



House of Commons
Environmental Audit
Committee

**Are biofuels
sustainable?**

First Report of Session 2007–08

Volume I



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Report, together with formal minutes

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The Environmental Audit Committee

The Environmental Audit Committee is appointed by the House of Commons to consider to what extent the policies and programmes of government departments and non-departmental public bodies contribute to environmental protection and sustainable development; to audit their performance against such targets as may be set for them by Her Majesty's Ministers; and to report thereon to the House.

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References

In the footnotes of this Report, references to oral evidence are indicated by 'Q' followed by the question number. References to written evidence are indicated by page number as in 'Ev12'. number HC 76-II only if a vol 2: App' refers to written evidence printed in Volume II, serial number HC 76-II]

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Summary

1. Biofuels *can* reduce greenhouse gas emissions from road transport—but most first generation biofuels have a detrimental impact on the environment overall. In addition, most biofuels are often not an effective use of bioenergy resources, in terms either of cutting greenhouse gas emissions or value-for-money. The Government must ensure that its biofuels policy balances greenhouse gas emission cuts with wider environmental impacts, so that biofuels are only used where they contribute to sustainable emissions reductions.

2. The Government and EU's neglect of biomass and other more effective policies to reduce emissions in favour of biofuels is misguided. The current policy and support framework must be changed to ensure that sustainable bioenergy resources maximise their potential to generate energy for the lowest possible greenhouse gas emissions. In general biofuels produced from conventional crops should no longer receive support from the Government. Instead the Government should concentrate on the development of more efficient biofuel technologies that *might* have a sustainable role in the future.

3. The EU Environment Commissioner, Stavros Dimas, recently admitted that the Commission did not foresee all the problems that EU biofuels policy would cause. He indicated that certification would be used to address the negative impacts of biofuels. This is not good enough. The Government should seek to ensure that EU policy changes to reflect the concerns raised in this report. This means implementing a moratorium on current targets until technology improves, robust mechanisms to prevent damaging land use change are developed, and international sustainability standards are agreed. Only then might biofuels have a role to play. In the meantime, other more effective ways of cutting emissions from road transport should be pursued. It will take considerable courage for the Government and EU to admit that the current policy arrangements for biofuels are inappropriate. The policy realignments that are required will be a test of the Government's commitment to moving the UK towards a sustainable low carbon economy.

1 Introduction

4. We launched our Inquiry, *Are biofuels sustainable?*, on 25 July 2007 and decided that the Inquiry should:

- examine the role biofuels might play in reducing greenhouse gas emissions and improving fuel security;
- explore the wider economic, social and environmental impacts of biofuels;
- explore whether safeguards are in place to minimise any negative social and environmental impacts of biofuels; and
- review the policy arrangements for biofuels.

5. During the course of our inquiry several organisations have published reports raising concerns about the environmental impacts of transport biofuels and also the rationale for their use in reducing greenhouse gas emissions.¹ In response to these concerns we decided to focus on transport biofuels derived from agricultural commodities, rather than those derived from other sources such as waste. We have not therefore looked in great detail at other technologies, such as biomass, although we necessarily touch on these in places.

6. We received evidence from a range of sources including individuals, trade associations, academics, non-governmental organisations (NGOs) and the Department for Transport. We are grateful to all those who contributed to this Inquiry.²

What are biofuels?

7. Biofuels are liquid fuels produced from organic matter rather than from fossil fuels, which are a finite and non-renewable resource. Most biofuels are currently produced from food and fodder crops. Known as first generation biofuels, they are found in two different forms depending upon their source material. Biodiesel is produced through from oils such as rendered animal fats, rapeseed and palm oil. Bioethanol is produced from the fermentation of any feedstock that contains a high content of sugar or starch; typical feedstocks include sugarcane, sugar beet, maize, and starchy cereals such as wheat and barley.³ Biomass is solid organic matter, such as wood or straw, which is burned to provide either heat or electricity or both. Biomass, biofuels and other non-fossil organic fuels are collectively known as bioenergy.

¹ United Nations, *Sustainable bioenergy: A Framework for Decision Makers*, May 2007, www.un.org/esa/; Richard Doornbosch & Ronald Steenblik, OECD Round Table on Sustainable Development, *Biofuels: Is the cure worse than the disease?*, 11-12 September 2007, www.oecd.org

² See submitted written and oral evidence at the end of this report

³ Richard Doornbosch & Ronald Steenblik, OECD Round Table on Sustainable Development, *Biofuels: Is the cure worse than the disease?*, 11-12 September 2007, www.oecd.org

8. Second generation biofuels are produced from the whole of the plant, not just the sugar or oil-rich parts.⁴ They can be produced from biomass. These biofuel technologies are not yet commercially viable, and might be some 5 to 10 years or more from reaching the market. They could have benefits over conventional first generation biofuels because they might:

- have greater greenhouse gas savings;
- be grown on land not suitable for conventional agriculture;
- have lower input requirements than conventional crops; and
- be higher yielding per hectare than conventional crops.⁵

Are biofuels 'carbon neutral'?

9. A common misconception of biofuels is that they are 'carbon neutral', i.e. that they absorb as much carbon in their growing as they release when they are burned as fuel. However, a range of additional emissions have to be considered when calculating the actual amount of carbon they might save, including:

- emissions from agriculture such as from machinery usage and soil disturbance (which can release large volumes of carbon).
- nitrous oxide (a potent greenhouse gas) emissions from fertiliser application
- emissions from the energy used to convert the feedstock into a liquid fuel; and
- transport of either the feedstock, or the biofuel, to its point of use.

10. There may also be indirect emissions associated with a biofuel, especially if non-agricultural land is used to grow the feedstock. For example, if forest is cut down to grow biofuels it would take between 50 and 100 years for the biofuels to compensate for the initial release of carbon.⁶

11. The GHG savings associated with a biofuel vary greatly depending on the way that it was grown, where it was grown and how it was converted from the feedstock into the biofuel. When all these emissions are added together the final biofuel can actually lead to more GHG being emitted than if petrol or diesel was used, which is the case in some bioethanol produced in the US. Nevertheless many biofuels can result in some reduction of emissions and some can lead to significant reductions.⁷

⁴ *Transport Biofuels*, POSTnote 293, Parliamentary Office of Science and Technology, August 2007, www.parliament.uk

⁵ *ibid*

⁶ 'Forget biofuels – burn oil and plant forests instead', *New Scientist*, 16 August 2007

⁷ Ev 76

Biofuel policies and support mechanisms

12. Published by DEFRA in May 2007, the UK Biomass Strategy⁸ sets out the Government's plans for the sustainable development of a biomass industry in the UK out to 2020. It sought to evaluate the role biomass (including liquid biofuels) might play in meeting future sustainable energy needs. The Strategy argued that biofuels have a 'significant potential' to reduce carbon emissions from transport 'in a sector where other renewable sources such as wind, solar and tidal power are not practical'.⁹ It outlined how the Renewable Transport Fuel Obligation (RTFO, see below) would be one of the main policy instruments in the transport sector to reduce GHG in order to meet international agreements such as the Kyoto Protocol and EU Biofuels Directive.

13. The Strategy accepted that there could be problems associated with biofuels. In particular it acknowledged that air quality could be affected if the fuels are not properly handled and that there might be environmental impacts associated with their use. Due to these concerns the Strategy stated that the RTFO would only be increased beyond its current level if there was 'confidence that biofuels will be produced in a sustainable way, so that they deliver the maximum practicable carbon savings with the minimum practicable adverse environmental impacts'.¹⁰ The Government also said that the RTFO would not be raised until it was satisfied that biofuels represented an effective use of biomass resources, both in terms of cost effectiveness in reducing carbon emissions and in its impact on other industries that use biomass resources; increasing demand might force these industries to obtain biomass from less sustainable sources.

14. The Strategy set out a range of support mechanisms for biofuels in addition to the RTFO:

- fuel duty incentives (20 pence per litre on both biodiesel and bioethanol to 2010);
- Government Grant Programmes to provide grants towards the cost of installing a range of alternative fuel refuelling points;
- Regional Selective Assistance (RSA) or Selective Finance for Investment grants (an RSA grant helped fund the UK's first major biofuel plant);
- an assessment of what further support could be given through the tax system to encourage the direct refining of vegetable oils at oil refineries; and
- support for pilot projects.¹¹

⁸ Department for Environment, Food and Rural Affairs, *UK Biomass Strategy*, May 2007

⁹ *ibid*

¹⁰ *ibid*

¹¹ *ibid*, p33

The Renewable Transport Fuel Obligation

15. Alongside fuel duty incentives, the RTFO is the ‘main policy in the transport sector to reduce GHG emissions and to increase use of renewable fuels’.¹² The Order imposes an obligation on fuel suppliers to supply 5% of their UK road fuel sales from renewable fuels by 2010. The Order provides for a Renewable Fuels Agency (RFA) to manage the scheme and to issue tradeable certificates to those who supply renewable fuels. Those suppliers that fail to reach the minimum target are able to buy out of the scheme. These fees are then redistributed to all fuel suppliers ‘according to the number of certificates that they redeem or surrender’.¹³ The RFA will require fuel suppliers to report on the net GHG savings and sustainability of the biofuels that they supply in order to receive certificates. Large suppliers (claiming more than 450,000 certificates) are also required to produce an annual independently verified report.

