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European Union Committee

8th Report of Session 2009–10

**Adapting to climate
change:
EU agriculture and
forestry**

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NOTE: References in the text of the report are as follows:

(Q) refers to a question in the oral evidence

(p) refers to a page of written evidence

The report of the Committee is published in Volume I (HL Paper 91-I)

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SUMMARY

Climate change confronts society with a range of uncertainties. In the case of agriculture and forestry, demand for goods and services is expected to increase over the next decades, as the world's population grows. At the same time, the sectors are likely to undergo changes in climate which vary significantly within individual countries, let alone across larger geographical areas. Policy-makers must anticipate these uncertainties; climate change impacts will vary according to locality; policy development must allow for responses to be local, to be effective.

The European Commission's White Paper on adapting to climate change, of April 2009, contains proposals for a co-ordinated EU approach intended to complement measures taken by and in Member States. An accompanying paper deals with the challenge for agriculture and rural areas. Our inquiry has been conducted as an extended scrutiny of the Commission's documents, and our report offers commentary on the issues raised in them.

Farming is a core policy sector for the EU, through the Common Agricultural Policy (CAP). In the current financial period to 2013, funding under Pillar 2 of the CAP is already being allocated to measures related to climate change. The debate is underway on the shape of the CAP after 2013. The extent of support for EU agriculture to mitigate climate change and to adapt to it must be a key consideration. We see these climate change responses as part and parcel of the requirements of a sustainable intensification of agriculture which, in our view, should be the defining characteristics of the future CAP.

The EU does not have a similar policy competence for forestry. However, there is an important debate to be conducted on climate change-related responses to be promoted by Member States and the EU, and this will be stimulated by the Commission Green Paper on forestry published in March 2010.

The complex challenges ahead make it imperative that research is driven forward, into the science of the possible changes in climate and their impact on agriculture and forestry, and into the technology that can help farmers and foresters in the tasks of mitigation and adaptation. The EU should play an important role in helping Member States to co-ordinate their efforts. Other parts of the world, where these sectors are now responding to conditions that may affect Europe in the future, have relevant experience, for example, with innovative water management techniques. The EU's efforts should include improving research links with other countries. A strong EU research and development capacity related to climate change will provide a basis to transfer knowledge outside the EU.

Our inquiry has made one thing abundantly clear: proposed activity at the EU level, or indeed by Member States' governments, whether it be better research into the changing climate, or adjustments to funding programmes, will be of limited effect unless the knowledge gained or the money offered is made available to individual land managers in a practical and relevant manner. Adapting agriculture and forestry to climate change will be little more than an abstract aspiration unless governments turn policies into specific advice to farmers and foresters. The Commission is reviewing the Farm Advisory System which Member States operate under the CAP; any such system is worthy of the name only if it serves as an effective channel for this purpose.

Adapting to climate change: EU agriculture and forestry

CHAPTER 1: INTRODUCTION

1. There has been climate change throughout the centuries. Nature has adapted, and farmers have always reacted to changing weather patterns; the uncertain and unpredictable incidence of rainfall and extremes of temperature have always meant that decisions on sowing, managing and harvesting crops have to be kept constantly under review. However, current understanding of climate change, and projections of its impacts over the decades to come, indicate a far higher level of uncertainty in the future. This has implications across all sectors of economic and social activity; for agriculture and forestry, it points to changes in weather patterns taking place more rapidly, and with more powerful effects, than in recent experience.
2. What exacerbates these potential problems is that they are expected to occur in a world whose total population is projected to increase from 6 billion now to 9 billion in 2050, and where some estimates point to the need to double agricultural production by that date. These factors, combined with issues of energy and water supply, may be the harbingers of the “perfect storm” of global events described by Professor John Beddington, the Government’s Chief Scientific Adviser.¹
3. The European Commission considers that, in the period until 2030, increasing weather instability, extreme events, and seasonal variations in precipitation patterns in areas already suffering from water scarcity, are the factors likely to have the most serious consequences for agricultural production; outbreaks of pests and diseases are increasingly likely to become risk factors. Over the longer term (by 2080–2100), the Commission foresees a more detrimental impact on agricultural production if warming continues and intensifies, calling for important changes in crop suitability and distribution, as well as raising risks of land abandonment. Moreover, the Commission considers that rising atmospheric CO₂ concentration, higher temperatures, changes in precipitation, flooding, drought duration and frequency will have significant effects on the growth of trees with associated consequences for outbreaks of pests and diseases and for the frequency and intensity of fires and wind storms (European Commission, p 161).
4. The relationship of agriculture and forestry to climate change is not simply a reactive one; not only adaptation but also mitigation is an important issue. Livestock emits methane, a greenhouse gas (GHG) 21 times more potent than CO₂; fertiliser use for crop-growing can produce nitrous oxide, a GHG 310 times more potent than CO₂. In the EU, around 9% of GHG emissions come from agriculture.² In the UK, agriculture accounts for some 7% of GHG emissions;³ 36% of the UK’s methane emissions come from livestock

¹ “Food, Energy, Water and the Climate: A Perfect Storm of Global Events?” Speech of 19 March 2009: <http://www.govnet.co.uk/news/govnet/professor-sir-john-beddington-speech-at-sduk-09>

² See: http://ec.europa.eu/agriculture/climate_change/index_en.htm

³ See: <http://www.defra.gov.uk/foodfarm/landmanage/climate/index.htm>

and livestock manures; 67% of the UK's nitrous oxide emissions also come from agriculture, partly from livestock manures but mainly from the use of artificial fertiliser.

5. The UK is committed to reducing total GHG emissions by at least 80% below 1990 levels by 2050.⁴ The EU commitment is for a 20% reduction, possibly rising to 30%, by 2020. The achievement of these reductions will require agriculture, alongside other sectors, to change its practices, even as it continues to provide the goods and services demanded of it.
6. In the UK, the Climate Change Act 2008 established a statutory framework for national measures aimed at adaptation to climate change. It includes an Adaptation Sub-Committee (set up in 2009) of the Committee on Climate Change, to advise the Government; a national risk assessment, by 2012; and a power for Government to require public bodies to produce adaptation plans, which will be matched by Government departments, by spring 2010. The Department for Environment, Food and Rural Affairs (Defra) is co-ordinating a cross-Government Adapting to Climate Change Programme. The adaptation of agriculture, forestry and land management is being addressed by a joint project between Defra, Natural England, the Environment Agency and the Forestry Commission, under Defra's Farming for the Future Programme, and this will inform the agricultural adaptation contribution to the Defra Departmental Climate Change Plan to be published in spring 2010.
7. In April 2009, the European Commission published a White Paper on adapting to climate change,⁵ with an accompanying paper on the challenge for agriculture and rural areas.⁶ The White Paper recognised that most adaptation measures would be taken at national, regional or local level, but said that such measures could be strengthened by an integrated and coordinated approach at EU level. The Commission foresaw a two-stage approach: Phase 1, from 2009 to 2012, would lay the ground work for preparing a comprehensive EU adaptation strategy; Phase 2, from 2013 onwards, would see that strategy implemented. The date of 2013 is of particular significance for the Common Agricultural Policy (CAP); the EU's current Financial Perspective runs from 2007 to 2013; and a Budget Review is now underway which will address the post-2013 future of the CAP.
8. In the 2007–08 session, we completed an inquiry into the future of the CAP;⁷ in the 2008–09 session, we conducted an inquiry into the review of the Less Favoured Areas scheme that is part of the rural development component of the CAP.⁸ We carried out this inquiry, into the EU policy response to the adaptation of agriculture and forestry to climate change, not least in order to consider the relevance of this response to the continuing debate about the future of the CAP after 2013.
9. The EU does not have specific competence in forestry policy, though it has adopted both an EU Forestry Strategy (with common principles for sustainable forest management) and an EU Forest Action Plan (working

⁴ Under the Climate Change Act 2008.

⁵ COM(2009)147 "Adapting to Climate Change: Towards a European framework for action"

⁶ SEC(2009)417 "Adapting to climate change: the challenge for agriculture and rural areas"

⁷ 7th Report (2007–08): The Future of the Common Agricultural Policy (HL Paper 54)

⁸ 13th Report (2008–09): The Review of the Less Favoured Areas Scheme (HL Paper 98)

towards a monitoring system and enhanced protection for EU forests). The White Paper of April 2009 referred to the need to update these documents, and during our inquiry the Commission was preparing a Green Paper on forest protection and information, which was published in March 2010 (see Box 2, Chapter 5).⁹ Since publication took place after we had taken evidence, we offer no substantive comment on it. Although we address forestry in Chapter 5, most of our evidence concerned agriculture. We expect that the debate on the questions posed in the Green Paper will raise a number of issues that will deserve close consideration.

10. Our inquiry has done much to illuminate the adaptation challenges faced by agriculture in the short and longer term, though the answers remain difficult to find; the policy responses proposed by the European Commission have to be considered against this background. Understanding the future which agriculture and forestry will face is a complex task: farms and forests are not just sources of food or timber, but also land areas of wider environmental and social significance; the impacts of climate change on farms and forests will vary widely, across the EU and within individual Member States; and knowledge about those impacts and about effective adaptation responses needs to be improved and shared more widely. We place particular stress on this last point. In the end, adaptation has to be achieved by individual land managers, and research findings and policy directions have to be boiled down to guidance and advice which can be used by agricultural practitioners and foresters.
11. We begin our report by establishing the challenge to be faced, before going on to explore how EU agricultural and other policies can assist agriculture and forestry to adapt in the medium to long term. We look too at possible sources of finance.
12. The inquiry was carried out by Sub-Committee D, whose members are listed in Appendix 1. We received written and oral evidence from the witnesses listed in Appendix 2, whom we thank for their contributions. We are grateful to Professor Tim Wheeler, Professor of Crop Science at the University of Reading, and Professor Gareth Edwards-Jones, Professor of Agriculture and Land Use at Bangor University, our Specialist Advisers on this inquiry; their interests are set out at Appendix 3. The call for evidence which we issued last November is at Appendix 4. **We make this report to the House for debate.**

⁹ COM(2010)66, 01.03.2010

CHAPTER 2: CLIMATE CHANGE—THE CHALLENGE

The global challenge

13. Discussion of the extent and impact of climate change has been stimulated over the past year by preparations for the UN climate change conference in Copenhagen in December 2009. Among the many views expressed, we note in particular that in November 2009 a joint statement¹⁰ was issued by three of the UK's leading scientific organisations: the Met Office, the Natural Environment Research Council and the Royal Society. This emphasised the scientific evidence of dangerous, long-term and potentially irreversible climate change, which had strengthened significantly since 2007; and it offered this prospectus for the future:

“Some countries and regions are already vulnerable to climate variability and change, but in the coming decades all countries will be affected, regardless of their affluence or individual emissions. Climate change will have major consequences for food production, water availability, ecosystems and human health, migration pressures, and regional instability. In the UK, we will be affected both directly and indirectly, through the effects of climate change on, for example, global markets (notably in food), health, extent of flooding, and sea levels.

“The accumulation of carbon dioxide in the atmosphere will lead to long-term changes in the climate system that will persist for millennia. Our growing understanding of the balance of carbon between the atmosphere, oceans and terrestrial systems tells us that the greater the accumulation of carbon dioxide in the atmosphere, the greater the risk of long-term damage to Earth's life support systems. Known or probable damage includes ocean acidification, loss of rain forests, degradation of ecosystems, and desertification. These effects will lead to loss of biodiversity and reduced agricultural productivity. Reducing emissions of greenhouse gases can substantially limit the extent and severity of long-term climate change.”

14. The UK Government, and governments around the world, have accepted the case for action to mitigate the effects of climate change as well as to adapt to its consequences. Key to the UK Government's attitude has been the Stern review of the economics of climate change, of October 2006. The central message of the review was that, if no action were taken, the overall costs and risks of climate change would be equivalent to losing at least 5% of global GDP each year; but that, if taken now, the costs of action to reduce greenhouse gas emissions and avoid the worst impacts of climate change could be limited to around 1% of global GDP each year.

