UK Report to the European Commission under Article 4 of the Biofuels Directive (2003/30/EC)

Promotion and Use of Biofuels in the United Kingdom during 2009: UK Report to European Commission under Article 4 of the Biofuels Directive (2003/30/EC)

Contents

Introduction

This report fulfils the UK's obligation to report to the European Commission by 1 July 2010 on the UK Government's support for biofuels during the calendar year 2009, as required by Article 4 of Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport.

The report covers:

- in section 1, the UK's targets for future biofuel sales and the measures the UK has taken during 2009 and subsequently to promote the use of biofuels to replace diesel or petrol for transport purposes;
- in section 2, the measures the UK has put in place to ensure that the environmental benefits of biofuels are fully realised;
- in section 3, the national resources allocated to the production of biomass for energy uses other than transport;
- in section 4, the total UK sales of road transport fuels, including biofuels, for the calendar year 2009.

Summary

During 2008 the UK Government introduced the Renewable Transport Fuel Obligation ('RTFO') to promote sustainable biofuels in the transport sector. In October 2007 the Renewable Transport Fuel Obligations Order (SI 2007/3072) ('the RTFO Order') was made, after it had been approved in draft by the UK Parliament.

Due to growing concerns about the sustainability of biofuels the previous Government commissioned Professor Ed Gallagher, the Chair of the Renewable Fuels Agency ('RFA'), to carry out a review of evidence concerning indirect impacts of biofuels. *The Gallagher Review of the Indirect Effects of Biofuels Production* was published in July 2008. The report recommended that due to the risk of unintended indirect effects, the UK Government should reduce the rate of increase of volume targets for the supply of biofuel. The Review is available at: http://www.renewablefuelsagency.gov.uk/reportsandpublications/reviewofthei ndirecteffectsofbiofuels

In response to the Gallagher Review, the UK Government consulted on proposals to slow down the rate of increase of the annual RTFO Obligation levels and this resulted in the Renewable Transport Fuel Obligations (Amendment) Order 2009 (SI 2009/843) ('the RTFO (Amendment) Order') in April 2009[1]. The revised obligation levels are as follows: 3.25% by volume of total fuel supplied for 2009/2010, 3.5% for 2010/2011, 4% for 2011/2012, 4.5% for 2012/2013 and 5% for 2013/2014 onwards.

Fiscal incentives for biofuels continued in 2009. Biodiesel and bioethanol received the 20 pence per litre fuel duty incentive until 31 March 2010. Biofuel sales were approximately 2.9% of UK road transport fuel at a level of around 1,361 million litres for 2009.

Under the 2003 Biofuels Directive targets applied up to 2010. However in the longer term the EU Renewable Energy Directive contains a 10% renewable energy in transport target to be met by 2020. This target is primarily expected to be met through the use of biofuels.

[1] The consultation in response to the recommendations in the Gallagher Review also sought views on adding two new renewable fuels to those eligible for RTFO certificates and revising the definition of relevant hydrocarbon oil. The definition of hydrocarbon oil had excluded fossil fuel which is blended with renewable fuel before the duty point and therefore less renewable fuel was required to be supplied than was intended. The Renewable Transport Fuel Obligations (Amendment) Order 2009 rectifies this unintended effect as from the start of the second obligation period, in April 2009. The problem with the definition does not seem to have caused the volume of biofuels supplied in the first obligation period to reduce below the level we expected to achieve. Data from the Renewable Fuels Agency indicates that biofuels accounted for 2.7% of total fuel supplied in the first obligation year, April 2008-April 2009, against an obligation of 2.5% for that period.

SECTION 1: UK Measures to Promote Renewable Transport Fuels

i) The Renewable Transport Fuel Obligation

The RTFO Scheme

To support and promote the use of renewable transport fuels in the UK, the UK Government introduced the Renewable Transport Fuel Obligation (RFTO) in April 2008. The RTFO is a scheme under which all fossil fuel suppliers who supply in excess of 450,000 litres of fossil fuel per year must provide evidence that a certain percentage of their fuels for road transport in the UK comes from renewable resources. Under the scheme fossil fuel suppliers can meet their obligation in a number of ways, either

- by supplying biofuels and claiming and redeeming certificates, or
- by redeeming certificates obtained from other biofuel suppliers, or
- by paying a buyout price.