16. Although they will not be mandatory, the Government has proposed GHG saving and sustainability targets that fuel suppliers should aim to meet. In June 2007 the Transport Secretary, Douglas Alexander MP, said that these would relate to ‘the level of [GHG] savings we expect to see from biofuels used to meet the RTFO, the proportion of biofuels from feedstock grown to recognised sustainability standards and the amount of information we expect to be included in sustainability reports’.¹⁴

Table 1: Proposed sustainability and carbon targets

Proposed annual supplier targets	2008–2009	2009–2010	2010–2011
Percentage of feedstock meeting standards	-	50%	80%
Annual GHG saving of fuel supplied	40%	50%	60%
Amount of information in sustainability reports	35%	65%	80%

Source: Department for Transport, Carbon and Sustainability Reporting Within the Renewable Transport Fuel Obligation, Requirements and Guidance, Draft Government Recommendation to RTFO Administrator, June 2007

17. From April 2010 the Government proposes that certificates will be awarded on the basis of the GHG emissions that they save. This should help to stimulate the use of those biofuels that lead to the greatest reductions in GHG. From April 2011 the Government also proposes that certificates will only be granted to biofuels if they meet the required sustainability standards.¹⁵

Agricultural subsidies

18. There are a range of subsidies that directly or indirectly support the production of biofuel feedstocks. Indirect subsidies include the Single Farm Payment and the Entry Level Environmental Stewardship Scheme that pay farmers per hectare of land. Direct subsidies include the Energy Aid Payments Scheme, for which farmers can receive €45 per hectare

¹² Explanatory memorandum to The Renewable Transport Fuel Obligations Order (SI 2007/3072)

¹³ *ibid*, p1

¹⁴ ‘Government proposes new measures to encourage sustainable Biofuels’, *Government News Network*, 21 June 2007, www.gnn.gov.uk

¹⁵ *ibid*

for growing biofuels on non set-aside land. Farmers can also grow biofuels on set-aside land and still receive set-aside payments.¹⁶

19. In October 2007 the Global Subsidies Initiative (GSI) published its report *Biofuels - at what cost? Government support for ethanol and biodiesel in the European Union*. It found that in 2006, the EU and individual Member States subsidised biofuels by around €3.7 billion taking into account (as far as possible) all support mechanisms such as excise tax exemptions, capital grants and R&D. Where a subsidy could not be directly tied to biofuels, but which would nevertheless still subsidise biofuel production, such as agricultural support through the Single Farm Payment, the subsidy was not counted and therefore the figure given is likely to be an underestimate. Added together this is the equivalent of €1.1 per litre of ethanol, and €0.55 per litre of biodiesel. This puts the cost of obtaining a reduction of one tonne of CO₂ equivalent, using ethanol from sugar beet, at between €575 and €800 (approximately £403 - £570) and over €600 (£428) for biodiesel made from rapeseed. Table 2 gives the cost per tonne of CO₂ equivalent under a range of different feedstocks and production processes.

Table 2: Greenhouse gas emissions reduced through the use of ethanol and biodiesel in selected OECD countries (£ per metric tonne of CO₂-equivalent)

OECD Economy	Ethanol	Biodiesel
EU ¹	344-2705	127-492
United States	>221 ²	123-295
Australia	123-836	78-295
Canada	123-934	123-221
Switzerland	162-187	123-861

Source: Global Subsidies Initiative, *Biofuels – At What Cost?*, September 2007

1: Ranges are given due to the differences in emissions between different feedstocks and production processes. In the EU the bioethanol range is due to the difference between sugar beet and rye, and the biodiesel range is due to the difference between used cooking oil and rape seed.

2: Negative figures are not shown. Some estimates of the lifecycle emissions indicate an overall increase in emissions of GHG.

20. Due to these costs GSI concludes that far more emission reductions could be achieved for the same amount of public funds simply by purchasing reductions in the marketplace:

The cost per tonne of reductions achieved through public support for biofuels made from crops in the EU could purchase more than 20 tonnes of CO₂-equivalent offsets on the European Climate Exchange, for example.¹⁷

21. GSI also cautions that as most support is tied to production, consumption, or blending targets, support across the EU ‘could treble if the current rates of subsidisation are not modified’.¹⁸ These subsidies are cause for concern. We argued in a recent report that large

¹⁶ HC Deb, 29 January 2007, col 10W

¹⁷ Global Subsidies Initiative, *Biofuels - At what cost? Government support for ethanol and biodiesel in the European Union*, October 2007, www.globalsubsidies.org

¹⁸ *ibid*

agricultural subsidies are not consistent with sustainable development.¹⁹ The EU's failure to remove subsidies has a negative impact on our credibility in arguing for better consideration of the environment in international trade negotiations, and subsidies directly contribute to environmental degradation. In addition subsidies can create market distortions that undermine domestic markets in developing countries, thereby contributing to poverty. Poverty is one of the main drivers of environmental degradation.

2 What are the possible impacts of biofuels?

22. We received a large amount of information about the potential positive and negative environmental and social impacts of biofuels. We have focused on the major implications of biofuels; not all environmental or social costs and benefits are considered here.

Environmental impacts

23. As outlined earlier some biofuels can lead to substantial GHG emission reductions when compared to fossil fuels, although the level of savings varies widely according to the feedstock and production process. The Low Carbon Vehicle Partnership (LCVP) told us that the level of GHG savings associated with the conversion of wheat to ethanol can vary anywhere between 7 to 77%. Ethanol produced from sugarcane can save as much as 90%.²⁰

Biofuels can be used to reduce greenhouse gas emissions from road transport.

24. In addition to GHG savings, an interesting environmental benefit that might come from a sustainable biofuels market could be the better regulation of all internationally traded agricultural commodities. Although there are potential benefits in terms of poverty reduction from expanded international trade in agricultural products, as we noted in our Report *Outflanked: The World Trade Organisation, International Trade and Sustainable Development*, there are also likely to be negative environmental impacts. These include deforestation and increased GHG emissions from the transport of goods. In that report we urged the Government and EU to 'pursue aggressively a more sustainable outcome' to the current Doha Development Round world trade negotiations. During that inquiry we were told that many developing countries were suspicious of demands to consider sustainable development regulations as part of trade negotiations out of fear that they will be used 'as cover for protectionist trade policy'.²¹

¹⁹ Environmental Audit Committee, Eleventh Report of Session 2005-06, *Outflanked: The World Trade Organisation, International Trade and Sustainable Development*, HC 1455

²⁰ Ev 76

²¹ Environmental Audit Committee, Eleventh Report of Session 2005-06, *Outflanked: The World Trade Organisation, International Trade and Sustainable Development*, HC 1455

25. A potentially significant benefit of a new sustainable biofuels market in the EU, from which developing countries could stand to benefit, could be that it would help to create economic conditions which would assist in securing international sustainability standards for agricultural products more widely.

26. Many of the witnesses to whom we spoke acknowledged that biofuels could have a role to play in reducing GHG emissions from transport, but were concerned that the wider environmental impacts have not been considered adequately. WWF and Friends of the Earth have argued previously that the 'Government's dash for biofuels is ill thought out, lacks appropriate safeguards and could be creating more problems than it solves'.²²

27. The creation of a biofuels market could substantially increase agricultural commodity prices. There are concerns that this will increase pressure to intensify agriculture and also to expand agriculture into natural habitats. The Joint Nature Conservation Committee (JNCC) told us that they were 'concerned that the rapidly growing biofuel industry and trade will, without appropriate safeguards, add another significant pressure on the environment with negative consequences for biodiversity'. They argued that biofuels could cause damage through:

- land use change to accommodate biofuel feedstock plantations resulting in loss, fragmentation and degradation of valuable habitats and consequent negative impacts on the associated biodiversity and ecosystem services;
- land use change resulting in the release of carbon from natural carbon stores such as peatland and forests, which might negate any carbon savings associated with the biofuels and increase global greenhouse gas emissions;
- intensification of agricultural production, including the increased use of pesticides and fertilisers with implications for water quality, increased use of water leading to shortages, and soil degradation and erosion;
- displaced food production encroaching on valuable habitats; and
- unregulated use of genetically modified feedstocks that 'may be damaging to wildlife, competitively displace native species, or lead to gene flow with native species'.²³

28. The Environment Agency agreed with most of the JNCC's concerns, but also argued that higher agricultural commodity values might decrease the relative 'value of agri-environment payments that offset environmental degradation'.²⁴ This could discourage farmers from working within agri-environment schemes. The Environment Agency also argued that 'an increase in the land used for late harvested crops such as maize and sugar beet for biofuels will inevitably result in more soil compaction, especially in wetter autumns and will increase water run-off and potential flooding in sensitive catchments'.²⁵

²² "Green fuels ' could be bad for the environment', *Friends of the Earth press release*, April 2007, www.foe.co.uk

²³ Ev 51

²⁴ Ev 59

²⁵ Ev 60

Increasing the land used for arable production will have an impact on our ability to reach environmental targets, and in particular those arising from the Water Framework Directive. The Environment Agency told us that there is evidence to suggest that water companies were ‘already having to treat drinking water for oilseed rape herbicides such as carbetamide’.²⁶ Another example of what might be expected was recently reported in the Financial Times. In response to high agricultural commodity prices, fertiliser prices have increased to their highest level in at least ten years as farmers plan to plant more crops and farm them more intensively. Jan Poulisse from the UN’s Food and Agriculture Organisation said that high agricultural commodity prices create an incentive for farmers to use more fertilisers to increase yields.²⁷

29. Research was commissioned by the Swiss Government to obtain the full life-cycle environmental impacts of a number of bioenergy technologies compared to fossil fuels. The environmental footprints calculated were an aggregate of indicators for damage to human health and ecosystems and the depletion of natural resources. It found that in many cases the damage caused by the use of fossil fuels is less than the damage caused by agricultural production of biofuels ‘in terms of acidification and excessive fertiliser use, biodiversity loss, air pollution... and the toxicity of pesticides’.²⁸ In Switzerland preferential tax status is only granted for a biofuel where it has a favourable environmental rating relative to conventional fuel. This means that very few biofuels qualify for the preferential tax status, and only those that are produced from waste products such as vegetable oil or those made from woody biomass.²⁹ Nevertheless it must be considered that the wider environmental impacts of biofuels are as variable as the potential GHG savings and depend very much on location and production methods. A case-by-case assessment might therefore be required.³⁰

