

<b>Title:</b> <b>Amendments to the Renewable Transport Fuel Obligation for compliance with the Renewable Energy Directive - (1) Minimum Sustainability Criteria</b>  <b>Lead department or agency:</b> Department for Transport (DfT) <b>Other departments or agencies:</b>	<b>Impact Assessment (IA)</b>
	<b>IA No:</b> DFT00049
	<b>Date:</b> 01/08/2011
	<b>Stage:</b> Final
	<b>Source of intervention:</b> EU
	<b>Type of measure:</b> Secondary legislation
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## Summary: Intervention and Options

### What is the problem under consideration? Why is government intervention necessary?

Greenhouse gas (GHG) emissions from transport are significant and impose costs on others through their contribution to climate change; those costs are not taken into account by those that emit them. Using renewable energy can reduce GHG emissions and there are therefore EU and UK renewable energy targets. However, these are not likely to be met by the market alone, because of the extra cost of renewable energy compared to fossil fuels in the near term at least. The UK intends to meet its Renewable Energy Directive (RED) target through the Renewable Transport Fuel Obligation (RTFO). Sustainability criteria are required to ensure that the UK biofuel supply is sustainably sourced and is compliant with the requirements of the RED.

### What are the policy objectives and the intended effects?

The RTFO aims to increase the use of renewable energy in the transport sector, in a cost effective way. The amendments to the RTFO considered in this Impact Assessment aim to ensure that only biofuels meeting carbon stock and biodiversity land based criteria and minimum greenhouse gas (GHG) saving criteria, count towards meeting UK biofuels targets as prescribed by the RED.

These amendments are intended to improve the GHG savings and sustainability of biofuel supplied under the RTFO, in order to comply with the RED requirements. We do not intend to implement this directive beyond the minimum requirements.

### What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

This impact assessment is the first in a set of five impact assessments considering amendments to the RTFO.

The only policy option considered is to implement the criteria. This has been considered against a "do nothing" baseline where the criteria are not implemented.

The preferred option is to implement mandatory sustainability criteria, as it would be expected to:

- Ensure minimum levels of sustainability of biofuels supplied in the UK.
- Ensure compliance with the RED and avoid the risk of infraction.
- However, this may impact on pump prices, which are estimated to increase by around 0 to 0.4ppl (including VAT) over the period 2012 to 2020 in the central scenario.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 4/2014

**What is the basis for this review?** Duty to review. **If applicable, set sunset clause date:** Month/Year

**Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?**

Yes

**Ministerial Sign-off** For final proposal stage Impact Assessments:

***I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.***

Signed by the responsible Minister:

*Norman Baker*

Date: 19 October 2011

# Summary: Analysis and Evidence

# Policy Option 1

## Description:

1a) Implement mandatory sustainability criteria as prescribed in the RED

Price Base Year 2011	PV Base Year 2010	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: 1739	High: -621	Best Estimate: 402

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low		7	106
High		52	809
Best Estimate		21	318

### Description and scale of key monetised costs by 'main affected groups'

The main cost impact is expected to be the higher costs associated with sourcing and supplying more sustainable biofuels. This would be a net cost to business in the first instance, but the competitive nature of the fuel market means that these costs would be expected to be fully passed through to the consumer in the form of pump prices.

### Other key non-monetised costs by 'main affected groups'

There may be possible indirect impacts on food prices depending on the types of fuels supplied; and possible welfare impacts of reduced driving. As there are significant uncertainties around indirect land use impacts, it is possible that greenhouse gas emissions could be higher where such effects are inadvertently caused. In addition, suppliers may face additional familiarisation costs due to the revised regulatory regime and implementing internal processes to ensure compliance.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low		142	1580
High		16	188
Best Estimate		59	720

### Description and scale of key monetised benefits by 'main affected groups'

The key monetised benefit is the greenhouse gas savings that the sustainability criteria are intended to secure, relative to the baseline.

### Other key non-monetised benefits by 'main affected groups'

Provisions to exclude biofuels sourced from areas of high biodiversity and/or carbon stocks may yield benefits not monetised in this impact assessment. Other non-monetised benefits include possible increased security of national fuel supply, potential small ancillary benefits arising from a possible reduction in driving, including congestion, air pollution, noise, road infrastructure and accidents, market / employment opportunities in UK agriculture and production of more sustainable biofuels.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5

The scale of increases to biofuel prices is the main uncertainty in estimating the costs of mandatory sustainability criteria. As such, these have been tested for high, low and central scenarios, generating the range of estimates above. See "Risks and assumptions" section of the Evidence Base for further details. Another key uncertainty remains the indirect land use effects of biofuels for which there is currently little available evidence, hence these effects have not been possible to capture in the analysis.

Direct impact on business (Equivalent Annual) £m):			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?		United Kingdom			
From what date will the policy be implemented?		15/12/2011			
Which organisation(s) will enforce the policy?		DfT			
What is the annual change in enforcement cost (£m)?		0			
Does enforcement comply with Hampton principles?		Yes			
Does implementation go beyond minimum EU requirements?		No			
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)		Traded: 2.5		Non-traded: 15.7	
Does the proposal have an impact on competition?		No			
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?		Costs: n/a		Benefits: n/a	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	Micro	< 20	Small	Medium	Large
Are any of these organisations exempt?	No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	23
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	24
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	No	17
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	Yes	24
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	Yes	25

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

## Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

### References

Include the links to relevant legislation and publications, such as public impact assessments of earlier stages (e.g. Consultation, Final, Enactment) and those of the matching IN or OUTs measures.

No.	Legislation or publication
1	EU Renewable Energy Directive – Promotion of the use of energy from renewable sources: <a href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF">http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF</a>
2	Renewable Fuels Agency carbon and sustainability data (archived) <a href="http://webarchive.nationalarchives.gov.uk/20110410141814/http://renewablefuelsagency.gov.uk/carbon-and-sustainability/rfto-reports">http://webarchive.nationalarchives.gov.uk/20110410141814/http://renewablefuelsagency.gov.uk/carbon-and-sustainability/rfto-reports</a>
3	DfT biofuels statistics webpage <a href="http://www2.dft.gov.uk/pgr/statistics/datatablespublications/biofuels/">http://www2.dft.gov.uk/pgr/statistics/datatablespublications/biofuels/</a>
4	The Renewable Transport Fuel Obligations Order <a href="http://www.legislation.gov.uk/uksi/2007/3072/contents/made">http://www.legislation.gov.uk/uksi/2007/3072/contents/made</a>
5	Department of Energy & Climate Change Energy Projections <a href="http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx">http://www.decc.gov.uk/en/content/cms/about/ec_social_res/analytic_projs/en_emis_projs/en_emis_projs.aspx</a>

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### Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

#### Annual profile of monetised costs and benefits\* - (£m) constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>
Transition costs										
Annual recurring cost										
Total annual costs										
Transition benefits										
Annual recurring benefits										
Total annual benefits										

\* For non-monetised benefits please see summary pages and main evidence base section



Microsoft Office  
Excel Worksheet

# Evidence Base (for summary sheets)

## Introduction

1. Transposition of the EU Renewable Energy Directive (RED) into UK law means that changes are required to the Renewable Transport Fuel Obligation (RTFO) in order for the UK to be compliant.
2. This Impact Assessment is one of five final stage impact assessments covering transposition of transport elements of the RED which will accompany the government response to the RED consultation which was published in March 2011. The focus of this impact assessment is the biofuel sustainability criteria requirements of the RED.
3. The suite of 5 final stage impact assessments includes:
  - i) Sustainability Criteria
  - ii) Verification of the Sustainability Criteria
  - iii) Double-Certification of Waste-Derived Biofuels
  - iv) Partially Renewable Fuels
  - v) Overarching Impacts
4. Two further impact assessments (relating to inclusion of Non Road Mobile Machinery fuel in the RTFO and the RTFO minimum threshold) were published during the consultation. Final stage impact assessments on these issues will be published at a later date alongside a further government response.
5. This impact assessment examines the costs and benefits of implementing minimum sustainability criteria for biofuels under the RTFO. These form part of the requirements of the RED, and are expected to improve the GHG savings of biofuels, contributing to tackling climate change and sustainable development policy goals.
6. There are significant uncertainties in the analysis presented, not only because of the long timeframe considered (to 2030) but also the underlying costs, benefits, fuel prices etc. The analysis is presented to 2030 to capture the potential long-run effects of the policy options. In addition, such uncertainties mean that the analysis is intended to illustrate the order of magnitude of expected effect.
7. The structure of this IA is as follows: it will set out the problem under consideration and the rationale for government intervention, before then explicitly stating the policy objectives of this intervention. The policy option is described and the methodology for analysing the costs and benefits of the policy option is explained, including the key assumptions and areas of uncertainty. Wider impacts and relevant specific impact tests are described in the annex. The impact assessment concludes by describing the preferred option.