Each supplier of road transport fossil fuel has to produce certificates showing the supply of an amount of renewable fuel equal to the percentage specified. Percentages are expressed by reference to volume rather than energy content. RTFO certificates can be traded between suppliers.

The buy-out price has been set at a level designed to ensure that it will generally be more economic to supply biofuel, in order to maximise the uptake. For the first two years of the obligation the buy out price was 15 pence per litre, rising to 30 pence per litre, at the same time as the fuel duty incentive (see below) is phased out in March 2010. The scheme provides for the recycling of buy-out payments to biofuel suppliers who have redeemed or surrendered certificates.

The scheme specifies how certificates are applied for and issued. It also sets out the powers and duties of the Renewable Fuels Agency ('RFA') as the Administrator of the scheme, and the civil penalties that it may impose following non-compliance with scheme requirements. The RFA also operates an internationally acclaimed carbon and sustainability reporting system.

The RTFO scheme was amended in 2009 so that two new renewable fuels are eligible for certificates under the RTFO. These are biobutanol and renewable diesel (a fuel made entirely from biomass resulting in a product chemically similar to fossil diesel rather than biodiesel.) Biodiesel, bioethanol and natural road fuel gas produced from biomass (commonly known as "biogas") are already eligible fuels under the RTFO.

RTFO obligation levels

The Gallagher review referred to above concluded that there was a risk that biofuel policies as they stood would lead to a net increase in GHG emissions caused by displacement of existing agricultural production. The previous

Government accepted the main recommendations in the report and consequently consulted in autumn 2008 on a draft Renewable Transport Fuel Obligations (Amendment) Order to amend the RTFO Order, including slowing down the rate of increase of the obligation level. The consultation document was published on 15 October 2008 and is available at: (http://www.dft.gov.uk/consultations/closed/rftoorder/)

Following the consultation the Renewable Transport Fuel Obligations (Amendment) Order 2009 (SI 2009/843) ('the RTFO (Amendment) Order') was approved by Parliament and made in April 2009.

As a result of this amendment we expect a 5% volume (5.75% by energy) biofuel obligation will still be achieved but in 2013/14 rather than in 2010/2011.

Under the Renewable Energy Directive the UK is required to source 10% of our transport energy from renewable sources by 2020 (as part of a wider EU commitment to sourcing 15% of UK energy from renewable sources). Our analysis (as set out in the UK Renewable Energy Strategy, 2009) shows that this target will primarily be met through the use of biofuels, although other innovations are also expected to play a part. We are reviewing how best the requirements of the Renewable Energy Directive could be met and .will consult on any new proposals later this year..

Cost Effectiveness

The intention of the policy is to reduce life-cycle carbon emissions from road transport. It is estimated that if 5% of road transport fuel were from renewable sources making 50% GHG savings then around 3.5 million tonnes of carbon dioxide (equivalent to 1.0 million tonnes of carbon) would be saved per annum. This assumes that there are no additional emissions due to indirect land use changes.

Analysis for the RTFO (Amendment) Order's Impact Assessment estimated that on this basis the RTFO would cost[2] around £114 per tonne of carbon dioxide saved (£409 per tonne of carbon), assuming average GHG savings of 50% are delivered[3]. Measures announced in other sectors tend to have a much lower cost, or in some cases a benefit, per tonne of carbon saved. However, over time the costs of saving carbon from biofuels may fall as production processes become more efficient, new technologies come on stream and the cost of displaced fossil fuel rises.

At 5% biofuel blends, due to the higher cost of biofuel and lower energy content compared to conventional fossil fuels, would be expected to add around 1.5% to driving costs by 2020.

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[2] Carbon cost-effectiveness estimates are presented as a net present value which nets out benefits (such as air quality and congestion impacts). Future costs and benefits have been discounted in line with Treasury Green Book Guidance.

[3] Reported carbon savings were 47% in the first year of the RTFO

The Explanatory Memorandum to the RTFO (Amendment) Order, which includes an impact assessment is available at:
(http://www.opsi.gov.uk/si/si2009/em/uksiem_20090843_en.pdf)

ii) Other support mechanisms for biofuels

Fuel Duty Incentives

In the past the UK Government has supported bio-fuels with 20 pence per litre fuel duty incentive. Following concerns around sustainability issues of bio-fuels, it was decided that the existing 20 pence per litre fuel duty incentive would cease on 31 March 2010. Incentives will from then on be provided through the RTFO by increasing its buy-out price from 15 pence to 30 pence per litre.

