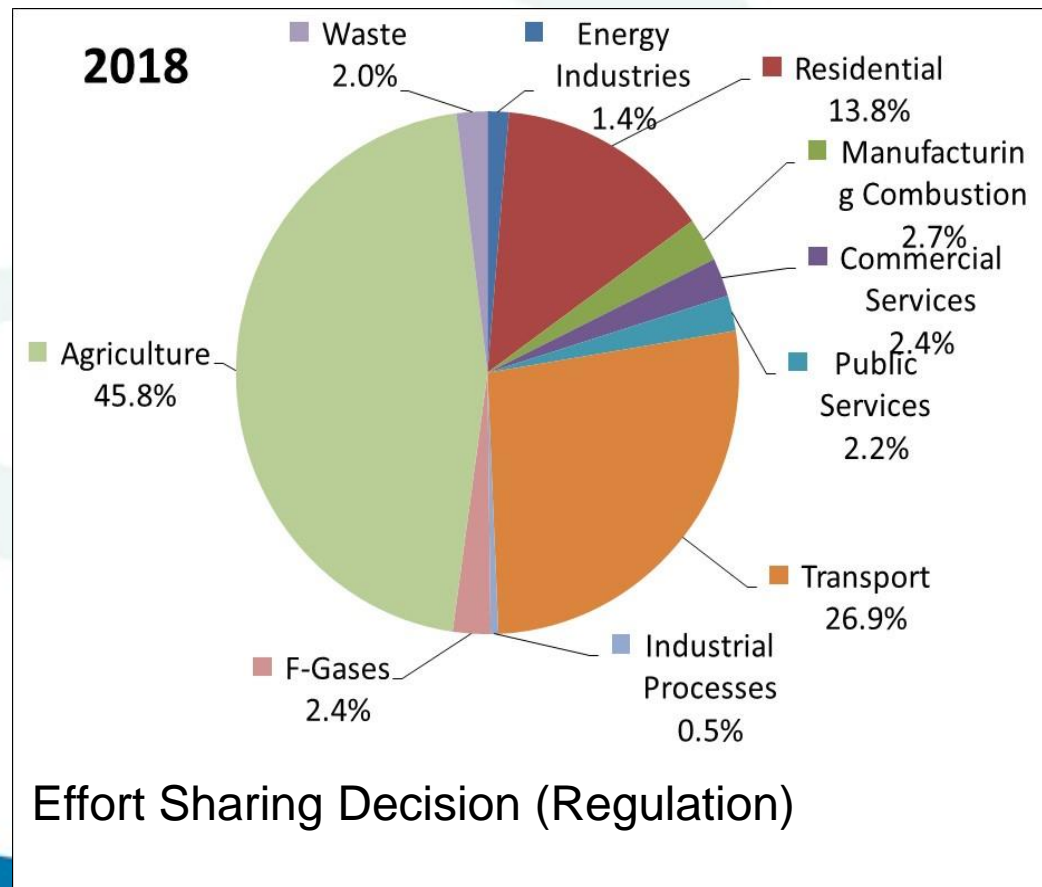
# EU Climate and Energy Package

## ETS and ESD(R)

- Ireland's response to climate change is framed in the context of the EU's collective response