## **Consultation Exercise**

8. This final stage impact assessment follows a public consultation exercise carried out by the Department for Transport. Interested parties were invited to comment on the policy options and underlying analysis either at public meetings (2 of which were held) or through written responses.
9. Stakeholders noted that sustainability criteria compliant biofuel does currently trade on international biofuel markets. The department has since obtained market data which has been used to test/validate estimated biodiesel price impacts. The market data showed that RED compliant biodiesel trading at a price premium of a similar magnitude<sup>1</sup> to the illustrative central estimate presented in the consultation stage impact assessment. Therefore the analysis of price impacts presented in the consultation stage impact assessment remains unchanged. No other suggestions or improvements were received in relation to the price assumptions, so in the absence of additional evidence the basic assumptions from the consultation stage impact assessment remain unchanged. However, in response to concerns raised by the Regulatory Policy Committee, sensitivities for the price adjustment phase (used in the modelling of costs) have now been added.
10. Stakeholders remarked that without action being taken to incentivise sustainability, other EU member states will become the favoured destination for sustainable biofuel, leaving the UK with the unsustainable remainder. This point of view has been reflected in revised baseline greenhouse gas (GHG) saving assumptions.
11. Stakeholders also raised concerns that the most recent RTFO data (the first 9 months of obligation year 3) had not been used in the analysis. RTFO year 3 data has now been taken into account in the analysis.

## **Problem under consideration**

12. In 2008, transport accounted for around a quarter of UK greenhouse gas emissions (132 MtCO<sub>2</sub>e) and the majority (around 90%) of those emissions come from road transport (Committee on Climate Change, 2010). The UK has legally binding climate change targets both for the long term to reduce emissions by at least 80% below 1990 levels by 2050; and, in the short term to reduce emissions by 34% below 1990 levels by 2020 (Climate Change Act, 2008). The UK also has a renewable energy target for 15% of UK energy to be supplied from renewable sources by 2020, with a transport-specific target of 10% (RED).
13. Biofuels are currently the only significant option for increasing renewable energy usage in transport, particularly in the period up to 2020 when other options are limited due to the lead in times for technological developments.
14. The RTFO currently requires fuel suppliers in the UK to provide a target volume of biofuel each year. This is currently the main mechanism through which the UK supports the supply of biofuels. The RED has implications for this mechanism because for compliance, several

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<sup>1</sup> The market data is subject to copyright, so cannot be referenced.

amendments would need to be made. As this IA focuses on the sustainability criteria of the RED, the changes to the RTFO to account for this are explained.

### **Rationale for intervention**

15. A market failure occurs when market outcomes do not maximise society's welfare. One example of this is climate change resulting from greenhouse gas emissions, which are formally known as a negative externality i.e. emissions are generated but those responsible for them do not take into account the impact they are having on others. Where the market is not likely to rectify this, it may be appropriate for public policy to do so through government intervention.
16. Biofuels have the potential to deliver GHG savings relative to fossil fuels. However, the GHG saving benefits of biofuels are not automatically captured in their market prices without public policy intervention, therefore there is no incentive to consider sustainability when meeting targets.
17. Currently, the RTFO does not directly price biofuels on the basis of % GHG savings or sustainability of the fuel, as it is a volume-based mandate. There is therefore no incentive for more sustainable or lower GHG fuels to be supplied. Government intervention to ensure sustainability is therefore justified.

### **Policy objective**

18. The transposition of the RED is intended to ensure all biofuels supplied in the UK meet the sustainability criteria, delivering a sufficient level of GHG savings to meet UK and EU renewable energy targets and demonstrate compliance with GHG saving targets.
19. The RTFO will need to be amended in order to be compliant with the RED. The particular amendment considered here is a verification system implemented to enforce sustainability criteria with a view to ensuring biofuels supplied in the UK are sustainable.
20. Implementing sustainability criteria in the RTFO will meet the requirements of the RED and will increase the overall level of GHG savings in the UK transport fuels sector, thus contributing to the UK meeting its commitments to the Fuel Quality Directive (FQD) and climate change targets.
21. The specific changes to the RTFO considered here are therefore that biofuels counted towards the RTFO targets:
  - Meet a minimum greenhouse gas saving (compared to a fossil fuel reference value).
  - Are not sourced from areas of high biodiversity.
  - Are not sourced from areas of high carbon stocks.

**Description of options considered (including baseline)**

**Baseline**

- 22. The baseline, or ‘do nothing’ option, would be to not implement the sustainability criteria as prescribed in the RED and to retain the RTFO in its current form.
- 23. This option carries the risk of infraction proceedings by the European Commission. This represents the counterfactual against which the policy option is assessed.

**Option 1A - Implement sustainability criteria as prescribed in the RED**

*GHG Savings Criteria*

- 24. The biofuel GHG saving (relative to fossil fuel) required increases over time and varies by the point in time at which a refinery commenced operation (i.e. older refineries do not have to comply with the criteria before 2013 and refineries commencing operation post-2017 are subject to a higher GHG saving threshold). In broad terms from 2011, refineries which commenced operation post 2007 are required to deliver GHG savings of at least 35%. From 2013, all refineries are required to deliver at least 35% GHG savings. From 2017, all refineries are required to deliver at least 50% GHG savings. From 2018, refineries which commence operation post 2016 are required to deliver at least 60% GHG savings.

Figure 1: Minimum GHG & grandfathering periods for biofuel installations (RED)

<i>Period</i>	<b>Date production started at an installation</b>		
	<b>Pre 24/01/08</b>	<b>Post 24/01/08</b>	<b>Post 01/01/17</b>
05/12/2010 – 31/03/2013	No criteria	35%	-
01/04/2013- 31/12/2016	35%	35%	-
01/01/2017- 31/12/2017	50%	50%	50%
01/01/2018- 31/12/2020	50%	50%	60%

- 25. Figures 2 and 3 show the levels of GHG savings being obtained by biofuels supplied under the RTFO up to Jan 2011.

Figure 2: Profile of reported biodiesel GHG savings (RTFO data Apr 2008 – Jan 2011)



