

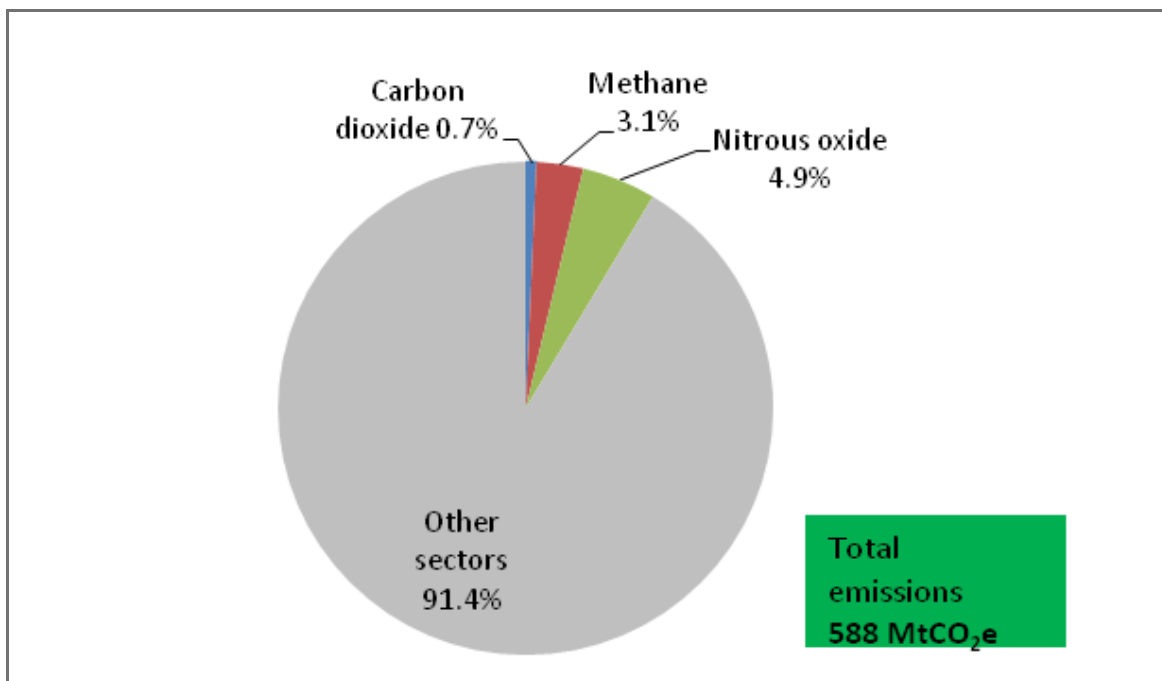
What does this sector include?

The agriculture sector comprises the growing of crops and rearing of livestock for food, fibre and other uses. In 2010, GHG emissions in this sector reached 51 MtCO₂e, equivalent to 9% of total UK GHG emissions. They are dominated by non-CO₂ emissions:

- Nitrous oxide (56% of sector emissions), largely arise from the use of nitrogen fertiliser (organic and chemical) on arable and grassland.
- Methane (36% of sector emissions), mainly from enteric fermentation, which occurs in the digestive system of ruminant animals (e.g. cattle and sheep) and waste/manure management (Figure 1).

CO₂ emissions from the use of fossil fuels to power stationary and mobile machinery (e.g. heating systems and tractors) make up the remainder (9%) of emissions in this sector

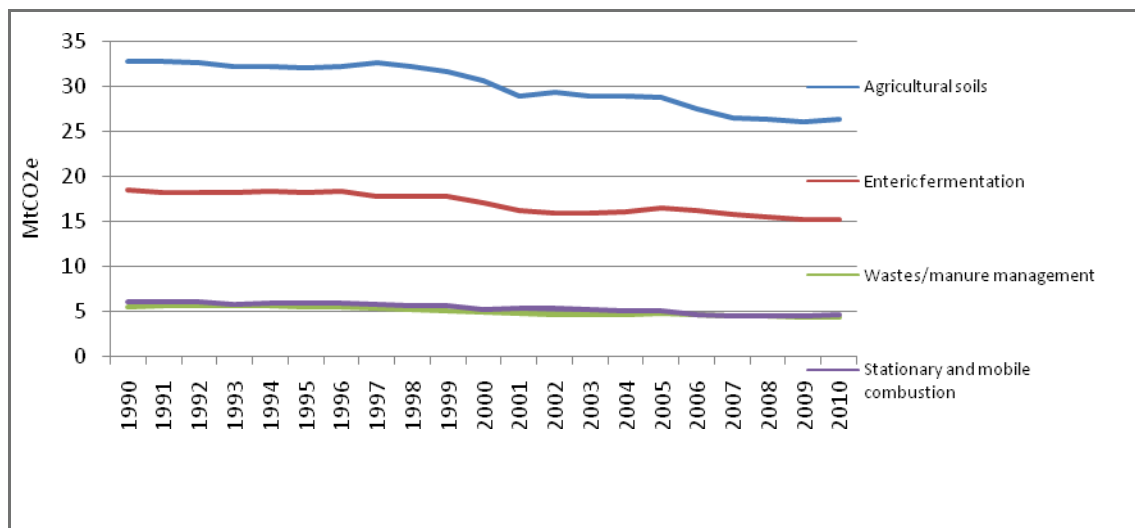
Figure 1. GHG emissions from agriculture (2010)



Key indicators/trends from 1990 to the present

Agricultural emissions declined by 12 MtCO₂e between 1990 and 2010 (Figure 2). A key driver has been the fall in livestock numbers, particularly from 2000 following CAP reform, which decoupled farming support payments from animal numbers. This had the effect of reducing methane emissions from enteric fermentation and waste management and also nitrous oxide emissions due to the decline in fertiliser use on grasslands. Emissions have also decreased due to improving efficiencies in livestock production and fertiliser practices and a smaller reduction in output.