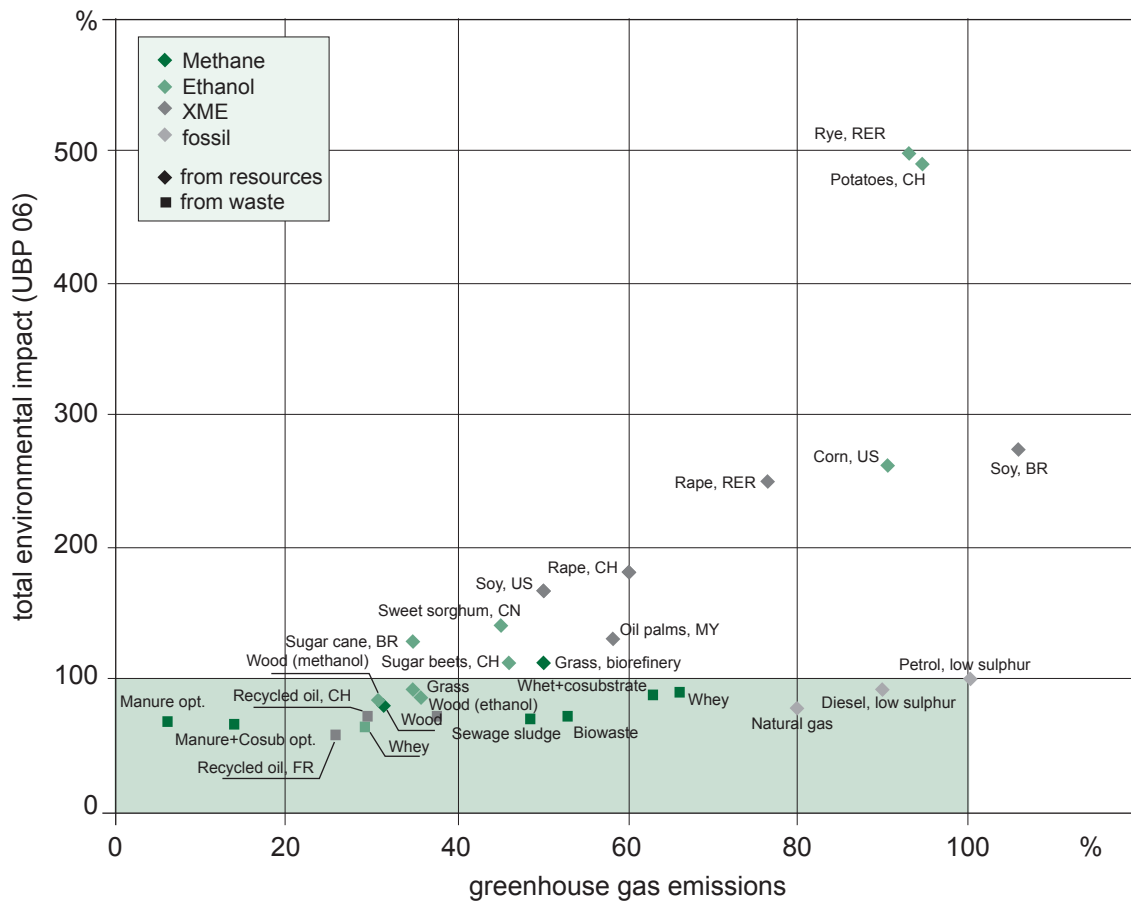
²⁶ *ibid*

²⁷ ‘Fertiliser prices jump as planting grows’, *Financial Times*, 26 October 2007

²⁸ Richard Doornbosch & Ronald Steenblik, OECD Round Table on Sustainable Development, *Biofuels: Is the cure worse than the disease?*, 11-12 September 2007, www.oecd.org

²⁹ Richard Doornbosch & Ronald Steenblik, OECD Round Table on Sustainable Development, *Biofuels: Is the cure worse than the disease?*, 11-12 September 2007, www.oecd.org

³⁰ Zah R, Hischier R, Gauch M, Lehmann M, Böni H, Wäger P, “Life Cycle Assessment of Energy Products: Environmental Impact Assessment of Biofuels”, Bern: Bundesamt für Energie, Bundesamt für Umwelt, Bundesamt für Landwirtschaft; 2007

Figure 1: Total environmental impact of biofuels against greenhouse gas emissions

Source: Zah R, Hischer R, Gauch M, Lehmann M, Böni H, Wäger P. Life Cycle Assessment of Energy Products: Environmental Impact Assessment of Biofuels. Bern: Bundesamt für Energie, Bundesamt für Umwelt, Bundesamt für Landwirtschaft; 2007, p. 20

UBP is a Swiss indicator of aggregate environmental impacts. Zah et al obtained the same results using the European Eco-indicator 99 method, which quantifies damage to human health and ecosystems.

How much sustainable bioenergy can the UK produce?

30. The UK Biomass Strategy 2007 refers to a paper by the European Environment Agency (EEA) that concluded the land available for environmentally-compatible bioenergy production in the UK would be around 0.8m hectares in 2010, 1.1m hectares in 2020 and 1.6m hectares in 2030. It is estimated that 0.8m hectares could supply enough arable crops in the UK to meet half of the 5% by volume target under the RTFO. Although these figures are correct, the Biomass Strategy neglects to highlight that this amount of land is only sustainable when certain conditions are applied, namely that:

- at least 30% of all agricultural land is dedicated to 'environmentally-orientated farming' in 2030;
- 3% of intensively cultivated land is set aside for ecological compensation by 2030;
- there is no conversion of existing grassland (and certain other agricultural land types) to arable land;
- current forest areas are maintained; and,

- ambitious waste minimisation strategies are applied.

31. More significantly for this inquiry, the EEA assumed that only those bioenergy crops with the lowest environmental pressures would be used (mainly perennial bioenergy crops such as miscanthus and short rotation coppice), and that the amount of bioenergy derived from conventional feedstocks, such as sugar beet, would ‘decrease rapidly after 2010’.³¹

32. As different biofuels are produced in a number of ways from different feedstocks with varying impacts, it is difficult to generalise the benefits or costs of biofuels. Nevertheless, today most biofuels are produced intensively from feedstocks in ways that could have serious environmental consequences.

33. The sustainability standards applied by the Renewable Transport Fuel Obligation are unlikely to prevent environmental damage from biofuels. In the UK aggregate environmental impacts might make it difficult for us to meet a range of targets, including those relating to halting biodiversity loss or improving water quality.

34. Biofuels standards should be changed to ensure that support is given only to those that deliver environmental improvements over fossil fuels in terms of not only greenhouse gas emission reductions but also wider impacts such as fertilizer and pesticide pollution. We envisage that such standards will be similar to those developed by the Swiss. **In the absence of such standards the Government and EU has moved too quickly to stimulate the use of biofuels. Until they are developed the Government should place a moratorium on policies aimed at increasing the use of biofuels.**

The effectiveness of international sustainability standards

35. The Government proposes that sustainability standards should apply to biofuels to prevent the potential environmental impacts outlined above. Such standards must be international in nature given that constraints on the production of feedstocks for bioenergy in the EU, and that certain feedstocks can more efficiently be produced in other countries, will mean that biofuel feedstock commodities will be traded internationally. The European Commission estimates that the EU 10% biofuel target might require 10% to 50% of feedstocks to be imported by 2020 depending on technological advances.

36. The Government argues that ‘to minimise the adverse impacts of biofuel production... it is necessary to work towards internationally agreed sustainability standards as a matter of urgency’, and that it is ‘in the forefront in the area... [for example] through work with the Global Energy Partnership (GBEP) to develop an internationally recognised lifecycle carbon methodology for biofuels’.³²

37. The NFU believes that there is a need to ensure that international standards are not less stringent than those which apply to UK producers. Otherwise domestic production will be disadvantaged in comparison to foreign production. Such a situation can lead to the loss of opportunities for UK business as well as the preferential use of potentially more damaging

³¹ European Environment Agency, *How much bioenergy can Europe produce without harming the environment?*, 2006

³² *ibid*

foreign imports.³³ The Government also believes that international standards have to be effective ‘but not so burdensome as to be beyond the capacity of developing countries, who may then export to less demanding importers’.³⁴

38. In the development of such standards the Government has to have regard to World Trade Organisation (WTO) rules, under which a country might challenge standards if they consider them to be an unfair barrier to trade. There are provisions for being able to distinguish between traded goods on the basis of environmental criteria (such as sustainability standards) but, the Low Carbon Vehicle Partnership (LCVP) points out that the ‘rules are complex, case-law very limited and outcomes highly uncertain’.³⁵ The LCVP believes that the Government took a conservative approach to lessen the risk of a WTO challenge to the RTFO by not requiring mandatory standards and permitting ‘not known’ categories in reporting.³⁶

39. Although international trade rules make the development of robust international sustainability standards more challenging, they do not necessarily mean that they cannot successfully be created. Indeed, a number of commodity standards are currently being worked on by multi-stakeholder groups, including the Roundtable on Sustainable Palm Oil (RSPO) and the Roundtable on Responsible Soy. The Government believes the development of such standards to be the correct way to improve the sustainability of these commodities.³⁷

40. Nevertheless, witnesses to this inquiry queried the effectiveness of international standard schemes. Professor Clift argued that the certification schemes currently in place do not give us much confidence that an international biofuels standard will successfully deal with the impacts of biofuels.³⁸ The JNCC argues that these schemes provide a good starting point but have limitations. For example, the RSPO is ‘not yet operational and no certified oil is on the market today [and] the current membership of the RSPO only covers 40% of the world’s palm oil production’.³⁹ It also points to the Forest Stewardship Council (FSC) as to what might be expected from biofuels standards. It argues that although there have been many positive outcomes of the scheme, illegal logging continues and demand for certified products continues to outstrip supply. In addition ‘in the case of the Asia Pacific region, results are rather disappointing... Overall, the market still focuses heavily on unsustainable timber production’.⁴⁰ A paper published by the OECD outlined the challenges facing the certification of forest products including:

- difficulties in tracking products from forest to end use because documents are easy to falsify; and

³³ Ev 67

³⁴ Ev 106

³⁵ Ev 82

³⁶ *ibid*

³⁷ Q165 [Mr Furness]

³⁸ Q142 [Professor Clift]

³⁹ Ev 54

⁴⁰ *ibid*

- the effectiveness of the scheme being undermined by segmentation of the market into one for countries that require certified products and one for those that does not.⁴¹

41. The authors of the report argued that certification for biofuels could well suffer from similar problems, and also point out that such a scheme will not address the indirect impacts of biofuels.