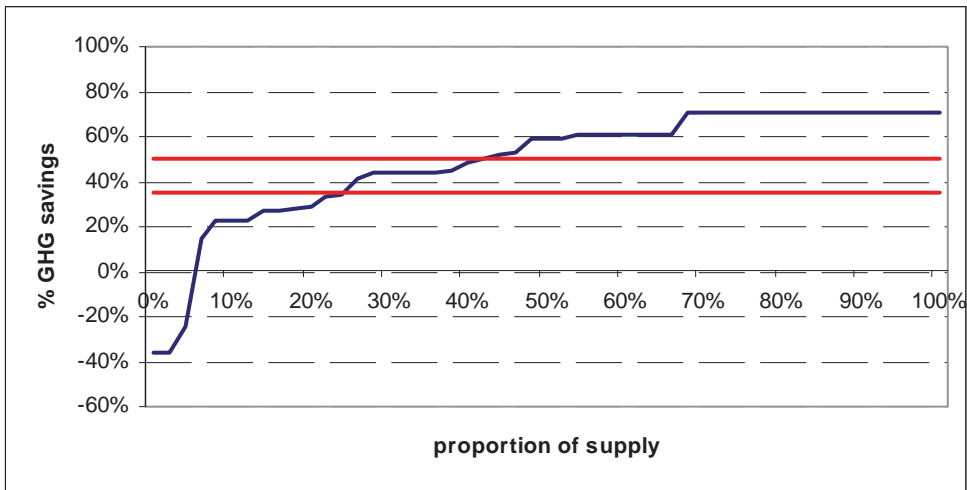
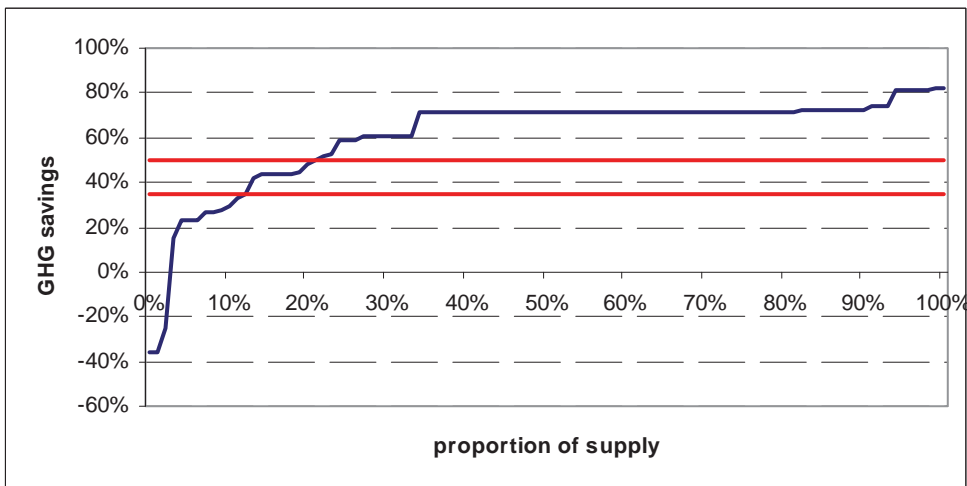


Figure 3: Profile of reported bioethanol GHG savings (RTFO data Apr 2008 – Jan 2011)



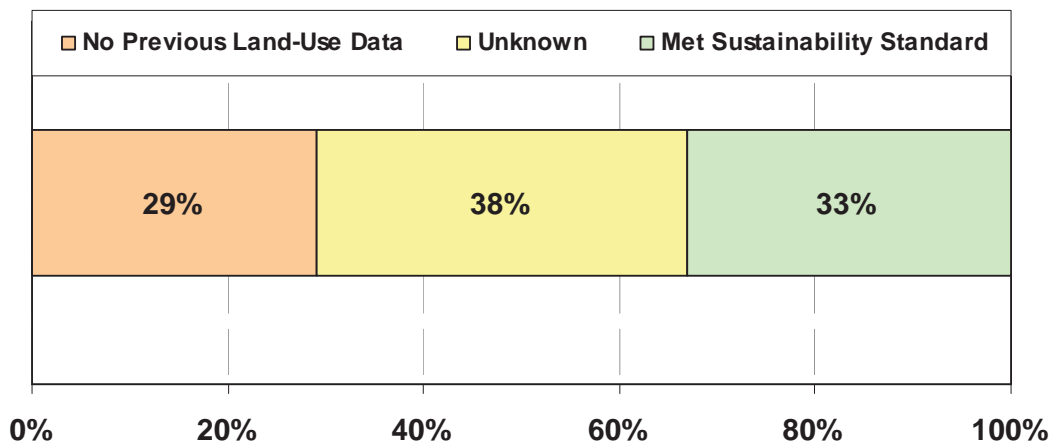
26. The horizontal lines above represent the sustainability criteria proposed, namely that biofuels supplied achieve a 35% GHG saving in 2012 and 50% saving in 2017. On the basis of fuels supplied under the RTFO up to Jan 2011, 71% of biodiesel would have exceeded the 35% GHG savings threshold and 26% would have exceeded the 50% GHG savings threshold. 87% of bioethanol would have exceeded the 35% GHG savings threshold and 79% would have exceeded the 50% GHG savings threshold. The sustainability criteria would be expected to raise the minimum and average levels of GHG savings delivered by biofuels supplied in the UK. In order to achieve higher GHG savings, there may be some increase in the cost of biofuels.
27. Biofuel producers are expected to increase average GHG savings following the implementation of the sustainability criteria. This can be achieved in a number of ways including increasing crop yields, reducing fertiliser use and improving energy efficiency / GHG intensity of refining processes.

#### *Land Based Criteria*

28. The implications of the requirement that biofuels are not sourced from areas of high carbon stock or high biodiversity areas are particularly uncertain and difficult to evaluate.

29. Figure 4 gives an indication of the proportions of the current UK biofuel supply that could be affected by the land-based criteria. Those with no previous land-use data could be considered more likely to not satisfy the land-based criteria. Those which have supplied land-use data but not demonstrated compliance with current RFA sustainability standards may or may not satisfy the land-based criteria. Those which have demonstrated compliance with current RFA sustainability standards could be considered more likely to satisfy the land-based criteria.

Figure 4: UK biofuel supply by land-use sustainability data (RFA provisional 2009/10 data)



30. Given that there is significant global agricultural production occurring in areas which do not have high carbon stocks or biodiversity, it is anticipated that the market will adapt and obligated suppliers will be able to obtain increased volumes of compliant biofuel following the introduction of the sustainability criteria. However, there may be some short term price pressures as biofuel producers gradually adapt to the requirements of the criteria.

**Cost benefit analysis**

**Baseline**

31. The baseline provides the counterfactual against which the costs and benefits of the policy option are assessed. The baseline in this case is the unamended RTFO (as it exists currently in legislation in July 2011) with no sustainability criteria in place. The RTFO requires that obligated road transport fuel suppliers must supply a given proportion of their fuel as biofuel. This proportion is determined by the RTFO target (which is expressed in volume terms).

Figure 5: RTFO trajectory

	Target Level
<b>2012/13</b>	4.5%
<b>2013/14</b>	5.0%
<b>2014 onwards</b>	5.0%

32. Given that all other EU member states would be expected to implement the RED sustainability criteria (as they are legally required to do), high GHG saving RED-compliant

biofuel is assumed to be diverted to these markets with the UK market receiving the relatively unsustainable (low GHG savings) remainder.

33. This effect has been modelled by assuming that the baseline profile of GHG savings reflects the GHG saving profile of the bottom 50% of the actual GHG savings distribution reported under the RTFO up to Jan 2011. Therefore in the baseline 42% of biodiesel and 74% of bioethanol supplied meets the 35% GHG saving requirement and 0% of biodiesel and 58% of bioethanol supplied meets the 50% GHG saving requirement.

Figure 6: Profile of projected baseline biodiesel GHG savings

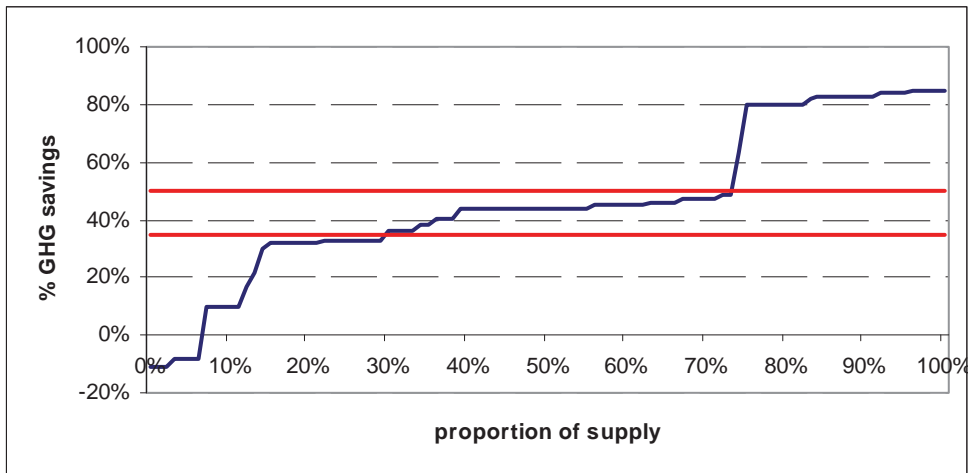
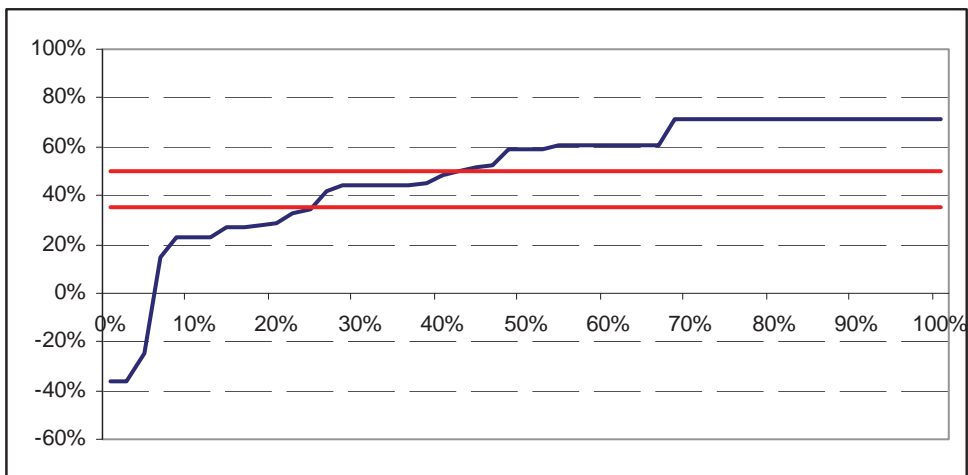