Emissions Trading System

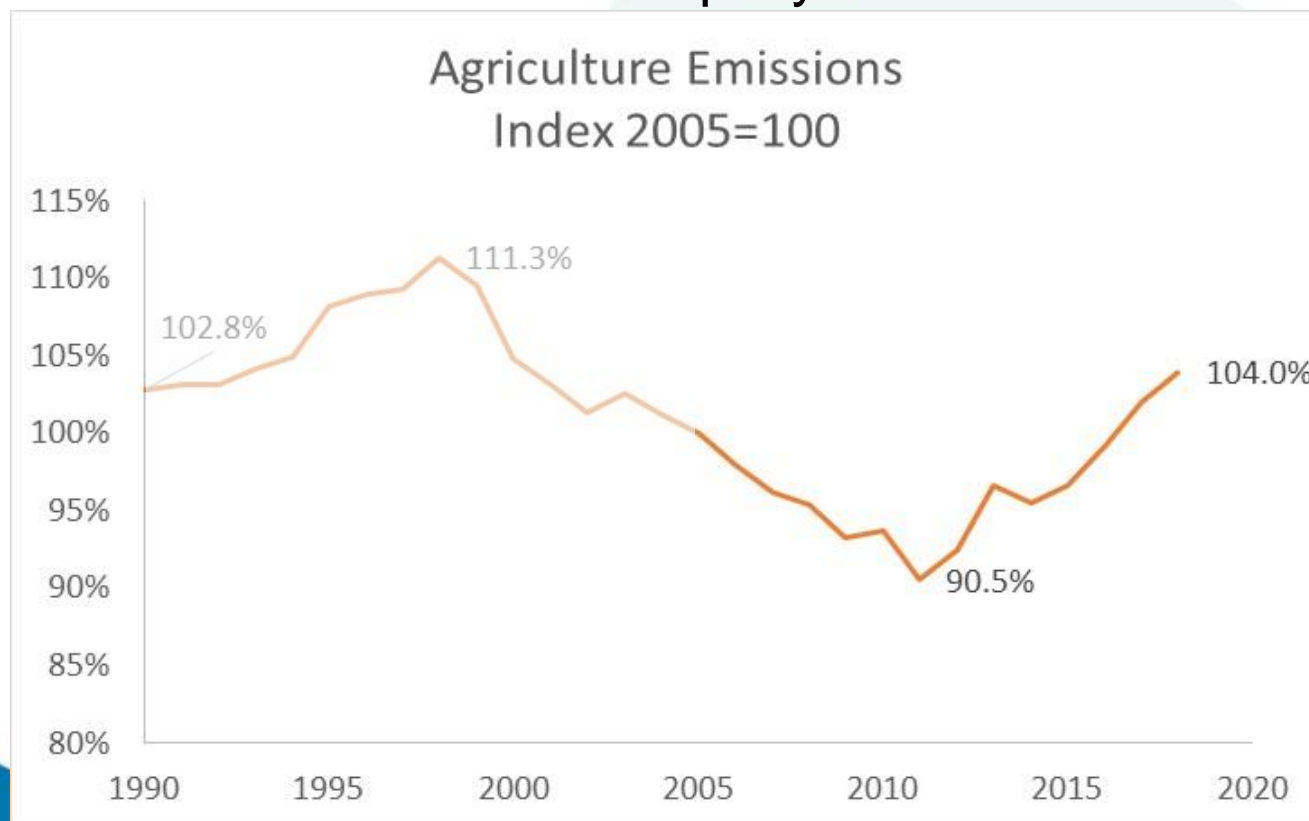


Effort Sharing Decision (Regulation)

