

Agriculture and Climate Change: Policy and Research

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My presentation

- Context and policy framework
- Agriculture's role in meeting climate change goals
- Policy developments
- Research & development

- **Context and policy framework**
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Sustainable agriculture – the policy context

Defra's Public Service Agreement targets:

- Secure a healthy natural environment for today and the future
- Lead the global effort to avoid dangerous climate change

Our Strategic Objective:

- A thriving farming and food sector with an improving net environmental impact

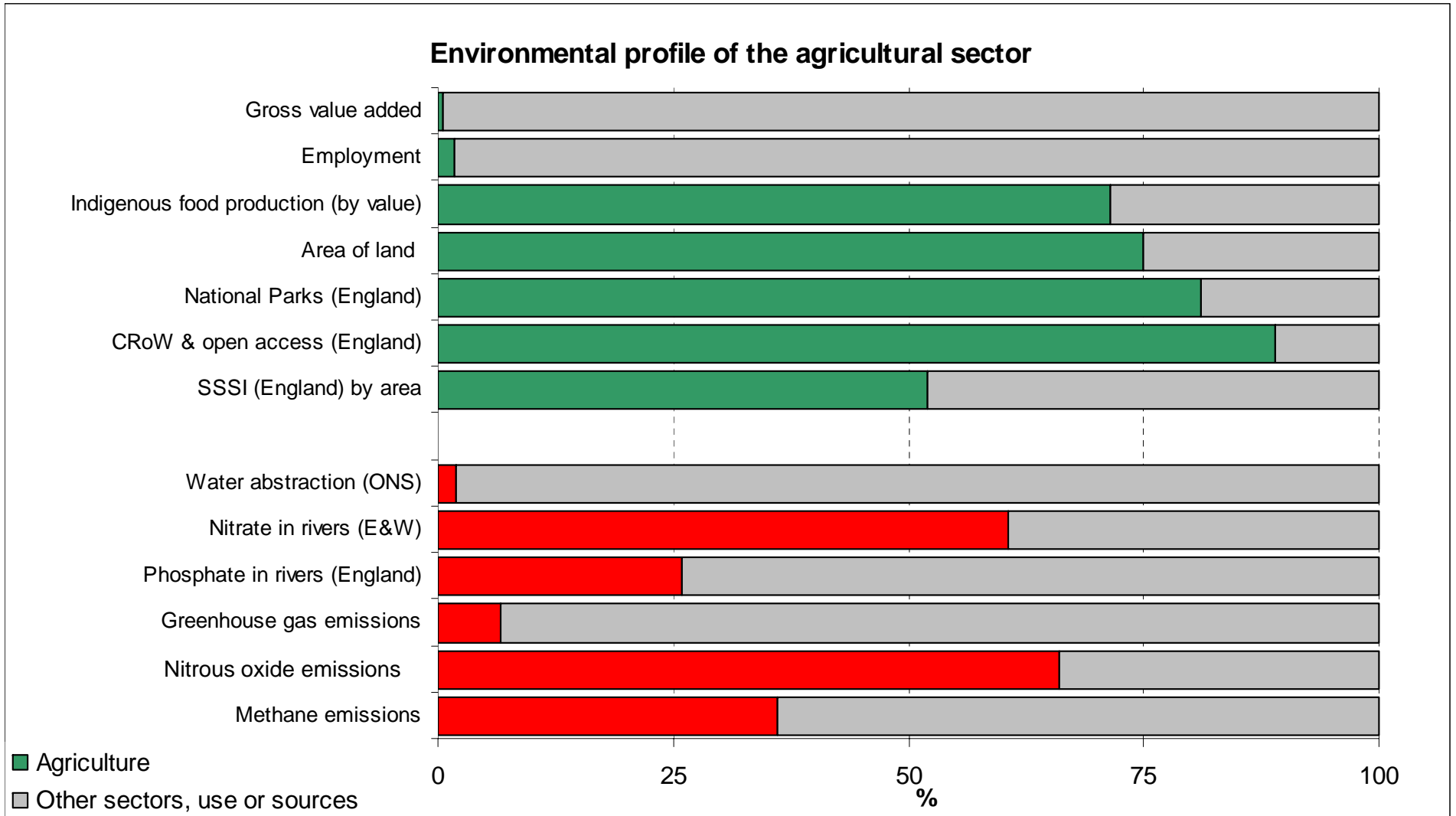
Sustainable agriculture – the policy context

Defra's vision of Farming for the Future: by 2020, English farming will be:

- profitable in the marketplace, continuing to produce the majority of the food we consume
- making an improving environmental contribution, notably in respect of climate change, but also more widely
- managing the landscape and the natural assets that underlie it.