Land use change

42. During the course of our inquiry land use change was raised as being of particular concern, especially when it occurs in tropical regions. A report published by OECD argued that the environmental services provided by natural ecosystems in the tropics are not properly valued, and that therefore such habitats are vulnerable to conversion to other uses, including the production of biofuels. Such changes in land use damage the environmental credentials of biofuels.⁴²

43. The public probably recognise the problem of rainforests being cleared for plantations such as palm oil. Currently only a small percentage of palm oil is used for biofuels, with most being used in food and cosmetics. The market for palm oil in these sectors is enormous — one in ten supermarket products contain it.⁴³ This demand means that clearance of forest for palm oil plantations is now the primary cause of permanent rainforest loss in Indonesia and Malaysia. A UN report, *The Last Stand of the Orangutan*, concluded that given the huge demand for palm oil it is 'very difficult to curb the spread of plantations'.⁴⁴ It also concluded that the 'rapid increase in plantation acreage is one of the greatest threats to orangutans and the forests on which they depend'. It found that between 1967 and 2000 the area under palm oil plantations grew from under 2,000 km² to over 30,000 km², with demand expected to double this area by 2020.⁴⁵

44. This large-scale deforestation has largely occurred in the historic absence of a demand created by a large biofuel industry. The Environment Agency told us that demand for biofuels is already leading to more deforestation in Indonesia and Malaysia, and that 20% of the EU's biofuels market is expected to be supplied from these two countries. A biofuels market in the EU also has an indirect impact on demand for palm oil. The Environment Agency told us that EU palm oil imports doubled 2000–2006, 'mostly to substitute for rapeseed oil diverted from food to fuel users'.⁴⁶ The UN estimate that combined with logging and fire pressures, palm oil production could result in the destruction of 98% of Indonesia's rainforest within 12 years. The lowland forests that are the most valuable in

⁴¹ Richard Doornbosch & Ronald Steenblik, OECD Round Table on Sustainable Development, *Biofuels: Is the cure worse than the disease?*, 11-12 September 2007, www.oecd.org

⁴² *ibid*

⁴³ 'Five years to save the orang-utan, *The Observer*, 25 March 2007

⁴⁴ United Nations Environment Programme, *The last stand of the orang-utan*, February 2007

⁴⁵ *ibid*

⁴⁶ Ev 59

terms of their biodiversity might be lost by 2012, making orangutans close to extinction in the wild within four years.⁴⁷

45. Some of our witnesses have argued that the availability of currently unutilised or degraded land might productively be used to produce biofuels without increasing pressure to change land use. The NFU says that 5% of transport fuel could be met through UK produced biofuels with current technology, and argues that much of the UK's cropland is 'under used and could be growing renewable fuel', such as by growing on the 513,000 hectares of set-aside land or 150,000 hectares of bare fallow (uncropped but crop-prepared land) that was available in 2006.⁴⁸

46. There is also degraded, waste or uncropped land in developing countries. For example, a report by Global Forest Watch in 2004 estimated that there is around 7 million hectares of cleared forest lying idle in Indonesia.⁴⁹ In 2007 the Indonesian Environment Minister said that although they plan to expand palm oil plantations by 7 million hectares by 2011, these will 'not be allowed to sacrifice natural forests... they will be planted in lots that are already empty. There are plenty of these, 18 million hectares of them'.⁵⁰ However, Indonesia's ability to enforce environmental protection standards locally is severely hampered by poor governance and corruption. The current primary cause of deforestation, palm oil plantations, are often grown preferentially on cleared rainforest as the palms do not provide a harvest for five years. Timber from the cleared forest provides a subsidy for the first few unproductive years.⁵¹

47. Hannah Griffiths from Friends of the Earth said that growing biofuels solely on true wasteland would be a good thing.⁵² However, she pointed out that there is controversy surrounding the term wasteland. It is sometimes applied to land on which people are living or relying for their livelihoods. She also pointed out that much of the wasteland in Indonesia is actually former peatland which 'could be reflooded and provide benefits in terms of becoming carbon sinks again'.⁵³ It would also be difficult to ensure that a national policy to focus development onto wasteland would actually translate into action at the local level.⁵⁴

48. One of the most effective methods of monitoring land use change is the deployment of earth observation technology. The Government should give as much support as possible to the appropriate technologies as well as to international co-operation on the shared use of earth observation data.

⁴⁷ 'Five years to save the orang-utan', *The Observer*, 25 March 2007

⁴⁸ Ev 71

⁴⁹ Global Forest Watch, *The State of the Forest: Indonesia*, 2002

⁵⁰ 'Indonesia Won't Allow Oil Palm Growers to Cut Forests', *Bloomberg*, 5 June 2007

⁵¹ United Nations Environment Programme, *The last stand of the orang-utan*, February 2007

⁵² Q62 [Ms Griffiths]

⁵³ Q62 [Ms Griffiths]

⁵⁴ Q62 [Mr Harrison]

Managing land to store carbon

49. Land use change is not only important in terms of its impacts on biodiversity or other more localised environmental impacts. It could also have implications for climate change given the large stores of carbon held in rainforests and other habitats such as peatland. Converting forest into a biofuel plantation could release some 100 to 200 tonnes of carbon per hectare.⁵⁵ The UN has said:

Ironically, in the desire to cut CO₂ emissions, western markets are driving ecosystem destruction and producing vast and significant CO₂ emissions through forest burning and peat swamp drainage. The most effective measure to achieve this is conservation of remaining peatland forests, alongside rehabilitation of degraded peatlands and improved management of plantations and agricultural areas.⁵⁶

50. Dr Dominic Spracklen told us that if the aim of biofuels policy is to reduce GHG emissions, the Government should instead focus on improving the efficiency of fossil fuel use and conserving remaining forests. He also argued that restoring natural forests or grassland habitats on cropland not needed for food is a highly cost effective way to reduce GHG emissions.⁵⁷ His research suggests that reforesting land sequesters 'two to nine times more carbon over a 30 year period than the emissions avoided by the use of biofuels'. Ultimately, he said, 'carbon-free transport fuel technologies are needed to replace fossil hydrocarbons'.⁵⁸ Dr Spracklen also told us that the costs associated with habitat restoration for carbon sequestration in the UK, where costs are likely to be higher, would be between 20 to 100 £/tC and that the IPCC indicates that for 10 £/tC 'large amounts of carbon could be sequestered through forest restoration'.⁵⁹ In a direct comparison to expenditure on road transport biofuels, he told us that 'forest restoration... could sequester a significantly larger fraction of carbon'.⁶⁰ There are also co-benefits to the more sustainable management of the landscape through habitat restoration 'such as prevention of desertification, provision of forest products, maintenance of biological diversity, and regional climate regulation'. Such action also avoids the additional environmental strains that an expansion in biofuel production might create.⁶¹

51. The Stern Review also identified avoiding deforestation as a relatively cheap way to mitigate climate change.⁶² In order to finance this the Review suggested that incentives be created for the maintenance of forest areas. It concluded that the international community should provide compensation for the maintenance of carbon sinks, and that such action is 'urgent' given the scale of the problem:

⁵⁵ 'Forget biofuels – burn oil and plant forests instead', *New Scientist*, 16 August 2007

⁵⁶ United Nations Environment Programme, *The last stand of the orang-utan*, February 2007

⁵⁷ Qu 131 [Dr Spracklen]

⁵⁸ 'Carbon Mitigation by Biofuels or by Saving and Restoring Forests?', *Science*, 17 August 2007

⁵⁹ Q130

⁶⁰ Q131 [Dr Spracklen]

⁶¹ 'Carbon Mitigation by Biofuels or by Saving and Restoring Forests?', *Science*, 17 August 2007

⁶² Stern Review, *The Economics of Climate Change*, October 2006

Without prompt action emissions from deforestation between 2008 and 2012 are expected to total 40 Gt CO₂, which alone will raise atmospheric levels of CO₂ by ~2ppm, greater than the cumulative total of aviation emissions from the invention of the flying machine until at least 2025.⁶³

52. Biofuel sustainability standards by themselves are unlikely to be able to prevent biofuels from causing environmental damage in the UK and internationally. Other mechanisms are required to protect carbon sinks from land conversion.

53. The stimulation of biofuels production by the Government and EU is reckless in the absence of effective mechanisms to prevent the destruction of carbon sinks internationally. The Government must ensure that carbon sinks are effectively protected before providing incentives for the use of biofuels. The Government should also explore the development of international mechanisms to enable the creation of new carbon sinks.

