



Department  
for Environment  
Food & Rural Affairs

[www.defra.gov.uk](http://www.defra.gov.uk)

# **2012 Review of Progress in Reducing Greenhouse Gas Emissions from English Agriculture**

**November 2012**

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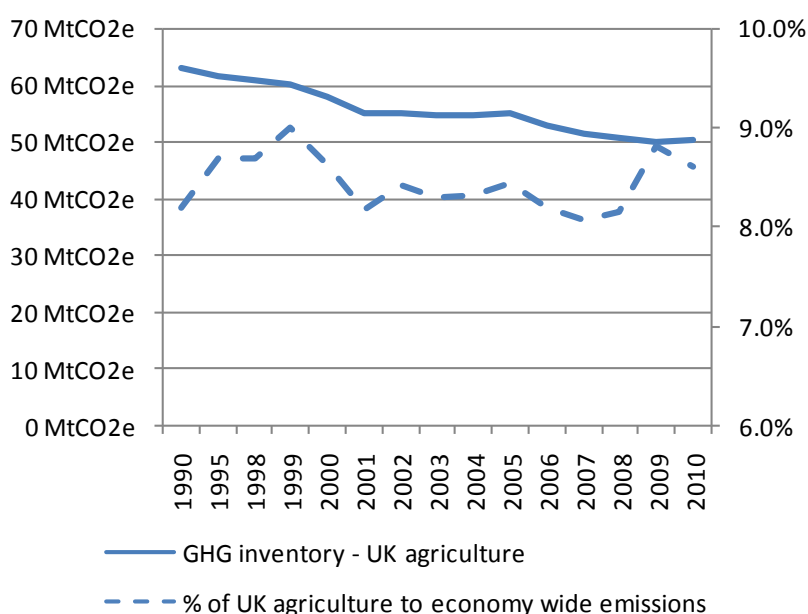
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## Introduction

1. The 2012 review is a long standing commitment to assess the effectiveness of the Government's current approach to achieve greenhouse gas (GHG) emission reductions from English agriculture. Working collaboratively with a range of stakeholders it has sought to develop a better understanding of the evidence in order to understand current progress in the context of developing policy options for the future. The Terms of Reference for the review are available online<sup>1</sup>. This review is also a Defra Business Plan commitment:

- Report on progress made towards reducing GHG emissions from agriculture and opportunities for further action (Action 1.3.iii – End November 2012)

Figure 1: Agricultural GHG inventory (1990 – 2010)



2. We estimate agriculture makes up around **9%** of UK GHG emissions, a significant proportion of the overall carbon economy, however because of the limitations in the way we currently measure GHG emissions from agriculture, these estimates are uncertain<sup>2</sup>. For example, the estimates do not fully reflect the

<sup>1</sup> <http://www.defra.gov.uk/environment/climate/sectors/agriculture/>

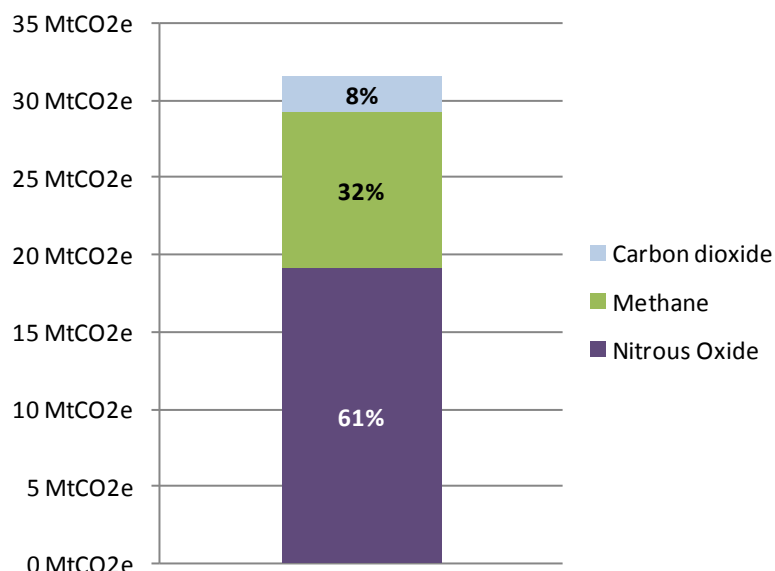
<sup>2</sup> 95% confidence intervals (Source: National Inventory Report 2010)

