



Ammonia and Greenhouse Gas Emissions from Irish Farming

· Pat Murphy¹

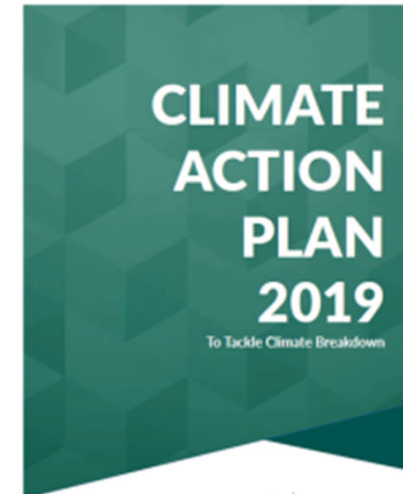
¹ Teagasc, Johnstown Castle

Talk Outline

- Challenges
- Background: GHG and ammonia in Irish agriculture
- Reducing emissions

The Role of Irish Farmers

- Job – To produce food
 - High Quality & Safe
 - Environmentally Sustainable
 - Economic – Delivers income
 - Socially Sustainable – Helps rural communities



Cleaning Our Air

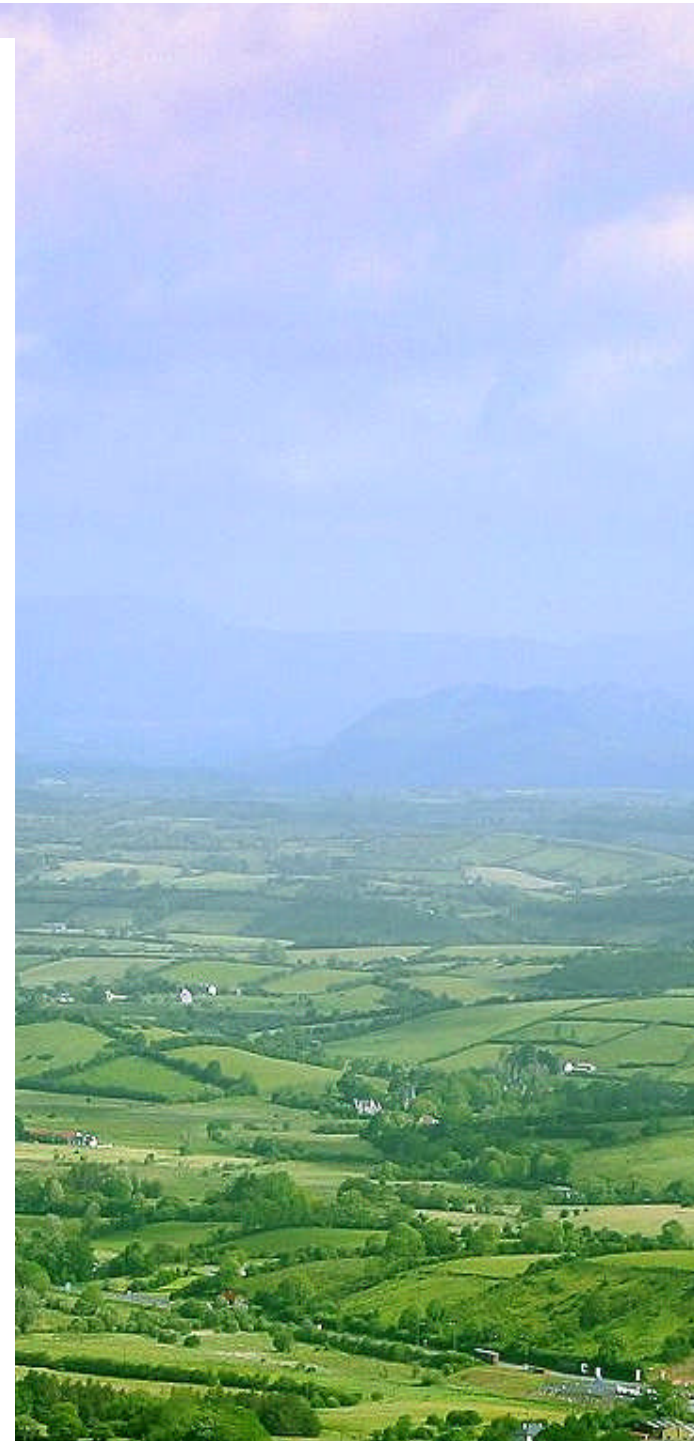
Public Consultation to inform the development of a National Clean Air Strategy



Sustainability

Sustainability is a big issue for Irish agriculture

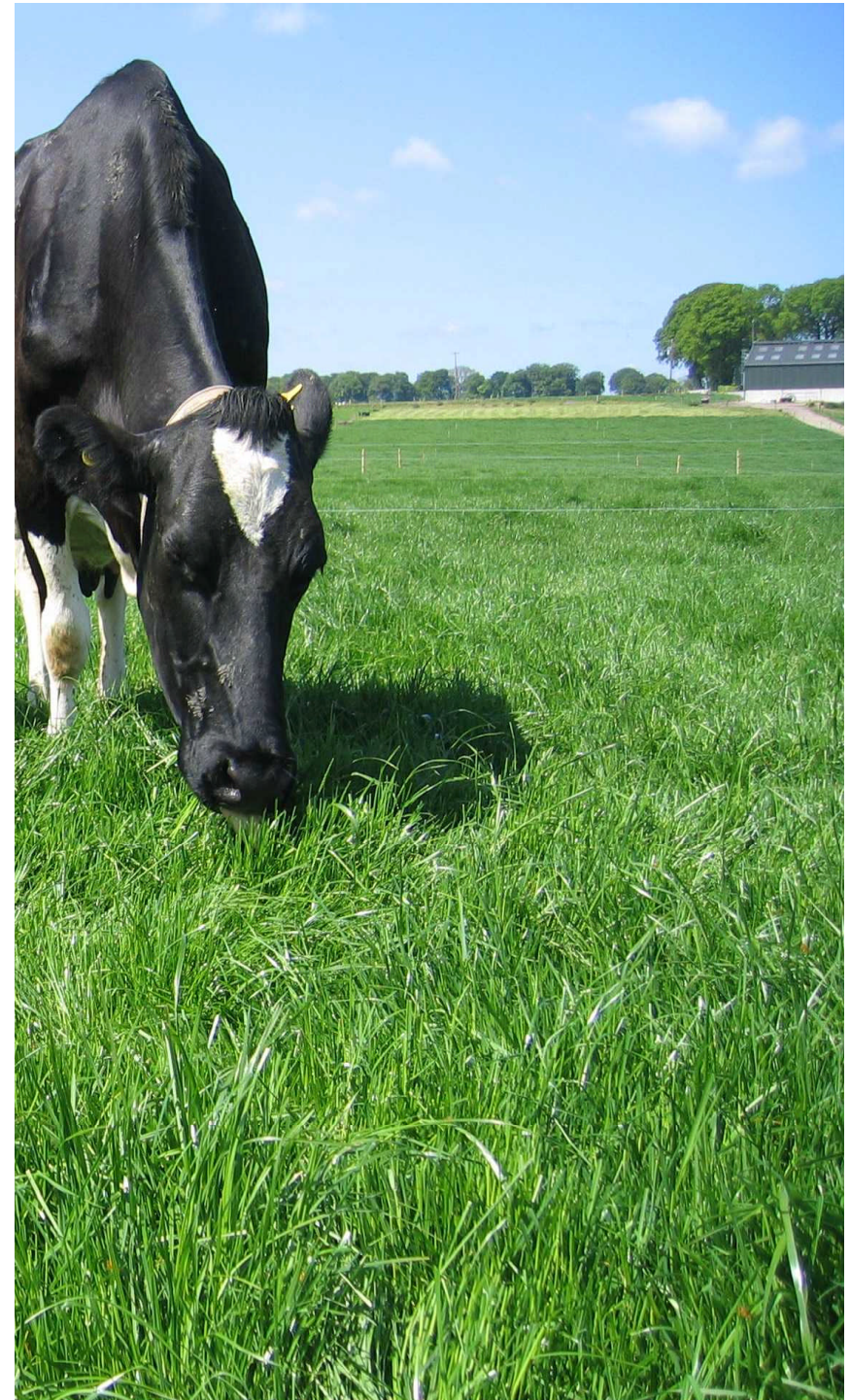
- Export 80-90% of our dairy and beef products
- Sustainability embedded in international food marketing (Bord Bia's Origin Green programme)
- Agricultural emissions are large, and Ireland has signed up to challenging emission reduction targets
- Water Quality & Biodiversity Challenges



Irish dairy industry – a great success story

- Output growing rapidly since quota elimination
- The expansion has generally been low cost and debt levels are low in Irish dairying
- Successful breeding programme has delivered much improved fertility and milk solids
- Very good international reputation for quality
- Very low carbon footprint with downward trajectory

BUT.....