54. In relation to the UK more work is needed to ensure that carbon stores are better protected and managed. For example, the better management of UK upland peat bogs alone could store up to 40,000 tonnes of carbon per year, the equivalent of removing 2% of cars from England's roads.⁶⁴ Given the potential for such interventions, Professor Richard Bateman argued that current biofuels policy is strongly incompatible with better environmental management.⁶⁵ He argued that we do not have the required information to be able to decide whether it would be better from a GHG emission reduction perspective to grow biofuels on a hectare of land or to restore habitat on the land instead. To enable this he believes that a landscape 'integrated carbon accountancy model' should be developed to ensure that 'we can start to judge what the effect of a particular decision... will have on our landscape'.⁶⁶ Before such a model is in place he thought that it is too early to 'talk about a [biofuels] industry'.⁶⁷

55. DEFRA published '*Securing a healthy natural environment: An action plan for embedding an ecosystems approach*' in November 2007. Joan Ruddock MP, Minister for Climate Change, Biodiversity and Waste, said in the foreword that it 'sets out an ambitious programme of work to deliver a decisive shift towards an ecosystems approach in our policy-making and delivery. It aims... to develop better ways to value the natural environment in decision-making'.⁶⁸ The valuation of such ecosystem services is important and could enable better land use decisions to be taken as suggested by Professor Bateman. The document outlines a number of core principles for embedding an ecosystems approach in policy making:

- Taking a more holistic approach to policy-making and delivery, with the focus on maintaining healthy ecosystems and ecosystem services.

⁶³ *ibid*, p547

⁶⁴ 'Key role for farmers on climate change', *Natural England*, 29 November 2006

⁶⁵ Q132 [Professor Bateman]

⁶⁶ Q135

⁶⁷ Q135

⁶⁸ Department for the Environment, Food and Rural Affairs, *Securing a healthy natural environment: An action plan for embedding an ecosystems approach*, November 2007

- Ensuring that the value of ecosystem services is fully reflected in decision-making.
- Ensuring environmental limits are respected in the context of sustainable development, taking into account ecosystem functioning.
- Taking decisions at the appropriate spatial scale while recognising the cumulative impacts of decisions.
- Promoting adaptive management of the natural environment to respond to changing pressures, including climate change.⁶⁹

56. We argue that current biofuels policy fails in relation to all these core principles because:

- biofuels policy could undermine attempts to ‘maintain healthy ecosystems’;
- the ‘value of ecosystem services’ is not reflected in the policy as it is seeking to emulate an ecosystem service (GHG reductions) that an ecosystem could more effectively provide;
- a potential increase in intensive agriculture will place pressure on ‘environmental limits’;
- the ‘cumulative impacts of decisions’, (which might be manifested as, for example, increased diffuse pollution) are not reflected in current policy; and
- the added environmental stress that biofuels could place on the environment could hinder the natural environment’s ability to respond to climate change.

57. We welcome the recently published action plan for embedding an ecosystems approach as it shows that Government is seeking to take better decisions in relation to the UK’s natural environment and the protection of ecosystem services. But biofuels policy currently fails to follow such an approach. There are significant knowledge gaps relating to land management for sustainable bioenergy production and for carbon sequestration. In order to align biofuels policy to an ecosystems approach the Government must commission work to assess:

- **the potential in the UK for carbon-oriented land management;**
- **how UK land managers might better be rewarded for maintaining, improving or creating carbon sinks and other ecosystem services; and**
- **the potential for UK sustainable bioenergy production.**

Food security

58. In October 2007 the UN special rapporteur on the right to food, Jean Ziegler, said that it is ‘a crime against humanity to divert arable land to the production of crops which are then burned for fuel’, due to the impact that this could have on levels of hunger.⁷⁰ The

⁶⁹ *ibid*

⁷⁰ ‘Biofuels ‘crime against humanity’’, *BBC News*, 27 October 2007

International Monetary Fund (IMF) acknowledged that demand for biofuels in the US and EU had resulted in higher prices for a range of agricultural commodities. This trend has been exacerbated by poor harvests, animal disease outbreaks and demographic changes.⁷¹ It stressed that such commodity prices have a disproportionate impact on the poor in developing countries. Due to these issues the IMF said that ‘until new technologies are developed, using food to produce biofuels might further strain already tight supplies of arable land and water all over the world, thereby pushing food prices up even further’.⁷² WWF and Friends of the Earth both told us that they were concerned about the impact of biofuels on food security.⁷³

59. BP accepted that biofuels could increase agricultural commodity prices, in particular in developing countries, but that increased economic activity from biofuels could also ‘improve or create market mechanisms the absence of which is often at the core of food shortages and high prices in developing countries’.⁷⁴ It argued that the situation should be closely monitored.⁷⁵ The NFU pointed out that concern about food security can be mitigated through increasing feedstock production by utilising ‘spare agricultural capacity’, including set-aside land. It also argued that efficiencies in biofuel feedstock production will increase yields yet further.⁷⁶ Bayer CropScience argued that the food or fuel debate is ‘alleviated somewhat when a crop can be used for fuel and food [as] when food security is an issue’ feedstocks allocated for fuel production can be diverted to food.⁷⁷ It did accept that farmers are likely to grow crops that give them a favourable return on their investment. This might mean that fuel could be produced over food even if there are food security problems.

60. In the future, developments in biofuel technology might lessen the potential impacts on food security. There is significant interest in the development of non-food crops that do not compete for the same agricultural requirements as food and fodder crops. There is interest too in plants that can grow on marginal land and that require less agricultural inputs such as fertiliser. This would expand the land available for biofuel production without necessarily decreasing the land available for food production.⁷⁸ However, such crops might still displace food crops as farmers plant those crops which produce the most return. Therefore non-food biofuel crops could be grown on high grade agricultural land.

61. The Minister, Jim Fitzpatrick MP, confirmed that the Government is concerned about the issue of food security. He said that they are ‘hopeful that the European mechanism will be equally strong in protecting developing countries and protecting communities’.⁷⁹

⁷¹ International Monetary Fund, *Biofuels demand pushes up food prices*, 17 October 2007

⁷² *ibid*

⁷³ Q30

⁷⁴ Ev 198

⁷⁵ *ibid*

⁷⁶ Ev 72

⁷⁷ Ev 161

⁷⁸ Ev 193, Ev 199

⁷⁹ Q159

62. A number of trends indicate that food security concerns will increase in the longer term even in the absence of a large biofuels market. These include land availability pressures and demographic changes. In addition, climate change might add further to the need to intensify agricultural commodity production for food production due to changes in weather patterns leading to water stress and increased flooding.⁸⁰

63. **A large biofuel industry based on current technology is likely to increase agricultural commodity prices and, by displacing food production, could damage food security in developing countries. Only when technology improves and an appropriate regulatory framework is in place should biofuels be utilised. When these changes have occurred barriers to free trade in bioenergy could be removed to allow developing countries to take advantage of the market and so that UK taxpayers can take advantage of lower prices. Even then impacts on food security should be closely monitored.**

64. **Given long-term demographic and climate change trends that might add further to food security problems we question whether transport biofuels have a long-term role.**

3 The biofuel rationale

Climate change mitigation

Biofuels vs biomass

65. The primary stated aim of the Government's support for road transport biofuels is climate change mitigation. However, as we outline above, there are significant environmental risks associated with the large-scale utilisation of first generation biofuels as a source of road transport fuel. In developing the UK Biomass Strategy, the Department of Trade and Industry published an *Economic analysis of biomass energy*. It concluded that first generation transport biofuels are the least cost-effective way to lower GHG from UK-grown biomass, with all other uses of biomass being more effective.

⁸⁰ HM Treasury, *Long term opportunities and challenges for the UK*, November 2006

Table 3: Cost effectiveness of energy from a range of UK biomass (excluding from waste)

Application	Biomass type	Fossil fuel displaced	CO2 abatement cost (£/tCO2)
Medium industrial/commercial boilers	Chip	Oil	-5
Small commercial boilers	Chip	Gas	36
District heat/CHP	Chip	Oil	52
10% co-firing with miscanthus on existing coal power plant	Miscanthus	Gas	111
10% co-firing with SRC on existing coal power plant	Short rotation coppice	Gas	128
Biodiesel	Waste cooking oil, rape seed	Diesel	137
Bioethanol	Wheat	Petrol	152

Source: Department for Trade and Industry, *UK Biomass Strategy 2007, Working Paper 1 – Economic analysis of biomass energy*

66. As identified earlier, there are a range of other subsidies associated with biofuels, increasing abatement costs and reducing cost-effectiveness further. This bleak picture is balanced somewhat by a report published in January 2008 by the Royal Society, *Sustainable biofuels*. Focusing on ability to reduce emissions rather than cost-effectiveness of emission reduction, it pointed out that biofuel GHG emissions per unit of energy are highly dependent upon a range of factors such as the yield of feedstock and which fossil fuel is being displaced. When these wider issues are taken into account it argues that one cannot claim that biomass always provides greater GHG emission reductions than biofuels. It concluded that:

Although on a greenhouse gas reduction basis the most immediately effective use of plant material, in terms of conversion efficiency is to generate heat, this is not always true when comparing combustion for electricity with conversion to biofuels. There are real opportunities to develop biofuels that can deliver substantial greenhouse gas savings.⁸¹

67. Current UK and EU policy fails to ensure the most efficient use of bioenergy in terms of the greenhouse gas mitigation potential of the land on which it is grown. It does not deliver good value for the taxpayer. The Common Agricultural Policy should be adjusted to ensure that bioenergy feedstock production no longer receives agricultural subsidies where it fails to constitute the most effective use of sustainable bioenergy resources.

⁸¹ Royal Society, *Sustainable biofuels: prospects and challenges*, January 2008

Biofuels vs wider policies

68. A cost-effectiveness comparison between a range of GHG emission reduction policies was conducted in the Government's Climate Change Programme Review (Table 4). In comparing the RTFO with other forms of GHG emission reduction policies, the Review concluded that only three other policies were less cost-effective: the Voluntary Agreements package; the future voluntary agreement with car manufacturers; and subsidies for biomass. Revised figures published in the explanatory memorandum that accompanied the Order, makes the RTFO the second least cost-effective policy behind the Voluntary Agreements package.