Figure 2. Agricultural emissions by source (1990-2010)



Uncertainty around current level of agricultural emissions

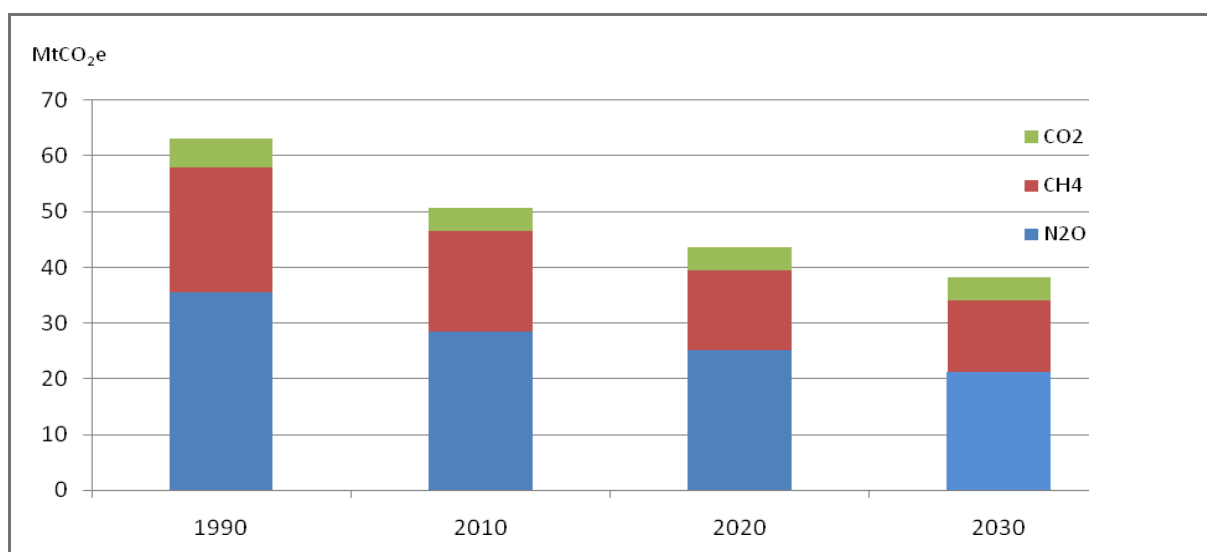
The absolute level of GHG emissions is particularly uncertain for non-CO₂ emissions in agriculture. In the absence of better country-specific emissions factors (to reflect regional conditions such as climate, soil quality and farming practices), current methods use default IPCC emissions factors. For example, calculating nitrous oxide emissions from soils is based on applying a generic emissions factor to the quantity of nitrogen fertiliser applied. However, these emissions will vary according to soil type, timing of application and the farming practice employed in applying the fertiliser. Defra estimates suggest that these uncertainties overall could result in emissions that are 61% lower or 152% higher than current emissions.

What can be done to reduce emissions in this sector?

Changing farming practices will be the main focus for reducing agricultural emissions to 38 MtCO₂e by 2030 (figure 3). The majority of abatement measures identified will enable farmers to save money as well as reduce emissions. These measures include improvement to nutrient management plans and the use of more nitrogen efficient plants, both of which will reduce nitrous oxide emissions. For reducing methane emissions, the measures include increased deployment of anaerobic digestion and changes to cattle and sheep diets.

After 2030 opportunities are more speculative. We have considered a number of scenarios in our report 'The 2050 target'.

Figure 3. Agricultural emissions to 2030



What is Government doing?

- **Voluntary approach.** Currently, the Government is pursuing a voluntary approach, based on the provision of information and encouragement. This is being led by industry in England under the Agriculture Industry GHG Action Plan, aiming to deliver a reduction of 3 MtCO₂e by 2022.
- **Smart Inventory.** Defra is undertaking work to better understand and measure how biological systems and different farming practices impact on emissions. This will allow for the development of a more sophisticated methodology for measuring, reporting and verifying emissions by 2015.

What is the CCC's position?

- **Policy.** The Government should consider the full range of abatement options, and circumstances under which it would be appropriate to move from the current voluntary approach to one with stronger incentives for action. Any UK options would have to address concerns about competitiveness impacts.

Links to recent work by CCC

- **Fourth Carbon Budget**, Chapter 7 – Reducing emissions from agriculture and land use, land-use change and forestry.
[http://www.theccc.org.uk/aws2/4th Budget/4th-Budget_Chapter7.pdf](http://www.theccc.org.uk/aws2/4th%20Budget/4th-Budget_Chapter7.pdf)
- **2012 Annual Progress Report**, Chapter 6 – Progress reducing emissions from agriculture.
<http://www.theccc.org.uk/reports/2012-progress-report>
- **The 2050 target**, Chapter 6 – Reducing Emissions of Non-CO₂ Greenhouse Gases.
<http://www.theccc.org.uk/reports/international-aviation-a-shipping>