The challenge for EU agriculture and forestry

15. The Commission paper on the challenges for agriculture and rural areas of adaptation to climate change, which was published alongside the White Paper of April 2009, gives an overview of the impacts of climate change on agricultural production. These include the following:

¹⁰ Climate science statement, 24 November 2009, by Professor Julia Slingo, Chief Scientist, Met Office; Professor Alan Thorpe, Chief Executive, Natural Environment Research Council; and Lord Rees of Ludlow, President, the Royal Society

- rising atmospheric CO₂ concentration, higher temperatures, changes in annual and seasonal precipitation patterns and in the frequency of extreme events, affecting the volume, quality and stability of food production and the natural environment;
 - climatic variations affecting the availability of water resources, the incidence of pests and diseases, and the quality of soils, leading to significant changes in the conditions for agriculture and livestock production;
 - in extreme cases, the degradation of agricultural ecosystems, causing desertification and a total loss of the productive capacity of the land affected.
16. The paper states that, in the short term, the most serious consequences for agriculture are likely to result from the frequency and intensity of extreme weather events, and seasonal variations in precipitation patterns. It stresses that, since the local impacts of climate change will be diverse, some areas will have negative and positive effects at the same time with unknown net results. Overall net effects on farm activities will vary across the EU and between farm types within the same region (paper SEC(2009)417, section 2.1).
 17. Defra commented that climate change would affect, directly or indirectly, many or all of the important benefits that agricultural land provided to society: UK research findings broadly confirmed the likely impacts on agriculture identified by the Commission. Climate change impacts on UK forests would vary widely across regions: “in the north and west, productivity is likely to increase, while the current range of species—both those planted for production forestry and components of semi-natural ecosystems—may prove to be much less viable in the latter half of the century, and perhaps severely so in the south and east of the UK” (Defra evidence, p 186). The submission added that these impacts must be seen in the context of an increased demand for the services provided by trees, woodlands and the forestry sector, in particular, woodfuel supply for renewable energy production, and timber and wood products as a sustainable material, particularly in the construction sector.
 18. Among the challenges to be faced by agriculture will be mitigation, the reduction of its contribution to climate change, as well as adaptation. For the RSPB, Dr Mark Avery questioned whether the agricultural community fully recognised how different agriculture would need to be in future decades: “not only will agriculture need to be able to operate under a future climate, but it will have to be able to operate under regulation and conditions where agriculture will have to be emitting far fewer greenhouse gases than it does now. The Climate Change Act calls for 80% reductions overall in the UK emissions by 2050. Agriculture will have to play a part; it may not be 80% reductions from agriculture, but it will have to be big” (Q 79).
 19. Changes in the availability of water will be a major determinant of future agricultural practice. The Environment Agency stated that by 2050 in England and Wales, river flows in the late summer and early autumn could decrease by over 50% and as much as 80% in some places; total annual average river flow was expected to fall by up to 15% (Environment Agency, p 95). For the Agency, Tricia Henton told us that the reduced quantity of water had implications for water quality, if less water was available for the dilution of effluent from run-off from agricultural or other land uses, or of treated sewage

effluent: “The implications of all of that are that there will be less water available for agricultural purposes, particularly in the south-east of England; ... and of course we have to balance the amount available for agriculture with that for public water supply, for industry and of course for wildlife, leaving some in the environment as a basis” (Q 220). Ms Henton also acknowledged that changes in the distribution of rainfall could give rise to severe flooding, as happened in Cumbria in 2009, and this had implications for soil erosion. The Cumbrian example was just one of several such incidences around the UK.

Meeting the challenges

20. A number of our witnesses commented that mitigation measures could be beneficial to agricultural balance-sheets, not least through the more efficient use of inputs (water, fertiliser: Environment Agency, Q 220; Professor Bill Davies, Q 269); and also that there were opportunities to be exploited (such as the generation of energy through anaerobic digestion of farm manures or bio-fuels: CLA, Q 74, NFU Cymru, Q 121). For the Forestry Commission, Mark Broadmeadow underlined the relevance of woodland to mitigation: “We should also see woodland creation and forestry in general as an important component of the land manager’s toolkit to reduce soil erosion, to alleviate flooding and to improve water quality” (Q 167).
21. Antonia Andugar, for COPA/COGECA, the representative body of farming across the EU, commented that, in the wake of the last CAP reforms, EU agriculture worked to “better natural resource use, efficiency and sustainability criteria ... we are in favour of the development of these criteria. The conclusion is that adaptation and mitigation in synergy could provide increasing productivity more efficiently but not leading to using new land or more imports” (Q 349).
22. Peter Gammeltoft, for DG Environment of the Commission, referred to studies which showed that, on average across the EU, there was the potential for savings in water consumption of around 40%: “We can say on household goods it seems to be about 20%, and on agriculture it is probably significantly more ... The potential that I mentioned of 40% across Europe is through simple technical means, no structural changes or anything like that. It is simply by changing equipment and upgrading” (QQ 400, 401).
23. Several of our witnesses acknowledged that the new pattern of climate change might well pose a challenge of a different order of magnitude from problems faced in the past, but made the point that farmers and land managers had always been required to adapt to changing circumstances. Ms Henton, for the Environment Agency, said: “We can all probably be quite confident that farmers will adapt. They have probably not called it climate change but that is what they have done. Indeed, some of the adaptation that people are undertaking now in the types of cropping patterns they have and the way they use water is really an adaptation to longer-term changes” (Q 220).
24. For the Country Land and Business Association (CLA), William Worsley referred to the Campaign for the Farmed Environment,¹¹ as an example of a

¹¹ Under the Campaign for the Farmed Environment, leading farming organisations are working together to encourage farmers and land managers voluntarily to adopt important land management practices that will benefit the environment. The Campaign unites key industry stakeholders, including the CLA and the National Farmers’ Union, to work in partnership with Defra and its agencies, Natural England and the Environment Agency, as well as the RSPB and other wildlife representatives.

voluntary project involving industry and environmental groups: “This is about encouraging farmers to engage voluntarily with environmental land management. This is part of moving people from just pure production of wheat or beef to look at the broader environment. One of the things the CLA has been promoting is its food and environmental security policy, because we see environment and management of the environment as being a key part of land management” (Q 43). Dr Andrew Clark, of the NFU, also pointed to the same campaign as evidence of action to develop local responses to nationally agreed priorities (Q 138).

25. In Chapter 3, we look at adaptation measures, which have been, or could be, promoted through regulation, notably under Pillars 1 and 2 of the CAP.
26. There is of course a wider dimension. Changes to climate, and to agriculture and forestry practice, will take place against the complex background of global food supply and demand conditions. The Commission’s paper on the challenges for agriculture refers to the global impacts of climate change on agriculture and food security, contrasting the potentially negative effects on farming in low-latitude world regions with a possible increase in agricultural productivity in higher latitudes, over the next few decades: “The combination of changes in the agricultural production potential in different world regions and increased incidence of extreme events could lead to greater variability of production, contributing to increased volatility of prices and changes in trade flows”.¹²
27. Present understanding of many of these issues is limited by uncertainty, but there is widespread expectation that climate change will have a significant, though varying, impact on agriculture and forestry in the EU; that a moderate degree of climate change will offer opportunities for northern European land managers to exploit; but that economic and regulatory pressures will drive the need for existing practice to change and become more efficient. The challenge might be summed up as the need, in a situation of considerable uncertainty, to produce more food in response to an expanding population while reducing water consumption, reducing greenhouse gas emissions and protecting biodiversity.

¹² Op. cit., section 2.5

CHAPTER 3: THE EU POLICY RESPONSE IN THE SHORT TERM

28. The White Paper identifies the integration of adaptation into EU policies as one of the components in Phase 1 of the adaptation framework proposed. It proposes the following actions to be taken in the period to 2013 by the EU and Member States:
- ensuring that measures for adaptation and water management are embedded in national rural development strategies and programmes for 2007–2013
 - consideration of how adaptation can be integrated into the three strands of rural development (see below) and how to give adequate support for sustainable production, including how the CAP can contribute to the efficient use of water in agriculture
 - examination of the capacity of the Farm Advisory System to reinforce training, knowledge and adoption of new technologies that facilitate adaptation
 - updating of the forestry strategy, and launch of debate on options for an EU approach on forest protection and forest information systems.
29. We consider the issue of the Farm Advisory System in Chapter 6 of this report (paras 134–5), in the context of knowledge transfer. The future development of the EU's forestry policy is considered in greater detail in Chapter 5. This chapter looks at other aspects of the EU policy response before 2013.

Rural Development Pillar of the CAP

30. CAP expenditure during the period 2007–13 is divided between two Pillars: Pillar I comprises direct payments to farmers and market management measures; Pillar 2 supports rural development and environmental programmes. Pillar 1 makes up some 80% of total spend, Pillar 2 some 20%, worth €96 billion across the EU over the seven-year period.
31. In 2005, several separate programmes and budget lines under the CAP were merged into a single funding and programming instrument known as the European Agricultural Fund for Rural Development (EAFRD), supporting projects along three main axes:¹³
- Axis 1: measures designed to improve the competitiveness of the farming and forestry industry;
 - Axis 2: environmental and land-management schemes; and
 - Axis 3: initiatives aimed at improving quality of life and the diversification of the rural economy.

¹³ A fourth, separate, element of the fund was reserved for LEADER initiatives, enabling local action groups in rural areas to secure funding for local development projects.

32. Rural development policy under the EAFRD is implemented through national strategy plans prepared by each Member State on the basis of domestic priorities (but complying with minimum spending requirements for each axis). These plans must be approved by the Commission, and are subsequently delivered through rural development programmes in each Member State. Once plans are approved, spending must be co-financed according to fixed percentages, meaning that Member States must contribute national resources in addition to the funds provided by the EU.
33. In the course of the interim review of the CAP, undertaken in 2008 and known as the “Health Check”, Member States agreed¹⁴ that a number of new challenges should be included in the EAFRD as funding priorities. These included mitigation of, and adaptation to, climate change. Alongside this decision, and in response to the economic downturn, the EU agreed the European Economic Recovery Programme,¹⁵ according to which unspent EU funding was diverted towards rural development, including the new challenges.
34. The Commission explained that, in the context of the CAP Health Check and the Recovery Programme, a total amount of €4.4 billion had been made available for rural development programmes, and that Member States were required to ensure that at least an equivalent amount (of their national share) would be spent on the priorities identified in the context of these two policy packages in the period to 2013: “On the basis of first indicative information submitted by Member States, their intention is to use about 14% of the funds for climate change action. The split of this amount between mitigation and adaptation cannot be assessed yet” (European Commission, p 162).
35. Dr Janet Dwyer, of the University of Gloucestershire, whose research focus is Pillar 2 of the CAP, has analysed the extent to which the funding of €4.4 billion was being used to promote climate change adaptation and mitigation through rural development programmes: “The picture is not edifying. By and large, those countries and regions which are deciding to devote quite a lot of new energy to climate change as a strategy are those countries which have prioritised it in the past. That is unsurprising. They tend to be those countries which are more wealthy, not those which are less wealthy” (Q 303). Further information is given in Table 1 below; climate change is shown as a separate category of expenditure, though in practice such expenditure is not necessarily distinct from other categories, such as water management.

¹⁴ Annex II, Council Regulation (EC) No 74/2009 of 19 January 2009 amending Regulation (EC) No 1698/2005 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD).