- N<sub>2</sub>O (soils): **+249%, -93%**;
- N<sub>2</sub>O & CH<sub>4</sub> (manure management): **+/-25%**;
- CH<sub>4</sub> (enteric fermentation): **+/-16%**

positive actions farmers have already taken to improve their farming practice, improvements which are likely to provide savings not currently accounted for in our estimates. Despite this uncertainty, over the last two decades the trend for GHG emissions in the agriculture sector is moving in the right direction as a result of the reduced use of nitrogen fertilisers and a decline in overall livestock numbers, partly as a result of reforms to the Common Agricultural Policy.

3. Between 2009 and 2010 there was a **0.9%** increase in GHG emissions from agriculture. In the context of the longer term downward trend and wider uncertainty already discussed, this result is not in itself unduly worrying. This is because the result is only a limited increase over a single reporting year and does not indicate a change in the overall trend. We will keep a close eye on progress to see whether this single year increase is the start of a change in the longer term, downward trend but at this stage, we view this isolated increase of limited significance.

Figure 2: By source, English agricultural GHG emissions (2010)



4. Agriculture is a devolved policy area with the overall approach in reducing GHG emissions from agriculture varying between England, Scotland, Wales and Northern Ireland to reflect local circumstances and priorities<sup>3</sup>. In England and by source, **Nitrous oxide (N<sub>2</sub>O)** from the use of synthetic and organic fertilisers in soil nutrient management practices is the most significant source of GHG emissions from agriculture, accounting for 61%. **Methane (CH<sub>4</sub>)** from the ruminant digestion processes in livestock animals and the production and use of

<sup>3</sup> Further information on the policy approaches for reducing GHG emissions from agriculture in Scotland, Wales and Northern Ireland is provided in Paper 1: Background of this Report.

manure and slurry is the next most significant at 32%. Less than 10% of emissions from agriculture are in the form of **carbon dioxide (CO<sub>2</sub>)** from energy used for fuel and heating. Although there is uncertainty associated with the current agricultural GHG inventory, the root causes of emissions from agriculture are well understood and action can be taken now to address these.

5. In 2011, an Industry Partnership published the Greenhouse Gas Action Plan (GHGAP), a voluntary led approach with an ambition to:
  - **Reduce annual GHG emissions from English agricultural production by 3 MtCO<sub>2</sub>e by the third carbon budget period (2018 – 2022), compared to a 2007 baseline**
6. Defra is not a partner of this voluntary approach however we are supportive of the leadership the industry is showing and we are taking actions to support its implementation. This includes investing £12.6m over four and a half years in partnership with the devolved administrations to improve the national agriculture GHG Inventory, continuing a wider research programme to develop the evidence base, mapping farm practices to policies and incentives to develop a better understanding of the current policy framework and establishing a monitoring and indicator framework to transparently track progress made. Defra will formally review progress again in **2016**, following the completion of research to improve the agricultural GHG inventory and GHGAP phase 2 (2012 – 2015)<sup>4</sup>.

## 2012 Review findings

7. The mitigation methods which can reduce nitrous oxide emissions from farms typically help to increase farm efficiency and provide an opportunity to deliver a range of wider environmental benefits too. Improving a farms overall nutrient management system for example, can bring down the costs of production whilst also reducing the level of excess nitrogen in the environment. This action can provide a number of public goods including reduced GHG and ammonia emissions, nitrate pollution to water as well as the support of wider efforts to protect and enhance biodiversity<sup>5</sup>. Additional mitigation methods specifically related to the reduction of methane from livestock have also been identified which can reduce overall GHG emissions and help to increase farm efficiency. Research to assess the wider environmental impacts of these mitigation

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<sup>4</sup> The indicator and monitoring framework developed by the review is provided in Paper 5: Indicator and monitoring framework of this Report

<sup>5</sup> Full analytical findings are presented in Paper 3: Analysis of this Report

methods<sup>6</sup> is due to be completed soon. It will provide an important body of evidence to inform the consideration of implementing mitigation methods for livestock systems in the context of wider environmental and land management objectives.