Figure 7: Profile of projected baseline bioethanol GHG savings



34. Given the uncertainty around the baseline GHG savings distribution, 'high baseline GHG savings' and 'low baseline GHG savings' sensitivities have also been explored in the following analysis of GHG saving benefits. The 'high baseline GHG savings' scenario has been modelled by assuming that the baseline profile of GHG savings reflects the GHG saving profile of the actual GHG savings distribution reported under the RTFO up to Jan 2011 (see figures 2 and 3). The 'low baseline GHG savings' takes the bottom 25%.
35. The infraction risk (i.e. a fine for failing to comply with an EU directive) for this option has not been explicitly monetised in the Impact Assessment.

## Option 1a) Implement sustainability criteria as prescribed in the RED

### Costs

36. The potential cost impacts of the sustainability criteria are subject to considerable uncertainty; the following estimates of the potential impacts are therefore presented across a necessarily wide range.
37. In general, the sustainability criteria would be expected to restrict, to some extent, the origin of the feedstock (i.e. sourcing feedstock from high GHG saving 'NUTS2' regions or crop land with high yields) used for the production of compliant biofuel and require biofuel producers to switch to less GHG intensive production processes.
38. Following implementation of the sustainability criteria, a sudden increase in demand for compliant fuels, combined with an initial shortage in compliant supply is expected to create 'tight' market conditions which would lead to a sharp increase of the price of sustainability criteria compliant biofuel. Higher prices will enable biofuel producers and farmers to make the necessary investments to improve the sustainability of their processes. There are a number of investments that can be made to improve the sustainability of biofuel. These include upgrading from a gas 'heat only' boiler (which is used to produce process heat) to a gas 'combined heat and power' boiler which has lower GHG emissions or installing a methane capture unit at a palm oil mill.
39. After the initial price spike, the market is assumed to gradually adapt to the requirements of the sustainability criteria and prices (of compliant biofuel) are projected to gradually return to trend as producers recoup the additional capital costs incurred in order to comply with the criteria and market forces identify the most cost effective sources of compliant feedstock.
40. It is believed that the assumption of prices returning to trend is justified because a significant volume of biofuel which is currently supplied under the RTFO (and can therefore be produced profitably at current 'trend' market prices) is already sustainability criteria compliant. If these production processes can be replicated more widely (at no additional cost) then all of the obligation could be met without an increase in costs. There are likely to be transition costs associated with replicating these processes and these have been captured by the 'price spike' outlined in paras 38 & 39.
41. The following cost-benefit analysis assesses this market adjustment period by exploring 'pinch points' in biofuel price projections i.e. hikes in the price of biofuel reflecting the increased demand for available criteria-compliant biofuels. The 'pinch points' have been modelled to reflect the market response to introduction of the criteria in 2012 and subsequent tightening in 2017.
42. Given the uncertainty over the impact these factors may have on the price of biofuel, scenario analysis has been used to reflect low, medium and high price impacts. It could be

assumed that these scenarios reflect the ability of the biofuel market to react to the changes in demand and the underlying costs of those fuels offering higher GHG savings.

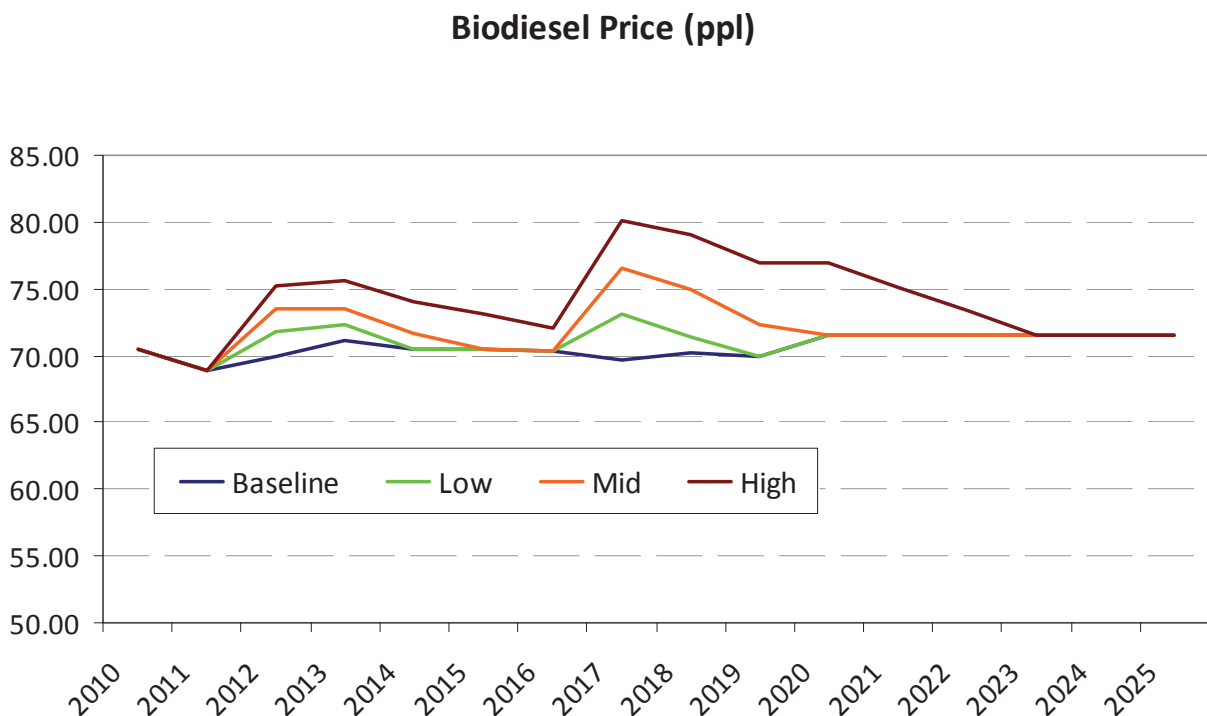
### Biodiesel

43. The scenarios explored for biodiesel prices are shown in figures 8 and 9. The prices of sustainability criteria compliant biofuel is expected to rise above the baseline following the introduction of criteria in 2012 and 2017. The central scenario for 2012 is consistent with current market data. The price impacts in 2017 are subject to greater uncertainty but are expected to be greater due to increased stringency of the criteria. A range around the central estimate has been taken to reflect this uncertainty. Prices are then assumed to fall gradually back to trend as the market adapts to the criteria (see para 37 -38 for more detail). The length of time taken for prices to fall back to trend is also uncertain and has been varied across scenarios to reflect this uncertainty.