¹⁵ COM(2008)859

TABLE 1
Distribution of Health-Check and EERP funds by Member States¹⁶

RDP	Climate Change	Renewable Energy	Water Management	Bio-diversity	Dairy Restructuring	Innovation & New Challenges	Broadband	Total
in million euro								
AT	21			21	40		15	97
CY				1			1	2
MT					1			1
DK	22	7	61	34				124
PL		4	34	10	62		59	169
LT		0			18		4	22
NL	23	19	21	23		13	1	98
LU	2				2			5
LV					13			13
EE					3		6	9
SI	5	1	1		0		4	12
BG		12	19		3			33
EL	20		70		44		42	176
RO	18	36	22	14	12			102
SE	19	34	13	31	2		21	120
SK	12			11			5	27
CZ	15	8	7		13			42
HU					54			54
IE	18		26	89			13	146
IT	83	29	88	86	87		93	465
BE	18	10	22	12	7			68
UK	129	4	104	235	3		6	482
ES	26	70	189	243	46	1		574
DE	252	22	166	264	232		6	942
FI	3	3	31	1	2	2	25	68
FR	17	16	461	468			30	992
PT	1			1	70		30	102
EU27	704 (14.2%)	275 (5.6%)	133 (26.9%)	1542 (31.2%)	716 (14.5%)	16 (0.3%)	360 (7.3%)	4946 (100%)

¹⁶ From European Commission press release of 29 January 2010

36. As regards experience in England, Dr Andrew Clark of the NFU told us that “in terms of the CAP and in terms of the rural development programme there are sufficient opportunities, sufficient measures available to be able to help farmers adapt to climate change, to have integrated programmes that look at climate change and the Water Framework Directive¹⁷ and biodiversity” (Q 136).
37. Other witnesses voiced support for the use of CAP Pillar 2 funding to promote measures aimed at adaptation to climate change. For Defra, Dan Norris, MP, Parliamentary Under Secretary of State, stressed the contribution of the rural development programme to the Environmental Stewardship scheme which supports work to make habitats more resilient to the effects of climate change; to improved water management; and to the funding of information and vocational training to help farmers understand the implications of climate change for their business (Q 472).
38. Dr Geoff Radley, of Natural England, commented that the discretion given to Member States over the content of national programmes under Pillar 2 made it a good mechanism for the potential inclusion of additional sources of funding (Q 33). However, he also highlighted the fact that support to farmers under the CAP did not extend to capital payments, for example to meet the costs of managed re-alignments of landscape features: “We are already finding society as a whole needs to make significant changes in land use to help with wider problems. We may need to have something like a managed realignment, and that is very unfair on the farmer whose land it happens to be on, because what CAP does not provide is the lump sum or capital payment needed to facilitate that step-change in land use that may be in the wider public interest” (Q 23).
39. We heard more about current experience across the EU from Hilka Summa, of DG Agriculture of the Commission. Her comments reinforced the information provided in the Commission’s written evidence (see above): “Directly focused climate change measures are receiving 14% of the additional funding. It is a question of priorities. Biodiversity got one-third of the additional funding, and the dairy sector quite a significant share. The issue with climate change activities in rural development is that most of the concrete actions included in the programmes are multi-objective ... [but it] is true that the take-up of climate change specific measures was not as good as we would have hoped” (Q 386). Ms Summa offered the view that it was unlikely that there would be big changes in rural development programmes to 2013. This meant that the real discussion about future priorities for the CAP needed to focus on the period from 2013 onwards.
40. Dr Janet Dwyer suggested that the EU could do more “to try and step up a focus on climate change challenges and adaptation ... At the European level there could be a requirement on the Member States: they all have to report annually what they are doing with their rural development programmes, and that requirement could specifically ask them to report on what they are doing in respect of climate change” (Q 303). At the same time, Dr Dwyer stressed the importance of making early progress towards identifying policy priorities for the period from 2013: “The other thing that we can do in the short term, which is not really covered in the White Paper, is to have better planning in

¹⁷ Directive 2000/60/EC of 23 October 2000.

respect to what comes after 2013. I think that an awful lot more could be done now in that process”.

41. We deal with issues related to the CAP after 2013 in the next chapter. We conclude, however, that there should have been better uptake, in agriculture and forestry, of existing possibilities for financing adaptation measures under Pillar 2 of the CAP across the EU in the short term. We accept that the discretion exercised by Member States means that there will be differences of national approaches, but **we endorse the suggestion that, in their annual reports on rural development programmes, Member States should be asked to specify the measures taken to promote adaptation to climate change. We further recommend that the Commission compile these responses and produce a short report, assessing Member States’ approaches to using rural development programmes to promote adaptation to climate change.**

Other (non-CAP) policy approaches

42. A concern raised was the need to ensure that steps taken by the sector without top-down guidance or direction—autonomous adaptation measures—were not instances of “mal-adaptation”.¹⁸ For the RSPB, Mr Gareth Morgan pointed to the cultivation of vegetables in areas of Spain suffering chronic water shortages as an example of defective adaptation (Q 93). Professor Andy Whitmore, of Rothamsted Research Institute, commented on the potentially negative effects that could result if land that was not already under cultivation were brought into use for agricultural production, such as a decrease in pollinating organisms (Q 271).
43. For the Scottish Environment Protection Agency (SEPA), Mark Aitken talked about the links, in theory and in practice, between adaptation and mitigation: “We feel that there are significant risks in considering the adaptation of agriculture and forestry in isolation from mitigation. Both forestry and agriculture with poor management can cause significant damage to a range of eco-system services” (Q 237). Mr Aitken offered examples of synergies—“win/wins”—including better use of fuel and energy on farms; better use of water, manures and fertilisers; and use of anaerobic digestion (see also NFU Q 130).
44. The agricultural sector operates within a wider framework of regulation. Under Pillar 1 of the CAP, to be eligible to receive Single Farm Payments, farmers are obliged to meet certain public, animal and plant health standards, to respect certain environmental and animal welfare standards, and to keep their land in good agricultural and environmental condition (GAEC). This element of conditionality associated with Single Farm Payments is known as cross-compliance. In his evidence, Mr Aitken of SEPA stressed the importance of cross-compliance (notably GAEC) in the context of adaptation responses by farmers (Q 237). For the Environment Agency, Ms Henton also referred to aspects of cross-compliance as useful to adaptation, as well as to the controls imposed under the Water Framework Directive (Q 220).
45. Ms Henton stressed that “within the Environment Agency we would prefer voluntary action wherever possible ... but obviously regulation has its part to

¹⁸ An action or process that increases vulnerability to climate change-related hazards.

play” (Q 220). For Natural England, Dr Tom Tew made a similar point (Q 5). The importance of incentives was also stressed by Professor Buckwell, for the CLA (Q 43), and by Dr Clark, for the NFU (Q 125).

46. **We agree that the challenges posed to the sector by climate change need to be met by using a range of mechanisms. These include regulation, notably in relation to the water environment; incentives, such as the availability of support for capital measures; as well as the Single Farm Payment and the associated cross-compliance requirements, which encourage farmers to adapt to climate change in changing circumstances.**
47. **Public authorities have a key role in this area to discourage mal-adaptation by land managers. We therefore recommend that the Commission and Member States work together to identify approaches which may cause mal-adaptation, such as the growth of water-intensive crops in already water-stressed environments.**

The need for urgent change

48. The situation is most acute in the southern parts of the EU. Dr Mark Avery, of the RSPB, referred to a Spanish wetland site, the Tablas de Daimiel, which had suffered serious degradation because of water use by intensive agriculture: “... there have been subterranean fires in the peat because it has become so dry. And that is a wetland that was storing carbon ... it has lost its wildlife, it is probably not providing the same services to the local environment, and that is because of unsustainable agricultural use” (Q 93). For NFU Cymru, in exemplifying the different attitudes towards climate change measures across the EU, Mr Bernard Llewellyn said: “... when I talk to Greek farmers about forestry being a way of alleviating climate change, the first question they ask is, ‘What happens when it all goes on fire?’ They are not looking towards forestry ...” (Q 128). Commission representatives confirmed that southern EU states are already facing significant problems caused by droughts and heat waves (Q 378).
49. Cyprus offers a particularly stark example. Demand for water on the island runs at some 100 million cubic metres (m³) of fresh water per year; in the three years to 2008, annual availability never exceeded 40 million m³ and fell to as little as 19 million m³. During the summer of 2008, water was transported to the island by ship, from Greece, and the Cypriot government introduced emergency measures which included cutting water supply by 30%.¹⁹
50. **Between now and 2013, the EU should direct its efforts towards delivering change where it is most urgently needed; in our view, that need is strongest in the southern EU states. Given that EU funding levels are fixed until 2013, we conclude that such an approach would need to be based on encouraging the re-orientation of existing EU funding within those countries, not least the rural development expenditure under the CAP Health Check and the European Economic Recovery Package, in addition to the use of national and private funds.**

¹⁹ European Environment Agency article of 14 April 2009: “If the well runs dry—climate change adaptation and water.” (<http://www.eea.europa.eu/articles/climate-change-adaptation-and-water>)

CHAPTER 4: LONG-TERM CHANGES TO THE CAP

51. The debate on the shape of the CAP after 2013 is already underway; 2010 will be a key year for both the Council and the Parliament to advance their thinking. Although discussion includes the possibility of reducing the overall size of CAP funding, we are clear that decisions about the future of the CAP must take account of the issues of climate change and food security.
52. The Commission White Paper and associated working document on the challenge for European agriculture say relatively little about long-term changes to the CAP after 2013. The White Paper makes the point that, since most land in the EU is managed by farmers, the CAP can play a central role in contributing to adaptation, not only by helping farmers to adapt their production to the changing climate, but also by helping provide wider ecosystem services dependent on specific land management (paragraph 3.2.2). However, this comment is primarily directed at short-term policy responses; as regards the longer term, the White Paper says no more than that the possible contribution of the CAP to adaptation to climate change will have to be examined in the context of the review of the CAP after 2013. The associated working document adds little, beyond the statement: “Effective adaptation and adoption of new technologies, which contribute both to mitigation and the long term viability of farming, will require investments and planning efforts beyond the capacity of individual farms. Public authorities will have a role to play in supporting and facilitating climate change adaptation policies” (section 6).
53. The Commission’s written submission explains this reticence: “The EU budget review and the reform of the CAP for the next financial period are currently under reflection. It is therefore difficult at this stage to be precise about future Community adaptation strategy and the involvement of agriculture and forest sectors. Climate change will feature importantly in the debate about the financial perspectives and the CAP post-2013” (European Commission, p 163).
54. Consideration of the nature of the CAP after 2013 is made more difficult by the uncertainties both in the demand for the goods and services provided by agriculture, and also in the climatic conditions that will affect agricultural productivity. Peter Gammeltoft, of DG Environment of the Commission, commented on this difficulty, while stressing that it could not be an excuse for inaction: “Some of the uncertainties we simply cannot do away with and they will have to be addressed in policy terms in the way that policies are designed to be robust in relation to those uncertainties” (Q 375). Dr Mark Avery, of the RSPB, agreed that the lack of a clear picture of the state of agriculture in the longer term made it difficult to be confident about current mechanisms: “It feels to us as though we are not really moving in any particular direction, and therefore, we are moving in a rather jerky way and rather slowly rather than heading towards a thought-through position for future agriculture” (Q 97).
55. Ms Summa, of DG Agriculture of the Commission, said that the post-2013 shape of the CAP should be seen as the next stage in the continuous reform process of the CAP that began in the early 1990s. Existing CAP instruments were helpful in tackling climate change; the CAP’s current architecture, including the Single Farm Payment, provided a level of economic security which helped facilitate necessary farm-level investments; and cross-

compliance enforced aspects of environmental legislation which served both mitigation and adaptation: “This, combined with rural development which has targeted programme-based co-funding possibilities which Member States rate according to their priorities within the general Community framework of priorities, is a good way of addressing the climate change challenge” (Q 388).

56. In our previous inquiry into the future of the CAP²⁰ we offered our views on the future shape of this cornerstone EU policy, and on three sets of goals for the post-2013 CAP: economic, social and environmental. We summarise our views below.

BOX 1

EU Committee report: The Future of the Common Agricultural Policy (March 2008)

Goals for the CAP after 2013

- Economic goals—we recognised that the regulation of the Single Market in agricultural commodities within the EU should continue to be the primary role of a Common Agricultural Policy. But over the longer term we supported the drive towards a more market-oriented EU agriculture, which should be able eventually to compete in open international markets without subsidy or special protection.
- Social goals—we recognised that many Member States relied on CAP funds, particularly on direct payments under Pillar I, to secure social policy goals, but we considered many of the problems being addressed needed to be tackled in their own right. Some goals (e.g., diversification of the rural economy) would be better pursued through Pillar 2 of the CAP, while others (e.g., structural problems in rural areas of new Member States) would be better tackled through other EU programmes (e.g., Structural Funds).
- Environmental goals—we concluded that the CAP should continue to promote farming practices that resulted in environmental benefits, but we saw merit in distinguishing between environmental outcomes that could be secured through regulation (e.g., control of pollution) and those that were unlikely to be delivered without financial incentives (e.g., positive management of wildlife habitats). We recognised the importance of climate change considerations to the CAP’s future, and the need for the EU’s agriculture sector to improve its impact on the environment. We pressed for consideration to be given to integrating agriculture in an EU-wide greenhouse gas emissions trading scheme.

Future CAP—Pillars 1 and 2

57. The Government’s position on CAP reform is summarised in the written submission from Defra: “the Government has been clear in our ambitions for CAP reform: measures targeting the protection and enhancement of the rural environment, including tackling the threat of climate change, should be given a central role in the future CAP” (Defra, p 190). Dan Norris said that the Government would need to ensure that the strategic importance of climate change in respect of both mitigation and adaptation was taken into account

²⁰ Op. cit.

in CAP Pillar 2: “We are not keen on Pillar 1 for sure, we think it is inefficient ... We much prefer Pillar 2, we think it is more focused and more efficient and makes more of a difference ... we would like to see Pillar 1 go completely, be phased out” (Q 473).