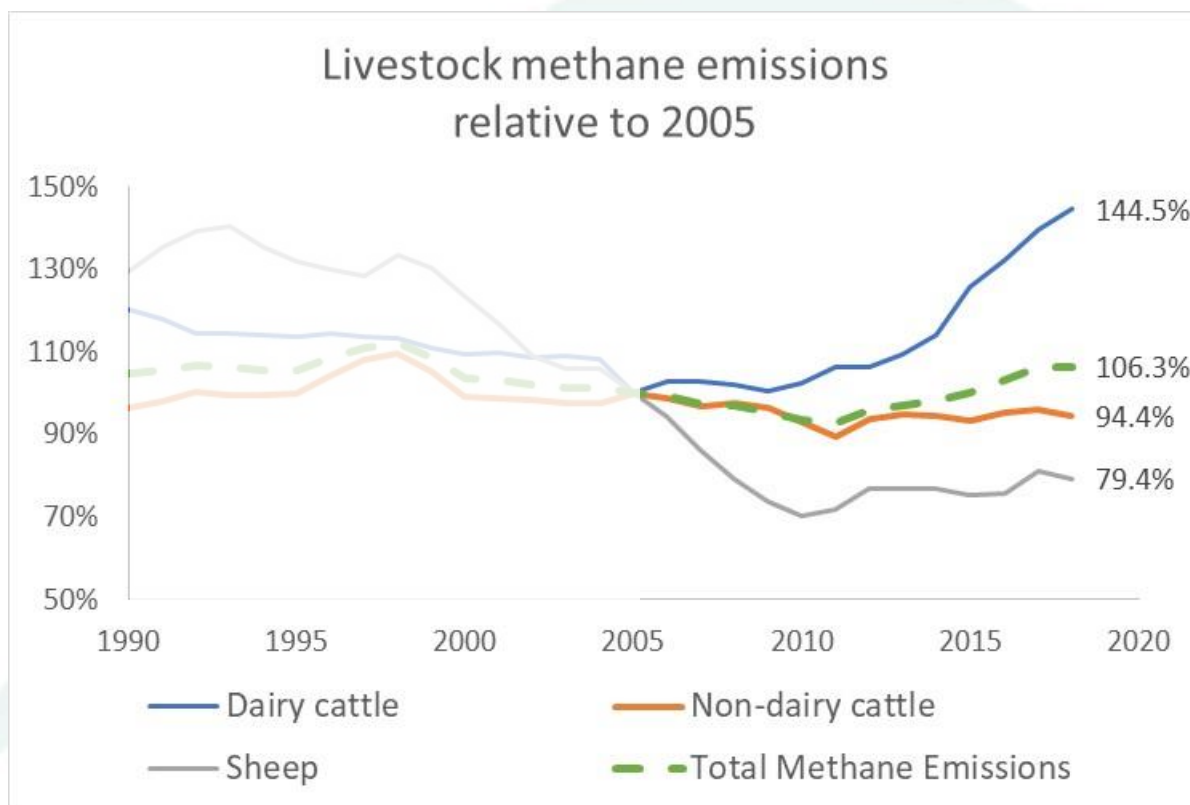


# Agriculture emissions

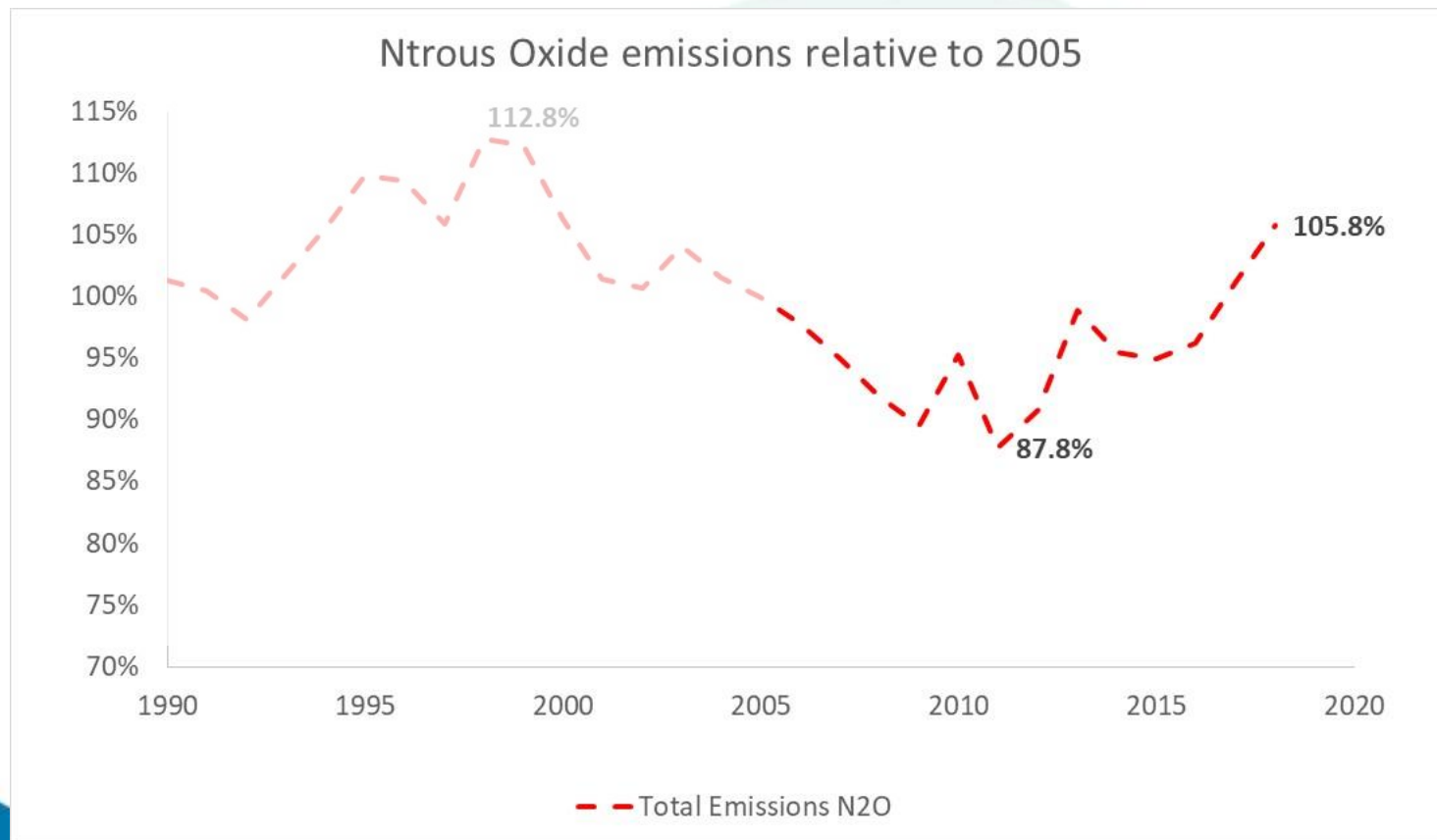
- Emissions have increased rapidly since 2011



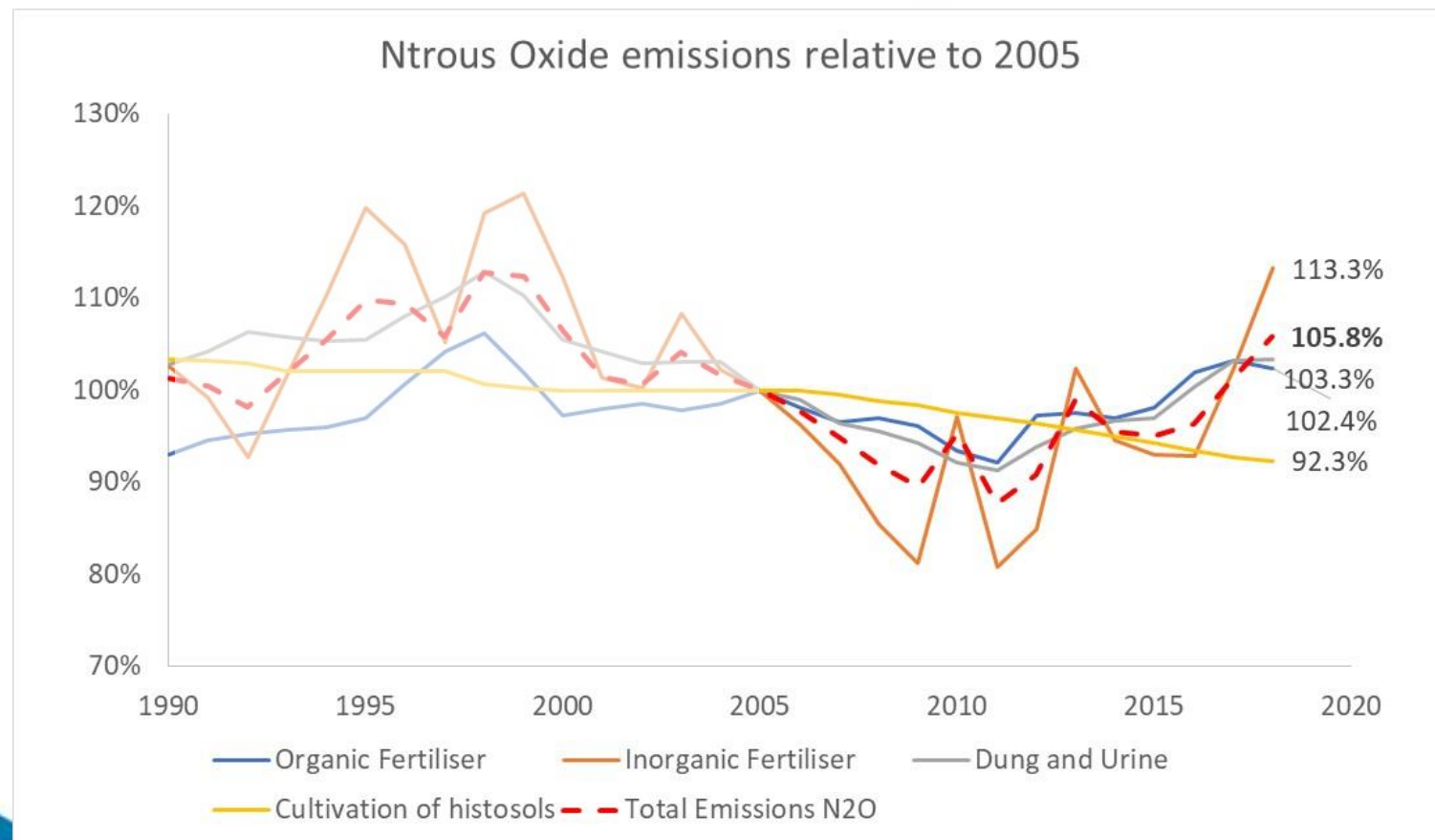
# Major Livestock types Methane emissions