Table 4: Cost-effectiveness of policies in the Climate Change Programme Review

Biomass-related policies	Cost effectiveness (£/tC)
Woodland Grants Scheme	50
Subsidy for biomass heat	-140
Transport-related policies	
Fuel Duty Escalator	250
RTFO (as given in CCP Review)	-135
Revised RTFO estimates in explanatory memorandum	-320
Voluntary Agreements Package (including reform of company car tax and graduated Vehicle Excise Duty)	-365
Other policies	
Market Transformation including appliance standards and labelling	570
Better billing and metering	0-170
Renewables Obligation	-175

Source: A review by the National Audit Office

NOTES

1 Figures given represent expectations at the time of the Climate Change Programme review and might not be an accurate reflection of current expectations. The revised RTFO estimate is an example of this; the latest figures lowered the carbon savings expected.

2 Positive figures represent a total net benefit over the lifetime of the policy, negative figures represent a total net cost.

69. We asked the Minister, Jim Fitzpatrick MP, whether he was satisfied that biofuels offer good value-for-money. He responded that he believes that the policy is cost-effective, and should be as 'cost-effective as wind farms, for example'.⁸² He also argued that there are ancillary benefits to the biofuels policy including 'security of fuel supplies, [...] support for British agriculture [and] employment in new technologies in respect of renewables and biofuels'. He told us that 'therefore, there are a range of important reasons why we are supporting biofuels but certainly the question of climate change is the biggest and most important but not exclusive'.⁸³

70. The Minister's favourable comparison of the cost-effectiveness of biofuels policy to wind farms would appear to come from analysis conducted for the Energy White Paper.

⁸² Q148

⁸³ Q148

This indeed found that an extension to the RTFO has mid-range costs out to 2020 and is slightly cheaper than onshore wind over that timescale.⁸⁴ However it also showed that biofuels are roughly twice as expensive as biomass making them a less effective use of bioenergy resources. This analysis also fails to include the considerable costs associated with agricultural support for biofuel production.

Biofuels vs road transport policies

71. In 2006 we looked at the challenges associated with reducing emissions from transport. We concluded that the level of effort by the Department for Transport (DfT) in reducing emissions was ‘not nearly good enough’.⁸⁵ We found that ‘in view of the imperative to take bold actions in order to help avert dangerous climate change, the Department should actively encourage modal shift towards lower carbon modes of transport [and take] more decisive action to shift the balance of affordability more in favour of trains, buses and lower carbon cars and lorries’.⁸⁶ The latest UN Human Development Report 2007/2008 gave a similar critique of Government transport climate change policy. It concluded that a range of measures, not including biofuels, would be required to reduce transport emissions:

Increased taxation on petrol is one demand management mechanism. More broadly, vehicle excise duties could be adjusted, with a steeper graduation to reflect the higher CO₂ emissions associated with low fuel-efficiency vehicles, especially sports utility vehicles. The national carbon budget could establish ‘carbon pricing’ in vehicle taxation as a source of revenue for investment in renewable energy, with vehicle tax registration for all new cars after 2010 graduated to reflect more stringent pricing on CO₂ emissions. Rising emissions from transport also reflect weaknesses in the public transport infrastructure and a decline in the cost of private transport relative to public transport.⁸⁷

72. The Government told us that biofuels are not a particularly expensive way to reduce emissions from the transport sector.⁸⁸ But we were given evidence that directly contradicts this assertion.

⁸⁴ Department for Trade and Industry, *Meeting the energy challenge; A White Paper on Energy*, Cm 7124, May 2007

⁸⁵ Environmental Audit Committee, Ninth Report of Session 2005-06, *Reducing Carbon Emissions from Transport*, HC 981

⁸⁶ *ibid*

⁸⁷ United Nations Development Programme, *Human Development Report 2007/2008, Fighting climate change: Human solidarity in a divide world*, 2007

⁸⁸ Q156

73. In September 2007 the Commission for Integrated Transport (CfIT) published a major review of transport and climate change policies. It said that ‘the transport element of the Climate Change Programme... appears to depend heavily on relatively expensive measures to deliver emissions savings’, and questioned whether these measures would actually lead to the expected reductions. It pointed out that the figures used by the Government fail to account for carbon emitted during the production of biofuels imported from abroad and therefore potentially overstates the net global reduction of emissions. It suggested that actual reductions would be a third less than those given and that it was ‘premature to move towards greater biofuels penetration of the transport fuels market [given the] significant debate about the life-cycle carbon benefits of biofuels, the extent to which greater demand might accelerate deforestation [...] and crowded out food crops, and about the relative merits of using biofuels for transport as opposed to meeting other energy needs’. It argued that further work is required to resolve these issues ‘before committing to more ambitious policy goals for the use of biofuels’.⁸⁹ CfIT concluded that policies focused on behavioural change could be more cost effective and help to lock in the benefits of any technological advances. It said:

There is therefore a case for identifying measures that can deliver greater and more cost-effective ways of reducing transport carbon emissions. We believe that the case is even stronger, given that there are challenges facing the delivery of carbon abatement opportunities in other sectors and the strengthening scientific evidence pointing to the need for larger carbon reductions to be delivered more quickly than currently anticipated in the Government’s approach.⁹⁰

74. Evidence that we received for this inquiry also indicated that biofuels have received disproportionate and inappropriate attention and funding in comparison to other transport policies. The RSPB argued that a range of other transport mechanisms should be prioritised over biofuels as they have potentially greater GHG savings with smaller environmental risk.⁹¹ It pointed out that the hoped-for 1 million tonnes of CO₂ saved by the RTFO was relatively small compared to what could be delivered using alternative methods. For example, ‘an equal amount of savings could be gained through enforcing the 70mph speed limit on motorways, whilst increasing the average vehicle efficiency to 100g CO₂/km would save 2.4 [million] tonnes of CO₂’.⁹² It also said that road transport emissions could be ‘reduced by 14% from 1990 levels through a combination of vehicle efficiency savings, eco-driving, changes in travel behaviour, efficiencies in freight transport, and including aviation in the European Emissions Trading Scheme’. On this basis they did not feel that the argument that biofuels have an important role to play in reducing emissions was valid.⁹³ From the perspective of fuel consumers biofuels also represent a poor deal as biofuels are far more expensive than conventional fuels. Even when oil prices are high, biofuels are estimated to be 25 to 65 % more expensive than fossil fuels.⁹⁴

⁸⁹ Commission for Integrated Transport, *Transport and Climate Change*, 2007

⁹⁰ *ibid* p52

⁹¹ written rspb memo

⁹² *ibid*

⁹³ Ev147

⁹⁴ Commission for Integrated Transport, *Supporting document to the CfIT Transport and Climate Change report*, September 2007

75. The Royal Society argued that there is a role for biofuels, as emissions from the transport sector are rising rapidly and that these emissions are difficult to deal with due in part to increased demand and a lack of mature technologies available to reduce carbon from transport. It states that ‘with suitable targeted [biofuel] policy interventions, energy supply in the transport sector could become more diverse, while also reducing greenhouse gas emissions... Biofuels have a limited, but potentially useful, ability to replace fossil fuels, largely due to technical and economic constraints’. However, they are critical of the policy arrangements for biofuels and low-carbon fuels in general due to:

- the short-term nature of the policy which will ‘encourage the import of fuels from abroad and the domestic production of crops and fuels with low CO₂-equivalent savings’;
- the failure of policy to recognise that low carbon technologies at earlier phases of development require more support, and that therefore investment will flow to established technologies;
- the lack of wider carbon pricing; and
- the current approach does not clearly lead to wider environmental co-benefits, such as better flood management or carbon sequestration.⁹⁵

76. The Royal Society recommended that other transport measures outside of the RTFO would be required to bring down emissions, and that the RTFO should be redefined to become a Low Carbon Transport Fuel Obligation taking into account the need to address the above points.⁹⁶

77. Part 1 of the King Review of Low-Carbon Cars found that biofuels are likely to have a significant role to play but that their use ‘must not be expanded ahead of advances in technology and the development of robust safeguards to minimise their environmental and social impacts’.⁹⁷ It argued that future biofuel technology has the potential to deliver GHG emission reductions without the environmental risks associated with current technologies. The next stage of the King Review will detail how an appropriate low-carbon vehicle policy framework should be developed to cost-effectively reduce emissions. It will aim to encourage emission reductions across the life cycle of all fuels.⁹⁸

78. Transport biofuels have received disproportionate attention and funding in comparison to other policies which could reduce greenhouse gas emissions at lower environmental risk and lower cost. The focus on biofuels is an example of silo policy-making as the Department for Transport has failed to ensure that the policy fits rationally with cross-Government action on climate change.

⁹⁵ Royal Society, *Sustainable biofuels: prospects and challenges*, January 2008

⁹⁶ *ibid*

⁹⁷ King Review, *The King Review of low-carbon cars*, October 2007

⁹⁸ *ibid*

79. Support for biofuels has been premature given the substantial environmental risks associated with current technologies. Second generation biofuels might have a role to play in reducing emissions from transport at some point in the future. In the meantime other transport measures are required. Indeed, these wider measures can deliver significant and cost-effective GHG savings without the environmental risk of first generation biofuels. They could lower UK transport emissions by 14% in 2020 from 1990 levels.

80. In order to stimulate the development of second generation biofuels and other low carbon fuels we recommend that the RTFO is reformed exclusively to stimulate the development and use of low carbon fuel technologies, rather than to simply encourage the use of conventional biofuels. As part of this:

81. certificates should be granted on a highly differentiated carbon-saving basis to encourage the development and use of those technologies that deliver the most greenhouse gas emission reductions from the start of the scheme; and

82. long-term market stability must be granted to give the confidence required to stimulate the development of effective technologies — referential tax status should be guaranteed at an appropriate level out to 2020.