58. A counterpoint to this approach was provided by the NFU who commented that debate in the UK about the CAP was often “characterised by political rhetoric, which not only fails to recognise the importance of the CAP in terms of farm incomes and delivery of public goods, but also serves to alienate the UK from engaging in serious debate about its future” (NFU, p 55). Dr Clark, of the NFU, told us: “we need to have a single Common Agricultural Policy that covers the whole of the European Union and ensures, number one, there is a single market for food and it incentivises farmers to produce food, to sustain production and then to produce food in an environmentally responsible and welfare responsible way. Our view looking forward is that there will be substantial changes in terms of the CAP’s funding. There has to be in terms of the budget. We would expect to see some evolution but we do not need to see a revolution in terms of the CAP” (Q 137).
59. COPA/COGECA agreed, in a position paper of October 2009,²¹ on the need for what they called “a strong Common Agricultural Policy to support farmers in improving their resilience to climatic variability and to contribute to climate change mitigation, which will deliver cost-saving benefits for the whole of society”.
60. Mr Morgan said that the RSPB differed from the UK Government position on “whether there is a dividend from the CAP. We need those resources to be applied to meeting the climate change challenge, but that does not have to be done just through rural development programmes, we need to look at the whole of the CAP, and we should not limit ourselves to thinking Pillar 1, Pillar 2 at the moment. Indeed, the Commission itself is already suggesting that there might be a third pillar to the CAP, which would be to address the climate change challenge. I am not sure if that is the best approach ...” (Q 90). The possibility was included in a European Commission paper on the Budget Review, in October 2009, which was leaked and covered in media reporting. No other witness voiced support for a Pillar 3 of CAP.
61. Dr Janet Dwyer pointed out that Pillar 1 supported not just direct payments, but market management as well, which was likely to continue to be part of the CAP after 2013 (Q 306). She referred to current discussions about moving away from the historic basis on which Pillar 1 direct payments were largely made at present towards a different approach to distribution of such payments, which might well take account of the challenges from climate change, including the need for adaptation. There were examples of earlier EU initiatives to promote innovative approaches to policy-making, and looking ahead to dealing with responses to climate change there could well be a case “for the European Commission to do a bit of experimental funding here and there across Europe and to enable people at the local level to take action”. Dr Dwyer put this in the context of the desirability of seeing work by the Commission on “mapping and zoning vulnerability to climate change in an agro-economic sense ... They could do long-term work and then you

²¹ Agriculture and forestry contributing to the EU climate change roadmap to Copenhagen: COPA-GOGECA position paper

would almost be in a position to be able to classify those areas into areas that need additional attention.” (QQ 305–306)

Food and environmental security

62. A good deal of the evidence that we received for our current inquiry acknowledged the importance of an October 2009 report by the Royal Society, “Reaping the benefits”,²² dealing with what it described as the global challenge of food security in the 21st century.
63. Professor Bill Davies, Professor of Environmental Plant Biology at Lancaster University, a co-author of the report, put that challenge in the context of the rapid appearance of the effects of climate change: “I think things are changing so fast we need to be aware that although the slope of food production against time is impressive—farmers have done a wonderful job through history—we need to increase the slope of that line dramatically if we are going to cope with the extra population and feed the proportion of today’s population, which is itself hungry now” (Q 284). He stressed that the core message of the report was the need for “sustainable intensification of agriculture”: concerns about the potentially negative environmental impact of agriculture should be met by seeking to increase its productivity “per unit area” rather than making agriculture more extensive (Q 269).
64. An awareness of the need to reconcile increased output from farms with effective environmental protection underlay evidence from a number of witnesses who commented on the CAP after 2013. For the CLA, William Worsley said: “We have been arguing that the CAP must change post-2013 to focus more on non-market public goods et cetera from land management. We have been arguing that for quite some time, for it to become Europe’s policy for food and environmental security. We think that the two need to link in together” (Q 53). Dr Geoff Radley, for Natural England, supported this approach. He said that he saw no need for there to be a tension between the optimisation of food production on the one hand, and the protection of biodiversity and other environmental services on the other (Q 24).
65. The NFU Scotland drew on its experience to exemplify the range of environmental and other services which society might look to farms to provide, stating that Scotland’s farmland could not reasonably be expected to deliver against all Scottish Government policies on food, flooding, climate change, tourism, access and inclusion without some trade-offs: “If farmland is to deliver multiple public benefits, then there needs to be a proper evaluation of its worth backed by fully resourced and accessible measures that allow farmers to optimise that ‘value’ for the greater good” (NFU Scotland, p 222).
66. Towards the end of our inquiry, we were interested to note the publication of a report on the provision of public goods through agriculture.²³ The report identifies the full range of environmental public goods provided by farmers across Europe, a number of which link directly to public goods resulting from efforts by farmers to adapt to climate change. These include: water

²² “Reaping the benefits: Science and the sustainable intensification of global agriculture”: Royal Society, October 2009

²³ Cooper T., Hart, K. and Baldock, D. (2009) *The provision of Public Goods through Agriculture in the European Union* (report prepared for EC DG Agriculture, Contract No 30-CE-0233091/00–28), Institute for European Environmental Policy, London

availability; soil functionality; climate stability; resilience to flooding; and food security.

Conclusions

67. Under the CAP after 2013, the policy orientations currently embodied in Pillar 2 (i.e., rural development) will be a crucial component of the CAP's response to the challenges of climate change; and we are aware that the idea of introducing a third Pillar of the CAP to channel funding in this direction has been mooted (see paragraph 60 above). We note the Government's opposition to the continuation of Pillar 1. We are aware of the line of thought that more resources could be made available for climate change adaptation and mitigation by reducing or even abolishing direct payments provided through Pillar 1, so as to allow the CAP to evolve into a single "land management policy" or a "food and environmental security policy" (QQ 53, 188).
68. Discussions are already underway on the shape of the CAP after 2013. **We recommend that the Government participate constructively in this debate, and promote full and early discussion among all interested parties in the UK.**
69. **The requirements of a sustainable intensification of agriculture should be the defining characteristics of the future CAP. This should include a consideration of the public environmental goods provided by the agricultural industry, particularly as it and the forestry industry adapt to the challenges of climate change.**
70. **We recommend that the Government should work to ensure that the future CAP is shaped along these lines.**
71. **In addition, we consider that examination should be given to whether the existing requirement for CAP payments to be linked to cross-compliance could be extended to include some form of "carbon compliance", linked to measures taken by farmers to mitigate, or adapt to, climate change.**
72. We have received no evidence supporting the possibility of creating a "climate change" Pillar 3; in our view, this might well cut across mainstreaming the need to respond to climate change into EU policies generally, and we do not favour it. More generally, we question whether dividing the CAP between Pillars may serve to marginalise important policy objectives within EU-supported agriculture. **We recommend that priority should be given to defining the objectives of the policy before deciding on the delivery mechanisms.**
73. **We recommend that the future CAP should not support agriculture in areas where climate change means that productive capacity can be maintained only at unacceptable environmental and economic cost. A comprehensive mapping of climate change vulnerability should therefore be prepared as the basis for allocating CAP support to agriculture. Where such mapping implies the withdrawal of CAP funding from areas, the case for replacement funding from other sources, notably the cohesion funds, will need to be considered. We explore this further in Chapter 5.**

CHAPTER 5: USING OTHER EU POLICIES IN THE LONG TERM

74. The focus of the White Paper in relation to the adaptation of agriculture to climate change is on potential changes to the Common Agricultural Policy. It also indicates, in relation to forestry, that the EU forestry strategy should be updated on climate-related aspects and that, in the framework of the EU Forest Action Plan, a debate should be launched on the options for an EU approach on forest protection and forest information systems.
75. Other EU policies impact directly on agriculture, forestry and land management more generally. These include water management, soil management, biotechnology, regional policy and external policy. In this chapter we explore some of these issues and how policy on them at the EU level, including forestry policy, might develop in the medium to long term.

Forestry policy

76. Forestry and other wooded land represent only 11.9% of the UK's landmass; for the EU as whole, the equivalent figure is over 42%.²⁴ It was suggested by Defra and the Forestry Commission that the White Paper dealt poorly with forestry (Defra p 189). The European Commission told us that some of the themes relating to forestry would be taken up in its Green Paper on Forestry (published after evidence had been taken for this inquiry).²⁵ Ms Summa explained that the Green Paper would include an analysis of the threats which EU forests are facing, particularly as regards climate change (Q 397).

BOX 2

Forestry Green Paper

“Forest Protection and Information in the EU:
Preparing forests for climate change”

The Green Paper sets out the characteristics of EU forestry and woodland and the challenges faced by forests in a changing climate and raises a series of questions in order to initiate a public debate. It is noted that forests provide a number of socio-economic and environmental functions and that climate change is likely to have a significant gradual impact on forestry, particularly through pests and species change. Climate change will also increase forestry's vulnerability to shocks such as storms and fires.

The Commission asks:

- whether forest functions should be given more attention and, if so, what sort of action is required and at what level;
- to what extent the sector is ready to address the challenges, whether any regions are particularly vulnerable and how the EU can contribute to action by Member States;
- whether current EU and national policies are sufficient to ensure that the EU contributes to forest protection;
- specifically what steps are required to conserve and adapt to climate change the gene pool in forest reproductive material; and
- how information about forest resources and condition could be improved.

²⁴ Eurostat, *Forestry Statistics*, 2007

²⁵ COM(2010)66, 01.03.2010.

77. Mr Norris said that the Government welcomed the initiative to review the EU Forest Strategy and to produce a Green Paper. He stressed that the Government wished to see the Commission's proposals before responding but were keen that the Commission should establish a clear process for consulting a wide range of interests. At the same time, the Minister said that "recognising the existing division of competence under the TFEU²⁶ and the general principle of subsidiarity, it would not be appropriate to extend EU competence here" (letter of 2 March 2010, p 207).
78. In considering forestry's role within the climate change adaptation debate, several witnesses recognised the value of woodland as a method of carbon sequestration²⁷ (Natural England Q 27; CLA Q 55; RSPB Q 98; Commission QQ 386, 397). Mr Smithers (Woodland Trust) referred to the Read Report²⁸: if 23,200 hectares (approximately 0.1% of the UK's landmass) of new woodland were to be planted annually in the UK for the next 40 years, and the current annual deforestation rate of 1,128 hectares per year were to continue, forestry could, by the 2050s, be delivering emissions abatement equivalent to 10% of the UK's total greenhouse gas emissions. The Read Report emphasised the scale of this challenge, noting that there had been a dramatic decline in new planting over the last 20 years to the current level of 8,360 hectares per year.
79. It was argued that afforestation could be part of the tool kit of farmers in adapting to climate change (QQ 177, 184). This might be for several reasons. Vittorio Prodi MEP,²⁹ Ms Summa and Mr Townsend of the Woodland Trust (Q 176) all suggested that it could be a good option for land managers where land was becoming otherwise unproductive. Alternatively, increased woodland cover had a role to play in productive agriculture by providing shade for livestock and crops and by assisting in water and soil management. The practical example was given of a group of Welsh farmers, who had planted small blocks of woodland and found an increase in pasture production and increased lambing percentage, with the bonus that benefits were derived from the woodland more quickly than if the woodland had simply been grown for timber production, with a lengthy rotation period (QQ 38, 181, 185–7).
80. The RSPB was less positive about the ability of agriculture and forestry to develop in such an integrated manner, and suggested that there was a tension between the two (Q 104). Mr Morgan noted that, in contrast to agricultural policy, forestry was not a European competence. "Unless some kind of synergy can be achieved between those two mechanisms, it is going to be quite hard to provide a joined-up signal to landowners and farmers about what their appropriate land uses are" (Q 98). For Natural England, Dr Tom Tew advocated "proper integrated land use planning" with appropriate incentives (Q 2).
81. We were alerted to the possibility that different issues in relation to adaptation to climate change may arise in the case of forests which are not

²⁶ Treaty on the Functioning of the European Union.

²⁷ The long-term storage of carbon dioxide or other forms of carbon.

²⁸ Read, D.J., Freer-Smith, P.H., Morison, J.I.L., Hanley, N., West, C.C. and Snowdon, P. (eds). 2009. Combating climate change—a role for UK forests. An assessment of the potential of the UK's trees and woodlands to mitigate and adapt to climate change. The Stationery Office, Edinburgh.

²⁹ Vittorio Prodi, MEP, has been at the forefront of the European Parliament's consideration of issues related to climate change.

managed for timber production (ConFor evidence, p 213). We note that these issues may well need further consideration in the debate which will happen following the European Commission's publication of a Green Paper.