# Agriculture Nitrous Oxide Emissions relative to 2005



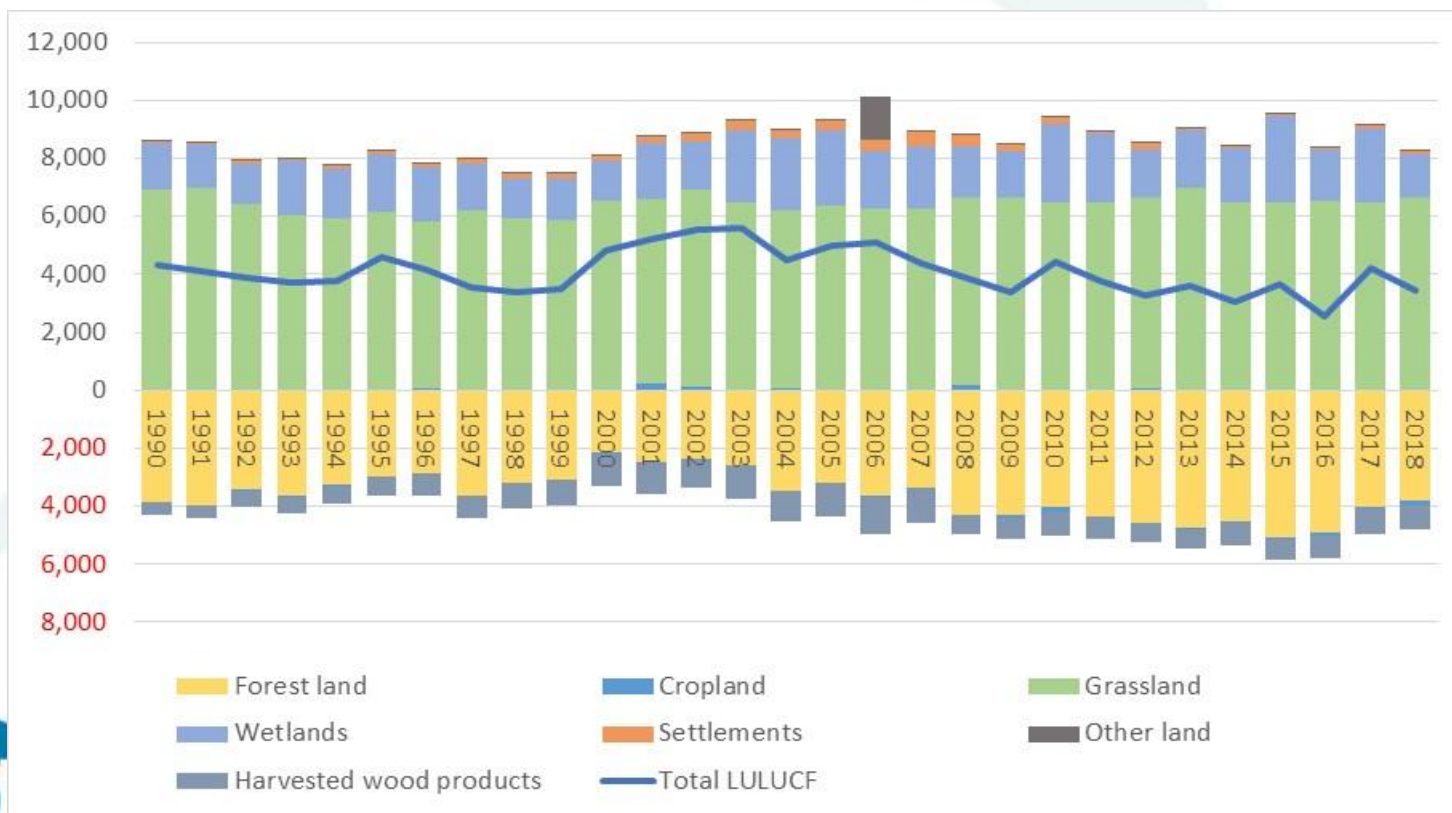
# Agriculture Nitrous Oxide Emissions relative to 2005



# Greenhouse gas emissions Land Use

■ As reported to the UN

Mostly due to the drainage of organic soils Land Use in Ireland is a **Source** of emissions