Figure 8: Scenarios for biodiesel price increases in 2012 and 2017 (% increase above baseline)

Biodiesel	Low	Central	High
2012	2.5%	5.0%	7.5%
2017	5.0%	10.0%	15.0%

Figure 9: Scenarios for biodiesel price increases, 2010 – 2020 (2010 prices)



44. Under the low scenario the price of biodiesel is assumed to increase by 2.5% in 2012 (with the introduction of the sustainability criteria) and fall gradually back down to baseline levels over the following 1.5 years. In 2017, when the 50% minimum GHG savings criteria is introduced, the biodiesel price rises 5% above baseline and then falls back down to trend over the following 1.5 years.

45. Under the central scenario the price of biodiesel is assumed to increase by 5% in 2012 and fall gradually back down to baseline levels over the following 3 years. In 2017, when the 50% minimum GHG savings criteria is introduced, the biodiesel price rises 10% above baseline and then falls back down to trend over the following 3 years.
46. Under the high scenario the price of biodiesel is assumed to increase by 7.5% in 2012 and fall gradually back down to baseline levels over the following 6 years. In 2017, when the 50% minimum GHG savings criteria is introduced, the biodiesel price rises 15% above baseline and then falls back down to trend over the following 6 years.

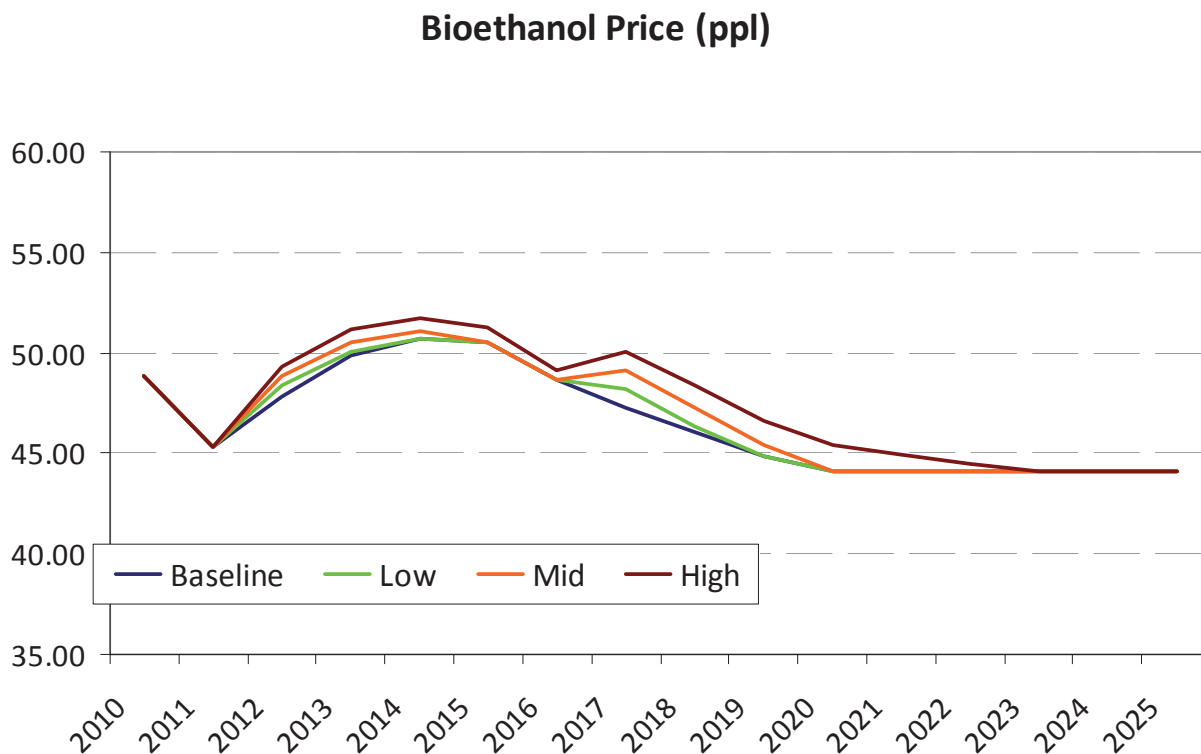
### *Bioethanol*

47. The price impacts of the sustainability criteria on ethanol have been modelled in the same way as biodiesel. However, bioethanol prices are assumed to increase to a lesser extent than biodiesel prices. This is due to two main factors: (1) according to RTFO data, bioethanol GHG savings are on average substantially closer to the sustainability criteria and (2) the potential global supply of sustainable biodiesel is expected in the long run to be more constrained than that of sustainable bioethanol. There also potentially exists a large residual market for non-compliant bioethanol in the USA. The scenarios explored for bioethanol prices are shown in figures 10 and 11. It has not been possible to obtain current market data on sustainability criteria compliant bioethanol prices with which to validate the price assumptions.

Figure 10: Scenarios for bioethanol price increases in 2012 and 2017 (% increase)

Bioethanol	Low	Central	High
2012	1.0%	2.0%	3.0%
2017	2.0%	4.0%	6.0%

Figure 11: Scenarios for bioethanol price increases, 2010 – 2020 (2010 prices)



48. Under the low scenario the price of bioethanol is assumed to increase by 1% in 2012 (with the introduction of the sustainability criteria) and fall gradually back down to baseline levels over the following 1.5 years. In 2017, when the 50% minimum GHG savings criterion is introduced, the bioethanol price rises 2% above baseline and then falls back down to trend over the following 1.5 years.
49. Under the central scenario the price of bioethanol is assumed to increase by 2% in 2012 and fall gradually back down to baseline levels over the following 3 years. In 2017, when the 50% minimum GHG savings criterion is introduced, the bioethanol price rises 4% above baseline and then falls back down to trend over the following 3 years.
50. Under the high scenario the price of bioethanol is assumed to increase by 3% in 2012 and fall gradually back down to baseline levels over the following 6 years. In 2017, when the 50% minimum GHG savings criterion is introduced, the bioethanol price rises 6% above baseline and then falls back down to trend over the following 6 years.

**Validation**

51. During the consultation process, it was brought to the department’s attention that sustainability criteria-compliant biofuel currently trades on international biofuel markets. Therefore it has been possible to test/validate the estimated biodiesel price impacts used in this impact assessment. Recent market data shows that RED compliant biodiesel is trading at a price premium of a similar magnitude to the central estimate (for 2012)

presented in this impact assessment. It has not been possible to obtain equivalent data for bioethanol prices.

### **Compliance Costs**

52. When combined with future biofuel supply projections (which have been produced using the OECD FAO Aglink-Cosimo model – see annexes 6 and 7) the estimated biodiesel and bioethanol price impacts can be used to project the additional compliance costs attributable to implementation of the sustainability criteria for the RTFO as a whole. The estimated profile compliance costs (over the period to 2030) under each of the scenarios are presented in figure 12.

Figure 12: projected sustainability criteria compliance cost profile (£m, undiscounted, 2010 prices)

	<b>Bioethanol</b>	<b>Biodiesel</b>
<b>2012</b>	8.8	46.3
<b>2013</b>	6.5	35.8
<b>2014</b>	3.2	18.2
<b>2015</b>	0	0
<b>2016</b>	0	0
<b>2017</b>	15.6	113.2
<b>2018</b>	9.8	77.0
<b>2019</b>	4.6	38.8
<b>2020</b>	0	0
<b>2021</b>	0	0
<b>2022</b>	0	0
<b>2023</b>	0	0
<b>2024</b>	0	0
<b>2025</b>	0	0
<b>2026</b>	0	0
<b>2027</b>	0	0
<b>2028</b>	0	0
<b>2029</b>	0	0
<b>2030</b>	0	0

### **Cost Pass Through**

53. All additional RTFO compliance costs are assumed to be passed through 100% from obligated fuel suppliers to final consumers of road transport fuel. The increased cost of supplying bioethanol is assumed to be passed through to petrol prices (as bioethanol is blended with petrol) and the increased cost of supplying biodiesel is assumed to be passed through to diesel pump prices. The estimated pump price impacts (inclusive of additional VAT) for petrol and diesel are outlined in figure 13.