82. In terms of how the EU could most effectively assist forestry's adaptation to climate change, Mr Broadmeadow of the Forestry Commission suggested that it could play a very useful role in monitoring and sharing best practice: "You will get a much better picture of the impacts of climate change as they unfold than you will from much smaller regions" (Q 208). One of the impacts of climate change in forestry was already an increase in disease and pests (QQ 167, 169). As part of tackling this, Mr Townsend suggested that the EU might have an additional role in promoting and protecting forest biosecurity (QQ 165, 208).
83. **We note the publication of the Green Paper on forestry.** We expect that the debate on the questions posed in it will raise a number of issues that will deserve close consideration.
84. While forestry remains largely a national competence, it is none the less the case that land managers operating within the CAP may consider both agricultural and forestry, or woodland, options, and indeed that they should be encouraged to do so. Policy initiatives should take account of the specific economic circumstances of forestry. It is clear that the climate change-related spread of disease and pests will pose a major challenge to forestry.
85. **We recommend that the Commission should work with the Member States to monitor the incidence and spread of pests and diseases. The Commission should collaborate with the Member States to share best practice and contribute to anticipatory work on designing responses appropriate to a changed climate.**

Biotechnology

86. A number of witnesses suggested that, given the challenges of food security, the role of biotechnology in assisting the adaptation of agriculture to climate change ought to be re-considered within the context of EU policy (Q 275). This view was epitomised by the October 2009 Royal Society report "Reaping the benefits". Professor Davies, one of the report's co-authors, stressed that bio-technology in general, and genetically modified (GM) crops in particular, could only ever be one part of a solution involving a wide range of scientific and technological options. This view was shared by Dr Clark (NFU), Mr Woods (Rothamsted), Professor Buckwell (CLA) and the Defra Minister (QQ 38, 152, 275, 465).
87. Mr Furey (Ulster Farmers Union) and Mr Llewellyn (NFU Cymru) both emphasised that industry was prepared to grow crops if consumers were happy to buy and eat them, but feared that consumers remained to be convinced of the environmental benefits of GM crops (QQ 151–2). Mr Norris said that the case had not been made for the benefits that GM crops potentially offered (Q 465). Among those which Dr Clark outlined were more drought resistance, greater disease resistance, more productivity, and the fixing of nitrogen in the root nodules of wheat. Similarly, Dr Avery (RSPB) pointed to crops which might allow less water and herbicide use, or were saline-tolerant (QQ 81, 152). Mr Norris told us that there appeared to be a much greater understanding and appreciation in Spain of the need to embrace biotechnology, and that this could be attributed at least partly to

challenges faced by Spain in relation to some of their crops (Q 486). In his letter of 2 March, he also provided information on correspondence received by Defra on GM issues since 2007 (letter of 2 March, pp 208–209).

88. Timothy Hall, of the Commission's DG Research, regretted the continued difficulties experienced in "convincing the public that we should be allowed to do research in these areas, that GM should be part of the toolbox of potential solutions to these big issues of maintaining food security under climate change" (Q 436). He told the Committee that there would be a publication in 2010 bringing together all of the work on GM that has taken place over the last decade or so, including substantial work on risk assessment.
89. **We agree that biotechnology is only one of the tools available to tackle the impact of climate change, but we none the less consider that it is one with significant potential.** Scientists and industry are supportive but some consumers continue to resist its development. In the light of climate change and the need to feed an increasing global population, more efforts are needed to shift public opinion. This will take time and will require effective, sustained, communication of the practical environmental benefits offered by biotechnology. In our view, this is an issue which merits close attention in the future.
90. **We therefore welcome the news that the Commission will be publishing a compilation of research work undertaken on GM over the past decade. We urge the Commission and Member States to play their part in ensuring that the conclusions of such publications are accompanied by public communication strategies.**

Structural Funds

91. It was noted by witnesses that territorial cohesion policies (i.e., regional policies) ought to be considered in the framework of agriculture and forestry. In addition to supporting unproductive agricultural areas, funds might also be deployed to plant woodland in urban areas. Natural England suggested that numerous societal benefits could derive from such planting such as health, temperature regulation, flood management and reduction in anti-social behaviour. Increased planting of woodland in urban areas was recommended by the recent Read Report.
92. The European Commission explained that Structural Funds could already be used for this purpose (Q 402). Ms Summa confirmed that climate change was part of the current discussions taking place on the future of the Structural Funds. She explained that Structural Funds are "very much focused on economic objectives and much less detailed in steering what is actually being done" (Q 402). We were interested to note, in a Commission staff working document of December 2009 on mountain farming in the EU,³⁰ discussion of how to improve co-ordination between measures, funds and areas, which included a statement that the EU Structural Funds might provide a complementary source of funding for mountain areas, for example in relation to basic services and training. This is clearly relevant to agricultural policy as well.

³⁰ Commission staff working document Peak Performance: New Insights into Mountain Farming in the European Union, SEC(2009)1724.

93. We asked about the availability of funding to meet the problem of land abandonment. Ms Summa warned against desertification: “desertification is one of the immediate already existing threats and if farmers move away, if you just have an ageing population which eventually moves away, there is nothing to stop this development, so we need to have people who have an interest in caring for the land” (Q 410). The need to avoid desertification, and to retain people on the land, was also of importance to Vittorio Prodi MEP, who suggested pursuing renewable energies (Q 428), or other innovative solutions.
94. Mr Norris, by contrast, clearly stated that “we do not want to use subsidies to maintain any activity that really should be ended because of climate change”. He acknowledged that this would be tough for some people and for some governments (Q 485).
95. We agree with the Minister: if climate change means that the productive capacity of some forms of farming can be maintained in certain places only at unacceptable environmental cost, they must stop, rather than being artificially prolonged by subsidy. Structural Funds are primarily an economic instrument, while the Common Agricultural Policy has a different, sectoral emphasis. **We therefore recommend that consideration be given to deploying Structural Funds to support economically those areas where climate change imposes unacceptable environmental costs on the maintenance of agriculture’s productive capacity.**
96. **In the longer term, the synergies between the Structural Funds and the CAP must be considered when designing the new Structural Funds programmes, in order to ensure that they recognise the pressure that climate change may apply to certain areas of the European Union. Support from Structural Funds may be able to assist with local innovative approaches to land use.**
97. **We recommend that consideration be given by Member States to making greater use of Structural Funds to support planting woodland in urban areas.**

Water management

98. Water management will be pivotal to the ability of agriculture to adapt to climate change; the impact of this differs across the European Union. For the Environment Agency, Ms Henton told us that overall water availability in England and Wales was probably going to be about 15% less by about 2050, with a general trend of wetter winters and drier summers (Q 220). The Minister added that, while water was a precious commodity here in the UK, it was particularly so in climates that were already warmer and which were going to get “much, much warmer” (Q 486).
99. Mr Gammeltoft told us that there was potential to save around 40% of total water consumption across Europe, including both domestic and industrial consumption.³¹ He rejected the idea of an EU water grid in order to move water around, but asserted that water savings could be made in other ways. In agriculture, for example, it would be possible to develop more efficient irrigation systems (Q 401). The Minister emphasised too that “we have got

³¹ See Commission Communication: Addressing the challenge of water scarcity and droughts in the European Union (COM(2007) 414).

to use the existing supply much more effectively” (Q 478). We are aware that some inspiration for possible solutions to the water management dilemma might be derived from experience outside Europe. Qatar, for example, is drawing heavily on de-salination in order to ensure sufficient water supplies.³²

100. There was some discussion among our witnesses about implementation of the Water Framework Directive, which will be completed only in 2027. Mr Morgan (RSPB) noted that there was a failure to tackle diffuse pollution from agriculture and implementation of the Water Framework Directive in a coherent way because most of the onus for improving water quality had been placed on water companies (Q 97). We heard that woodland could help to reduce diffuse pollution³³ from agriculture, and that woodland was also likely to have an important role in implementation of the Floods Directive³⁴ (Q 199).
101. Effective water management lies at the heart of efforts to adapt EU agriculture to climate change, and the problem is at its most severe in southern Europe. Improvement of irrigation, de-salination or introduction of better water storage facilities can help to address the problem, though they cannot provide a complete solution. **We recommend that, in its efforts to co-ordinate relevant research, the Commission should include knowledge of water management technologies, and should draw upon work undertaken in similar, or warmer, climates such as the Middle East.**
102. The timescale for implementation of the Water Framework Directive is long and we have heard concerns that agriculture and water management are not being as connected as they might in that implementation. Diffuse pollution from agriculture has been specifically mentioned. **We recommend that diffuse pollution from agriculture be addressed by the Commission in the medium term as Member States continue their implementation of the Water Framework Directive.**
103. **In working with Member States on implementation of both the Water Framework Directive and the Floods Directive, we recommend that the Commission gives consideration also to the potential role of woodland.**

Soil Management

104. While large parts of Europe benefit from “relatively young and fertile” soil according to Professor Whitmore, he also recognised that an increasing level of soil degradation might be one impact of climate change (Q 273), a view shared by Ms Henton of the Environment Agency (Q 220).
105. Vittorio Prodi, MEP, suggested that agriculture had a role to play in overcoming this problem by introducing modern terracing allowing water capture during periods of intense rainfall and retention during drier periods in order to maintain the quality of soil (Q 415). Mr Prodi went further in arguing for an innovative approach to soil protection, pointing to the

³² UN FAO, Aquastat, Water Report no 34, 2009

³³ Diffuse pollution originates from many small sources, and is distinct from point source pollution, such as the discharge of wastewater.

³⁴ Directive 2007/60/EC.

particular benefits of biochar³⁵: “it could host the micro-flora that is responsible for soil fertility and could enhance that” (Q 424).

106. Mr Aitken of SEPA pointed to the use of Good Agricultural and Environment Conditions (GAEC) under the CAP’s cross-compliance mechanism as a useful mechanism to protect soil and prevent soil erosion (Q 237). Like Mr Prodi, Mr Aitken also recommended that innovative solutions such as carbon storage in soils be examined, and emphasised that farmers should be rewarded for such efforts (Q 251).
107. Agriculture and forestry depend on productive soil, which is at risk from climate change. **We recommend that the Government and Commission give consideration to innovative approaches to soil management and soil use, such as the protection of the existing capacity of soil to act as a carbon sink, and carbon storage in soils through the addition of biochar.**

External policies

108. The link between EU agriculture and forestry policy and international development policy is complex. It relates to provision of funding for adaptation in developing countries under the Copenhagen Accord; research; and global food supply and demand.
109. Dr Natasha Grist, for the Overseas Development Institute, thought that the Copenhagen Accord showed ambition, implying new and additional funding for adaptation to approach \$30 billion per year by 2010 and then moving to a goal of \$100 billion per year by 2030. Dr Grist emphasised that developing country governments were very keen that funding was made available to them so that they could adapt to create more sustainable livelihoods, and that efforts should be “very clearly tailored to the needs of specific developing countries” (QQ 325, 326, 336).
110. Vittorio Prodi, MEP, noted that the migration pressure towards Europe derived at least partly from desertification of land due to climate change. He emphasised that the EU should appreciate such interlinkages. The Minister confirmed that it was important, in the light of a growing population and the need for security of food supply, to work closely with other nations to make sure that key changes took place (Q 505).
111. As a concrete example of work being undertaken at the moment, Mr Eppel cited Defra and DfID’s work with China on sustainable agriculture. Part of this—the Sustainable Agriculture Innovation Network—was looking at adaptation to climate change. He explained that the Chinese were “very clear that getting these issues right, coping with the impacts of climate change, particularly in the north and west of China where desertification is a big issue, are essential to their future food security. They recognise that maintaining the resource base for agriculture will be fundamental to having future possibilities to feed their populations” (Q 505).
112. Professor Davies warned that there were cultural, social, economic and structural reasons why water and food was not distributed effectively. He told us of his work on drought, trying to deliver novel, water-saving irrigation techniques into agriculture, allowing farmers to use less water while

³⁵ Biochar is a fine-grained material similar to charcoal, produced from the decomposition of plant-derived organic matter (biomass) in a low- or zero-oxygen environment.

sustaining yield. This had been effective in Australia and other countries, but less effective elsewhere when there was particularly intense competition for water (Q 272). Similarly, the Minister warned that it was sometimes difficult to work with developing countries on adaptation strategies when their focus might be feeding the population, or the political leadership might be corrupt and so aid was misdirected (Q 505).