83. These changes, alongside robust sustainability standards, should ensure that support is no longer provided for the production of damaging first generation biofuels. Even with these changes it is not clear to us that current level of expenditure on alternative fuels is justified in light of our assessment that the money could more effectively reduce emissions elsewhere. Therefore we call on the Committee on Climate Change to report at the earliest opportunity on how more appropriately to stimulate the development and use of low-carbon fuels, taking into account the risks presented in this report.

84. The 2007 Comprehensive Spending Review set out new Public Service Agreements (PSA) to identify ‘the key priority outcomes the Government wants to achieve in the next spending period’.⁹⁹ PSA 28, DEFRA argues, is the first time that there is a shared responsibility across Government to *secure a healthy natural environment for today and the future*. Progress on the PSA is measured using a number of indicators:

Indicator 1: Water quality as measured by parameters assessed by Environment Agency river water quality monitoring programmes.

Indicator 2: Biodiversity as indicated by changes in wild breeding bird populations in England, as a proxy for the health of wider biodiversity.

Indicator 3: Air quality – meeting the Air Quality Strategy objectives for eight air pollutants as illustrated by trends in measurements of two of the more important pollutants which affect public health: particles and nitrogen dioxide.

⁹⁹ ‘2007 PBR CSR: Public Service Agreements’, *HM Treasury*, www.hm-treasury.gov.uk

Indicator 4: Marine health – clean, healthy, safe, productive and biologically diverse oceans and seas as indicated by proxy measurements of fish stocks, sea pollution and plankton status.

Indicator 5: Land management – the contribution of agricultural land management to the natural environment as measured by the positive and negative impacts of farming.¹⁰⁰

85. The DfT is listed as a formal delivery partner of the PSA. The Department will ensure that it ‘improves the environmental performance of transport, taking into account impacts on land, water, biodiversity, air and the marine environment’.¹⁰¹ The evidence that we have received for this inquiry has indicated that biofuel policy is likely to have a negative impact on at least four of the five PSA indicators (1, 2, 4, & 5). **The responsibility given to the Department for Transport to consider transport’s wider environmental impacts as part of Public Service Agreement 28 is very welcome but current biofuels policy is at odds with the Public Service Agreement and will jeopardise the Government’s stated aim to ‘secure a healthy natural environment for today and the future’. We call on the Department for Transport to reassess the policy in light of the new PSA.**

Rural support

86. The Minister, Jim Fitzpatrick MP, told us that climate change mitigation was not the sole rationale for biofuels policy. He argued that biofuels can also be used to improve the economic situation of the rural economy through an increase in agricultural commodity prices, more diverse markets for commodities and potentially an increase in employment opportunities.¹⁰² Professor Roland Clift thought that this is the primary motivation for a biofuels policy in many EU countries. His argument is supported by the existence of import tariffs and quotas which in many cases are enough to keep cheaper foreign imports from the domestic market.¹⁰³ The EU Trade Commissioner, Peter Mandelson, has argued that import tariffs should be removed so that the most efficient biofuels, from both an environmental and cost-effective perspective, could be imported, but there is likely to be resistance from certain EU countries to this.^{104, 105} Indeed, there is significant pressure to increase trade barriers as a result of US subsidies.

¹⁰⁰ HM Treasury, *PSA Delivery Agreement 28*, October 2007

¹⁰¹ *ibid*

¹⁰² Q148

¹⁰³ Richard Doornbosch & Ronald Steenblik, OECD Round Table on Sustainable Development, *Biofuels: Is the cure worse than the disease?*, 11-12 September 2007, www.oecd.org

¹⁰⁴ ‘The biofuels challenge’, *European Commission*, July 2007

¹⁰⁵ ‘Brazil calls on Brussels to scrap biofuel tariffs’, *EUobserver.com*, July 2007

87. Since 2004 a US subsidy to stimulate the use of biodiesel has granted 1 cent for every percent of biodiesel blended into regular diesel. This means that biofuel shipments to the EU often stop off in the US where typically 0.1% of diesel is added to take advantage of the subsidy. This arrangement means that many EU producers are being undercut. It also adds a further incentive to produce biofuels in the tropics as well as increasing the greenhouse gases emitted in their transport to the EU. We were told that the Government had expressed concern to the European Commission about the US subsidy, and that the Commission was considering the introduction of a duty to limit such imports.¹⁰⁶

88. Increased agricultural commodity prices and biofuel support mechanisms will benefit the rural economy. However current agricultural support for biofuels is inappropriate as these mechanisms do not guarantee that bioenergy is produced sustainably. By failing to move away from supporting conventional high input crops the EU is missing a significant opportunity to make overall land management more sustainable while ensuring that bioenergy potential is maximised.

89. Reforms of agricultural subsidies and support mechanisms to focus only on technologies that are the most effective at cutting greenhouse gas emissions in a sustainable fashion will benefit the rural economy and be better value-for-money for the taxpayer. Arbitrary trade barriers to international bioenergy markets must ultimately be removed, although international regulatory improvements must be in place to ensure sustainable supplies.

Fuel security

90. The Minister, Jim Fitzpatrick MP, told us that biofuel policy also contributes to fuel security objectives.¹⁰⁷ Witnesses from the biofuels industry argued that although the role biofuels can play in improving fuel security should not be overstated, the fuel security benefits are justified as ‘any contribution will be beneficial even at a relatively small level’.¹⁰⁸ The National Farmers Union (NFU) told us that:

... the UK [has] a chance to establish an indigenous industry that will relieve dependence on imported transport fuels, albeit to a limited extent. Furthermore, as the global industry develops, the UK will have an increasing number of potential trade partners from whom to source imported biofuels. The opportunity to diversify supply sources and thereby spread supply risk undoubtedly increases the UK’s fuel security.¹⁰⁹

¹⁰⁶ Ev123

¹⁰⁷ Q148

¹⁰⁸ Q21 [Mr Carter]

¹⁰⁹ Ev73

91. However, this issue is more complicated than simply assuming that producing a litre of biofuel means that we have to find one less litre of fossil fuel. This is because most conventional biofuels depend on oil or other fossil fuels for their production. Fossil fuels are used to fuel the machinery to farm and then to process biofuel feedstocks, and are also used to make fertilisers and pesticides. When a country can use domestic sources of energy and other inputs to produce biofuels fuel security might indeed improve, but this is unlikely in the UK where trends point to increasing imports of energy. An OECD report argued that due to these factors, biofuels were ‘unlikely to become the solution to rising crude-oil prices’.¹¹⁰ The argument that biofuels will improve fuel security is further weakened as a large proportion of biofuels will have to be imported into the UK and EU.¹¹¹ Friends of the Earth argued that a better way to improve fuel security would simply be to improve fuel efficiency.¹¹²

92. In our view first generation biofuels will not improve fuel security in the EU. Second generation biofuels might have a role to play in the longer-term, but road transport fuel security is only likely to improve significantly when non-oil technologies become available. If transport fuel security is a major concern, measures other than biofuel use should be adopted.

Policy coordination

93. Our recent report on the *Structure of Government and the Challenge of Climate Change* found that policy coordination on climate change is inadequate and confused.¹¹³ We argued that this was having a negative impact on our ability to reduce greenhouse gas emissions. **Biofuels policy is a clear example of failure to co-ordinate climate change policy.** As we recommended in the *Structure of Government* report, **a long-term climate change policy framework should be developed to eliminate misguided or harmful policies, such as current biofuels policy, and to ensure that emissions are reduced in an effective and efficient manner across the whole economy.**

94. This report demonstrates there may be potentially damaging environmental impacts associated with measures to reduce greenhouse gas emissions. It is vital that the Committee on Climate Change has and exercises a remit on sustainable development.

¹¹⁰ Richard Doornbosch & Ronald Steenblik, OECD Round Table on Sustainable Development, *Biofuels: Is the cure worse than the disease?*, 11-12 September 2007, www.oecd.org

¹¹¹ Ev152

¹¹² Ev30

¹¹³ Environmental Audit Committee, Ninth Report of Session 2006-07, *The structure of Government and the challenge of climate change*, October 2007, HC 740

Conclusions and recommendations

1. Biofuels can be used to reduce greenhouse gas emissions from road transport. (Paragraph 23)
2. A potentially significant benefit of a new sustainable biofuels market in the EU, from which developing countries could stand to benefit, could be that it would help to create economic conditions which would assist in securing international sustainability standards for agricultural products more widely. (Paragraph 25)
3. As different biofuels are produced in a number of ways from different feedstocks with varying impacts, it is difficult to generalise the benefits or costs of biofuels. Nevertheless, today most biofuels are produced intensively from feedstocks in ways that could have serious environmental consequences. (Paragraph 32)
4. The sustainability standards applied by the Renewable Transport Fuel Obligation are unlikely to prevent environmental damage from biofuels. In the UK aggregate environmental impacts might make it difficult for us to meet a range of targets, including those relating to halting biodiversity loss or improving water quality. (Paragraph 33)
5. Biofuels standards should be changed to ensure that support is given only to those that deliver environmental improvements over fossil fuels in terms of not only greenhouse gas emission reductions but also wider impacts such as fertilizer and pesticide pollution. (Paragraph 34)
6. In the absence of such standards the Government and EU has moved too quickly to stimulate the use of biofuels. Until they are developed the Government should place a moratorium on policies aimed at increasing the use of biofuels. (Paragraph 34)
7. One of the most effective methods of monitoring land use change is the deployment of earth observation technology. The Government should give as much support as possible to the appropriate technologies as well as to international co-operation on the shared use of earth observation data. (Paragraph 48)
8. The stimulation of biofuels production by the Government and EU is reckless in the absence of effective mechanisms to prevent the destruction of carbon sinks internationally. The Government must ensure that carbon sinks are effectively protected before providing incentives for the use of biofuels. The Government should also explore the development of international mechanisms to enable the creation of new carbon sinks. (Paragraph 53)