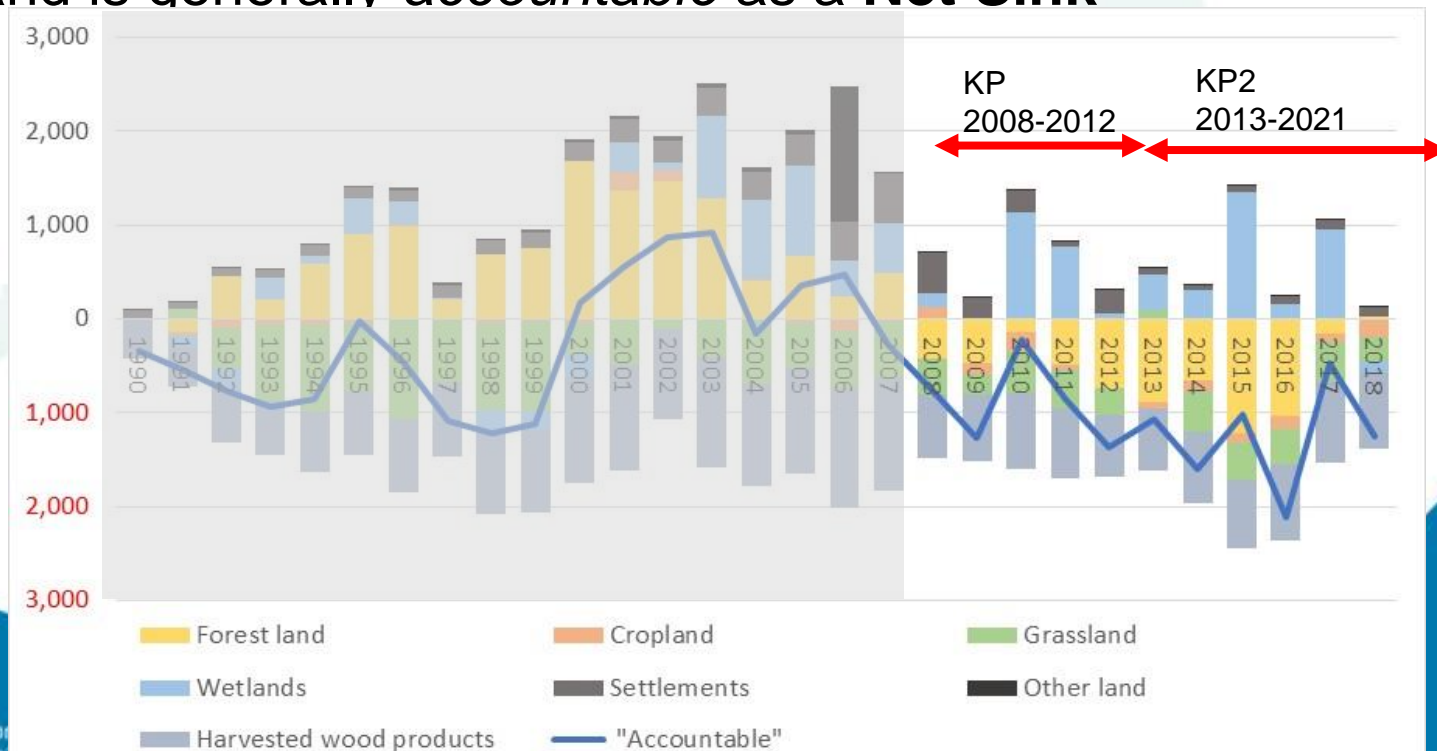
# Hypothetical Accounting for Greenhouse gas emissions Land Use

- Under EU rules, but to 2020 what happens in LULUCF does not contribute to targets

Mostly due to

Afforestation, Harvest Wood and Grassland

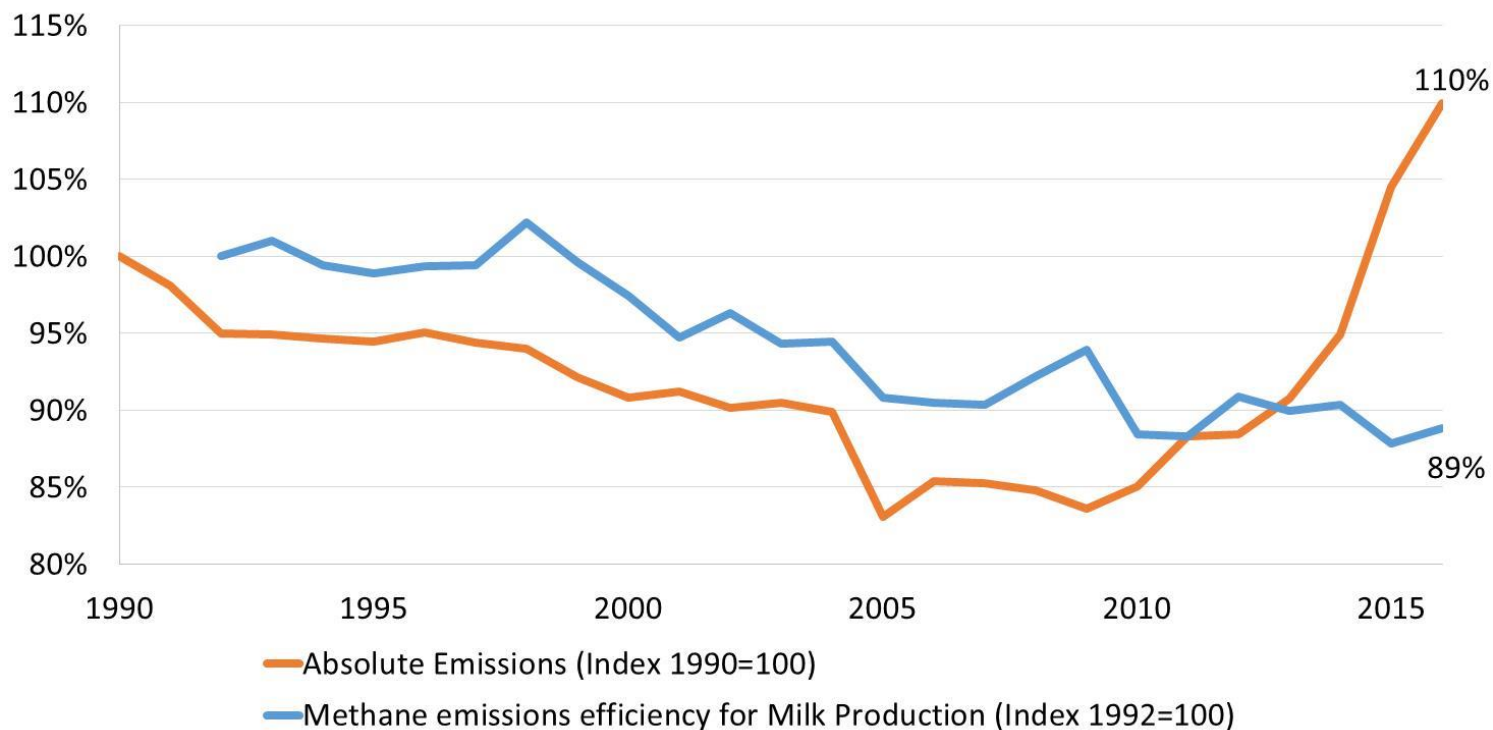
Land Use in Ireland is generally *accountable* as a **Net Sink** emissions