Higher animals numbers, mainly dairy cows and their progeny being reared for beef, are driving up greenhouse gas (and ammonia) emissions

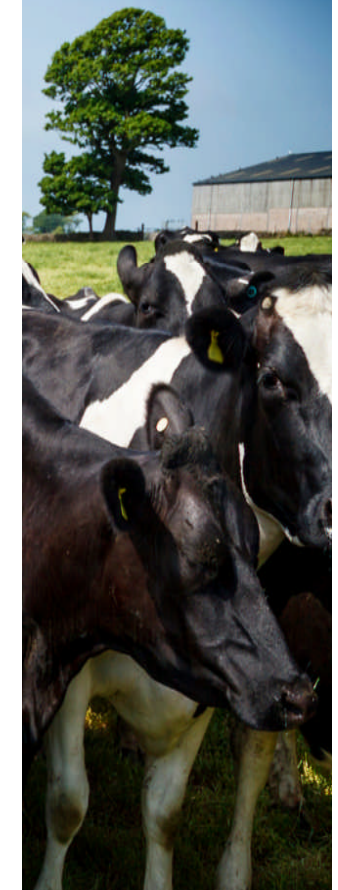
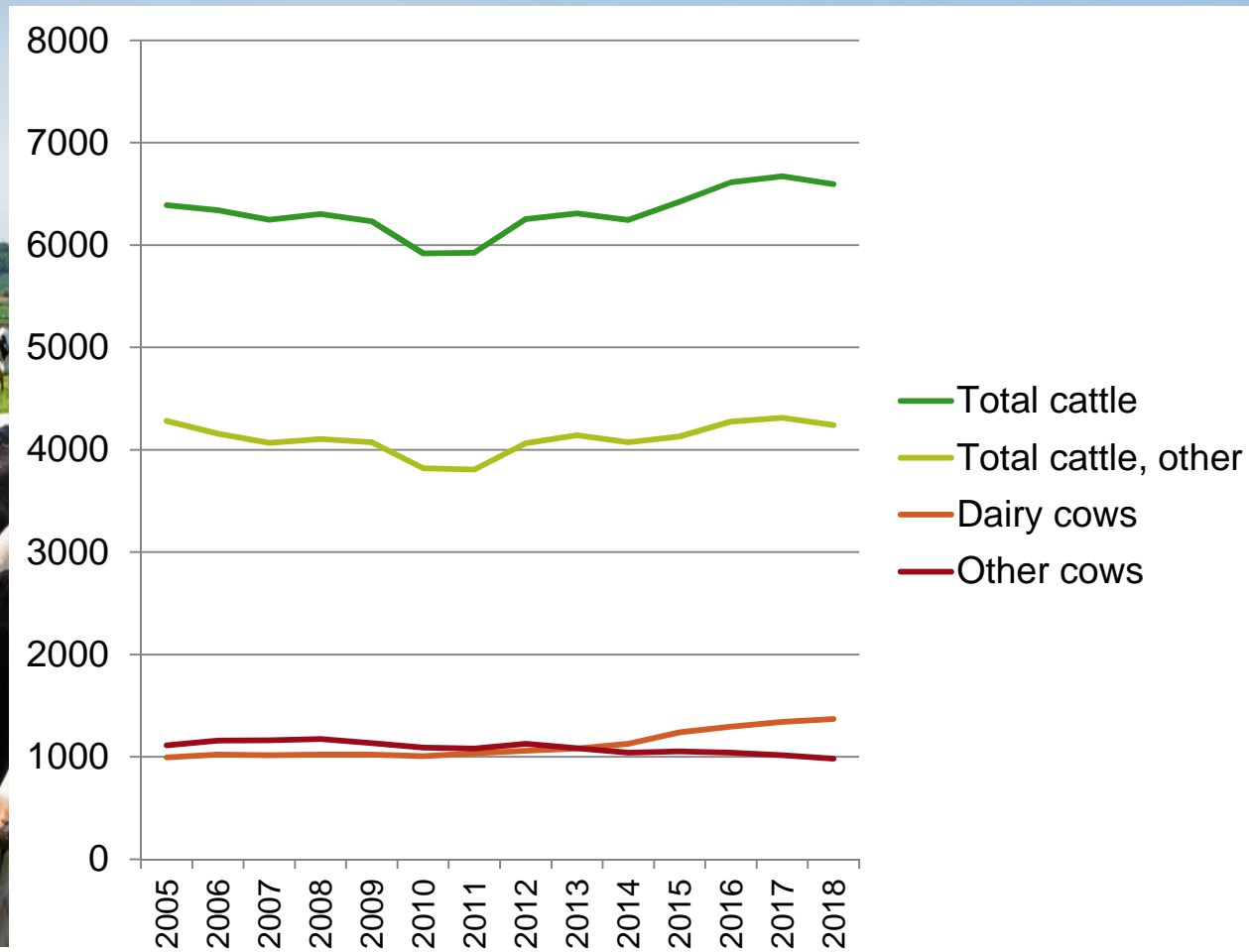
and

the trends are for continued increases!