19th November 2007: High Level Conference on Farming for the Future, convened by Hilary Benn

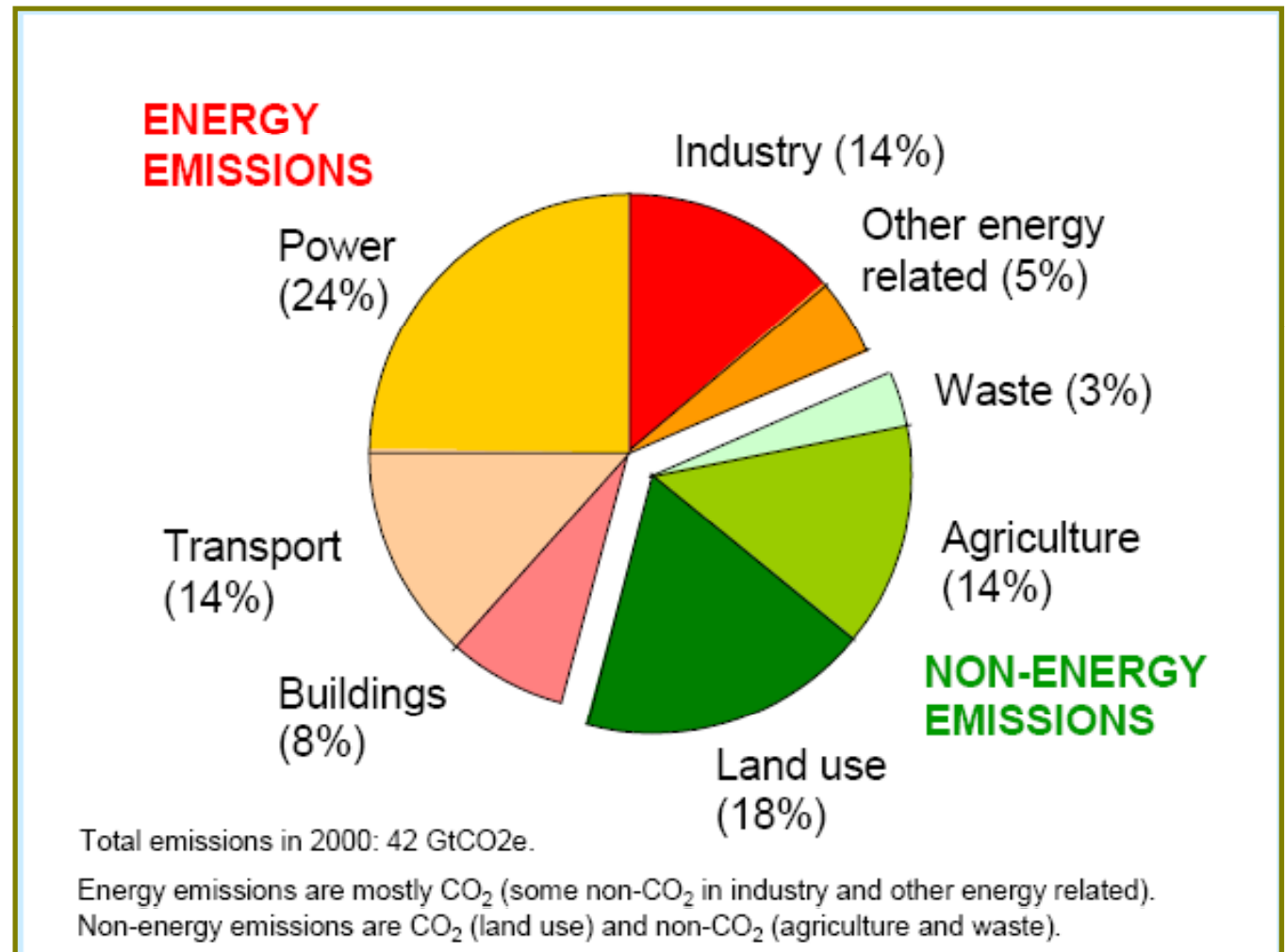
Environmental profile of the agricultural sector