113. **The EU needs to continue the actions described in the White Paper of working with developing countries to facilitate effective adaptation policies. As our witnesses noted, there are linkages between such assistance and migration towards the European Union, placing pressure on Member States' internal resources.**
114. **Such assistance is complex and the barriers are significant. Financial aid delivered under the Copenhagen Accord must be supported by a strategic approach to effective delivery on the ground. We urge the European Commission to take a lead in this.**

CHAPTER 6: RESEARCH AND KNOWLEDGE TRANSFER

115. The White Paper states that there is already much information and research about climate change impacts, though it is not adequately shared across Member States; but also that more knowledge is needed to allow the development of appropriate policy responses. It proposes (paragraph 3.1) that the EU and Member States should complete the following actions by 2011:
- establishment of a Clearing House Mechanism, as a database on climate change impact, vulnerability and best practices on adaptation
 - development of methods, models, data sets and prediction tools
 - development of indicators for better monitoring of the impact of climate change, including vulnerability impacts, and of progress on adaptation
 - assessment of the cost and benefit of adaptation options.
116. We heard a range of views about what needed to be done to improve the present state of knowledge. A recurrent theme was the importance of taking forward research on the scale of local impacts. For example, Dr Tew, for Natural England, highlighted four gaps in the evidence base: an adequate analysis of the differing vulnerability of different parts of the UK and the EU; sufficient field-testing of practical adaptation options; the interaction between adaptation options and other agricultural measures; and a co-operative, rather than supervisory, approach to monitoring climate change impacts. “We think we should be much more engaged with land managers and in using their expertise and their knowledge to help tell us what is going on ... rather than monitoring what people are doing all the time” (Q 14).
117. Other witnesses emphasised that the expected variation in the geographical incidence of climate change pointed to the need to improve knowledge of localised impacts and of appropriate adaptation responses. Mr Morgan, for the RSPB, commented that “the adaptive response to climate change is going to be highly spatially specific” (Q 87); Dr Clark, for the NFU, in discussing possible opportunities which climate change might offer UK farmers, said: “I suspect this is one of the things where the locality of climate change impacts is going to be very significant” (Q 121). Dan Norris told us: “the driver for this flexibility [in adaptation policy] is going to be better modelling which will give you much more localised information, which will empower people to make decisions and plan for the risks that they have got to face on a much smaller, localised scale” (Q 499).
118. Witnesses from the European Commission spoke of current efforts to improve knowledge in this area. Ms Summa said that the Commission’s Joint Research Centre currently had work in hand to bring together longer-term data from climate change modelling with shorter-term agro-meteorological modelling: the purpose was to be able to produce crop-specific and locally more specific information on climate change impacts, on quite a small geographical scale, to forecast more precise impacts on the main crops such as maize and wheat (Q 376).
119. We conclude that there is a lack of knowledge about the likely local impacts of climate change and about the practicability of correspondingly local

adaptive measures, both in the UK and across the EU more widely.³⁶ **We recommend that priority should be given to research efforts, such as the work now being done by the Commission’s Joint Research Centre, to improve understanding of local impacts and appropriate responses, building on initiatives such as that of the UK Climate Impacts Programme. This will also need to take account of the local socio-economic context.**

120. More generally, we were left in no doubt by our witnesses about the need to step up research in a range of areas. For the Rothamsted Research Institute, Dr Angela Karp spoke of significant gaps in the areas of understanding resource use and the efficiency of crops; as well as data on soils, and understanding the water availability in soils; data on greenhouse gas emissions; and the need for more long-term datasets to help the understanding of trends (Q 265).
121. Professor Davies agreed with this list of research needs, and also pointed to the need for better understanding of the effects of drought and high temperature on crop plants. “We need more basic science, I think, and then we need the translation of science to take profit from that science in the whole area of stress tolerance”. The authors of the Royal Society report had decided for scoping reasons not to deal with the issue of the links between livestock and climate change in the October 2009 report, but it merited attention (Q 267).
122. For the NFU, Dr Clark stressed the need for farmers to know more about the likely interaction between climate change and the spread of pests. His colleague, Dr Ceris Jones, said: “there has been a little research on [wildlife] corridors and connectivity and how that might encourage invasive species and diseases. Most of it has been modelling. We are more concerned about the evidence gap” (Q 142). A similar concern was expressed by Mark Broadmeadow from the Forestry Commission (QQ 167, 169).
123. For COPA/COGECA, Ms Andugar commented that, alongside knowledge gaps, there were also gaps in technology transfer. She cited the need for research and innovation on crop varieties that were more climate-resilient. Her colleague, Nella Mikkola, saw a similar need for research into tree species, and also into innovative forest management practices which would serve both mitigation of, and adaptation to, climate change (Q 353).
124. We found it particularly illuminating to hear from Mr Hall, of the Commission’s DG Research. He identified three research themes—energy; environment and climate change; and agriculture, fisheries and biotechnology—which he said had become very important to society in the last two or three years, but which were not adequately funded in the context of the current (7th) Framework Programme (for the period 2007–13) (Q 442). Partly because of this background, a process of joint research programming initiatives was now underway between Member States, in which the Commission’s role was as a facilitator. The next wave of activities would comprise research into agriculture, climate change and food security; those activities would be jointly led by the Biotechnology and Biological Sciences

³⁶ Since we began our inquiry, the UK Climate Impacts Programme has published predictions for the UK climate which are broken down into 25km square grids.

Research Council (BBSRC) in the UK, and the National Institute for Agricultural Research (INRA)³⁷ in France (Q 433).

125. **We share the view expressed by a number of witnesses, not only from the academic sector, that there are significant gaps in scientific and technological research bearing on the adaptation of agriculture and forestry, notably on the resilience of different varieties to projected climatic changes. We see an important role for the EU in co-ordinating the process of identifying these gaps and ensuring that they are rectified through research supported by the Commission and through co-operative efforts by Member States, including with countries outside the EU.**
126. We were struck by the fact that the UK, through the BBSRC, and in conjunction with INRA in France, will play a part in making good the deficiency in climate change-related research across the EU. Evidence from several UK-based witnesses pointed to a decline in this country's agricultural research capacity in recent years (CLA Q 63; NFU Q 135; Natural England Q 30; Professor Davies Q 278; Dr Karp Q 287).
127. We raised the issue of the UK's research capacity, and investment in research relevant to agriculture and adaptation to climate change, with Mr Norris. He said that, while changes in the policy priorities of Government influenced the focal points of research investment, there had not been a significant reduction in such support. "overall what we invest in research is broadly speaking about the same, but we have certainly moved away from traditional agriculture and towards climate change adaptation" (Q 458). For Defra, Mr Eppel commented that, while Defra's total agricultural R&D spending had declined since 2005, total expenditure by Defra and the research councils, including the BBSRC, had increased, from around £228 million in 2005-06 to a projected figure of £253 million for 2009-10 (Q 459). We received information on this point from Mr Norris, with his letter of 2 March 2010 which did not, however, set out levels of expenditure in the years before 2002-03; Defra has said that it does not have figures for earlier years.
128. The Government's response to our queries suggests a lack of interest in an issue of key importance. We are by no means the first to voice concern about a long-term decline in the UK's agricultural research capacity. In a debate on 20 January 2009, for example, the Earl of Selborne said that in the 1980s, the Government started on a round of closures of agricultural research institutes and experimental husbandry stations which, in his view, was still underway: during the preceding five years, closures had included the Long Ashton Research Station, Silsoe Research Institute, the Hannah Research Institute and much of the Horticultural Research Institute.³⁸ **We also understand that, between 1970 and 2010, the number of agricultural research institutes has fallen significantly and that there has been a substantial fall in the number of undergraduates studying agriculture. These reductions are of serious concern to us.**
129. We note that perceptions of the state of, and prospects for, the UK's agricultural research capacity vary sharply between Defra and other stakeholders from whom we took evidence; and that the information

³⁷ Institut National de la Recherche Agronomique

³⁸ HL Deb 20 January 2009, cols 1620-1621.

available from Government is limited and inconclusive. **We consider it essential to ensure that the UK's research capacity is strengthened in order to inform policy on adaptation to climate change effectively. We strongly urge the Government to acknowledge this and to act accordingly.**

130. Against this background of knowledge gained or to be acquired, we were interested to hear views on the proposed Clearing House mechanism. Mr Gammeltoft, of the Commission's DG Environment, explained the initiative to us. "The idea of a Clearing House, which should be operational in a first version by 2011, is to integrate assessments into this information about climate vulnerability, and make this available in the first instance to the people who have to take the administrative decisions on adaptation in the Member States and in the regional and central governments, the regional authorities, specialised authorities, and to provide information about measures that have been taken and experience of these measures" (Q 379).
131. Witnesses recognised the potential for Member States to draw on each other's experience, which is one of the underlying intentions for the mechanism. For the CLA, Professor Buckwell said: "... this is the strength of the European Union potentially, that somebody will alight on good ideas somewhere across Europe, so the more there are the means to share that information, the quicker we can all learn and adapt" (Q 49). For the NFU Cymru, Mr Llewellyn agreed and suggested that experience in southern Europe could prove particularly instructive (Q 140).
132. At the same time, some witnesses had reservations about the likely effectiveness of the mechanism as proposed. Dr Tew, for Natural England, said: "The Clearing House mechanism is a brilliant idea designed by conscientious scientists very keen on evidence base, and if it works it will be fantastic, but I would not like to think that billions of euros will be invested in constructing a Clearing House somewhere in Europe" (Q 14).
133. Professor Whitmore, of Rothamsted Research Institute, agreed that it would be valuable to bring together all relevant information in one place and make it accessible, but commented that it was not sufficient just to have knowledge. It was important to be able to interpret and apply it. The White Paper had not fully spelt out how that was going to be done (Q 276).
134. We consider that this is the nub of the issue. For the Commission, Mr Gammeltoft made it clear that the initial users of the Clearing House mechanism would be "the authorities" (Q 384), though in the longer term the information would have to be communicated to practitioners. We heard from his colleague, Ms Summa, about the consideration which is now being given to using the Farm Advisory System (which all Member States are required to operate under the CAP, and which is operated in the UK as farm advisory services) to pass on climate change-related information at the farm level (Q 379).
135. The importance of communicating practical advice and information to farmers was underlined to us in evidence from many of our witnesses. For the CLA, Professor Buckwell acknowledged that, while some adaptation measures had already been tried and tested, there were continuing obstacles to their take-up in practice (Q 49) including the lack of a well-developed, integrated farm advisory service (Q 63). We heard similar calls for an improved UK farm advisory service from Dr Karp (Q 291), and from

Mr Aitken, SEPA, who offered the example of advisory work done in Scotland by the Scottish Agricultural College (Q 242).³⁹

136. Dr Dwyer, of the University of Gloucestershire, referred to the need to make an understanding of climate change projections “a reality in terms of adaptation strategies for the land-based sectors”, and contrasted the way in which advice to farmers had been handled in the UK over the past 60 years with the approach followed in both France and Germany (Q 308).
137. We raised the issue of the effectiveness of the arrangements to provide advice to UK farmers with Dan Norris and his official colleagues. Mr Eppel said that, while there was not a single advisory structure, there were a number of services that had a role in this area. He drew attention to the example of the Farming Futures initiative,⁴⁰ which had begun to publish case studies offering detailed information about adapting farming practices (Q 471).
138. **We see it as of paramount importance that knowledge gained, from research or from others’ experience, is communicated to farmers and land managers in a practical, helpful and useable way. We strongly urge the Commission and the UK Government to put this objective at the centre of their efforts to improve the base of knowledge about climate change and adaptation efforts by agriculture and forestry, and to promote regular assessments of the effectiveness of communication of this knowledge to land managers. The proposed Clearing House mechanism will be of value only if the knowledge that it pools is in turn incorporated into advice provided to practitioners.**

³⁹ In Wales, the Welsh Assembly Government have established several Development Programmes, based in universities and colleges, to offer advisory services to farmers. In addition to the initial Development Programmes, aimed at red meat, dairy, organic and other sectors (i.e. horticulture, trees, non-ruminants), a new Development Programme was set up in August 2009, to offer technology transfer to farmers on issues concerning climate change.

⁴⁰ The Farming Futures website states that it is a communications collaboration between the National Farmers’ Union, the Country Land and Business Association, the Agricultural and Horticultural Research Forum (representing the agricultural and horticultural levy boards), the Agricultural Industries Confederation, Forum for the Future and Defra. It provides information about climate change for the stakeholders concerned.

CHAPTER 7: FINANCING

BOX 3

The cost of adaptation according to Stern

The Stern review of the economics of climate change (October 2006) suggested that, if no action were taken, the overall costs and risks of climate change would be equivalent to losing at least 5% of global GDP each year; but that the costs of action, to reduce greenhouse gas emissions and avoid the worst impacts of climate change, could be limited to around 1% of global GDP each year.

139. The White Paper notes that financial constraints were identified in the Stern Review as one of the main barriers to adaptation. Relevant sectors should therefore develop strategies and cost estimates for adaptive actions so that they may be taken into account in future financial decisions. The White Paper suggests that optimising the use of insurance and other financial services products could be explored. Consideration should be given to the role of market-based instruments, such as incentive schemes for protecting ecosystem services, and public-private partnerships should be encouraged. Finally, the possibility of using revenue generated from auctioning allowances under the EU's Emissions Trading System (ETS) should also be explored.
140. In this chapter, we explore witnesses' views on some of the possible sources of financing actions by agriculture and forestry to adapt to climate change.