Ecosystem service assessment

9. We welcome the recently published action plan for embedding an ecosystems approach as it shows that Government is seeking to take better decisions in relation to the UK's natural environment and the protection of ecosystem services. But biofuels policy currently fails to follow such an approach. There are significant knowledge gaps relating to land management for sustainable bioenergy production

and for carbon sequestration. In order to align biofuels policy to an ecosystems approach the Government must commission work to assess:

- the potential in the UK for carbon-oriented land management;
- how UK land managers might better be rewarded for maintaining, improving or creating carbon sinks and other ecosystem services; and
- the potential for UK sustainable bioenergy production. (Paragraph 57)

Food security

10. A large biofuel industry based on current technology is likely to increase agricultural commodity prices and, by displacing food production, could damage food security in developing countries. Only when technology improves and an appropriate regulatory framework is in place should biofuels be utilised. When these changes have occurred barriers to free trade in bioenergy could be removed to allow developing countries to take advantage of the market and so that UK taxpayers can take advantage of lower prices. Even then impacts on food security should be closely monitored. (Paragraph 63)
11. Given long-term demographic and climate change trends that might add further to food security problems we question whether transport biofuels have a long-term role. (Paragraph 64)

Is current biofuels policy justified?

12. Current UK and EU policy fails to ensure the most efficient use of bioenergy in terms of the greenhouse gas mitigation potential of the land on which it is grown. It does not deliver good value for the taxpayer. The Common Agricultural Policy should be adjusted to ensure that bioenergy feedstock production no longer receives agricultural subsidies where it fails to constitute the most effective use of sustainable bioenergy resources. (Paragraph 67)
13. Transport biofuels have received disproportionate attention and funding in comparison to other policies which could reduce greenhouse gas emissions at lower environmental risk and lower cost. The focus on biofuels is an example of silo policy-making as the Department for Transport has failed to ensure that the policy fits rationally with cross-Government action on climate change. (Paragraph 78)
14. Support for biofuels has been premature given the substantial environmental risks associated with current technologies. Second generation biofuels might have a role to play in reducing emissions from transport at some point in the future. In the meantime other transport measures are required. Indeed, these wider measures can deliver significant and cost-effective GHG savings without the environmental risk of first generation biofuels. They could lower UK transport emissions by 14% in 2020 from 1990 levels. (Paragraph 79)
15. In order to stimulate the development of second generation biofuels and other low carbon fuels we recommend that the RTFO is reformed exclusively to stimulate the

development and use of low carbon fuel technologies, rather than to simply encourage the use of conventional biofuels. As part of this:

- certificates should be granted on a highly differentiated carbon-saving basis to encourage the development and use of those technologies that deliver the most greenhouse gas emission reductions from the start of the scheme; and
 - long-term market stability must be granted to give the confidence required to stimulate the development of effective technologies — referential tax status should be guaranteed at an appropriate level out to 2020. (Paragraph 80)
16. These changes, alongside robust sustainability standards, should ensure that support is no longer provided for the production of damaging first generation biofuels. Even with these changes it is not clear to us that current level of expenditure on alternative fuels is justified in light of our assessment that the money could more effectively reduce emissions elsewhere. Therefore we call on the Committee on Climate Change to report at the earliest opportunity on how more appropriately to stimulate the development and use of low-carbon fuels, taking into account the risks presented in this report. (Paragraph 83)

PSA 28

17. The responsibility given to the Department for Transport to consider transport's wider environmental impacts as part of Public Service Agreement 28 is very welcome but current biofuels policy is at odds with the Public Service Agreement and will jeopardise the Government's stated aim to 'secure a healthy natural environment for today and the future'. We call on the Department for Transport to reassess the policy in light of the new PSA. (Paragraph 85)

Rural support

18. Increased agricultural commodity prices and biofuel support mechanisms will benefit the rural economy. However current agricultural support for biofuels is inappropriate as these mechanisms do not guarantee that bioenergy is produced sustainably. By failing to move away from supporting conventional high input crops the EU is missing a significant opportunity to make overall land management more sustainable while ensuring that bioenergy potential is maximised. (Paragraph 88)
19. Reforms of agricultural subsidies and support mechanisms to focus only on technologies that are the most effective at cutting greenhouse gas emissions in a sustainable fashion will benefit the rural economy and be better value-for-money for the taxpayer. Arbitrary trade barriers to international bioenergy markets must ultimately be removed, although international regulatory improvements must be in place to ensure sustainable supplies. (Paragraph 89)

Fuel security

20. In our view first generation biofuels will not improve fuel security in the EU. Second generation biofuels might have a role to play in the longer-term, but road transport fuel security is only likely to improve significantly when non-oil technologies become available. If transport fuel security is a major concern, measures other than biofuel use should be adopted. (Paragraph 92)

Policy coordination

21. Biofuels policy is a clear example of failure to co-ordinate climate change policy. (Paragraph 93)
22. A long-term climate change policy framework should be developed to eliminate misguided or harmful policies, such as current biofuels policy, and to ensure that emissions are reduced in an effective and efficient manner across the whole economy. (Paragraph 93)
23. This report demonstrates there may be potentially damaging environmental impacts associated with measures to reduce greenhouse gas emissions. It is vital that the Committee on Climate Change has and exercises a remit on sustainable development. (Paragraph 94)

Formal minutes

Tuesday 15 January 2008

Members present
Mr Tim Yeo, in the Chair

Mr Martin Caton
Colin Challen
Mr David Chaytor
Martin Horwood

Mark Lazarowicz
Mr Ian Liddell-Grainger
Jo Swinson
Joan Walley

Are biofuels sustainable?

The Committee considered this matter.

Draft Report (*Are biofuels sustainable?*), proposed by the Chairman, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 3 read and postponed.

Paragraphs 4 to 94 read and agreed to.

Postponed paragraphs 1 to 3 read again and agreed to.

Resolved, That the Report be the First Report of the Committee to the House.

Ordered, That the Chairman make the Report to the House.

Ordered, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

Written evidence was ordered to be reported to the House for printing with the Report.

[Adjourned till Tuesday 22 January 2008 at 10.00am]

Witnesses

Tuesday 13 November 2007

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Mr Sean Sutcliffe, Chief Executive, Biofuels Corporation, **Mr Graham Hilton**, Chairman, EIC Renewable Transport Fuels Working Group, **Mr Chris Carter**, Corporate Affairs Director, British Sugar plc, **Ms Clare Wenner**, Head of Transport Biofuels, Renewable Energy Association, **Mr Merlin Hyman**, Director, Environmental Industries Commission Ev 20

Ms Hannah Griffiths, Biofuels Campaigner, Friends of the Earth, and **Mr Adam Harrison**, Food and Agriculture Policy Officer, WWF Scotland Ev 42

Tuesday 20 November 2007

Ms Julie Foley, Head, Sustainable Development, **Ms Amanda Barratt**, Industry Regulation Policy Adviser, the Environment Agency; and **Dr Tony Weighell**, Global Impacts Programme Manager, and **Ms Jessica Magnus**, EU Policy Adviser, The Joint Nature Conservation Committee Ev 62

Mr Peter Kendall, President, and **Mr Guy Gagen**, Head of Combinable Crops, National Farmers' Union (NFU); and **Mr Greg Archer**, Director, and **Ms Jessica Chalmers**, Programme Manager, Low Carbon Vehicle Partnership (LCVP) Ev 84

Professor Richard Bateman, **Professor Roland Clift CBE**, Biosciences Federation, and **Dr Dominick Spracklen**, University of Leeds Ev 100

Thursday 27 November 2007

Jim Fitzpatrick MP, Secretary of State; **Malcolm Fendick**, Head Of Cleaner Fuels and Vehicles Division and Chief Mechanical Engineer; and **Rupert Furness**, Head of Biofuels Branch, Department for Transport Ev 109

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32	UK Petroleum Industry Association Ltd	Ev 182
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Eleventh	Sustainable Development Headline Indicators, HC 1080 (<i>Reply, HC 320</i>)
Twelfth	World Summit for Sustainable Development – From rhetoric to reality, HC 98 (<i>Reply, HC 232</i>)
Thirteenth	Greening Government 2003, HC 961 (<i>Reply, HC 489,2003-04</i>)

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First	Departmental Responsibilities for Sustainable Development, HC 326 (<i>Reply, Cm 5519</i>)
Second	Pre-Budget Report 2001: <i>A New Agenda?</i> , HC 363 (<i>HC 1000</i>)
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Fourth	The Pre-Budget Report 1999: pesticides, aggregates and the Climate Change Levy, HC 76
Fifth	The Greening Government Initiative: first annual report from the Green Ministers Committee 1998/99, HC 341
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Seventh	Water Prices and the Environment, HC 597 (<i>Reply, HC 290, Session 2000-01</i>)

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Third	The Comprehensive Spending Review and Public Service Agreements, HC 92 (<i>Reply, HC 233, Session 1999-2000</i>)
Fourth	The Pre-Budget Report 1998, HC 93
Fifth	GMOs and the Environment: Coordination of Government Policy, HC 384 (<i>Reply Cm 4528</i>)
Sixth	The Greening Government Initiative 1999, HC 426
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Third	The Pre-Budget Report: Government response and follow-up, HC 985
Fourth	Climate Change: UK Emission Reduction Targets and Audit Arrangements, HC 899 (<i>Reply, HC 88, Session 1998-99</i>)