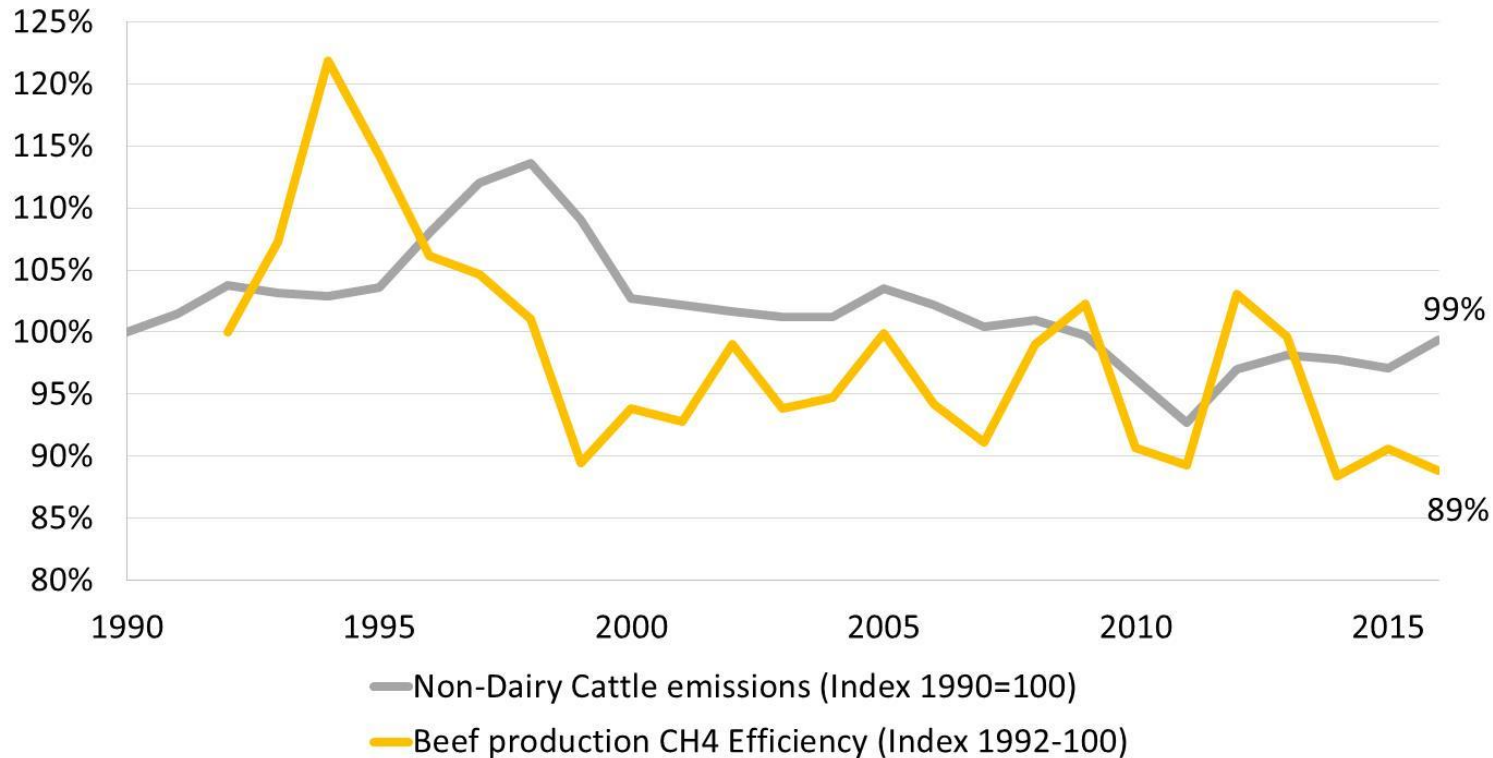
# Milk production efficiency (2016)