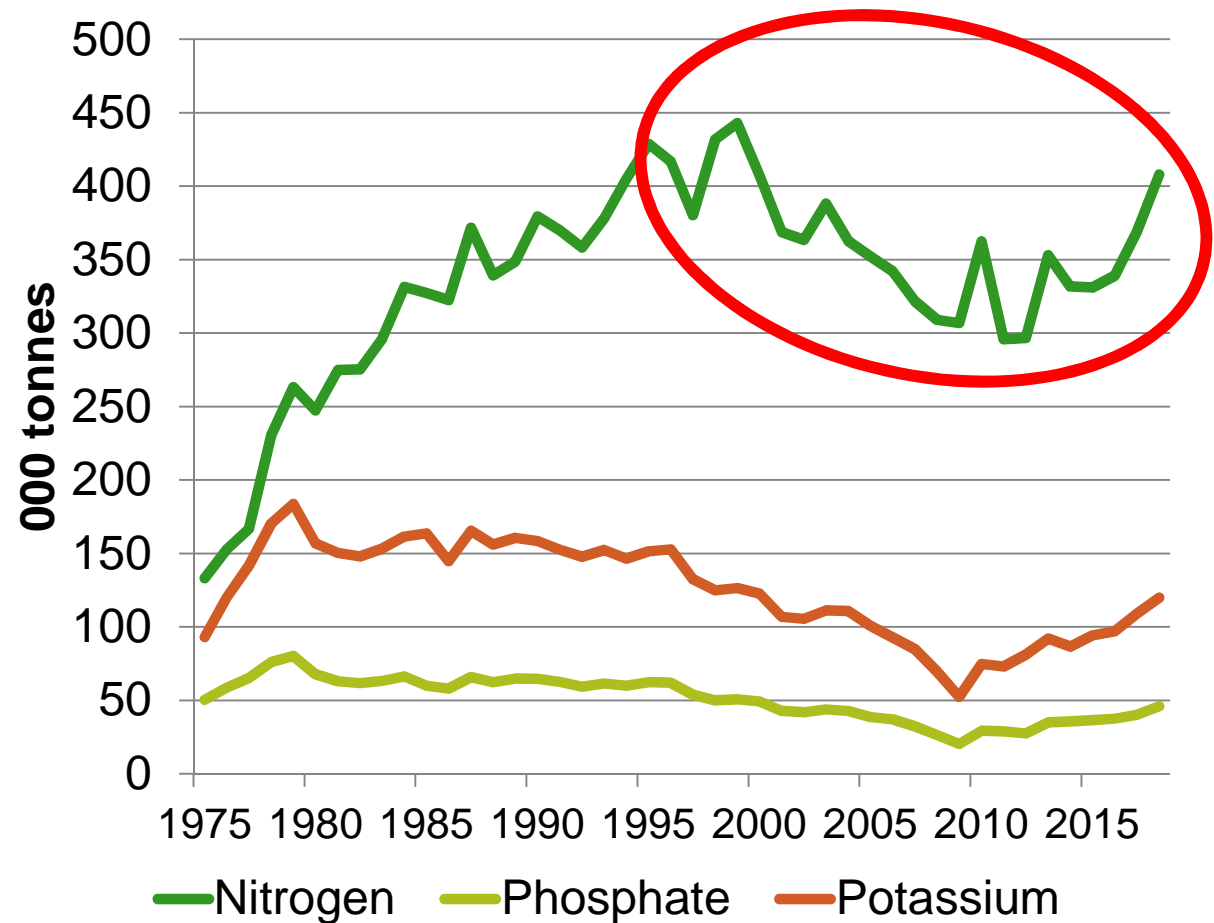
Footprint x Activity = Total emissions



Irish cattle numbers ('000)



Annual Fertiliser Sales in Ireland 1975-2018



Source: DAFM

The Challenges

Agricultural GHG 2030 targets:

- Reduce emissions ~10% (17.5 -19Mt CO₂e)
- Deliver carbon sequestration ~ 10% (2.7 MT CO₂e)

Ammonia targets:

- 1% reduction 2020-30
- 5% from 2030 onwards
- ammonia mitigation can be linked with GHG mitigation
- Sometimes positively – Sometimes negatively

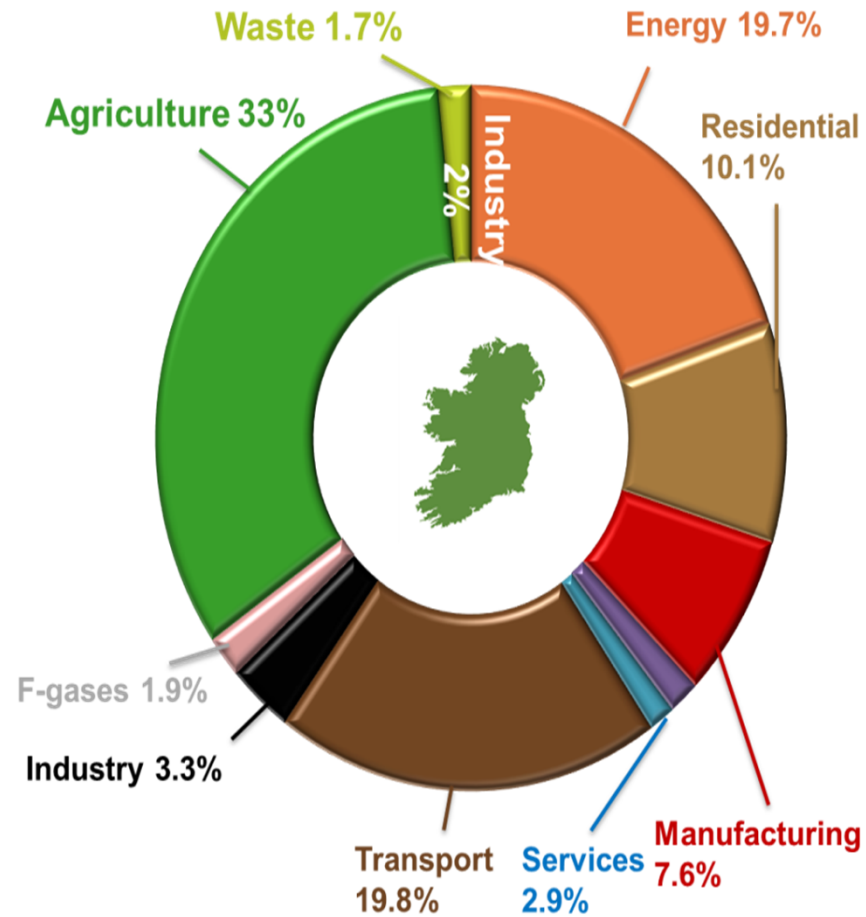


Cleaning Our Air

Public Consultation to inform the development of a National Clean Air Strategy

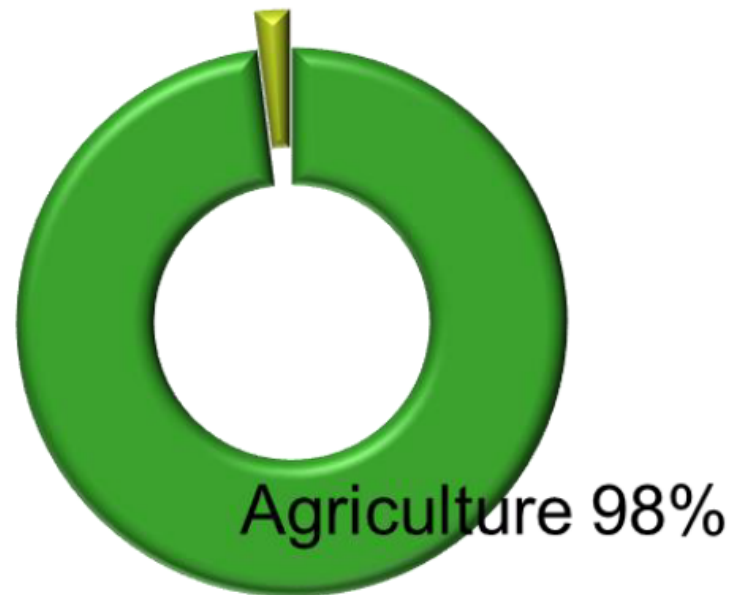


Irish agricultural GHG emissions



Ammonia Emissions

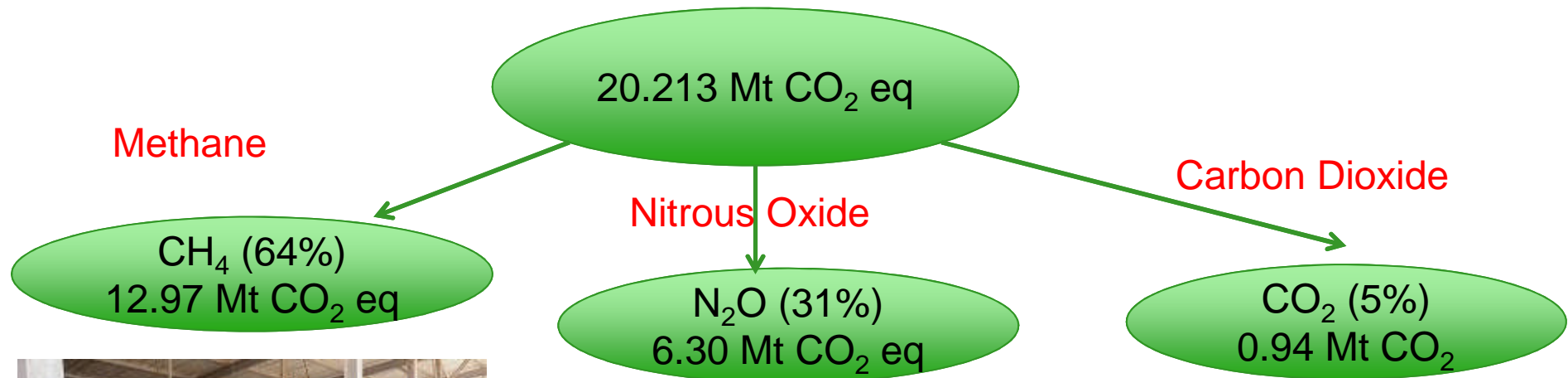
- 80% of ammonia from dairy and beef
- Remainder from pig and poultry