Cost of adapting agriculture and forestry to climate change

141. No witness was willing categorically to put a figure on the cost of adapting agriculture and forestry to climate change. For DG Environment of the Commission, Mr Gammeltoft commented: "If you look in the literature there is a very wide range of numbers for this, and there is no certainty about what the costs of adaptation to climate change will be. However, what is certain is that there will be very significant costs" (Q 406). Mr Norris, Defra Minister, also declined to put an exact figure on the costs, stating that the level of funding required would depend on the mix of measures (Q 494).
142. In line with the Stern Review, Ms Rose Manise, for Natural England, said that delaying sustainable adaptation measures would mean that society would end up having to pay a very much higher bill than if action were taken now (Q 32). In 2009, the total value of output from UK farming stood at £19.3 billion (at market prices).⁴¹ Based on the Stern review, the CLA calculated that the annual cost of mitigating and adapting to climate change in the UK agricultural sector alone could be about £910 million. The CLA concluded that "the improbable scale of this figure signifies to us that we may have to deploy significant resources to deal with the challenges ahead and we have not begun to get our heads round the scale of the actions required" (CLA p 20).
143. Like our witnesses, we would not wish to put a precise figure on the cost of adapting forestry and agriculture to climate change. It is nevertheless evident

⁴¹ The figure is taken from an announcement of 28 January 2010 on *Provisional estimates of farm incomes in the United Kingdom 2009*, published on Defra's website.

that public funding, whether EU or national, will not meet the entirety of the costs. Autonomous financing and innovative private sector funding will thus be required.

The EU budget

144. In Chapter 4, we looked at the long-term future of the CAP. We will not repeat the points made there, but we recognise that, important though it will remain in this context, the CAP cannot be expected to provide the main source of the necessary finance.
145. We continue to take the view expressed in our 2008 report that payments would usefully be moved progressively from direct support to payments for activities currently supported by Pillar 2, which should include efforts to adapt agriculture and forestry to climate change, but, as previously indicated, we question the usefulness of maintaining the division between Pillar 1 and Pillar 2 expenditure.
146. In Chapter 4, we also referred to the recent IEEP report on the provision of public goods through agriculture.⁴² The report concluded that the CAP has considerable potential to influence the scale of delivery of public goods, but that such goods are undersupplied compared to the level demanded by the public, including sustainable water management.
147. A number of our witnesses stressed that farms provided not just products for consumption, but other environmental services and public goods which had no obvious market value. For Natural England, Dr Tew commented: “There are a few things that land managers are rewarded for; they deliver a wide range of things they are not rewarded for, and if society wants them to deliver that wide range of things, then society has to find a way of paying land managers to deliver” (Q 2).
148. This is an issue of particular relevance to forestry. For the RSPB, Dr Avery cited the example of woodland owned by the RSPB in north of England. Carbon sequestration was a public good being provided by the woodland, but it was provided for free. He observed that “there is a market problem, a dysfunction in the way that we value things” (Q 103). Similarly, Professor Buckwell for the CLA observed that European afforestation could be part of the wider effort to tackle climate change, but funding was a key issue. The planting of trees was “not a charitable activity” (Q 56).
149. We raised this issue with the Defra Minister and his official colleagues. Mr Eppel said that the potentially significant contribution of forestry to climate change mitigation was recognised and had been reflected in the Government’s Low Carbon Transition Plan of July 2009. However, he stated that “there is no self-evident immediate source of funding, but it could be a valuable contribution, so finding potentially innovative ways of financing additional forest cover in the UK could be an important contribution” (Q 483).
150. **We firmly believe that the future CAP should reward land managers appropriately for the public goods provided, including for woodland. Consideration must be given as to how land managers can be rewarded within the CAP for the provision of woodland.**

⁴² Op. cit.

Private funding options

151. As Dr Dwyer commented, public funding for measures to adapt to climate change will continue to be constrained by the wider economic situation, so that there is a need to find ways of drawing in private sector funding to meet some of the challenges, using the right mechanisms. She suggested that it should be possible to draw supermarkets into public private partnerships given that they both depend on food production and have policies on corporate social responsibility (Q 309).
152. Many of the actions to be undertaken by agriculture and forestry to climate change will be self-financed. As Mr Morgan of the RSPB observed: “Farmers ... will spot opportunities and they will exploit them, so the process of agricultural adaptation itself is something that will happen following normal economic pathways” (Q 106).
153. **Since autonomous adaptation actions are likely to be financed by land managers themselves, additional public and private finance should only be required to incentivise incremental action.**
154. Mr Morgan illustrated the potentially complex interaction of funding streams in this area. He cited the example of work being undertaken by the RSPB on the Ouse Washes in the Fens in Eastern England. The organisation had acquired land adjacent to the Ouse Washes from farmers who had found increasing difficulty in using the land for arable production because the land was more often subject to flooding. The land was an important breeding-site for birds, and continued to be available for cattle when they had to be moved from the Washes, but the Washes themselves provided a flood protection benefit which accrued to private owners of houses upstream (Q 92). The RSPB had worked with the Environment Agency, arable farmers and graziers to arrive at the solution (Q 107).
155. For the NFU, Dr Clark said that there was a need to identify mechanisms that would be suited to individual farmers; he pointed to the example of the Environmental Stewardship scheme, operated by Natural England, which provided a fairly straightforward approach to participating. He also referred to a tender approach used in the new National Forest in the Midlands “where they have asked farmers to bid for undertaking changes to land use and land management in return for tendered area payments. So there are different approaches that can be taken, and if it appeals to farmers’ market sensibility and market understanding and it recognises that the paperwork should not submerge the value, then there are opportunities there” (Q 145).
156. The CLA added that there ought also to be opportunities to get transfers from businesses to businesses rather than public sector to businesses. For example, water companies could pay land managers to change what they were doing in order to reduce the cost of dealing with problems such as discolouration in water (Q 64).
157. As noted above, when we reported on the future of the CAP in 2008, we urged that consideration be given to the possibility of integrating agriculture in an EU-wide greenhouse gas emissions trading scheme. We heard little support from our witnesses for such an approach. For the NFU, Dr Clark said that, given that the farming sector contained so many small and micro-businesses, its ability to engage in initiatives such as the Emissions Trading System was very limited, because of the heavy administrative burden

(Q 145). We recognise the difficulties, but we remain of the view that this is an option which merits further thought.

158. **We believe that private funding options are a possible source of financing adaptation actions in the agriculture and forestry sector. These might be encouraged by public authorities through public private partnerships, or could be developed as a private sector contract between land manager and company where their interests coincide. We urge the Government to work with key private sector interests, such as supermarkets and water companies, along with land managers, to develop a strategy which might help to take forward this avenue of work.**

CHAPTER 8: THE EU AS A CO-ORDINATOR OF NATIONAL, REGIONAL AND LOCAL POLICY RESPONSES

159. The Commission's White Paper is clear that most adaptation measures will be taken at national, regional or local levels, due to the regional variability in severity of climate impact. However, it also states that an integrated and coordinated approach at EU level will support and strengthen these measures (paragraph 2.3).
160. In expanding on this, Mr Gammeltoft, of the Commission's DG Environment, spoke of the significant trans-boundary issues related to climate change which needed to be co-ordinated between Member States: in particular, water management (70% of the EU territory is situated in trans-boundary water basins), and biodiversity issues. He referred as well to trans-European infrastructure networks which were vulnerable to extreme weather events; to the relevance of climate change to sectors, such as agriculture, which were subject to EU regulation; and to the greater efficiency which would result if relevant R&D were carried out and co-ordinated at EU level (QQ 370, 371).
161. There was recognition among our witnesses that the EU had a role to play. For the CLA, Mr Worsley commented that climate change mitigation and adaptation had to be done at EU level, because these were challenges of more than national impact (Q 48). For the Environment Agency, Ms Kirmond commented that Europe had a very strong part to play, in promoting strategic planning of responses to climate change (Q 245). Mr Norris said that "where the EU can be very, very effective I think is in co-ordinating best practice" (Q 456).
162. Other witnesses struck a warning note about the manner in which the Commission should take forward its work on adaptation to climate change. For Natural England, Ms Manise said that there was a question mark over the relationship between the Commission and the Member States: to what extent would the Commission "stand back and provide what it needs to do, which is to deal with trans-boundary issues, with a degree of support and co-ordination", and allow Member States "to develop their own responses and their own mechanisms to suit their local circumstances"? (Q 34).
163. For the NFU, Dr Clark said that the key challenge posed by the White Paper was ensuring that "we do not create climate change activity within another silo of activity which runs alongside all the other silos of activity" (Q 157). Ms Kirmond, of the Environment Agency, stressed the need for the different parts of the Commission—DG Agriculture, Environment and Energy—to work together: "we need a clear framework on the importance of climate change and the priority that Europe is going to give to that across its policy areas" (Q 256).
164. Ms Summa, of the Commission's DG Agriculture, touched on the same issue in referring to an internal EU need to focus on adaptation, and to check that all EU policies made sense from the point of view of climate change challenges as a whole. "In a way, the policy also speaks to us in the EU to ensure that we are pulling in the same direction on all EU policies" (Q 371).
165. In 2009, the European Commission President announced the intention to create a new post of Climate Action Commissioner: Ms Connie Hedegaard's appointment to this post has been confirmed. Mr Gammeltoft and Ms

Summa reported that their respective Departments were already working closely together on adaptation to climate change and that one of the roles of the new Climate Action Commissioner would be to integrate climate change adaptation into EU policies (QQ 372–4).

166. We are familiar with the call to “think globally and act locally”, but it is a maxim with particular relevance to policy on adaptation to climate change. Decisions on changing land management practices in response to climatic shifts will vary within individual countries, let alone across Europe. It would make no sense for fine-scale measures to be decided at EU level, and it would breach the principle of subsidiarity. At the same time, it is undoubtedly the case that, as Dr Dwyer remarked, the EU has a valuable role in providing aspiration and inspiration, guiding Member States to reflect important concerns in their own policy-making (Q 303).
167. **The EU has a useful part to play in helping Member States to share information on adaptation approaches, and in monitoring the impact of climate change on agriculture and forestry across the EU and communicating that information as well.** This is in addition to its role where a policy competence exists, or where it can generate knowledge through its research budget.
168. **We see the appointment of the new Climate Action Commissioner as key to ensuring an integrated approach to the formulation of climate change adaptation policy across the European Commission’s Directorates-General. We urge the new Commissioner to seize this opportunity.**

CHAPTER 9: CONCLUSIONS AND RECOMMENDATIONS

The EU policy response in the short term

169. We endorse the suggestion that, in their annual reports on rural development programmes, Member States should be asked to specify the measures taken to promote adaptation to climate change. We further recommend that the Commission compile these responses and produce a short report, assessing Member States' approaches to using rural development programmes to promote adaptation to climate change (paragraph 41).
170. We agree that the challenges posed to the sector by climate change need to be met by using a range of mechanisms. These include regulation, notably in relation to the water environment; incentives, such as the availability of support for capital measures; as well as the Single Farm Payment and the associated cross-compliance requirements, which encourage farmers to adapt to climate change in changing circumstances (paragraph 46).
171. Public authorities have a key role in this area to discourage mal-adaptation (action that increases vulnerability to climate change-related hazards) by land managers. We therefore recommend that the Commission and Member States work together to identify approaches which may cause mal-adaptation, such as the growth of water-intensive crops in already water-stressed environments (paragraph 47).
172. Between now and 2013, the EU should direct its efforts towards delivering change where it is most urgently needed; in our view, that need is strongest in the southern EU states. Given that EU funding levels are fixed until 2013, we conclude that such an approach would need to be based on encouraging the re-orientation of existing EU funding within those countries, not least the rural development expenditure under the CAP Health Check and the European Recovery Package, in addition to the use of national and private funds (paragraph 50).

Long-term changes to the CAP

173. We recommend that the Government participate constructively in the debate on the future shape of the CAP, and promote full and early discussion among all interested parties in the UK (paragraph 68).
174. The requirements of a sustainable intensification of agriculture should be the defining characteristics of the future CAP. This should include a consideration of the public environmental goods provided by the agricultural industry, particularly as it and the forestry industry adapt to the challenges of climate change (paragraph 69).
175. We recommend that the Government should work to ensure that the future CAP is shaped along these lines (paragraph 70).
176. In addition, we consider that examination should be given to whether the existing requirement for CAP payments to be linked to cross-compliance could be extended to include some form of "carbon compliance", linked to measures taken by farmers to mitigate, or adapt to, climate change (paragraph 71).
177. We recommend that priority should be given to defining the objectives of the CAP before deciding on the delivery mechanisms (paragraph 72).