**Methane emissions associated with Milk Production**



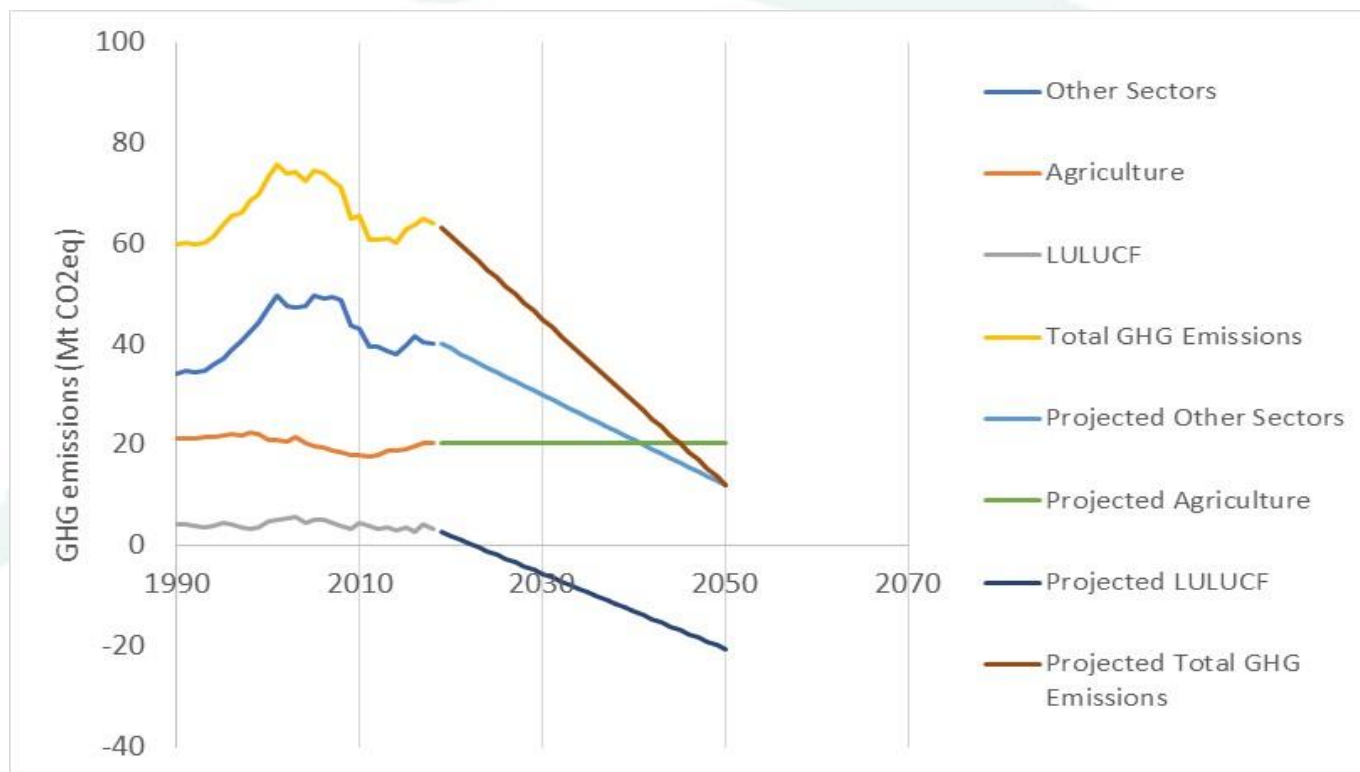
# Emissions associated with Livestock (Beef)

**Methane emissions associated with Beef Production**



# Current National Policy Position

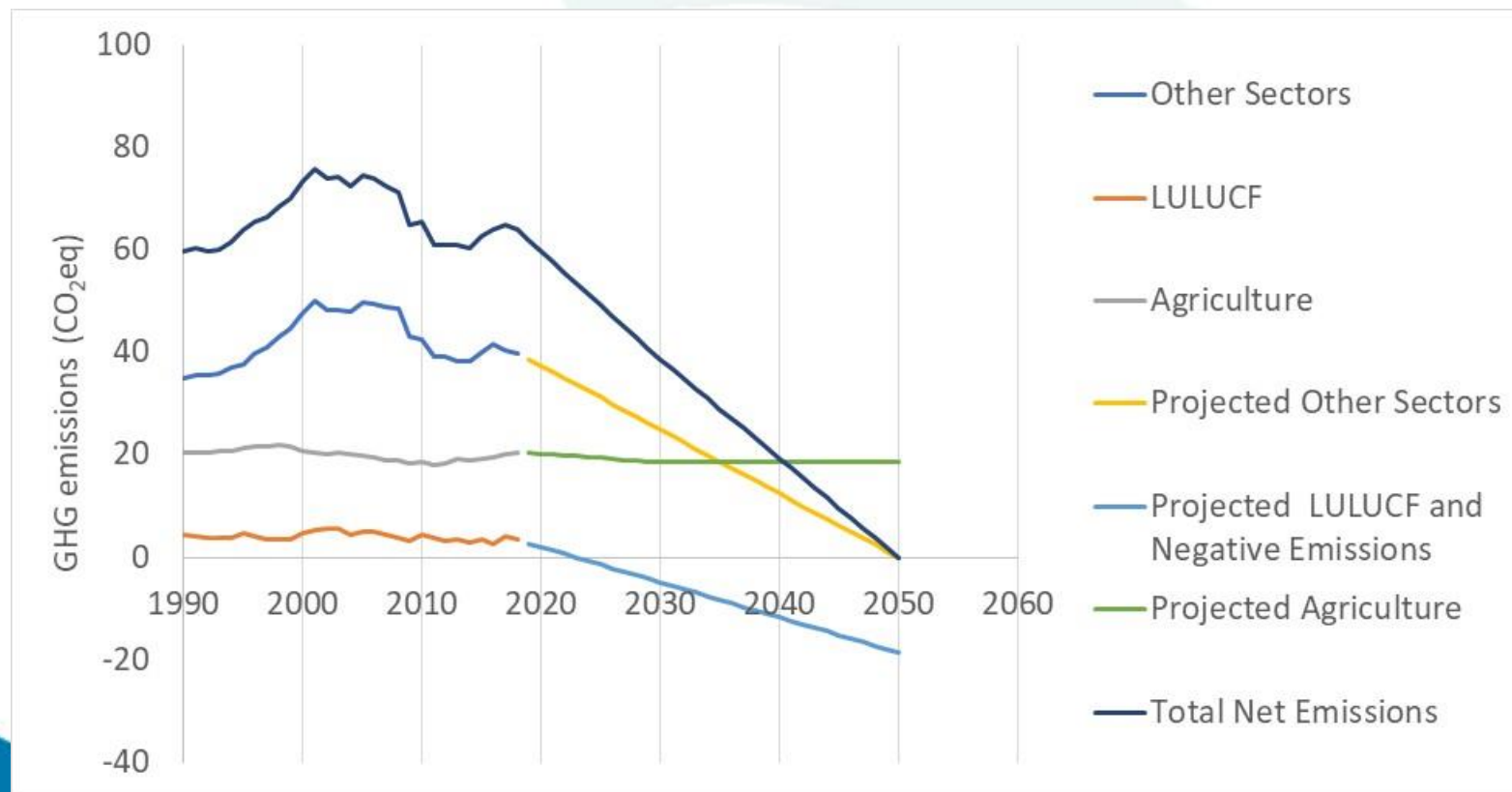
- 80% Fossil Fuel CO<sub>2</sub> emissions reduction by 2050
- Approach neutrality in Agriculture and Land Use