Inin the 2009 Pre-Budget report it was announced that the duty incentive for biodiesel from used cooking oil would remain in place until 31 March 2012.

Government grant programmes

The UK Government in 2009, through the Alternative Fuels Infrastructure Grant Programme managed by Cenex, continued to provide grants toward the cost of installing alternative refuelling points including, for example, hydrogen, electric, natural gas and biogas stations. Although not exclusively aimed at biofuels, the grant programme attracted interest from a range of organisations considering the installation of biogas and hydrogen refuelling points. Since November 2009 the grant programme has assisted in funding of five biogas and two Hydrogen refuelling stations. More information is available at:
(http://www.cenex.co.uk/programmes/igp)

The scheme was initially granted State Aid clearance up to 2008 but following renewed State Aid clearance under a temporary framework to December 2010 the scheme was re-launched in July 2009.

iii) Support for other renewable fuels: bringing forward the hydrogen economy and Electric vehicles

The energy used in ultra-low carbon vehicles has the potential to contribute to renewable energy targets if that energy is generated from renewable energy sources. This is true regardless of the energy carrier – examples can include electricity and hydrogen amongst others.

In April 2009, the UK Government released "Ultra-Low Carbon Vehicles in the UK", a vision document setting out the UK's ambition to become a world

leader in the research development and demonstration of ultra-low carbon vehicles. The vision document includes a road map depicting various developments for the next 5 years, ranging from pioneering projects to illustrate the potential of these vehicles in real world settings to putting in place the necessary measures by which these vehicles will become part of motorists' lives.

The main barrier to mass commercialisation of low carbon vehicles is that they are substantially more expensive than their conventional counterparts;

In 2009 the UK Government provided funding to support the research, development and demonstration of key technologies for lower carbon vehicles, including electric options

Hydrogen stands alongside biofuels as the other major potential low-carbon transport fuel and could provide both ultra-low carbon and zero-pollution road transport. Although battery electric vehicles are a shorter term commercial prospect, many believe that the superior range of fuel cell vehicles (barring a breakthrough in battery technology) will lead to fuel cell vehicles being the end goal of ultra low carbon vehicle development, as depicted in the New Automotive Innovation and Growth Team (NAIGT) Roadmap.

iv) Sponsoring Research and Development

We are sponsoring biofuels research and development to help encourage the production of more sustainable biofuels.

In October 2009 we published a research scoping study so that we can understand the existing research gaps and areas where we could be supporting greater scientific progress. The range of topics covered in this gap analysis include:

- advanced biofuels
- indirect effects including indirect land use change;
- other environment issues including land use, biodiversity, greenhouse gas and natural resources;
- social and economic impacts of biofuels including food;
- markets including trade, investment decisions, supply chains and skills;
- upstream and downstream infrastructure and vehicle capability including extension of biofuels to use in other modes of transport;
- vehicle and infrastructure capability.

The Biotechnology and Biological Sciences Research Council (BBSRC) launched an Initiative in 'Capacity-Building Awards in Bioenergy' in 2007 with the aim of growing the UK capacity in bioenergy research. This followed on from BBSRC's Review of Bioenergy. Details are available at: (http://www.bbsrc.ac.uk/organisation/policies/reviews/scientific_areas/0603_bioenergy.pdf)

Applications were invited for a Bioenergy Centre, to act as a focus for UK bioenergy activities, and Programme Grants, to address specific areas of research. The recommendation of the peer review panel was to amalgamate the best aspects of the highest quality applications into a single distributed centre.

The BBSRC Sustainable Bioenergy Centre (BSBEC) was launched in January 2009, and is the largest UK public sector investment in bioenergy to date (£27M, including £7M from a number of industrial partners). The Centre will carry out research on a variety of aspects of bioenergy research, including sustainability, and it is expected that its results will lead to the development of fuels based on non-food crops, such as willow, industrial and agricultural waste products and inedible parts of crops, such as straw.

In addition to this, BBSRC participated in the ERA-Net Bioenergy call on short rotation coppice, and is involved in one of the successful applications. It also participated in the ERA-ARD call on social and economic aspects of bioenergy and is in the process of funding successful applications. BBSRC currently funds research on willows for biomass, on Miscanthus and also research on biobutanol production from Clostridium.