8. Our analysis, prior to the implementation of the industry's GHGAP, used 2010 data (the most up to date available) to assess the progress made by English farmers in adopting farm practices which lead to reductions in GHG emissions. It indicates advice schemes such as Catchment Sensitive Farming, incentive payments available through Environment Stewardship and Nitrate Vulnerable Zones rules are important external drivers to the efforts made by many English farmers, to adopt technology and farming practice which have led to GHG emission reductions of **over 1 MtCO<sub>2</sub>e**<sup>7</sup>. These reductions, which are not currently accounted for in the agriculture GHG inventory, have mainly been achieved through the adoption of resource efficient practices which make farmers more efficient and save money.
9. It is difficult to pinpoint the reason(s) why some farmers adopt mitigation methods and others do not. The choices made by farmers are influenced by a wide variety of internal and external factors of which the wider policy landscape is but one part. It is clear however that existing policies including those already mentioned are geared towards encouraging farmers to adopt resource efficient practices, practices which provide a range of public goods including GHG emission reductions. The industry's GHGAP is ideally placed to work alongside this, to identify the barriers to uptake and develop approaches to accelerate the adoption of mitigation methods to a wider proportion of farmers in England.
10. **On this basis we believe it is a realistic expectation that the overall ambition of reducing annual GHG emissions from agriculture by 3 MtCO<sub>2</sub>e by the third carbon budget can be achieved subject to continued focus and effort by the industry.**
11. Defra welcomes the progress made so far by the Industry Partnership in developing its GHGAP, most notably in bringing together 14 organisations to focus on the challenge of reducing GHG emissions from agriculture. We believe it is right for industry to continue to lead but we do not underestimate the challenges ahead. So it will be important for the Industry Partnership to show leadership, innovation and creativity in the implementation of its GHGAP Phase 2 (2012 – 2015), taking into account the emerging findings of the review of

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<sup>6</sup> Defra research project AC0226 – Wider environmental impacts of the Greenhouse Gas Action Plan

<sup>7</sup> Full analytical findings are presented in Paper 3: Analysis of this Report

voluntary and industry led approaches which recommends the industry should set out specific success criteria for how the novel approaches developed by the GHGAP will encourage change<sup>8</sup>.

12. Defra, although not a partner of the current plan, will collaborate with the Industry Partnership to support this effort. For example we will use the tools developed in this review to highlight the practical things farmers can do to save money, reduce their emissions and support our wider farming and environmental objectives.
13. Looking ahead to the fourth carbon budget (2023 – 2027) and beyond, our analysis suggests there is limited scope for further reductions. This is based on our current understanding of technology and farming practice, even when considering mitigation methods which exceed a predicted 2050 carbon price of £200 per tonne CO<sub>2</sub>e, reflecting the difficulty of delivering further efficiency from complex biological systems. So in the longer term agriculture as a share of the wider carbon economy is likely to increase and potentially exceed **20%** of UK wide GHG emissions by 2050 compared to around **9%** today. This is not because absolute emissions from agriculture will have risen, but because the pace of ‘decarbonisation’ elsewhere is expected to occur at a quicker pace when compared to agriculture.
14. Addressing these longer term challenges will require a concerted effort and a willingness to consider new and novel approaches. We have agreed to work closely with the industry, the Committee on Climate Change (CCC) and other expert stakeholders to consider these longer term options.

## Next steps

### Industry Leadership and Monitoring Progress

15. The industry has made a good start and now needs to continue to show leadership, innovation and creativity in driving forward actions to meet the challenge it has set itself. For example, we welcome the Industry Partnership’s Farm Efficiency Hub as a novel approach and would encourage the development of a plan to set out specific success criteria and clarify the industry’s thinking on who the tool is targeted at, how it will be used by its target audience and how that will assist knowledge exchange to farmers on the ground.
16. Regardless of the approaches taken, Defra will formally review progress again in 2016 following the completion of research to improve the agricultural GHG inventory and GHGAP phase 2 (2012 – 2015). However, between then and now

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<sup>8</sup> An overview of Industry Action is provided in Paper 4: Industry Action of this Report



it will be important to monitor progress on the ground. The indicator and monitoring framework developed as part of this review will provide an insight into what impact the GHGAP alongside the wider policy landscape is having on key indicators including farmer attitudes, the adoption of mitigation methods and GHG emission intensity of production. These are all leading indicators of future GHG emissions from agriculture.