# EU Green Deal implies a change will come

## National Policy Position

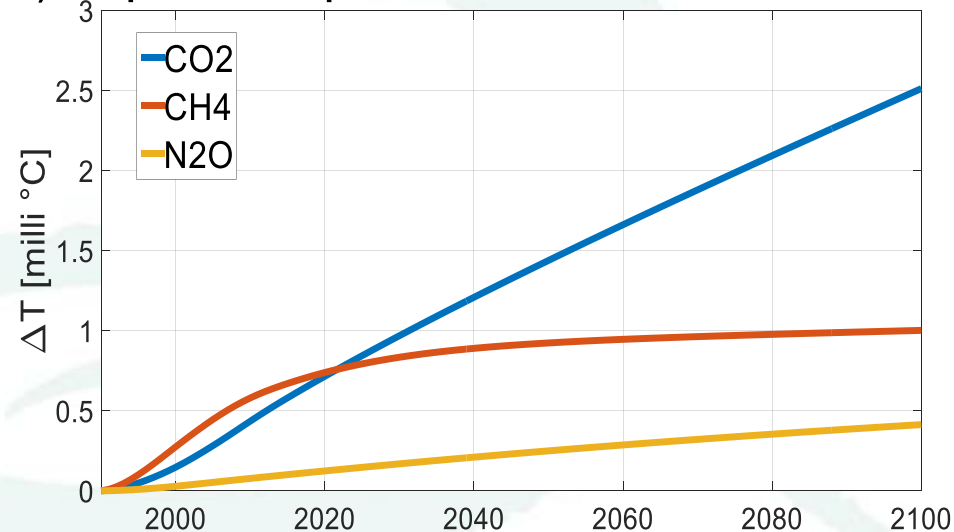
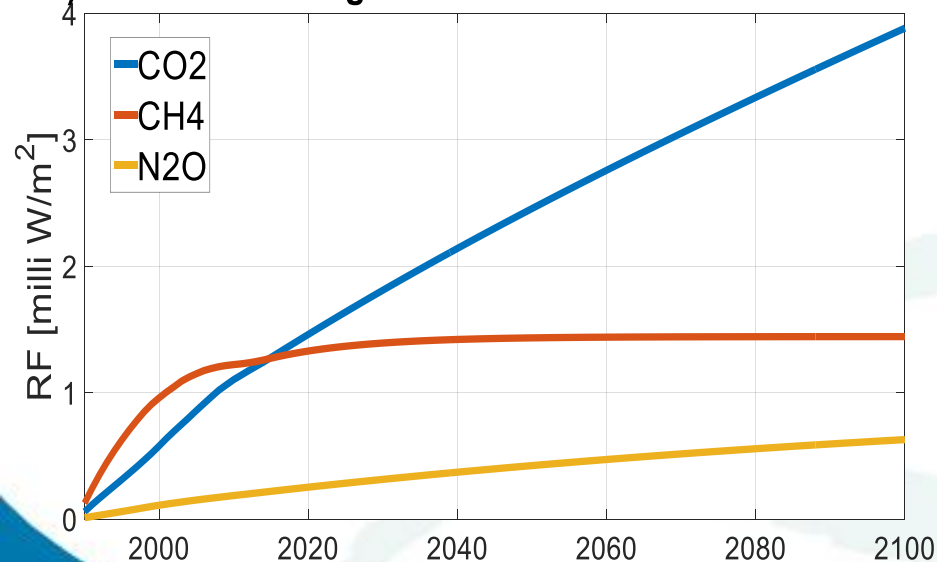
- Net Zero all GHG emissions 2050
- Climate neutrality



# Food for thought

## ■ Different gases CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O

A) Radiative forcing with constant emissions 2015-2100 B) Temperature response with constant emissions 2015-2100



# Conclusion

- Ireland is not on track to achieve 2020 targets
- Neutrality as a long term goal is challenging (regardless of how this is defined)
- Sustainable land management will be vital
- Need more detailed activity data to demonstrate impact of good practice
- All available, cost effective mitigation measures need to be implemented



# Thank you

■ Questions