Other key Research Council projects include - "SUPERGEN bioenergy consortium" (£6.4M four year research project bringing together growers, biologists, agronomists, economists, scientists and engineers to tackle the challenges associated with the further development of this renewable resource in a sustainable manner) and the "TSEC Biosys project" (which brings together natural and social scientists, engineers and economists from fifteen leading UK research organisations and from other organisations to focus on: the potential evolution of demand for bioenergy in the UK and current and future options for supplying the demand; studies of the biomass supply potential in the UK from a land use, forest and crop production perspective; the development of a sustainability framework for bioenergy chains; and addressing the implications of alternative pathways for the development of bioenergy).

The Carbon Trust, a not-for-profit company with the mission to accelerate the move to a low carbon economy, has developed two bioenergy Research Accelerators. Supported by Government funding these intend to make investments of up to £10 million per 3-5 year project and are focused on specific challenges. The Algae Biofuel Challenge seeks to increase oil yield and reduce harvesting costs for algae farmed in mixed shallow salt/brackish water open ponds. The Pyrolysis Challenge investigates new ways of producing and upgrade pyrolysis oil to form low cost and low greenhouse gas emission transport fuel from wastes. Pyrolysis is the thermal decomposition of large molecules when heated in the absence of oxygen at temperatures over 500 °C.

Section 2: Ensuring the Environmental Benefits of Biofuels

Carbon and sustainability reporting

The RTFO is intended to help create the right market conditions for the best biofuels to flourish and will where appropriate encourage the development of more advanced biofuels in the future

Following a public consultation in June 2007 the Government published its recommendation to the RFA on the details of carbon and sustainability reporting under the RTFO scheme. Certificates are issued for biofuels only if a carbon and sustainability report has been submitted to the RFA by the biofuel supplier. These reports cover matters such as the country of origin and the wider sustainability of the biofuels, and also the lifecycle carbon savings of the biofuels compared with the fossil fuels they replace.

The RFA publishes monthly and quarterly reports based on this data and includes details on individual supplier performance, carbon intensity (GHG saving) and sustainability of biofuels used under the RTFO. This creates an incentive to source the best biofuels and encourages better performance.

Indicative targets for suppliers

The Government has set the following indicative targets for suppliers under the RTFO:

Annual target	**2008/09**	**2009/10**	**2010/11**
Percentage of feedstock meeting a qualifying environmental standard	30%	50%	80%
Annual average greenhouse gas saving of biofuel supplied	40%	45%	50%
Data reporting on sustainability characteristics	50%	70%	90%

At present, the RTFO obligation period runs from April to April. Published performance data for the first nine months of the obligation period 2009/10? indicates the following:

- 34% of biofuels are estimated to have met an environmental standard, compared to the 50% government target. The ability of suppliers to source certifiably sustainable fuels is currently limited as there are a number of feedstocks for which there is no operational sustainability assurance scheme. However, it is expected that certified sustainable feedstock should become increasingly available over time, as feedstock standards develop in response to the demand created by the RTFO and the growing concern about the sustainability of agricultural commodities more widely;

- Greenhouse gas savings of 51% were achieved against the 45% Government target. This figure excludes the emissions from indirect land-use changes considered in the 'Gallagher Review';
- 73% of the data captured from suppliers provided information on sustainability characteristics, compared to the 70% Government target. The data reporting target of renewable fuel characteristics refers to the amount of data provided by transport fuel suppliers in relation to sustainability components such as the type of feedstock, feedstock country of origin, sustainability standard, and land use information.

These indicative targets will be kept under review in light of the UK's implementation of the Renewable Energy Directive and the Fuel Quality Directive.

Climate Change Act 2008

The Climate Change Act 2008 contains a new duty for the Administrator of the RTFO to "promote the supply of renewable fuel whose production, supply or use causes or contributes to the reduction of carbon emissions and contributes to sustainable development or the protection or enhancement of the environment generally". This came into force in January 2009 and recognises that the RFA has a role in encouraging transport fuel suppliers to supply "good" biofuels.