Ammonia

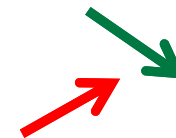
- Ammonia is not a Greenhouse Gas
- Target to reduce
- Code of Good Agricultural Practice for reducing Ammonia Emissions - Nov 2019
- Currently Exceeding Target
- Why reduce
 - Damage to human health
 - Damage to Environment – Particularly sensitive habitats

GHGs in Irish Agriculture

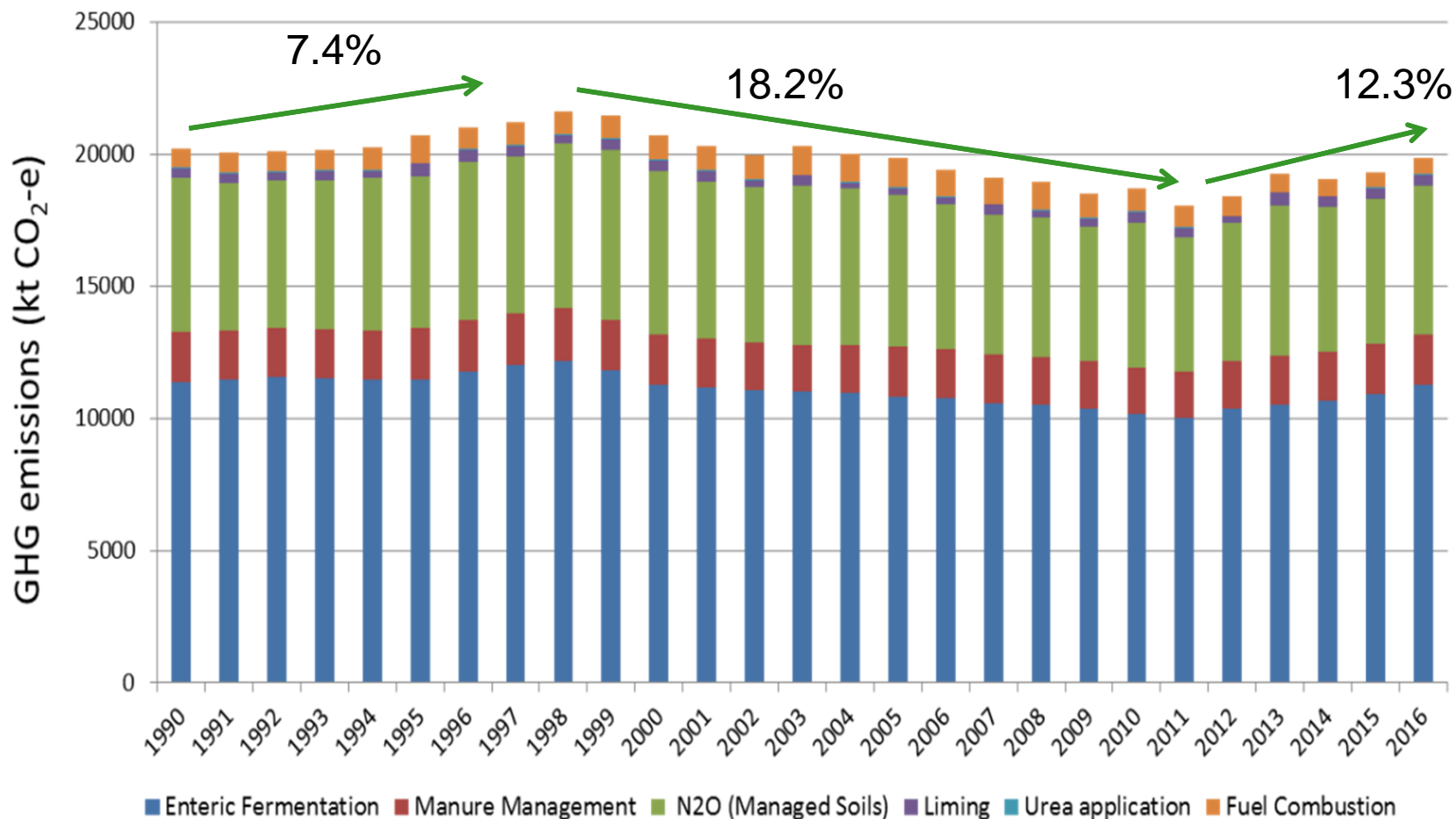


Total emissions V Carbon Footprint

- Total Emissions
 - Carbon Dioxide + Methane x 25 + Nitrous Oxide x298
- Carbon Footprint
 - Emissions per unit of output
- Both Important – But
- Nationally need to reduce Total Emissions
- E.g – Improve EBI gives better Fertility
 - Lower number of Replacements
 - If Farmer keeps extra cow