17. Our annual assessment will be based on progress made using long and short term success criteria:

- Trends in the indicators moving in the right direction from the previous year and/or over the longer term are a clear measure of success
- A significant trend in the indicators moving in the wrong direction for two consecutive years or over the longer term would provide cause for concern and prompt further analysis

18. The results of this annual assessment will be published in July of each year as a summary to the Agricultural Statistics and Climate Change publication and make use of the wider evidence base and ongoing dialogue with stakeholders. The timing and scale of the formal review in 2016 is flexible and may be brought forward if progress does not satisfy our key tests.

19. At this stage, Defra does not intend to specify targets or trigger points for further intervention. Our proposed approach to monitor and publish progress on an annual basis and amend or consider alternatives in the light of the most recent evidence and data will provide a good basis for transparency and action if progress is not as expected.

## **Improving the Evidence**

20. The GHG research platform is a key four and a half year project scheduled to complete in 2014/15, aimed at improving the accounting structure for GHG emissions from agriculture<sup>9</sup>. The project is important in providing a robust framework to monitor GHG emissions from agriculture. Although it is too early to begin drawing emerging findings from the GHG research platform, work continues to progress well and it remains on track to complete as scheduled. Alongside the GHG research platform, as part of the Sustainable and Competitive Farming Strategy Evidence Plan, Defra intends to continue to invest in research which will support efforts to bring more farmers up to current best practice,

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<sup>9</sup> An overview of the agricultural GHG inventory and Defra's wider research is provided in Paper 2: Research of this report

advance our understanding of what best practice is and achieve a balance between production and the environment.

21. Defra is committed to doing more to exchange the findings of its research with external stakeholders. In this area we are currently trailing a simple mailing list to provide interested parties with a list of current and recently completed Defra sponsored research projects, specifically focused on agriculture and climate change mitigation. Alongside this, we also intend to establish regular knowledge exchange events as well as working with the Industry Partnership to explore the results of the FARMSOPER Upscaling Tool, used extensively in the review, to support the development of the GHGAP.
22. Throughout the 2012 Review we heard feedback from stakeholders that it should review the role of land management to store carbon. As the core remit of this Business Plan commitment was to assess progress made in reducing GHG emissions from agriculture, we prioritised the role of production and the steps taken to deliver reductions to date. In the future however, it is our intention to develop the evidence and tools produced by this review to take into account wider land management practices and their associated impact on carbon storage. For example, we are looking to work with experts to develop the FARMSOPER Upscaling Tool to include new practices which relate to carbon storage, as well as filling gaps in the current modelling framework on the production side too.

## Longer term Challenge

23. The challenge of reducing agriculture GHG emissions over the longer term is significant and will require an improved evidence base to inform future scenarios. It will also be important to demonstrate the positive correlation between what is good for reducing GHG emissions, boosting productivity as well as supporting our wider environmental objectives. Addressing these challenges will require a concerted effort and a willingness to consider new and novel approaches. We have agreed that a dialogue with industry partners, the CCC and other stakeholders to consider these longer term options is a positive way forward with all players bringing their expertise and insights to the agenda.

## Supporting papers

24. In support of the 2012 Review, five papers have been developed which provide more detailed information on the results of this review. These papers are:

- **Paper 1: Background** – information on GHG emissions from agriculture, the current policy approach occurring in England and other Devolved Administrations as well as an overview of the scope of the review

- **Paper 2: Research** – an overview of efforts underway to improve Defra’s evidence base on GHG emissions from agriculture including information on current research, progress made and the future challenges for developing the evidence base
- **Paper 3: Analysis** – an overview of the Mapping Farm Practices and Incentives project, as recommended by the CCC, providing revised estimates of GHG emission reduction potential from over 100 farm practices in the context of English agriculture
- **Paper 4: Industry Action** – an overview of the industry-led GHGAP, the progress it and other supporting Sector Roadmaps have made to encourage GHG emission reductions from agriculture
- **Paper 5: Indicator and Monitoring Framework** – outlines an indicator framework to provide a leading indication of agriculture’s progress in reducing GHG emissions