GHG sources - global

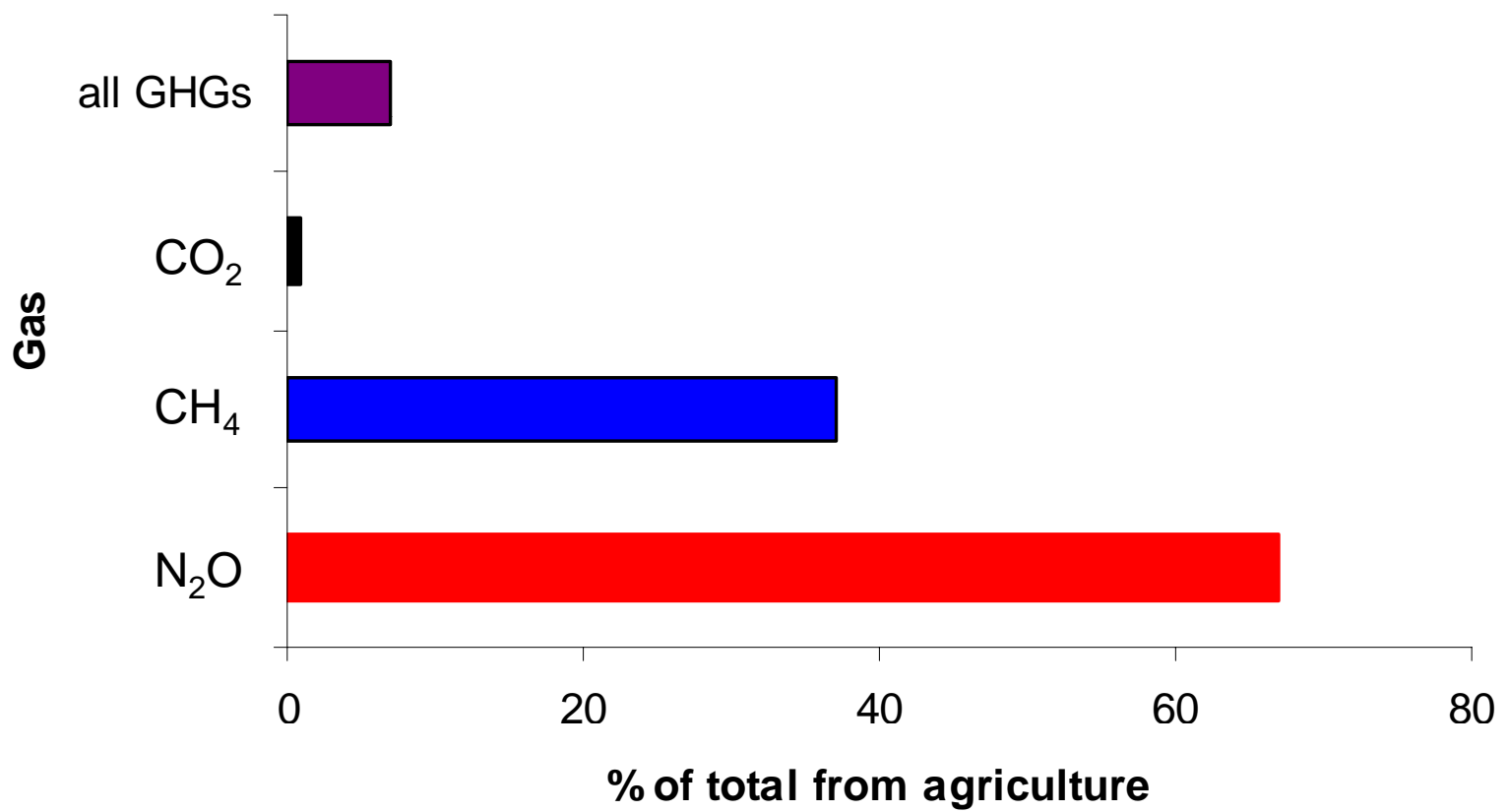
**Agriculture
= 14% of
global
GHGs**

**Deforestation
= 18% of
global
GHGs**

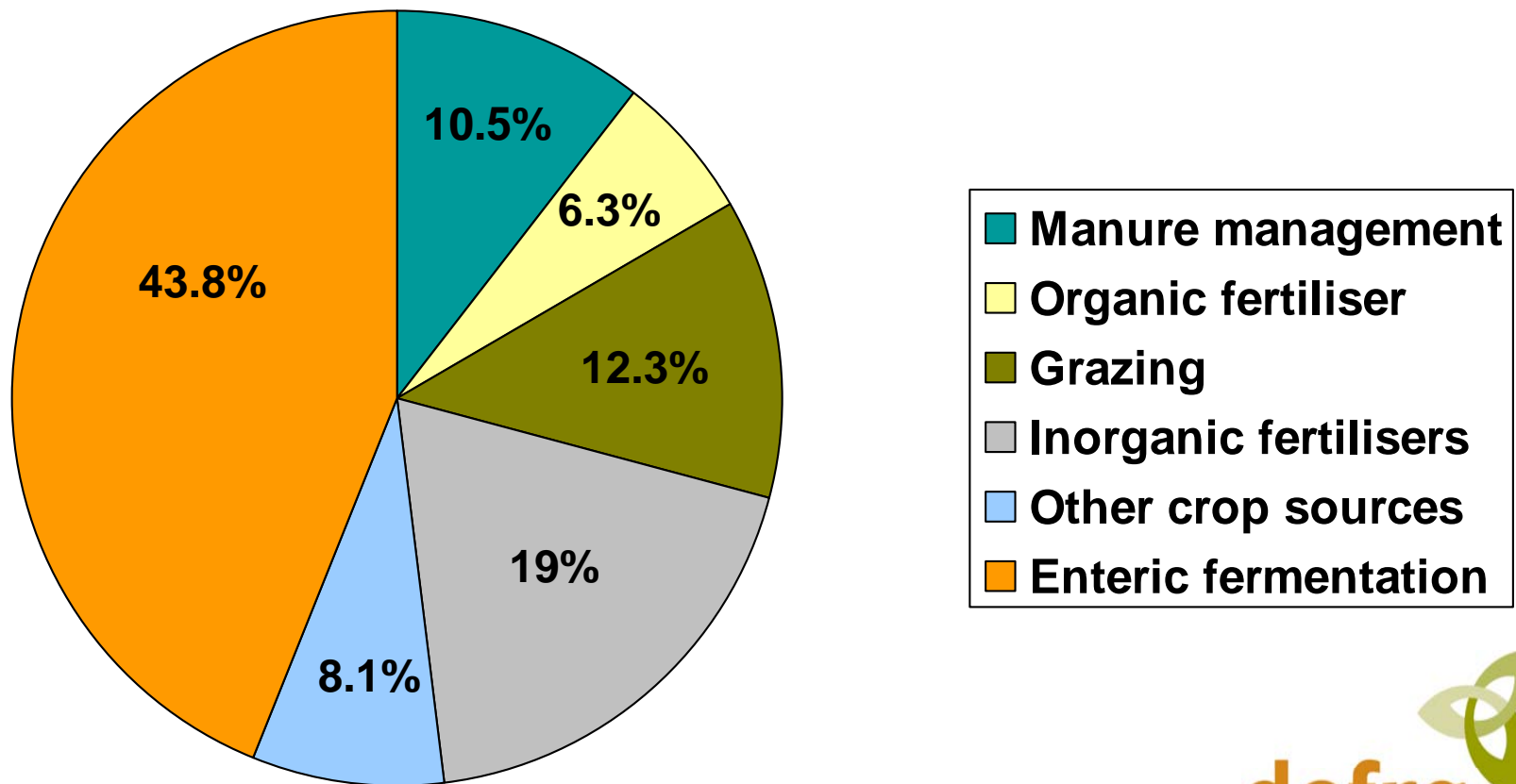