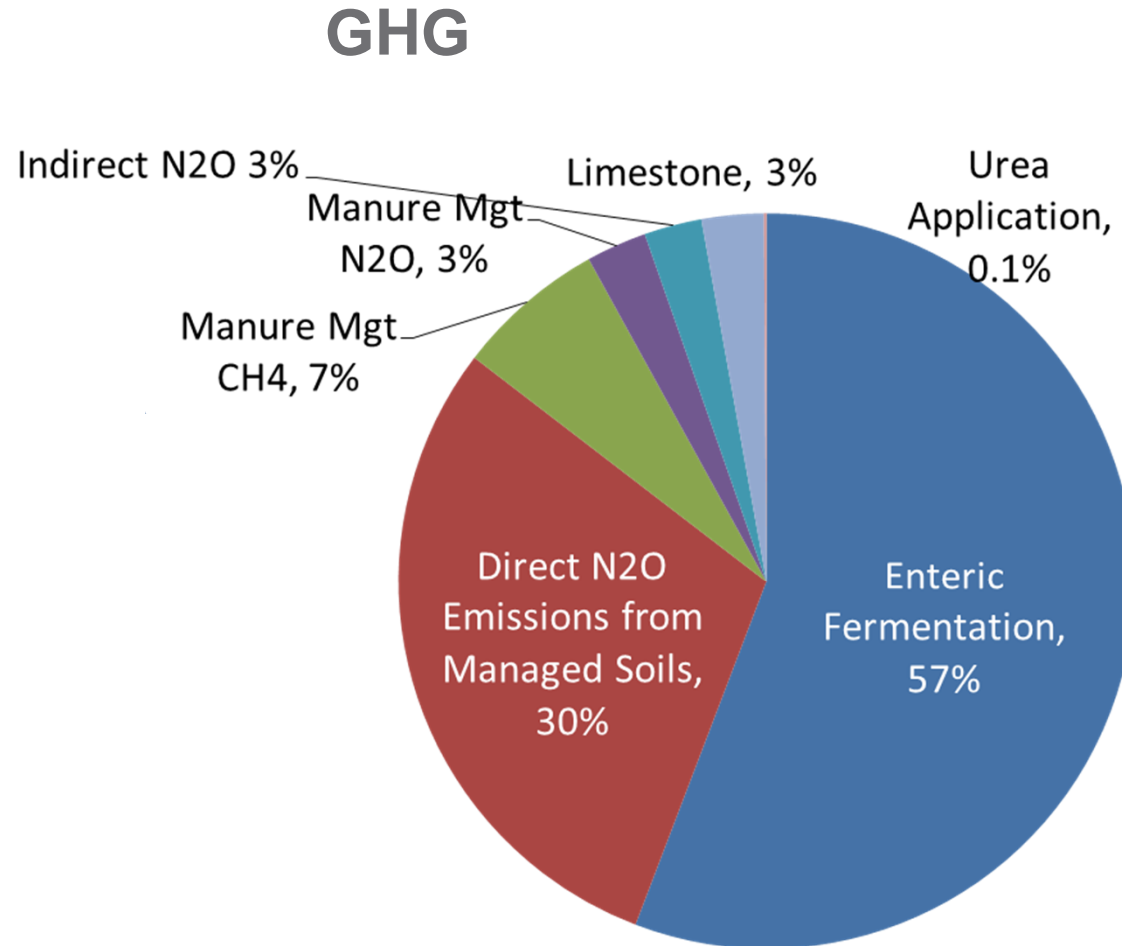


Agriculture GHG emissions profile



- Cattle account for 88.7 % of methane emissions and 90% of N₂O emissions

GHG Sources



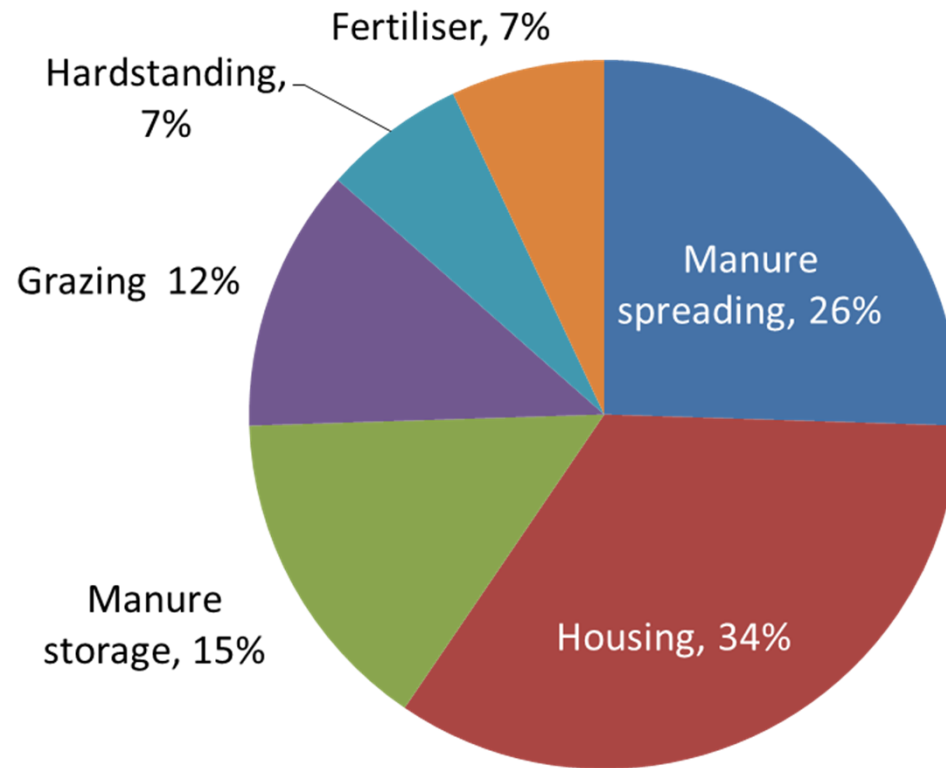
Ammonia in Irish Agriculture

Air pollutant ammonia
(NH₃) 117.4 kt

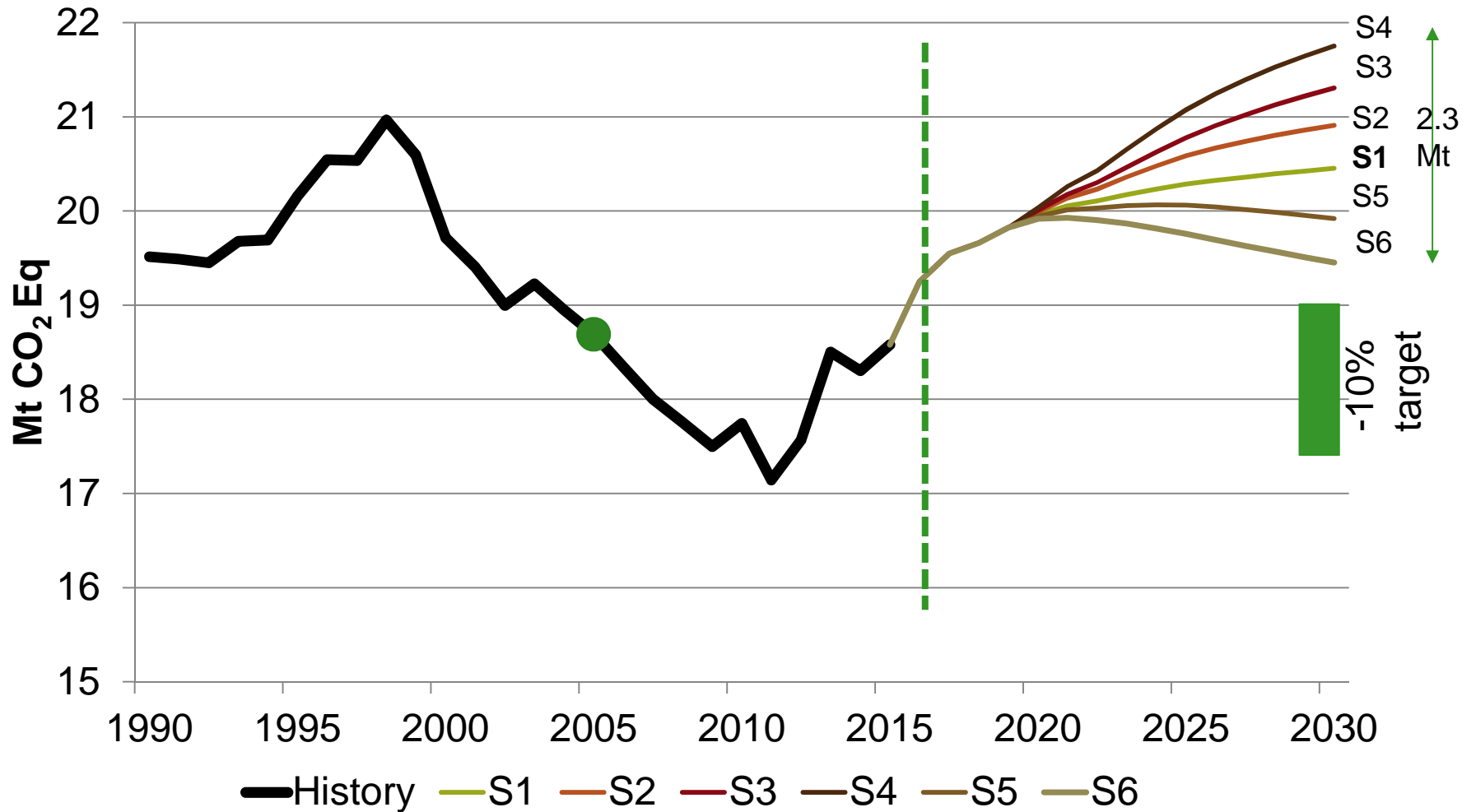


Ammonia Sources

Ammonia



GHG emissions (no mitigation)

