

# Agriculture

## GHG Inventory summary Factsheet

**Territorial coverage:** UK including Crown Dependencies and Overseas Territories

**Total emissions:** Quoted with respect to emissions including net LULUCF

**Sector Definition:** National Communication

### Sector summary – historic emissions

- Overall contribution of agricultural emissions to UK total in 2010 was 8.6%.
- Emissions from the agriculture sector have decreased by 20% since 1990, driven mostly by a decrease in emissions from agricultural soils.
- N<sub>2</sub>O is the dominant GHG emitted, accounting for 56% of emissions from this sector.
- Emissions from agricultural soils dominate the agricultural sector emissions in the UK.

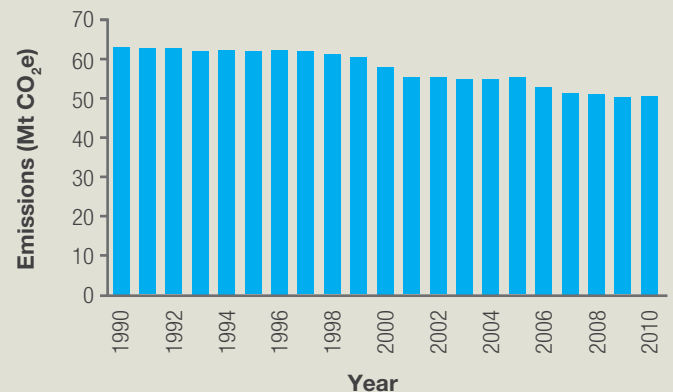
### Sources of emissions and data sets

- Stationary combustion includes all emissions from the direct combustion of fuel for heating or other uses. The main data set used is the Digest of UK Energy Statistics (DUKES).
- Emissions from enteric fermentation relate to CH<sub>4</sub> emissions associated with the digestion of food. The main data set for this is the June Survey of Agriculture and Horticulture, published by Defra.
- Animal wastes and manure management give rise to emissions of CH<sub>4</sub> and N<sub>2</sub>O due to anaerobic decay and denitrification. Estimates are also based on the Defra June Survey.
- Mobile machinery relates to emissions from equipment such as tractors.
- A small amount of CO<sub>2</sub> is released from the breakdown of agrochemicals. Data for this is taken from the Crop Protection Association handbook.
- Agricultural soil emissions arise from: the use of fertilisers (synthetic and animal manures); biological fixation of nitrogen by crops; ploughing in of crop residues; cultivation of organic soils; indirect emissions from atmospheric deposition of NO<sub>x</sub> and NH<sub>3</sub>; and leaching and runoff of nitrate. Key data sources include the British Survey of Fertiliser Practice (Defra), and the June Survey.

### Methodology

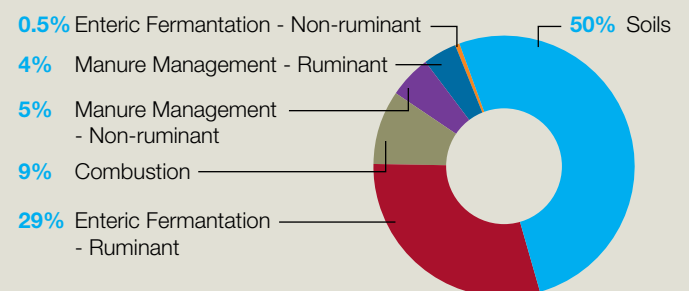
- Inventory compilers for the agriculture sector are Rothamsted Research.
- Stationary fuel combustion emissions are estimated by multiplying the fuel use estimates in DUKES by an emission factor (taken from IPCC and UNECE).

### Agriculture Emissions 1990-2010



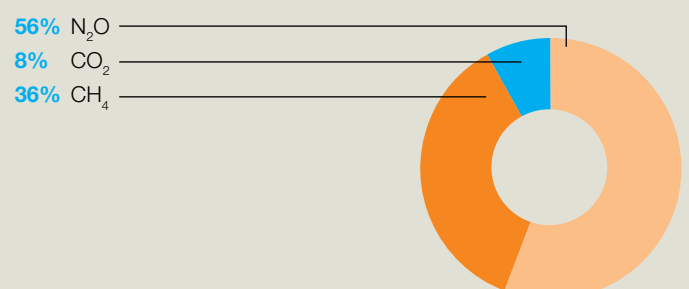
Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

### Agriculture Emissions by Source (2010)



Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

### Agriculture Emissions by Gas (2010)



Source: UK GHG Inventory (UNFCCC coverage) (AEA, 2012)