UK agriculture's contribution to GHGs

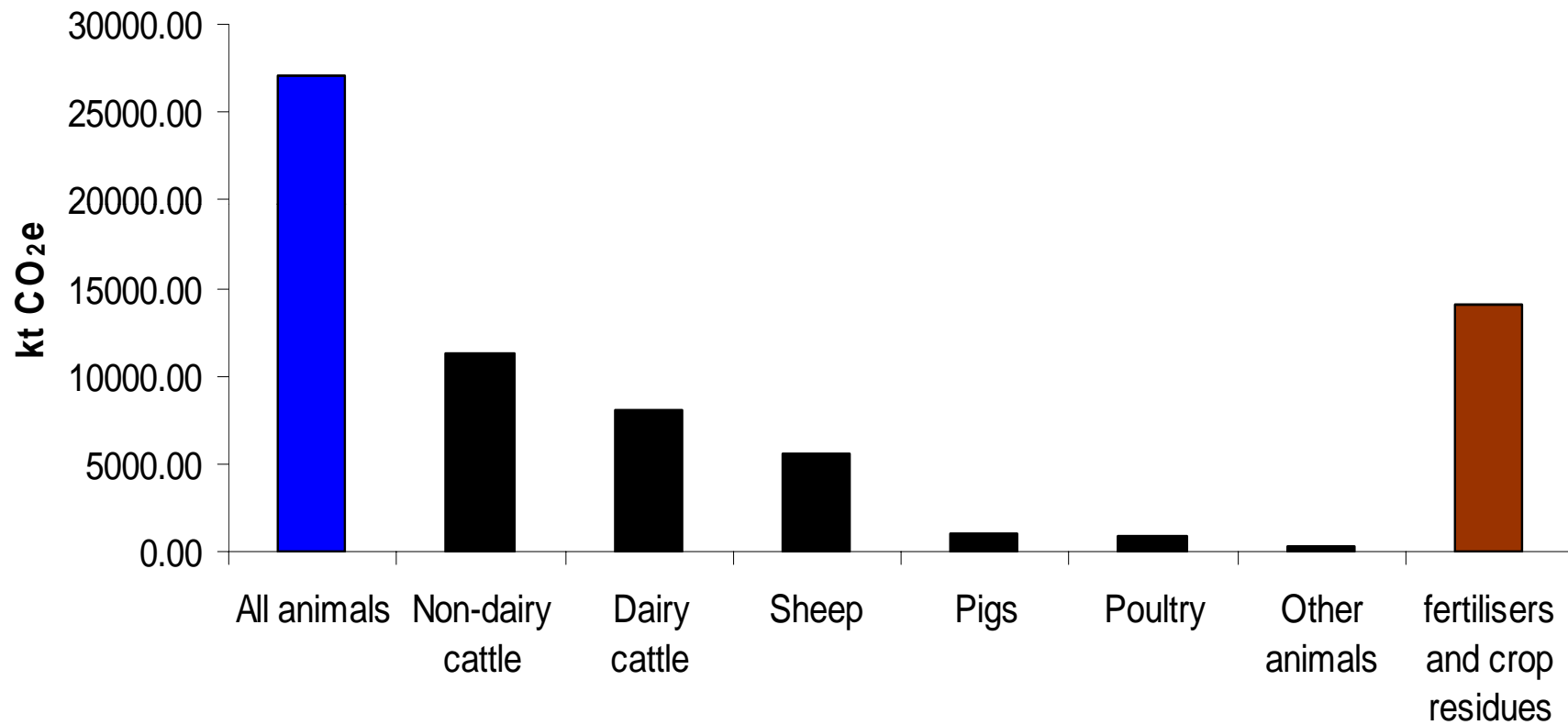
Percentage of UK total of greenhouse gases produced by agriculture in 2005