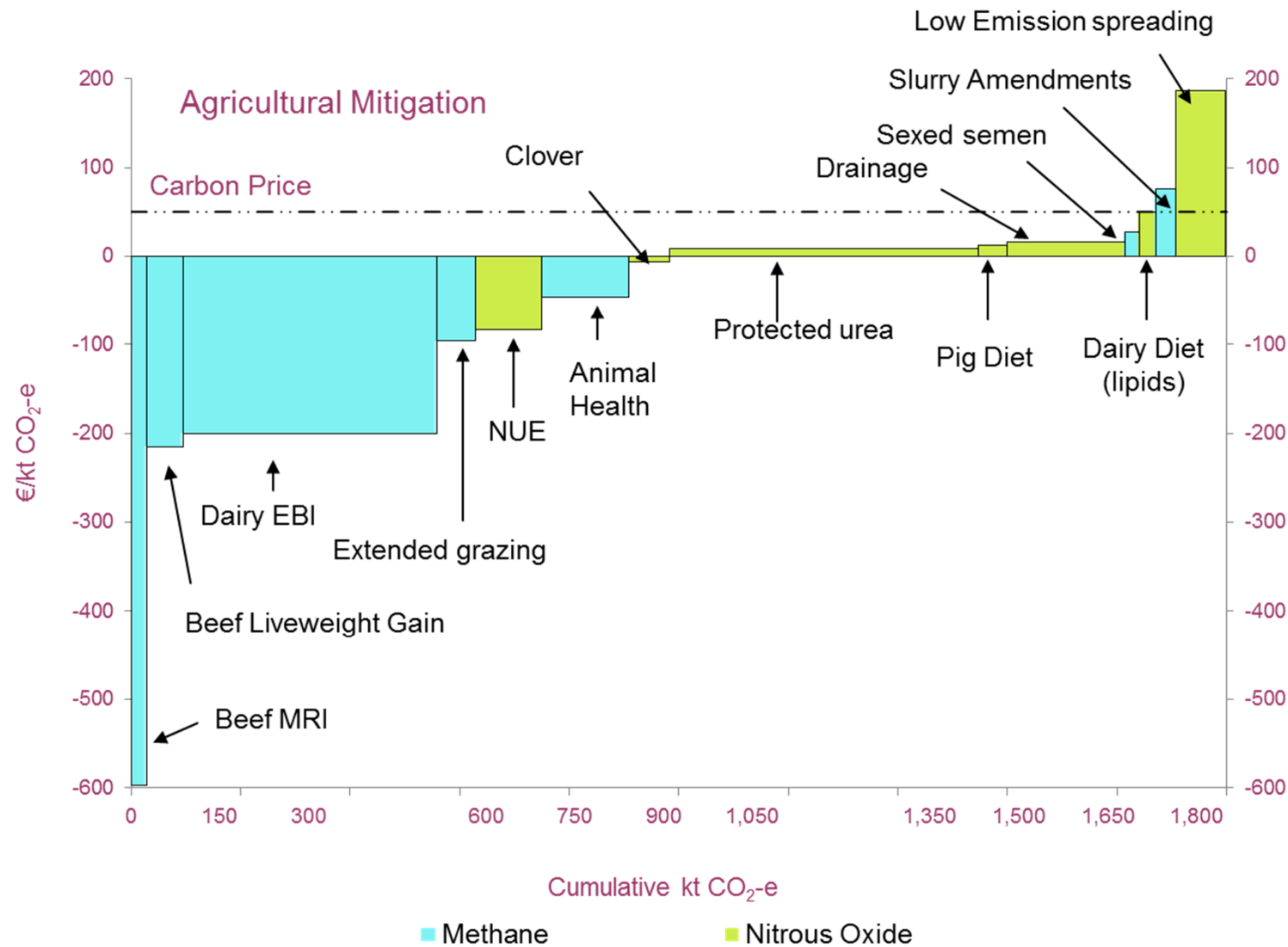


Source: FAPRI-Ireland Model

The MACC Curve

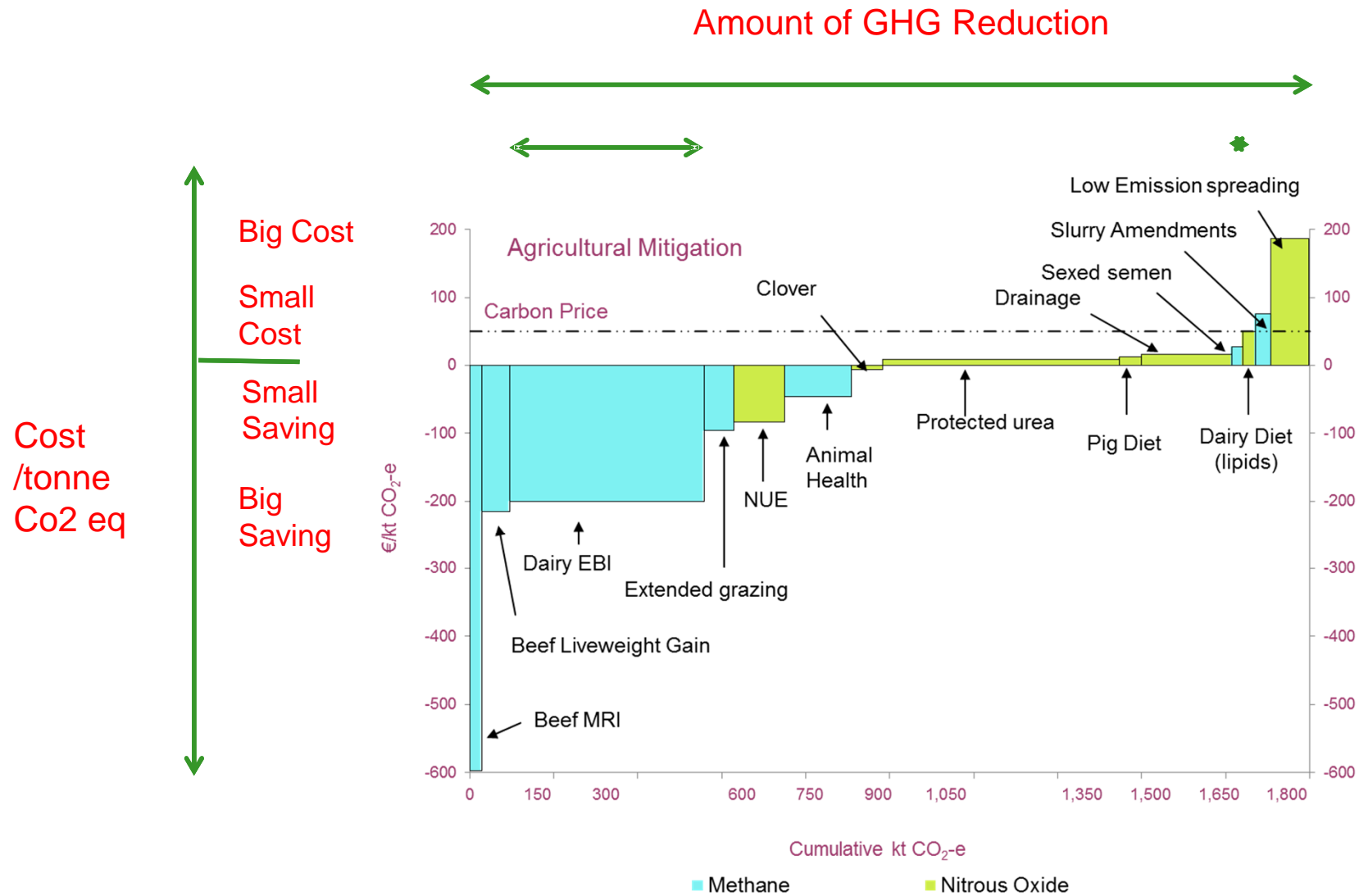
1. Reduce Agricultural Methane and Nitrous Oxide
 - lower emissions from animals, animal waste and fertiliser
2. Sequester Carbon (LULUCF)
 - Via land use change and forestry
3. Energy efficiency & biofuels and bioenergy production
 - to reduce overall energy usage on farms
 - to displace fossil fuel emissions
4. Ammonia