- Emissions from mobile machinery are modelled based on the population of the various machinery types, the age profile, the lifetime of the equipment, and average annual usage.
- For the breakdown of pesticides, an estimate of the carbon content of these products is combined with an estimate of how much carbon is stored, and how much is released. These estimates are based on data from the US EPA.
- Emissions from enteric fermentation are estimated by combining livestock numbers with appropriate emission factors (either default or UK specific).
- CH<sub>4</sub> emissions from animal wastes are estimated using livestock statistics and emission factors (default or UK specific).
- N<sub>2</sub>O emissions from manure management are based on livestock numbers, nitrogen excretion rates and animal waste management systems used.
- Emissions from agricultural soils are modelled using various statistical inputs, such as crop areas and fertiliser use, and the methods set out in the IPCC guidelines.

## Uncertainties

- The GHG Inventory quantifies uncertainties on emission factors and activity data, which in turn allow for the production of uncertainty estimates on the: emissions; overall uncertainty by gas; and indicative-only estimates of sector level uncertainties.
- For agriculture, the uncertainty is dominated by the uncertainty in the emission factor for agricultural soils. The uncertainty distribution for total agricultural N<sub>2</sub>O is skewed, with the 97.5<sup>th</sup> percentile 50 times greater than the 2.5<sup>th</sup> percentile. The uncertainty estimate for

this source indicates that the true value of the emission is within the range 2 to 101 Mt CO<sub>2</sub> equivalent in 2010.

- The uncertainties for methane emissions are around +/-20-30% for each of the categories, as a 95% confidence interval.
- The uncertainty in the emission for a given year is much greater than the uncertainty in the trend, since the emission factor is considered to be correlated across years.

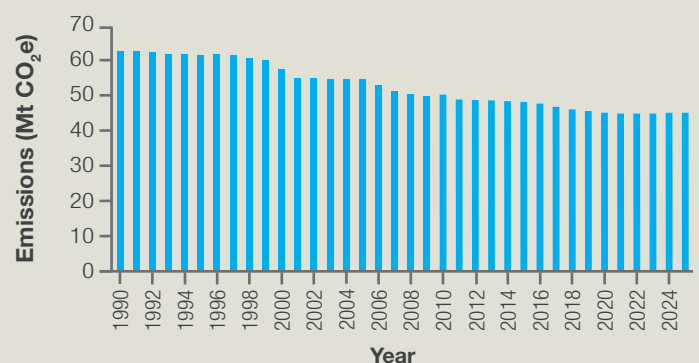
## Improvements

- Further research is being conducted through the UK GHG agriculture research platform to review and try to improve the estimates for agricultural soils.
- Continued inventory improvement will include research to develop more detailed emission factors and improve activity data from across the UK. There is particular focus on improving temporal and spatial resolution, sectoral reporting and improved representation of on farm mitigation measures.
- A key objective of the ongoing inventory research is to produce a model that allows the agricultural industry to track emissions reduction progress by sector and devolved administrative region.
- The latest inventory includes improvements to the method for emissions from enteric fermentation, to use new parameters related to the time spent grazing for cattle and to move from the method in the 1996 IPCC Guidelines to the 2000 Good Practice Guidance.
- Improvements to emissions from animal wastes have been made in line with recommendations from the UNFCCC's review of the inventory (these also impact on emissions from soils) and the changes outlined for enteric fermentation.

## Projections

- Projected emissions from the agriculture sector are expected to decrease by 12% from 2010 levels by 2025.
- Emissions continue to be dominated by N<sub>2</sub>O from agricultural soils.
- The overall decrease in agricultural emissions between 1990 and 2025 is estimated to be 28%.
- The projections presented here exclude the impact of emissions trading.
- The projections are taken from Updated Energy and Emissions Projections: October 2011 (DECC); historic data taken from the 2012 inventory.

## Historic and Projected Emissions from Agriculture



Source: Updated Energy and Emissions Projections: October 2011 (DECC).

## Links

- UK GHG Inventory: <http://ghgi.decc.gov.uk/>
- UK GHG National Statistics: <http://www.statistics.gov.uk/hub/agriculture-environment/environment/climate-change/index.html>
- Projections data: [http://www.decc.gov.uk/en/content/cms/about/ec\\_social\\_res/analytic\\_projs/en\\_emis\\_projs/en\\_emis\\_projs.aspx](http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx)
- Defra: <http://www.defra.gov.uk/>
- Rothamsted Research: <http://www.rothamsted.ac.uk/>