Sources of UK agricultural methane and nitrous oxide emissions - 2005

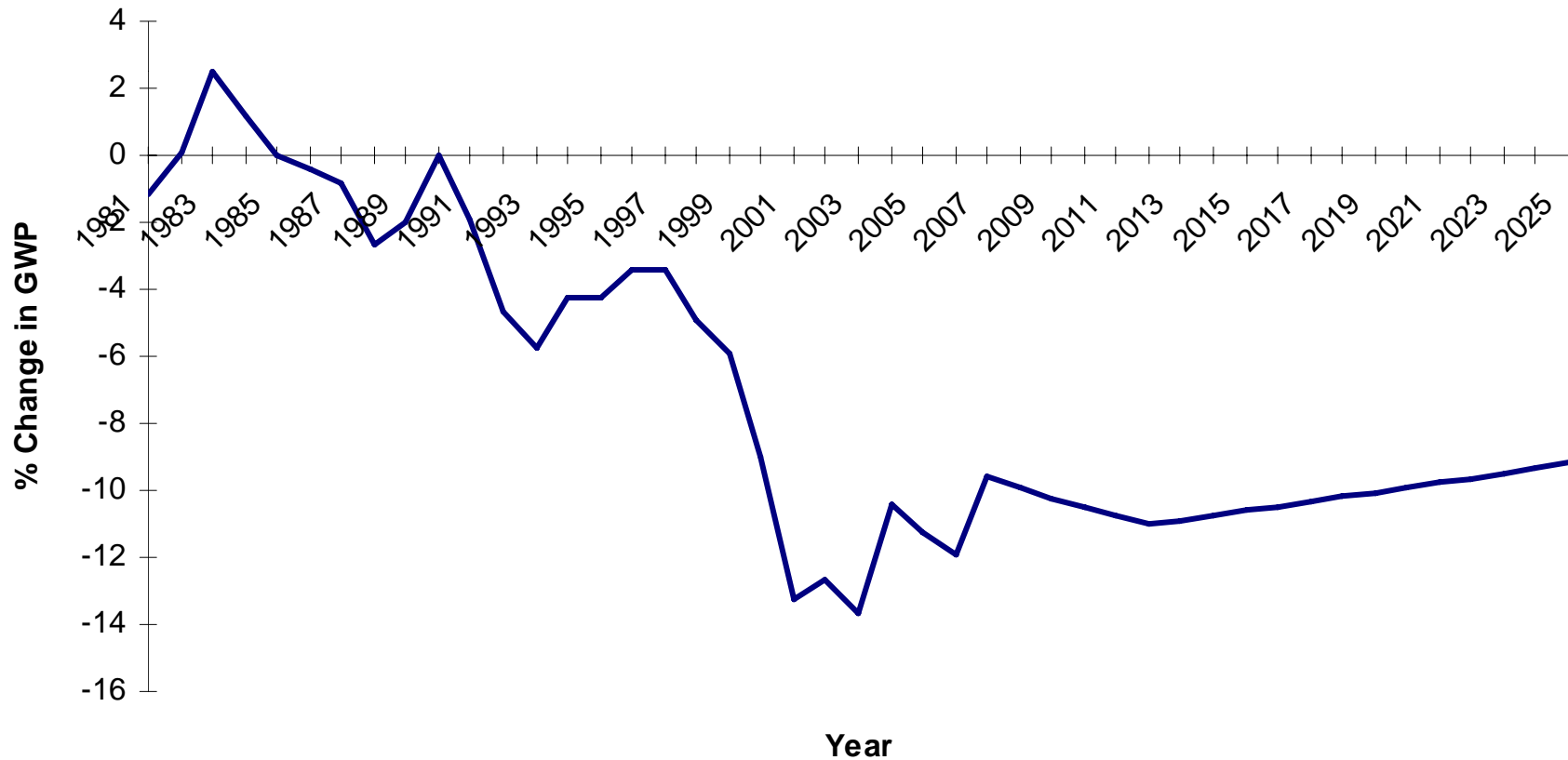


Emissions from agricultural sub-sectors (2003)

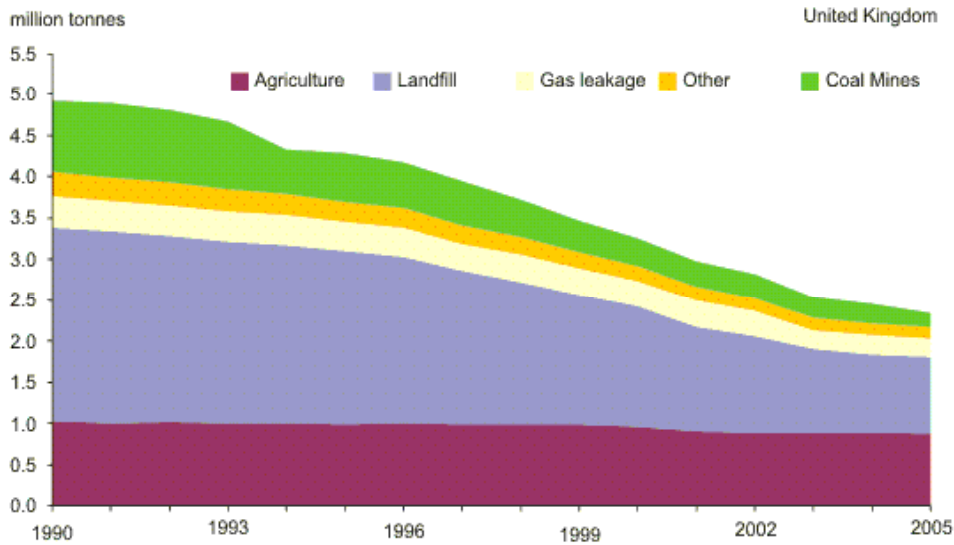


GHG projections for agriculture: 1981 – 2025, relative to 1990

% change in total agricultural GWP since 1981 and projected to 2025, relative to 1990 levels



Methane emissions by source: 1990-2005

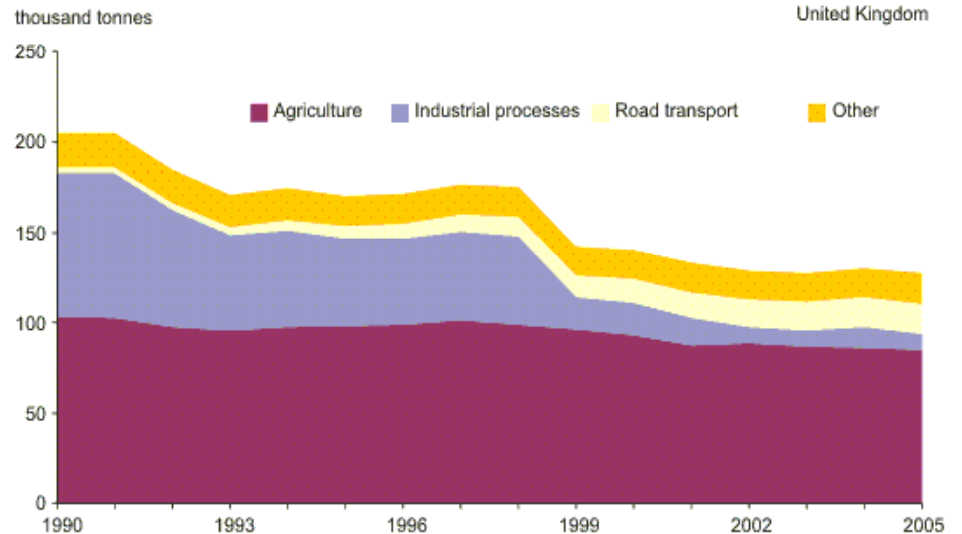


Source: AEA Energy & Environment

Methane emissions 1990 - 2005



Nitrous oxide emissions by source: 1990-2005



Source: AEA Energy & Environment

Nitrous oxide emissions 1990 - 2005



Climate change – the policy context

- Targets:
 - Kyoto Protocol: Reduce emissions of the “basket” of greenhouse gas emissions by 12.5% by 2012 (relative to 1990 levels):
 - Carbon dioxide
 - **Nitrous Oxide**
 - **Methane**
 - Sulphur hexafluoride
 - Hydrofluorocarbons
 - Perfluorocarbons
 - Domestic: Reduce CO₂ emissions by 20% by 2010