Agricultural Measures



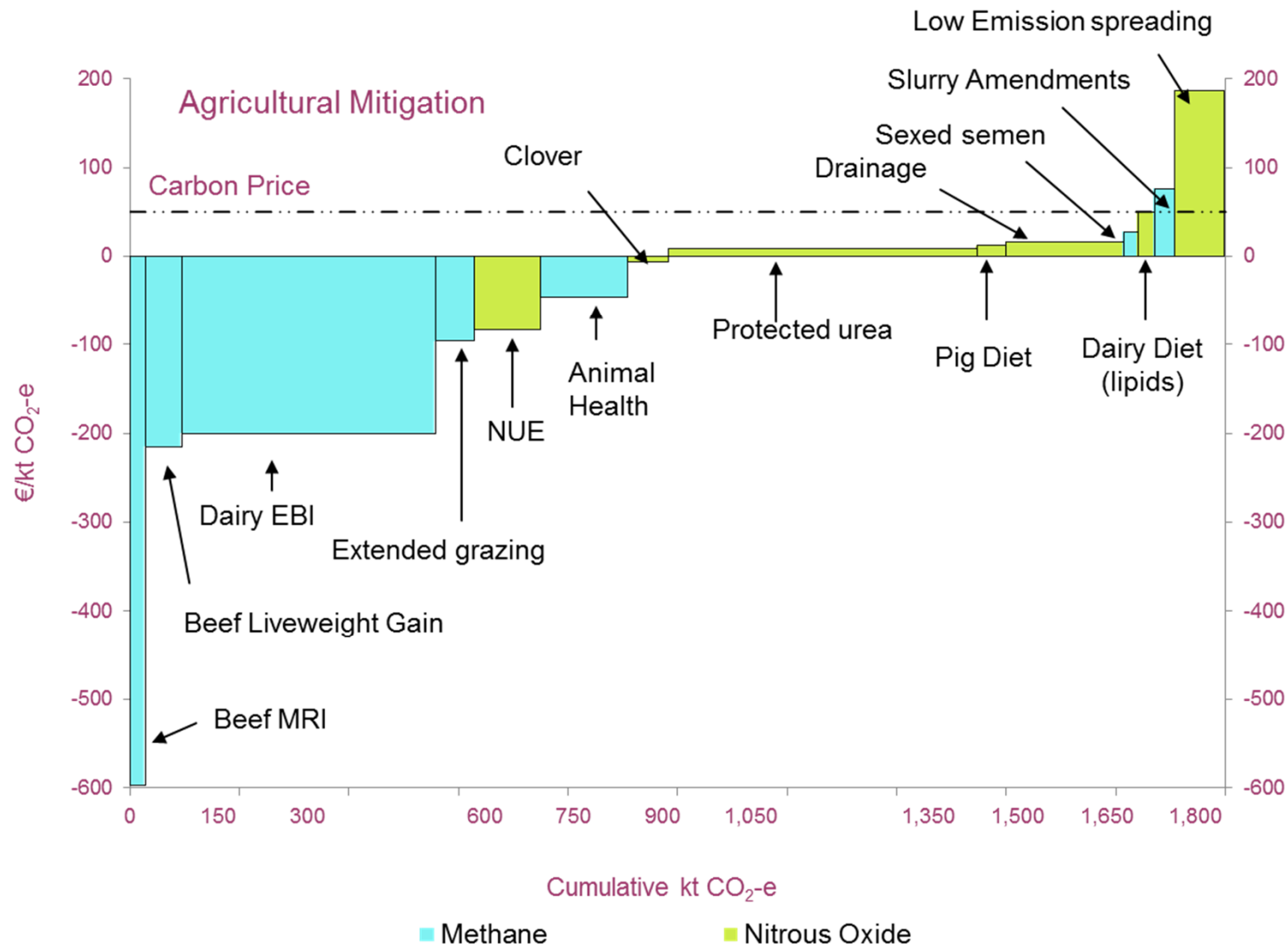
Gary J. Lanigan G.J. & Donnellan T. (eds.) 2018 An Analysis of Abatement Potential of Greenhouse Gas Emissions in Irish Agriculture 2021-2030, Teagasc .

Agricultural Measures



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Agricultural Measures

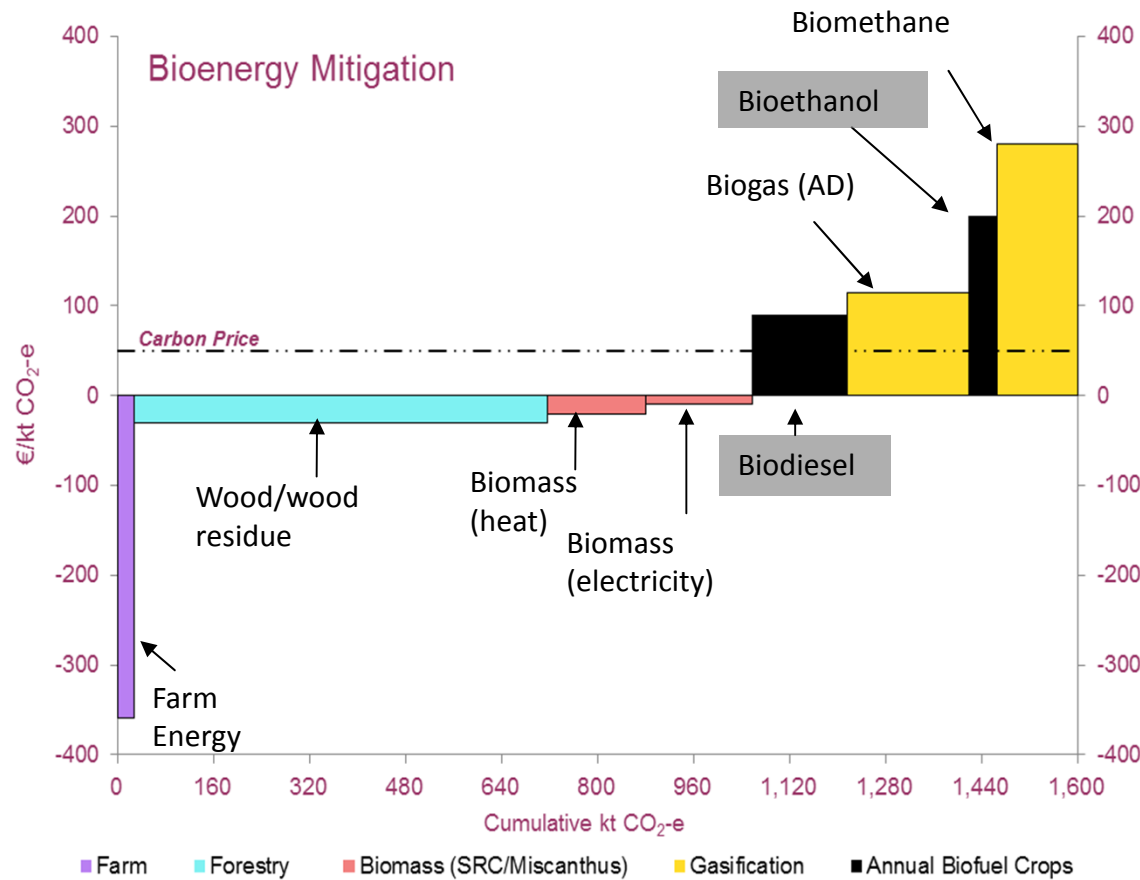


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GHG & Ammonia from Fertiliser