Figure 13: Projected pump price impacts of minimum sustainability criteria under central cost scenario (pence per litre, 2010 prices, undiscounted)

	Petrol	Diesel
2012	0.05	0.19
2013	0.04	0.14
2014	0.02	0.07
2015	0	0
2016	0	0
2017	0.11	0.42
2018	0.07	0.28
2019	0.04	0.14
2020	0	0
2021	0	0
2022	0	0
2023	0	0
2024	0	0
2025	0	0
2026	0	0
2027	0	0
2028	0	0
2029	0	0
2030	0	0

54. Projected pump price impacts, which are driven by the assumed increase in biofuel prices, peak in 2017 at around 0.4 pence per litre (including VAT) for diesel and 0.1 pence per litre for petrol including VAT

#### Business Familiarisation Costs

55. Implementation of the sustainability criteria will also impose ‘familiarisation costs’ on obligated suppliers, companies in the biofuel supply chain (including farmers) and auditors who will be required to verify compliance. Companies which are required to comply with the criteria will need to be familiar with the regulation and also the technical guidance produced by the RTFO administrator (DfT). Some companies may also send representatives to engage directly with the RTFO administrator at stakeholder workshops. In general, the magnitude of these costs will be dictated by the amount of time a particular organisation has to spend on becoming familiar with the requirements of the criteria. This is expected to vary by the size of the company and the scale and complexity of their operations. It has not been possible to quantify this cost.

#### **Benefits**

56. Implementation of the minimum sustainability criteria is expected to deliver benefits through:
- Improved lifecycle GHG savings from biofuels supplied under the RTFO
  - Improved biodiversity outcomes
  - Reduced depletion of high carbon stock land

57. Of these three impacts it has only been possible to quantify estimated improvements in lifecycle GHG savings from biofuels supplied under the RTFO.
58. The sustainability criteria would be expected to increase the level of GHG savings delivered by biofuels supplied in the UK. This benefit can be monetised using Department of Energy and Climate Change carbon values.
59. To estimate the quantity of net carbon saved through sustainability criteria, a baseline of existing GHG savings must first be established. Figures 6 and 7 show the projected baseline (i.e. the RTFO without sustainability criteria enforced) profile of future GHG emissions for bioethanol and biodiesel supplied under the RTFO.
60. The analysis proceeds by estimating what the difference in total GHG savings would be if all biofuels with GHG savings below the minimum threshold were raised to meet the minimum GHG saving requirement (biofuel supplied in the baseline with GHG savings above the minimum threshold are assumed to remain unchanged). Potential GHG savings in excess of the minimum (which may occur as a result of the sustainability criteria) have not been assessed.

Figure 14: GHG savings delivered by sustainability criteria (central baseline scenario), 2011 – 2030

	MtCO <sub>2</sub> e Saved	
	Bioethanol	Biodiesel
2012	0.07	0.34
2013	0.08	0.39
2014	0.07	0.40
2015	0.07	0.41
2016	0.07	0.41
2017	0.13	0.98
2018	0.13	0.99
2019	0.13	1.00
2020	0.12	1.01
2021	0.12	1.01
2022	0.12	1.01
2023	0.12	1.02
2024	0.12	1.02
2025	0.12	1.03
2026	0.12	1.03
2027	0.11	1.04
2028	0.11	1.04
2029	0.11	1.05
2030	0.11	1.05

61. These carbon savings are then priced at the non-traded and traded carbon values accordingly (see annex 8 for a more detailed description of the GHG accounting methodology). Under this approach 16.2 MTCO<sub>2</sub>e (over the period 2012 to 2030) of net GHG savings are estimated to take place in the non-traded sector (e.g. UK agriculture) and 2.6 MTCO<sub>2</sub>e are attributed to the traded sector (e.g. UK industry and rest of world industry/agriculture). The resulting valuations of total carbon saving benefits are as follows:

Figure 15: Value of tCO<sub>2</sub>e saved (central carbon prices), 2010 prices (undiscounted)

	Value of tCO <sub>2</sub> e Saved, £2010	
	Bioethanol	Biodiesel
2012	3.4	16.3
2013	3.7	18.8
2014	3.6	19.6
2015	3.5	20.3
2016	3.4	20.9
2017	6.9	50.3
2018	6.8	51.6
2019	6.7	53.0
2020	6.6	54.3
2021	6.8	55.8
2022	6.9	57.8
2023	7.0	59.7
2024	7.1	61.7
2025	7.3	63.8
2026	7.4	65.7
2027	7.5	67.7
2028	7.6	69.6
2029	7.7	71.5
2030	7.8	73.4

62. The above analysis monetises the estimate of the potential direct GHG savings due to the minimum GHG savings element of the sustainability criteria. Potential benefits of the remaining element of the sustainability criteria - the land-based criteria - would include avoided GHG emissions and improved biodiversity outcomes. However, there is at present no clear consensus or data regarding how such benefits should be accurately quantified or monetised.

Summary of Costs and Benefits

63. The costs and benefits associated with the administration and verification of the sustainability criteria have been assessed separately in an accompanying impact assessment; they are therefore not discussed here.

64. The above analysis is summarised in figure 16.

Figure 16: Summary table of costs and benefits of sustainability criteria

2010 prices			
Discounted to 2011	Low	Central	High
<b>Costs</b>			
PV: Increased Fuel Prices (£m)	105.9	318.1	809.0
Average Annual Costs, 2011-2031 (£m/yr)	6.9	21.0	55.2
<b>Benefits</b>			
PV: Increased GHG Savings (£m)	1738.9	720.4	187.8
Average Annual Benefits, 2011-2031 (£m/yr)	142.0	59.4	15.6
<b>Net Present Value (£m)</b>	1633.0	402.3	-621.2
<b>Max ppl impact (inc VAT) in 2017 - Petrol</b>	0.06	0.07	0.11
<b>Max ppl impact (inc VAT) in 2017 - Diesel</b>	0.21	0.42	0.63

65. The maximum potential costs of supplying biofuel (and therefore also the sustainability criteria) are effectively capped by the RTFO buy-out price which is currently set at £0.30/litre. Therefore, the sustainability criteria are not expected to become prohibitively expensive in terms of pump price impacts, since the buyout price effectively caps the level of potential pump price impacts of biofuels policy.
66. Given the competitive nature of the fuel market, costs to suppliers of higher biofuel prices are expected to be passed through to the consumer at the pump. Therefore the impact of higher biofuel prices would fall to firms and consumers based on the proportion of petrol and diesel they account for.
67. The above analysis does not monetise all the potential benefits of the sustainability criteria. In particular, the potential benefits of the land-based criteria would include avoided GHG emissions and improved biodiversity outcomes. However, there is at present no clear consensus or data regarding how such benefits should be accurately quantified or monetised.

### **Risks and assumptions**

68. The main areas of uncertainty in the preceding cost-benefit analysis are (1) the biofuel price uplift and (2) the price adjustment phase (i.e. the period of time taken for prices to adjust back down to trend following introduction of the criteria).
69. Biofuel price uplifts resulting from the sustainability criteria are explored using low, central and high scenarios. This provides a sensitivity analysis for the total estimated cost of sustainability criteria and the length of the price adjustment phase (i.e. the length of time it takes the biofuel price to return to trend following introduction of the sustainability criteria). The actual marginal increase in biofuel prices would be affected by a wide range of interacting factors, including: global agricultural supply and demand for a variety of biofuel feedstocks; the technological potential for various feedstocks to deliver higher GHG savings; the market response in terms of the composition of fuel supplied; costs associated with increasing GHG savings delivered by various feedstocks; the availability of capital

investment to deliver improvements to biofuel production facilities; the mix of feedstocks used in blending bioethanol and biodiesel; etc.