Climate change – the policy context

- Renewable Transport Fuel Obligation:
 - By 2010, 5% of fuel sold in UK must come from a renewable source
- EU:
 - Reduce GHG emissions by 20% by 2020
 - Reduce energy consumption by 20% by 2020
 - 20% of EU's energy consumption to come from renewables by 2020
 - 10% of transport fuel to come from biofuels by 2020

Climate change – future legislative framework

- Climate Change Bill:
 - Target to reduce CO₂ emissions by 26-32% by 2020 and by 60% by 2050
 - Will this target be made stronger - ???
 - Targets for other GHGs - ???
 - Carbon budgets for each 5 year period
 - Committee on Climate Change to advise on targets and budgets
 - Duties to assess risks from climate change and publish a programme on adaptation by 2011
 - Powers to introduce emissions trading schemes

- Context and policy framework
- **Agriculture's role in meeting climate change goals**
- Policy developments
- Research & development

How can agriculture support climate change goals?

- Climate change brings...
 - Responsibilities
 - Risks
 - Opportunities...for farmers and land managers
- Role of Rural Climate Change Forum

Responsibilities to...

- Reduce direct emissions of methane, nitrous oxide, and carbon dioxide e.g.:
 - Matching fertiliser to crop need (“precision farming”)
 - Spreading manure at appropriate times and in appropriate conditions
 - Improving dairy yields
 - Changes to livestock diets (e.g. maize silage rather than grass silage)
 - Using anaerobic digestion for manure and slurry
 - Ensuring on-farm energy efficiency or use of renewables
- Protect carbon stores in soils, peat and woodland Protect biodiversity and habitats
- Manage water sustainably

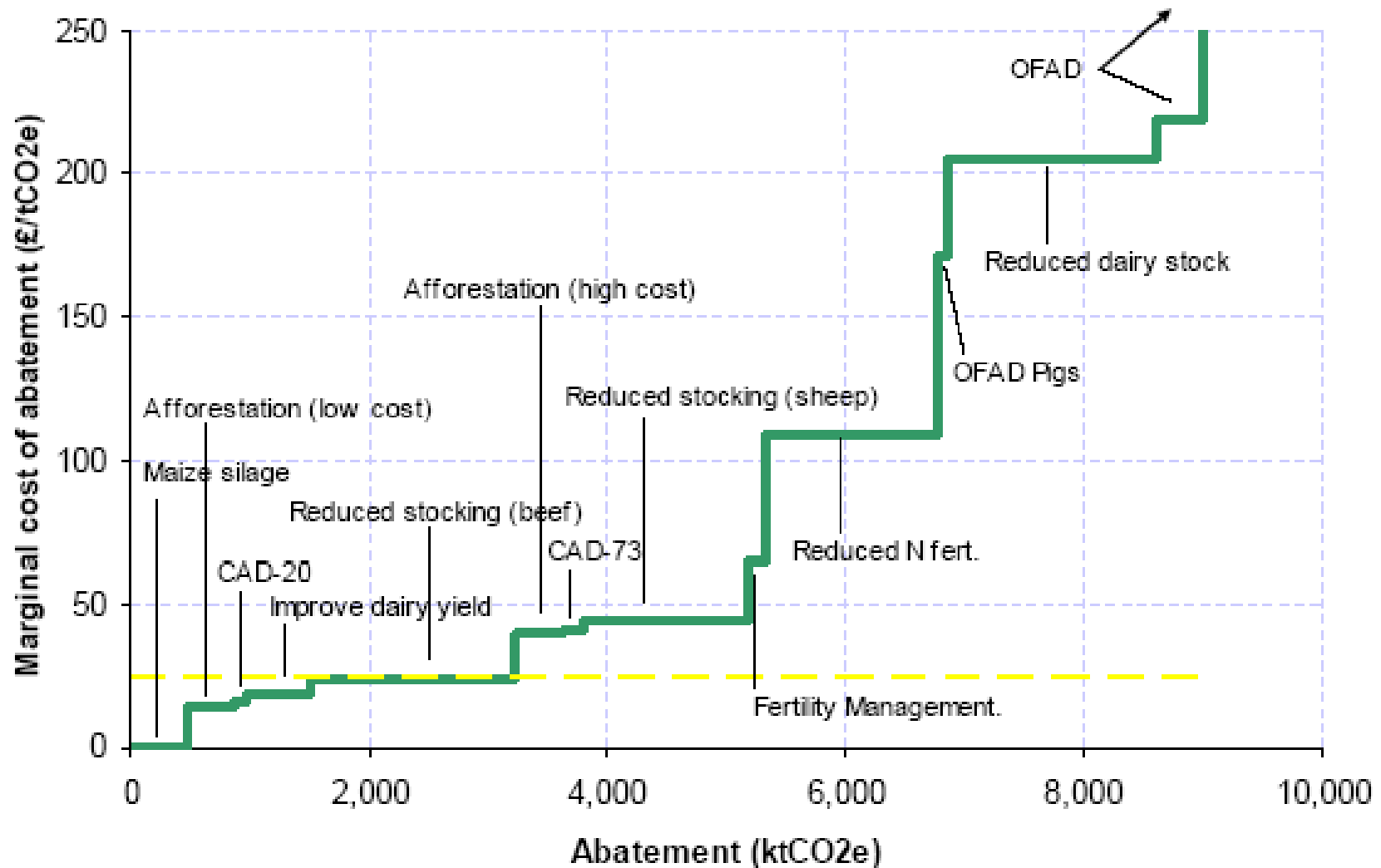
Risks from...