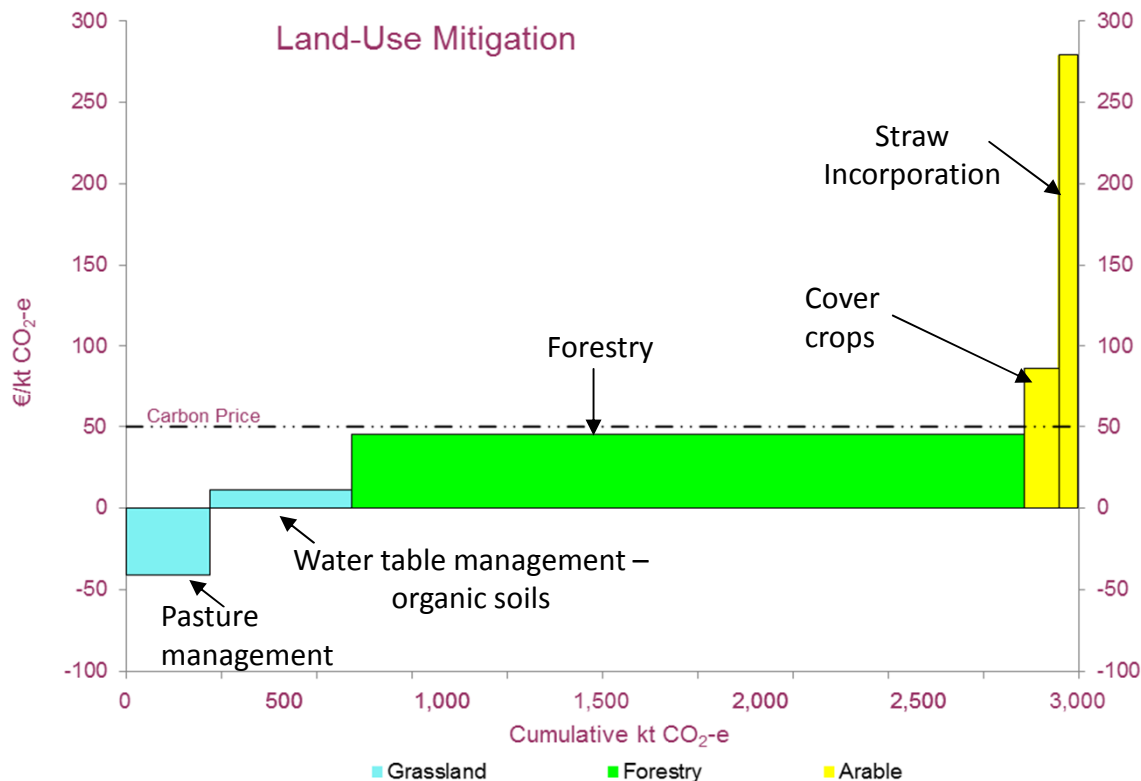
N Type	GHG	Ammonia	Advice
CAN	High	Low	Reduce
Urea	Low	High	Eliminate
Protected Urea	Low	Low	Increase

Energy Efficiency, Bioenergy and Biofuels



Energy efficiency on farm	0.03 Mt
Wood Biomass for energy	0.76 Mt
Biomass (SRC & Miscanthus) for heat	0.18 Mt
Biomass (SRC) for electricity	0.19 Mt
Biogas (anaerobic digestion)	0.22 Mt
Biomethane	0.15 Mt
Biofuel (OSR)	0.18 Mt
Biofuel (Sugar beet)	0.05 Mt

Land-Use C Sequestration

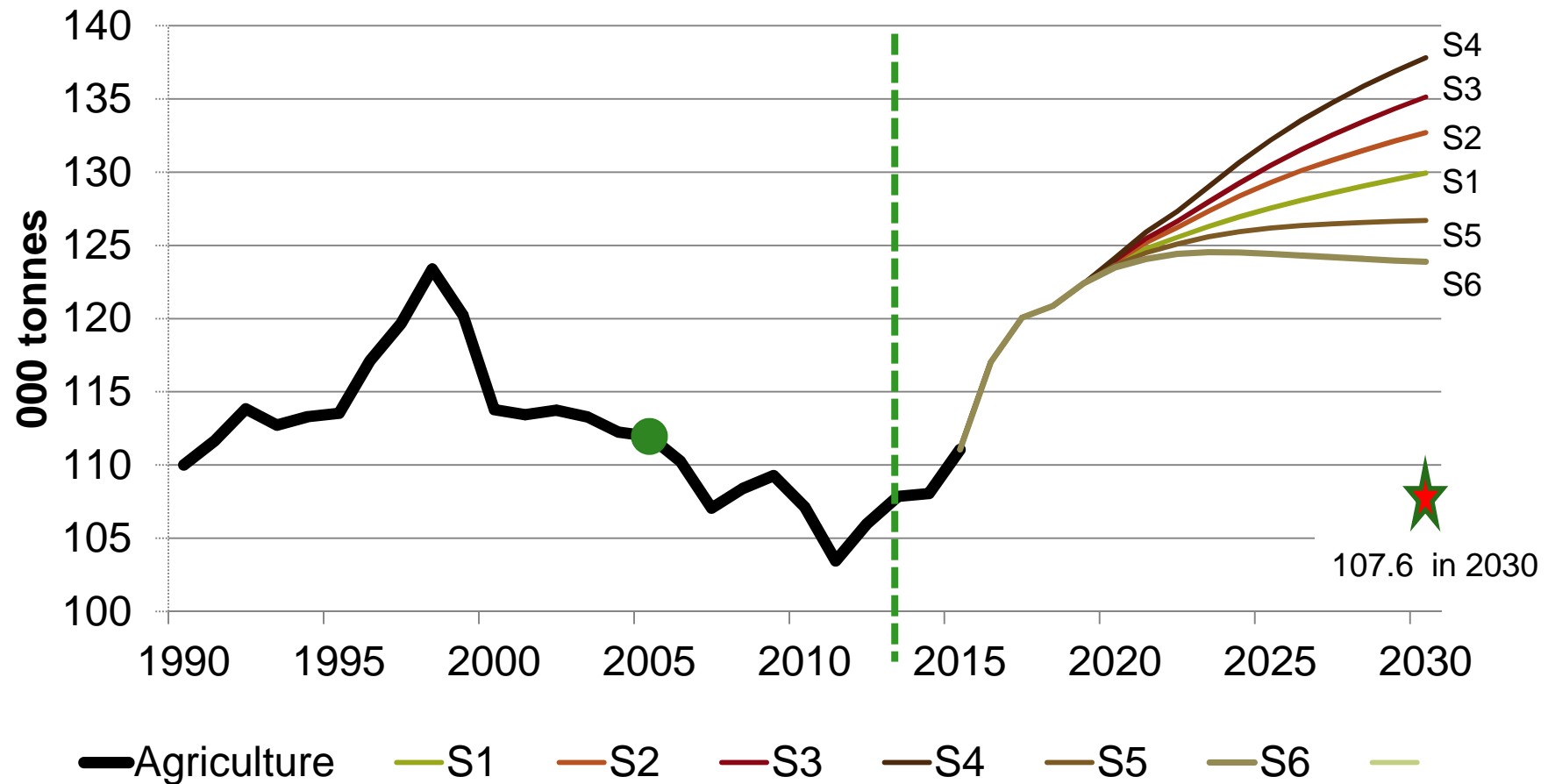


Pasture management	0.26 Mt
Water table mgt of organic soils	0.44 Mt
Forestry	2.1 Mt
Tillage mgt - Cover crops	0.1 Mt
Tillage mgt - Straw incorporation	0.06 Mt

Key Measures

1. Replace CAN and Urea with Protected Urea as much as possible
 2. Slurry Management
 - Low emissions Slurry Spreading
 - Spring Spreading of Slurry
 3. Better Grassland Management
 4. Better Nutrient Management
 5. EBI & MRI
 6. Energy efficiency & Generation
 - to reduce overall energy usage on farms
 - to displace fossil fuel emissions
 7. Forestry
- } Better N efficiency – Lower N
Lower Methane – Better quality Grass
Longer Grazing Season

Ammonia emissions (no mitigation)



Source: FAPRI-Ireland Model

Reducing NH₃ Draft MACC

