



Agriculture and Climate Change: a position paper by the Delivery Partners for the *Agricultural Industry Greenhouse Gas Action Plan* October 2010

Climate change presents a challenge to agriculture worldwide – how to produce more food and non-food products while having a reduced impact on the local and global environment.

1. Professor Sir John Beddington, Chief Scientific Adviser to the UK Government, warned in 2009 of a “perfect storm” of increasing demand for food, water and energy in the face of a changing climate. He highlighted the challenge of the need to almost double food production by 2050 while adapting to climate change and helping to mitigate its severe impacts.
2. Farmers worldwide currently have access to sufficient land on which to increase production, but to meet this challenge there is a need for investment in inputs, infrastructure, improved skills and innovations derived from research.
3. The precise impacts of climate change on agriculture are difficult to predict, but they will be experienced most likely through extremes of weather worldwide. As representatives of the UK agricultural industries we are firmly of the opinion that climate change is a threat to global human well-being, while recognizing that it may also present new economic opportunities for our sector (improved production efficiency, diversification, etc.). Our response to climate change may bring about many other environmental benefits, but there are likely to be complex trade-offs as well.
4. We support the UK Government's efforts to secure an international climate change agreement, and accept our responsibility to future generations for reducing the net greenhouse gas (GHG) emissions from agricultural production. To this end, we have devised a workable Action Plan, and we will embark on a programme of activities to ensure its effective delivery.

We draw attention below to the limited potential for GHG emission reductions from agricultural production, and the shortcomings of international reporting systems

5. The nature of agricultural GHG emissions is very different from other sectors of the economy such as electricity generation, transport, manufacturing, etc. The principal greenhouse gas for most industries is carbon dioxide (CO₂) from fossil fuel combustion, while for agricultural systems methane and nitrous oxide are the main GHGs. Determining these emissions is much more complex than measuring CO₂, and they are bound up in highly complex and imperfectly understood natural soil and animal microbial processes. These processes are not directly controllable by human intervention, and furthermore they are subject to seasonal and annual variability as a function of the weather, crop yield, etc.
6. A supply of nitrogen from organic or inorganic sources is an absolute requirement for the growth of crops and pasture, and it is an unavoidable consequence of soil processes that a small amount of the nitrogen in an agricultural system will be emitted as nitrous oxide. Likewise, methane is produced inevitably by bacteria in the rumen of cattle and sheep as they break down the cellulose in their diet, producing milk and meat for human consumption from the large areas of grassland that are often unsuitable for arable crops.

7. Unfortunately, the way that agriculture's emissions are reported globally in the GHG inventory does not reflect many of the benefits that farming can bring (e.g. by storing carbon in vegetation and soils, or by contributing low-carbon energy services to other sectors).

The Industry's Action Plan

8. The agricultural industry Greenhouse Gas Action Plan is a firm statement of intent and a commitment to reduce our sector's annual GHG emissions by 3 million tonnes CO₂ (equivalent) in England by 2020. Our focus is based on the following principles:
 - production efficiency gains should be the focus of activity - we are seeking to improve the resource efficiency of production and reduce emissions per unit of output.
 - we need an improved agricultural GHG inventory that accurately reflects progressive changes in farming practice, such as improvements to livestock diets, nutrient management and manure management.
 - all other GHG costs and benefits associated with the industry should be recognised, such as the contribution of on-farm renewable energy and the storage of carbon in vegetation and soils.
9. Factors over which the agricultural sector has a degree of control mostly concern efficiencies of resource utilisation:
 - nitrogen - in animal manures, crop residues, fertilisers and animal feeds impacting on nitrous oxide emissions
 - livestock management systems - where methane emissions are related to production efficiencies.
 - energy and fuels (net carbon dioxide emissions)
10. We believe that working through a voluntary industry-led partnership alongside government will capture existing good practice, and provide a potentially more cost-effective way of addressing the climate change challenge than regulation alone.
11. Successful examples already exist of this kind of voluntary initiative, as well as a range of sector-specific advisory services and roadmaps. Alongside Defra's own actions, the GHG Action Plan is intended to capture and extend best practice as well as addressing the gaps in farm business advice as they are identified, to ensure a concerted effort by the entire agricultural industry, sector by sector, across all regions and all categories of farmers and growers (conventional, organic, etc.).

Future possibilities

12. As an industry, we need to establish realistic goals for reducing agricultural GHG emissions towards a minimum future level, beyond which it may not be biologically possible to make further reductions. We must also remain open to future technological breakthroughs or innovative production systems that might be possible in the long term.
13. The biologically-constrained future minimum level of agricultural GHG emissions needs to be placed in the context of a decarbonised UK economy which recognises the contribution of agriculture to renewable energy and carbon storage, including new bio-based pathways such as biomass energy with carbon capture. The challenge of simultaneously reducing emissions while maintaining or increasing food production was recognised in the recent DECC 2050 Pathways Analysis.
14. It should be possible to establish an optimum GHG balance for the UK, based upon the most efficient systems producing domestically a substantial proportion of the food needs of the future population (c. 70 million by 2050). Concentrating on increased yields and efficiency across all types of farming would allow land to be available also for forestry, the cultivation of bioenergy crops and the maintenance of permanent grassland, all of which would increase the storage or displacement of carbon from burning of fossil fuels while providing other environmental benefits (biodiversity, soil quality, water quality, etc.).