70. Along with the assumptions explained in the costs section of this impact assessment, other assumptions have been adopted in producing this analysis. These are the following:
71. Oil prices are sourced from DECC fossil fuel price projections.
72. No new biofuel installations from 2018 – this is a simplifying assumption, as it is not possible to quantify what percentage biofuels would actually be supplied from such installations. The higher GHG target for post-2018 installations could also represent an incentive for installations to be built prior to 2018.
73. No pre-23/01/08 installations – also a simplifying assumption, required as the availability of data on the exact age of installations is constrained and it would be unclear what percentage of biofuel might be expected to be supplied by such installations in future years. These installations are assumed to have been preparing for the 35% target as the allowance for pre-23/01/08 installations only applies to April 2013 and several may already deliver at least 35% GHG savings.
74. Any additional benefits from criteria barring the use of biofuels grown on areas with high biodiversity / carbon stocks – the benefits of this part of the sustainability criteria have not been explicitly monetised, because there is at present no clear consensus or data regarding how such benefits should be accurately quantified or monetised. In addition, increasing GHG savings by sourcing sustainability criteria-compliant biofuels could at the same time divert biofuel demand away from areas of high biodiversity / carbon stocks. This could occur if biofuel produced on land that has changed its land use category has to undergo a full before-and-after carbon stock assessment, which could lead to the fuel not passing the minimum GHG saving threshold. The costs of meeting all elements of the sustainability criteria are included in the scenarios for price increases. Also the exact definition of one of the major “areas with high biodiversity” – highly biodiverse grasslands, has yet to be determined by the European Commission.

### **Administrative burden and policy savings calculations**

75. The second impact assessment out of the suite of five final stage impact assessments in this joint impact assessment addresses administrative costs of verifying compliance with the sustainability criteria. While a system of verification is necessary in order to enforce the sustainability criteria, there are a number of options as to how it could be implemented. Therefore a separate impact assessment is dedicated to comparing these options.
76. There may also be minimal additional search costs in securing new supplies of biofuel which meet the requirements of the sustainability criteria. These have not been quantified.

### **Wider impacts**

77. Biofuels could potentially deliver lower GHG savings than currently reported if Indirect Land Use Change (ILUC) impacts were found to be negative. These could arise from the displacement by biofuel feedstocks of other agricultural products onto non-agricultural land. However, currently the impacts are not sufficiently well quantified or understood to be able to be incorporated into GHG calculations. How any particular policy response regarding ILUC would affect the current sustainability criteria also remains unknown. There is a review clause in the RED for the European Commission to recommend how to address ILUC. Therefore, although recognised as an issue, ILUC impacts have had to be excluded from the present analysis of sustainability criteria.
78. A possible increase in biofuel prices is expected to feed through to pump prices, which could in turn marginally increase the cost of driving and reduce the demand for driving (and transport fuel). In turn, this could possibly lead to small ancillary impacts, including reduced congestion, air pollution, noise, road infrastructure and accidents. However, the likely relative magnitude of such effects is expected to be relatively small, particularly given the magnitude of the estimated pump price effects and compared with the fuel resource costs and GHG savings. The total monetisable costs and benefits would be almost entirely comprised of fuel resource costs and GHG savings, respectively.
79. The UK typically supplies biofuels that offer higher GHG savings than across the EU; according to RTFO data (around 90% of biofuel produced in the UK meets the current qualifying standard). Increased sustainability of biofuels supplied in the UK could incentivise greater UK production of biofuels, as fuel suppliers would be incentivised to use sustainability criteria-compliant biofuels, including those produced in the UK. This could lead to greater output and employment opportunities in agriculture and the production of more sustainability criteria-compliant biofuels. Sustainability criteria could potentially improve biodiversity outcomes in the UK and the rest of the world if biofuels with negative biodiversity impacts were disincentivised through the RTFO. However, there is no obvious or clear methodology for monetising any of these impacts, as the size of the potential benefits would be highly uncertain.

### **Summary and preferred option with description of implementation plan**

80. Implementing the sustainability criteria as prescribed in the RED (1a) is the preferred option as it will increase GHG savings and improve the sustainability of biofuel supplied under the RTFO. The transposition of the sustainability criteria is compulsory under the RED and would be implemented via amending the RTFO to include their provision in legislation.

## Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

### Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. If the policy is subject to a sunset clause, the review should be carried out sufficiently early that any renewal or amendment to legislation can be enacted before the expiry date. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

<p><b>Basis of the review:</b> [The basis of the review could be statutory (forming part of the legislation), i.e. a sunset clause or a duty to review, or there could be a political commitment to review (PIR)];</p> <p>A review of all the RTFO amendments proposed in this consultation exercise will be conducted in advance of April 2014.</p>
<p><b>Review objective:</b> [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?]</p> <p>The objective of the review will be to evaluate whether RTFO amendments are performing as intended.</p>
<p><b>Review approach and rationale:</b> [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach]</p> <p>The review will consist of an analysis of the impact of the RTFO amendments and will draw upon collected market data and stakeholder views.</p>
<p><b>Baseline:</b> [The current (baseline) position against which the change introduced by the legislation can be measured]</p> <p>Sustainability and price data from biofuels markets unaffected by the minimum sustainability criteria will be used to form a baseline against which the impact of the minimum sustainability criteria can be evaluated.</p>
<p><b>Success criteria:</b> [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]</p> <p>An improvement in the sustainability characteristics of the UK renewable transport energy supply without a large increase in costs.</p>
<p><b>Monitoring information arrangements:</b> [Provide further details of the planned/existing arrangements in place that will allow a systematic collection of monitoring information for future policy review]</p> <p>The RTFO administrator collects detailed data on RTFO performance.</p>
<p><b>Reasons for not planning a review:</b> [If there is no plan to do a PIR please provide reasons here]</p>

### Annex 2 - Competition Assessment

81. The same set of sustainability criteria will apply equally to all biofuel suppliers. Setting minimum GHG savings for all biofuels will also help ensure a more even playing field by defining an agreed minimum market standard for biofuels. The introduction of sustainability criteria is anticipated by existing biofuel suppliers, and has been at least since the introduction of the Renewable Energy Directive in 2009, which includes provision for sustainability criteria.

82. There would also be likely to be an impact on those that are currently more reliant on those feedstocks that would not meet the criteria - costs could be higher for such suppliers as they adjust their supply practices. However, such costs would be capped by the RTFO buyout price, since if sourcing criteria-compliant feedstocks happened to cost more on a per litre basis than the buyout price, such companies would be expected to buy out.

### **Annex 3 - Small Firms Assessment**

83. The Renewable Transport Fuel Obligations Order exempts small transport fuel suppliers (supplying less than 450,000 litres/year). From having to supply biofuel under the RTFO.
84. The RED sustainability criteria apply equally to all biofuel suppliers, and allow no exceptions. However, the way that the verification processes are structured potentially reduces the impact on these suppliers. The proposed legislative changes to the RTFO would require that verification (of meeting the sustainability criteria) is done to at least the ISAE3000 limited assurance standard, by a verifier who has the correct skills for the audit they are undertaking. Small suppliers of predominantly waste-derived biofuels may be able to utilise their independent accountant to verify that their product was derived from waste.
85. This will be relevant to many small firms, as to date biofuel producing SMEs have tended to supply biodiesel from used cooking oil, where the verification will be relatively straightforward (i.e. cross checking of volumes produced against waste transfer notes for UCO etc.). As such they will be able to use their accountants, which should be significantly cheaper than using a specialist audit company. Therefore the administrative costs of sustainability criteria are expected to be minimal.
86. In the UK, some 15.2% of biofuel supplied in 2009/2010 was supplied from wastes (RFA provisional 2009/10 data). As this is a biofuel that does not have to pass the high biodiversity and high carbon stock assessment, and many of the suppliers of such fuels are small, they may be expected to benefit to a greater extent than other suppliers. However, because these firms supply very low volumes of fuel, they make up a relatively small percentage of the overall supply of waste-derived biofuel.

### **Annex 4 - Rural Proofing Assessment**

87. UK biofuel feedstocks have the potential to meet a proportion of UK biofuel demand, and some deliver relatively higher GHG savings than feedstocks from other countries (above the minimum GHG savings thresholds). There is also a lower potential for UK biofuel feedstock to be sourced from areas of high carbon stock or biodiversity relative to other countries.
88. Therefore, the proposed sustainability criteria may potentially encourage demand for UK feedstock-derived biofuels, meaning some new business and job opportunities in rural areas as part of an expanding UK biofuel supply chain.