Wider effects of biofuel production

The UK Government has been taking forward further research into accounting for and reducing the indirect effects of biofuels as part of its aforementioned research and development strategy. It is hoped that this work will help inform the European Commission's report into indirect land use change and any future methodology to account for these effects.

The RFA also publishes an annual report each January on the impacts of the RTFO. The report for the 2009-10 reporting year is due January 11 2011.

SECTION 3: Biomass for uses other than transport

Renewables Obligation

- The Renewables Obligation (RO) is the UK Government's main mechanism for supporting renewable electricity generation. Since its introduction in 2002, it has succeeded in almost tripling the level of renewable electricity (from 1.8% of total UK supply to 9.1 per cent in England, Wales and Scotland and 3.0 per cent in Northern Ireland in 2008/09.).

- Important changes to the RO took effect on 1 April 2009, to provide different levels of support to different technologies, depending on their costs. This is known as 'banding'. These changes will enable the RO to deliver a higher level of generation from a wider range of renewable sources, while managing the cost to the consumer.

We announced in November 2008 that we would extend the RO from its current end date of 2027 to at least 2037, in order to give greater long-term certainty to investors.

An early review on the banding for co-firing of biomass with CHP concluded that the level of support should remain at 1 Renewables Obligation Certificate (ROC)/MWh and that banding for co-firing of energy crops with CHP should remain at 1.5 ROC/MWh.

We are now currently consulting on grandfathering (fixing the support level for 20 years) the capital element of biomass electricity projects. The consultation closed on the 28th May and we will issue a response in the summer.

In 2009 the percentage of UK electricity sales that were from biomass sources eligible for the RO was 8.5 per cent dedicated biomass and 11.7 co-firing, up from 5.3 per cent in 2008. Generation from biomass grew only marginally, but landfill gas, which was the main contributor, rose by 1.7 per cent. Total biomass generation accounted for 43 per cent of all renewable electricity generation in 2008.

The proposed incentive mechanism for renewable heat includes tariffs for biomass. The public consultation has now closed and the responses are under consideration. We will be able to provide further information in due course.

The Government invested around £14 million between in 2008/09 in capital grants and R&D for emerging renewable and low carbon technologies including biomass. We continue to see an expansion of our renewable generation capacity.

In May 2007 the UK published its Biomass Strategy (http://www.defra.gov.uk/Environment/climatechange/uk/energy/renewablefuel/pdf/ukbiomassstrategy-0507.pdf). Key actions taken in England as a result of

commitments within the UK Biomass Strategy and the Government's earlier Response to the Biomass Task Force Report include:

- expanding the use of biomass on the Government Estate;
- developing the Biomass Energy Centre to provide expert information and best practice advice (www.biomassenergycentre.org.uk/);
- supporting energy crops under the Rural Development Programme for England;
- supporting the development of biomass supply chains through the Bio-energy Capital Grants Scheme and the Bio-energy Infrastructure Scheme;
- a review of the Government's approach to anaerobic digestion within England; and
- the publication of the Woodfuel Strategy for England (2007) (http://www.forestry.gov.uk/england-woodfuel).

More specifically:

The Energy Crops Scheme, is delivered by Natural England as part of the Rural Development Programme for England, supports the establishment of perennial energy crops for heat, electricity or combined heat and power (CHP) use within a specified area. Under the scheme growers can claim 40% of the establishment costs for miscanthus (a woody grass) or Short Rotation Coppice (SRC) from a variety of trees (most commonly willow). Further information is available on the Natural England website at (http://www.naturalengland.org.uk/planning/grants-funding/energy-crops/default.htm)

The Bio-energy Capital Grants Scheme was launched in 2002 by the then DTI and the Big Lottery Fund. Round 1 of the scheme supported the installation of biomass-fuelled heating boilers, combined heat and power plants and large-scale dedicated biomass power stations. Round 2 was launched in April 2006 and funded by the Big Lottery Fund to support small-scale biomass heat and combined heat and power projects. Both these rounds offered funding across the UK.

In 2006, Defra funded a third round as part of a five-year capital grant scheme to support biomass heat installations - biomass-fuelled heat and combined heat and power projects, including anaerobic digestion in the industrial, commercial and community sectors in England only. Further Rounds followed - Round 3 was launched in December 2006, Round 4 in April 2008, Round 5 in December 2008 and Round 6 in December 2009. Round 6 closed in March 2010.