- Reduced soil moisture
- Increased heat stress in livestock
- Greater variability in crop yield due to more extreme and variable weather
- New pests and diseases invading previously 'safe' areas
- Warmer temperatures which will allow over-wintering of pests and diseases, leading to larger populations
- Flooding due to wetter winters and more extreme events
- Drought due to drier summers
- Increased soil erosion
- Water pollution from increased runoff.

Opportunities to...

- Benefit from longer growing seasons, increased yields, reduced frost damage to crops, reduced energy costs (e.g. for drying grain)
- Introduce new or novel crops and livestock species
- Increase profitability – including by:
 - ensuring effective use of inputs such as energy and fertiliser
 - improving waste management, for example by using anaerobic digestion for manures and slurries
 - increasing livestock nutrient use efficiency
 - making use of plant and animal genetic resources to improve resource use efficiency
- Produce biomass to displace fossil fuels
- Provide “carbon sinks” for greenhouse gas emissions from other sectors of the economy

Marginal Abatement Cost Curve for Agriculture



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Creating a supportive policy framework

- Farming for the Future Programme
- Agriculture and Climate Change Project
- Advice from Rural Climate Change Forum – policy, R&D, communications
- Building awareness and encouraging good practice among farmers; needs strong push on communications
- Looking at what agriculture needs to do to adapt
- Looking at the role of agri-environment schemes in reducing emissions and supporting adaptation
- Exploring the potential for emissions trading
- Promoting anaerobic digestion
- Showing international leadership / influencing other countries and organisations
- R&D on both mitigation and adaptation

GHG emissions trading

- Is emissions trading feasible for the agriculture sector? Study by NERA to look at this.
- Characteristics of sector make ET difficult and expensive to administer and monitor, because
 - Lots of small units - 90% of holdings emit 600 tCO₂e or less per year (very small in ET terms)
 - Diffuse sources of emissions
 - Emissions depend on what boundaries are set e.g. should emissions from cattle include N₂O emissions associated with feed?
 - Where should point of obligation lie?
- Further analysis

Anaerobic digestion: government action to overcome barriers

- Active stakeholder engagement on **financial, awareness, technical** barriers:
 - 2 ROCs/MWh for electricity from AD
 - Standard and protocol for digestate
 - Support for renewable heat?
 - Understanding among planners and regulators
 - Better coordination of advice e.g. through one portal or advice service?
 - Demonstration projects?
 - R&D – to address fugitive emissions and environmental impacts of digestate use
 - International collaboration

Adaptation project

- Key impacts of climate change – both positive (opportunities) and negative (risks) – on agriculture
- How industry needs to adapt in order to remain sustainable and economically viable
- How agriculture can contribute to managing and minimising impacts of climate change e.g. on land, ecosystems, biodiversity
- Communication to farmers and land managers
- Identify and implement appropriate mechanisms and policy frameworks

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Research and Development

- Approx £5 million per year for agriculture and climate change
- Includes:
 - Work on the GHG inventory and measuring emissions
 - Mitigation
 - Impacts and adaptation
 - Bio-energy

R&D projects

- Vulnerability of UK agriculture to extreme events
- Changes to agricultural management under extreme events - likelihood of effects and opportunities nationally (Chameleon)
- Climate Change Research and Innovation Adaptation Network
- Ecosystem services for climate change adaptation in land management

How to translate R&D into action on the ground?



FARMING FUTURES

- Defra, NFU, CLA, AIC, ARF
- Behaviour change to reduce GHG emissions and adapt to the impacts of climate change
- Katie Zabel – project manager
- www.farmingfutures.org.uk