178. We recommend that the future CAP should not support agriculture in areas where climate change means that productive capacity can be maintained only at unacceptable environmental and economic cost. A comprehensive mapping of climate change vulnerability should therefore be prepared as the basis for allocating CAP support to agriculture. Where such mapping implies the withdrawal of CAP funding the case for replacement funding from other sources, notably the cohesion funds, will need to be considered (paragraph 73).

Using other EU policies in the long term

179. We note the publication of the Green Paper on forestry. We recommend that the Commission should work with the Member States to monitor the incidence and spread of pests and diseases. The Commission should collaborate with the Member States to share best practice and contribute to anticipatory work on designing responses appropriate to a changed climate (paragraphs 83 and 85).

180. We agree that biotechnology is only one of the tools available to tackle the impact of climate change, but we none the less consider that it is one with significant potential. We therefore welcome the news that the Commission will be publishing a compilation of research work undertaken on GM over the past decade. We urge the Commission and Member States to play their part in ensuring that the conclusions of such publications are accompanied by public communication strategies (paragraphs 89 and 90).

181. We recommend that consideration be given to deploying Structural Funds to support economically those areas where climate change imposes unacceptable environmental costs on the maintenance of agriculture's productive capacity (paragraph 95).

182. In the longer term, the synergies between the Structural Funds and the CAP must be considered when designing the new Structural Funds programmes, in order to ensure that they recognise the pressure that climate change may apply to certain areas of the European Union. Support from Structural Funds may be able to assist with local innovative approaches to land use (paragraph 96).

183. We recommend that consideration be given by Member States to making greater use of Structural Funds to support planting woodland in urban areas (paragraph 97).

184. We recommend that, in its efforts to co-ordinate relevant research, the Commission should include knowledge of water management technologies, and should draw upon work undertaken in similar, or warmer, climates such as the Middle East (paragraph 101).

185. We recommend that diffuse pollution from agriculture be addressed by the Commission in the medium term as Member States continue their implementation of the Water Framework Directive. In working with Member States on implementation of both the Water Framework Directive and the Floods Directive, we recommend that the Commission gives consideration also to the potential role of woodland (paragraphs 102 and 103).

186. We recommend that the Government and Commission give consideration to innovative approaches to soil management and soil use, such as the

protection of the existing capacity of soil to act as a carbon sink, and carbon storage in soils through the addition of biochar (paragraph 107).

187. The EU needs to continue the actions described in the White Paper of working with developing countries to facilitate effective adaptation policies. As our witnesses noted, there are linkages between such assistance and migration towards the European Union, placing pressure on Member States' internal resources (paragraph 113).
188. Such assistance is complex and the barriers are significant. Financial aid delivered under the Copenhagen Accord must be supported by a strategic approach to effective delivery on the ground. We urge the European Commission to take a lead in this (paragraph 114).

Research and knowledge transfer

189. We recommend that priority should be given to research efforts, such as the work now being done by the Commission's Joint Research Centre, to improve understanding of local impacts and appropriate responses, building on initiatives such as that of the UK Climate Impacts Programme. This will also need to take account of the local socio-economic context (paragraph 119).
190. We share the view expressed by a number of witnesses, not only from the academic sector, that there are significant gaps in scientific and technological research bearing on the adaptation of agriculture and forestry, notably on the resilience of different varieties to projected climatic changes. We see an important role for the EU in co-ordinating the process of identifying these gaps and ensuring that they are rectified through research supported by the Commission and through co-operative efforts by Member States, including with countries outside the EU (paragraph 125).
191. We understand that, between 1970 and 2010, the number of agricultural research institutes has fallen significantly and that there has been a substantial fall in the number of undergraduates studying agriculture. These reductions are of serious concern to us (paragraph 128).
192. We consider it essential to ensure that the UK's research capacity is strengthened in order to inform policy on adaptation to climate change effectively. We urge the Government to acknowledge this and to act accordingly (paragraph 129).
193. We see it as of paramount importance that knowledge gained, from research or from others' experience, is communicated to farmers and land managers in a practical, helpful and useable way. We strongly urge the Commission and the UK Government to put this objective at the centre of their efforts to improve the base of knowledge about climate change and adaptation efforts by agriculture and forestry, and to promote regular assessments of the effectiveness of communication of this knowledge to land managers. The proposed Clearing House mechanism will be of value only if the knowledge that it pools is in turn incorporated into advice provided to practitioners (paragraph 138).

Financing

194. We firmly believe that the future CAP should reward land managers appropriately for the public goods provided, including for woodland. Consideration must be given as to how land managers can be rewarded within the CAP for the provision of woodland (paragraph 150).

195. Since autonomous adaptation actions are likely to be financed by land managers themselves, additional public and private finance should only be required to incentivise incremental action (paragraph 153).
196. We believe that private funding options are a possible source of financing adaptation actions in the agriculture and forestry sector. These might be encouraged by public authorities through public private partnerships, or could be developed as a private sector contract between land manager and company where their interests coincide. We urge the Government to work with key private sector interests, such as supermarkets and water companies, along with land managers, to develop a strategy which might help to take forward this avenue of work (paragraph 158).

The EU as a co-ordinator of national, regional and local responses

197. The EU has a useful part to play in helping Member States to share information on adaptation approaches, and in monitoring the impact of climate change on agriculture and forestry across the EU and communicating that information as well (paragraph 167).
198. We see the appointment of the new Climate Action Commissioner as key to ensuring an integrated approach to the formulation of climate change adaptation policy across the European Commission's Directorates-General. We urge the new Commissioner to seize this opportunity (paragraph 168).

APPENDIX 1: SUB-COMMITTEE D (ENVIRONMENT AND AGRICULTURE)

The members of the Sub-Committee that conducted this inquiry were:

The Earl of Arran
 Lord Brooke of Alverthorpe
 Viscount Brookeborough
 The Earl of Caithness
 Lord Carter of Coles (Chairman)
 The Earl of Dundee
 Lord Lewis of Newnham
 Lord Livsey of Talgarth
 Lord Palmer
 Baroness Sharp of Guildford
 Baroness Symons of Vernham Dean
 Viscount Ullswater

Declarations of Interest Relevant to this Inquiry

The Earl of Arran
Director of 'Weatherworld'
Married to a farmer and landowner in Devon
Trustee of certain family trusts associated with farming
Trustee of Chelsea Physic Garden

Lord Brooke of Alverthorpe
Senior Strategic Adviser to Accenture PLC

Viscount Brookeborough
Farmer

The Earl of Caithness
Trustee of landed property

Lord Carter of Coles
Farmer and landowner

The Earl of Dundee
Farmer, landowner and forester in Scotland
Director of farming company in Scotland
In receipt of Single Farm Payments

Lord Lewis of Newnham
Chair of Advisory Committee, Veolia Environment Services

Lord Livsey of Talgarth
Vice President of the Brecknock Federation of Young Farmers Clubs
Member of the Royal Welsh Agricultural Society
Associate of the British Veterinary Association

Lord Palmer
Arable farmer with let grazing for animals including horses, with let forestry for game shooting etc.
Member of the National Farmers' Union Scotland
Member of the Scottish Country Land and Business Association
In receipt of Single Farm Payment and other Rural Schemes

Baroness Sharp of Guildford
No relevant interests

Baroness Symons of Vernham Dean

No relevant interests

Viscount Ullswater

Trustee of landed estates in Cumbria and Devon (Expenses)—Land owned by the Trusts attracts LFA payments

Member of the Country Land and Business Association

A full list of Members' interests can be found in the Register of Lords Interests:

<http://www.publications.parliament.uk/pa/ld/ldreg.htm>

APPENDIX 2: LIST OF WITNESSES

The following witnesses gave evidence. Those marked * gave oral evidence.

- Confederation of Forest Industries (ConFor)
- * COPA-COGECA
- * Country Land and Business Association
- Countryside Council for Wales
- * Professor William Davies, University of Lancaster
- * Department for Environment, Food and Rural Affairs (Defra)
- * DG Agriculture of the European Commission
- * DG Environment of the European Commission
- * DG Research of the European Commission
- * Dr Janet Dwyer, Countryside and Community Research Institute, University of Gloucester
- * Environment Agency
- Lynn Erselius PhD, Brussels
- * Forestry Commission
- * National Farmers' Union
- * National Farmers' Union Cymru
- National Farmers' Union Scotland
- * Natural England
- * Overseas Development Institute (ODI)
- * Mr Vittorio Prodi MEP
- * Rothamsted Research
- * Royal Society for the Protection of Birds (RSPB)
- Scottish Agricultural College (SAC)
- * Scottish Environment Protection Agency (SEPA)
- * Ulster Farmers' Union
- * Woodland Trust

APPENDIX 3: INTERESTS OF THE SPECIALIST ADVISERS

Professor Tim Wheeler (to February 2010)

Part-time appointment as Senior Research Fellow at the Department for International Development (to February 2010)

Research grants for academic research in the area of climate change and agriculture

Professor Gareth Edwards-Jones (from March 2010)

Membership of:

- the Council of Food Policy Advisors of the Department for Food, Environment and Rural Affairs (Defra) (2008 to date)
- Defra's Fruit and Vegetable Task Force (2009 to date)
- Scientific Advisory Panel for Natural England (2007 to date)
- Agriculture Strategy Panel for the Biotechnology and Biological Sciences Research Council (2007 to date)
- Welsh Assembly Government's Land Use Climate Change Group (2008 to 2009)
- R&D panel Hybu Cig Cymru (Meat Promotion Wales) (2008 to date)
- Steering group for Food Climate Research Network (jointly funded by Engineering and Physical Sciences Research Council and Defra) (2008 to date)

Research grants for academic research in the areas of agriculture, climate change and carbon footprinting

Director of Footprints4Food, a company which undertakes carbon footprinting of food items for commercial organisations

APPENDIX 4: CALL FOR EVIDENCE

Introduction

The House of Lords European Union Committee will conduct an inquiry, through its Environment and Agriculture Sub-Committee (Sub-Committee D), into how EU policies can assist the adaptation of agriculture and forestry to climate change. The inquiry will be held against the background of the European Commission's White Paper on Adaptation to Climate Change⁴³ of 1 April 2009, and its accompanying Paper on the challenge for agriculture and rural areas.⁴⁴

The Committee is seeking evidence from stakeholders and other interested parties on the issues arising from the Commission's Adaptation White Paper. On the basis of that evidence, the Committee will formulate conclusions and recommendations to inform the House of Lords, and to contribute to the development of policy on adaptation of agriculture and forestry to climate change by the UK Government and the EU institutions over the next few years.

The issues

The Committee invites you to submit written evidence to its Inquiry. The Committee would find it helpful if you would focus on a number of specific issues, listed below. You may also wish to draw our attention to additional issues not addressed by the questions below; however, the Committee does not intend to look at adaptation to climate change in areas other than agriculture, forestry and related land use. It is recognised that those submitting evidence will not necessarily have an interest in all the questions and may therefore wish to be selective. Views are sought on the following:

Objectives of EU action

1. The objectives of any action by the EU to support the adaptation of agriculture and forestry to climate change and how any action dovetails with the broader sustainable development objectives of the EU for land use and land use change.

The threats and opportunities and obstacles to action

2. How EU agriculture and forestry can best adapt to the threats and opportunities that are presented by climate change, both in the EU and internationally, and what obstacles there may be to taking the appropriate action.

The short term: 2010–13

3. The available EU policy options and objectives in Phase 1 (2010–13), notably in terms of how well-suited CAP instruments are to assist adaptation, and whether the funding made available for 'new challenges' like adaptation is adequate and accessible.

The long term: 2013–20

4. Agriculture and forestry's contribution to the European Commission's comprehensive adaptation strategy beyond 2013, within the context of the EU budget review and a reformed Common Agricultural Policy.

⁴³ COM(2009)147 "Adapting to Climate Change: Towards a European framework for action"

⁴⁴ SEC(2009)417 "Adapting to climate change: the challenge for agriculture and rural areas"

The international dimension

5. Consistency between the various policies that affect EU agriculture and forestry's adaptation to climate change, including food security and the reduction of emissions from deforestation and forest degradation (REDD) in developing countries.

Synergies between adaptation and mitigation

6. How EU-coordinated efforts by agriculture and forestry to adapt to climate change can be combined with efforts to mitigate climate change.