Rounds 1, 3, 4 5 and 6 of the scheme are the responsibility of DECC, Round 2 remaining with the Big Lottery Fund. A decision on any continuation of funding by DECC under Round 6 is presently awaiting the views of new incoming UK Ministers.

There are currently no plans to continue the Scheme beyond March 2011. since the Government will be reviewing its policy on capital grants to support biomass heat projects in light of its stated intention to introduce a Renewable Heat Incentive.

In 2009 The Bio-energy Infrastructure Scheme (BEIS)
BEIS provided grants to help the development of the supply chain required to harvest, process, store and supply biomass to heat, combined heat and power, and electricity end-users, with schemes restricted to projects based in England and open to businesses, local authorities and charities. Round 1 of BEIS launched in 2004, Round 2 in 2008 and Round 3 in 2009, with Round 3 closing in February 2010.

In 2009 DECC, in association with industry, academia and other stakeholders, also provided R&D support in this area through the Technology Programme - including support work on next generation biofuels (such as ligno-cellulosic or 'woody' ethanol fuels) and biorefineries;

In 2009 the Government funded the Low Carbon Buildings Programme (phase one and two) which has, to-date, committed over £12 million of grant support to heat projects with just under £4 million for biomass heaters. In Budget 2009, the UK Government announced an additional £25 million for at least 10 community heating schemes through the Low Carbon Buildings Programme.

SECTION 4: UK Production, Sales and Availability

Total sales of biofuels in the UK from January to December 2009 inclusive were 1,361 million litres, 77% of which was biodiesel. Total road fuel sales over the same period were approximately 47,111 million litres. Biofuels made up 2.89 % of total road transport fuel sales by volume (approximately 2.48% by energy content – see table 2 below).This represents an increase of approximately 24% in total biofuel sales from the 2008 total of 1,092 million litres.

Biofuels sold in 2009 and the first quarter of 2010 are set out in table 1 below:

Table 1 – UK biofuel sales (million litres)

2009

Month	Biodiesel	Bioethanol	Total Diesel Sales	Total Petrol Sales
January	80	16	1,871	1,841
February	82	15	2,096	1,800
March	68	20	1,931	1,623
April	74	33	2,243	1,924
May	89	14	1,959	1,879
June	88	18	2,104	1,893
July	98	24	2,095	1,854
August	96	25	1,197	1,903
September	100	28	2,215	1,852
October	93	35	2,035	1,810
November	89	43	2,158	1,810
December	87	48	2,179	1,837
Annual total	1,044	317	25,084	22,027

2010

Month	Biodiesel	Bioethanol	Total Diesel Sales	Total Petrol Sales
January	73	46	1,831	1,570
February	93	51	2,140	1,691
March (p)	87	67	2,073	1,627
Quarter total	253	164	6,044	4,888

Notes
**Total diesel and petrol sales figures include all biodiesel and bioethanol sales.*
† Total diesel sales include all diesel sold for road transport, but do not include diesel sold for other purposes, such as for use in non-road mobile machinery or for domestic heating.
Totals may not sum due to rounding.
p Provisional amount

Further details on UK fuel sales are available at (http://www.uktradeinfo.com/index.cfm?task=bulloil)

Converting these biofuels sales figures into percentages gives the following results for the calendar year 2009 as a whole, as set out in table 2.

Table 2 - UK biofuels sales as a percentage of total fuel sales

	Total sales in 2009 *(million litres)*	As a percentage *by volume* of total fuel sales	As a percentage *by energy content* of total fuel sales *
Biodiesel	1,044	2.22%	2.04%
Bioethanol	317	0.67%	0.44%
Total biofuels	**1,361**	**2.89%**	**2.48%**

**assuming the following RED/FQD conversion factors:*
Bioethanol: 66% of petrol energy content by volume
Biodiesel 92% of diesel energy content by volume

Feedstocks for UK biofuel production include recycled cooking oils, agricultural by-products (for example, tallow), and mainstream agricultural crops (such as cereals and root crops for bioethanol and oilseed crops for biodiesel). Among the imports are biodiesel feedstocks (including tropical products such as palm oil) and manufactured bioethanol and biodiesel.

Most biofuels were sold in blends, the vast majority at or below the level of 5% by volume, which is in line with European road fuel standards EN590 and EN228.

UK Department for Transport 2010