## **Annex 5 - Sustainable Development**

89. The addition of sustainability criteria for biofuels will help ensure that the increase in the use of biofuels in transport delivers carbon reductions and helps tackle climate change. In addition, the restrictions on feedstocks that have been directly grown on land with high carbon stocks and/or high biodiversity will contribute more widely to sustainable development (although these impacts have not been quantified).

## **Annex 6 - Aglink-Cosimo Global Agricultural Model**

90. The biofuel prices that are assumed in the analysis are derived from outputs produced by the OECD-FAO Aglink-Cosimo model. The OECD-FAO Aglink-Cosimo model is a partial equilibrium agricultural commodities model that has a biofuels module attached to it. The biofuels component of the model is focused on four major economic centres: the EU27 group, the USA, Canada, and Brazil. Other important economic areas also enter the modelling, however, including Indonesia, Thailand, Argentina, and China. This gives good coverage of biofuel production: these areas accounted for 95% of world ethanol production and 82% of world biodiesel production in 2007.
91. The model operates by taking a bottom up approach to estimating ethanol and biodiesel prices. Net cost production functions take into account feedstock prices, production costs, revenues from by-products and capital costs. These net cost functions interact with demand functions that are defined by mandates and the price of fossil fuel substitutes. This market clearing price mechanism operates in terms of a global market, taking into account prevailing restrictions on international trade.
92. The OECD-FAO Aglink-Cosimo model was used to generate ethanol and biodiesel price outputs under different EU27 biofuel mandates against a baseline level of demand from other key economic regions. Each run of the model generated one mandate/price output scenario that was interpreted as an individual point on a EU27 consumption supply curve. This process was repeated over a variety of oil price and agricultural yield scenarios in order to give a range of possible biofuel costs and prices. These supply curves were then used to estimate the price of ethanol and biodiesel assuming that the UK is a price taker in the EU27 market. The steps involved in this methodology are set out more fully below.
93. The OECD-FAO Aglink-Cosimo baseline that was used for the preparation of the 2008 OECD outlook paper was taken as the starting point, but it was necessary to make a few adjustments to the assumptions to create a suitable baseline for this analysis. The most important update was issued to include up to date assumptions on mandates in the major economic centres. The US demand side included the Energy Independence and Security Act (EISA). The Brazilian mandate on biodiesel was included, and the Brazilian tax incentives that stimulate the production of ethanol were kept in line with OECD estimates. The much smaller Canadian targets of a 5% ethanol blend and a 2% biodiesel blend by 2010 are also built into the baseline. Exchange rates used are in accordance with those assumed for DECC fossil fuel price projections.

94. This produces sets of prices for both ethanol and biodiesel on a pence per litre basis that were fed into the cost benefit analysis under the UK uptake assumptions that were outlined previously in the section on counterfactuals. This assumes that the UK is a price taker, where the obligation level in the UK has no influence on the price of ethanol or biodiesel that is found in the EU.

## **Annex 7 – Data Tables**

95. The following input data assumptions were used in the cost benefit analysis modelling.

Figure 20: Carbon Price projections (£/tCO<sub>2</sub>e, 2010 prices)

	low		central		high	
	traded	non-traded	traded	non-traded	traded	non-traded
<b>2012</b>	8	27	14	53	18	80
<b>2013</b>	8	27	15	54	19	81
<b>2014</b>	8	27	15	55	19	82
<b>2015</b>	8	28	15	56	19	84
<b>2016</b>	8	28	15	57	19	85
<b>2017</b>	8	29	16	57	20	86
<b>2018</b>	8	29	16	58	20	87
<b>2019</b>	8	30	16	59	20	89
<b>2020</b>	8	30	16	60	21	90
<b>2021</b>	11	31	22	61	29	92
<b>2022</b>	14	31	27	62	38	93
<b>2023</b>	16	32	32	63	46	95
<b>2024</b>	19	32	38	64	54	96
<b>2025</b>	22	33	43	65	63	98
<b>2026</b>	24	33	49	66	71	99
<b>2027</b>	27	34	54	67	80	101
<b>2028</b>	30	34	59	68	88	102
<b>2029</b>	32	35	65	69	97	104
<b>2030</b>	35	35	70	70	105	105

Source: DECC

Figure 21: Biofuel Price Projections (pence per litre, 2010 projections)

	biodiesel	bioethanol
<b>2012</b>	70	48
<b>2013</b>	71	50
<b>2014</b>	70	51
<b>2015</b>	70	51
<b>2016</b>	70	49
<b>2017</b>	70	47
<b>2018</b>	70	46
<b>2019</b>	70	45
<b>2020</b>	72	44
<b>2021</b>	72	44
<b>2022</b>	72	44

<b>2023</b>	72	44
<b>2024</b>	72	44
<b>2025</b>	72	44
<b>2026</b>	72	44
<b>2027</b>	72	44
<b>2028</b>	72	44
<b>2029</b>	72	44
<b>2030</b>	72	44

Source: OECD FAO Aglink-Cosimo model

Figure 22: Petrol/Diesel split

	diesel	petrol
<b>2012</b>	61.0%	39.0%
<b>2013</b>	62.6%	37.4%
<b>2014</b>	64.2%	35.8%
<b>2015</b>	65.7%	34.3%
<b>2016</b>	67.0%	33.0%
<b>2017</b>	68.1%	31.9%
<b>2018</b>	69.0%	31.0%
<b>2019</b>	69.9%	30.1%
<b>2020</b>	70.6%	29.4%
<b>2021</b>	70.5%	29.5%
<b>2022</b>	71.0%	29.0%
<b>2023</b>	71.4%	28.6%
<b>2024</b>	71.7%	28.3%
<b>2025</b>	72.0%	28.0%
<b>2026</b>	72.3%	27.7%
<b>2027</b>	72.6%	27.4%
<b>2028</b>	72.9%	27.1%
<b>2029</b>	73.2%	26.8%
<b>2030</b>	73.4%	26.6%

Source: DfT National Transport Model

Figure 23 : Total Road Transport Fuel Demand (billion litres)

	diesel	petrol
<b>2012</b>	29.4	20.4
<b>2013</b>	30.2	19.5
<b>2014</b>	31.1	18.7
<b>2015</b>	31.6	17.9
<b>2016</b>	32.1	17.1
<b>2017</b>	32.5	16.5
<b>2018</b>	32.9	16.0
<b>2019</b>	33.3	15.5
<b>2020</b>	33.6	15.1
<b>2021</b>	33.5	15.2
<b>2022</b>	33.7	14.9
<b>2023</b>	33.9	14.7
<b>2024</b>	34.1	14.6

<b>2025</b>	34.3	14.4
<b>2026</b>	34.5	14.3
<b>2027</b>	34.6	14.1
<b>2028</b>	34.7	14.0
<b>2029</b>	34.9	13.9
<b>2030</b>	35.0	13.7

Source: Based on DECC UEP and DfT NTM modelling

Figure 24: RTFO Biofuel Demand (billion litres)

	biodiesel	bioethanol
<b>2012</b>	1.3	0.9
<b>2013</b>	1.5	1.0
<b>2014</b>	1.6	0.9
<b>2015</b>	1.6	0.9
<b>2016</b>	1.6	0.9
<b>2017</b>	1.6	0.8
<b>2018</b>	1.6	0.8
<b>2019</b>	1.7	0.8
<b>2020</b>	1.7	0.8
<b>2021</b>	1.7	0.8
<b>2022</b>	1.7	0.7
<b>2023</b>	1.7	0.7
<b>2024</b>	1.7	0.7
<b>2025</b>	1.7	0.7
<b>2026</b>	1.7	0.7
<b>2027</b>	1.7	0.7
<b>2028</b>	1.7	0.7
<b>2029</b>	1.7	0.7
<b>2030</b>	1.7	0.7

Source: Based on DECC UEP and DfT NTM modelling

## **Annex 8 — GHG accounting methodology**

96. In order to monetise the net change in lifecycle GHG emissions which are projected to occur under a GHG savings obligation, GHG savings and emissions have been split into various sectors and valued at the relevant carbon price. The monetised value of GHG emissions is subtracted from the value of GHG savings to produce a value for lifecycle GHG savings.

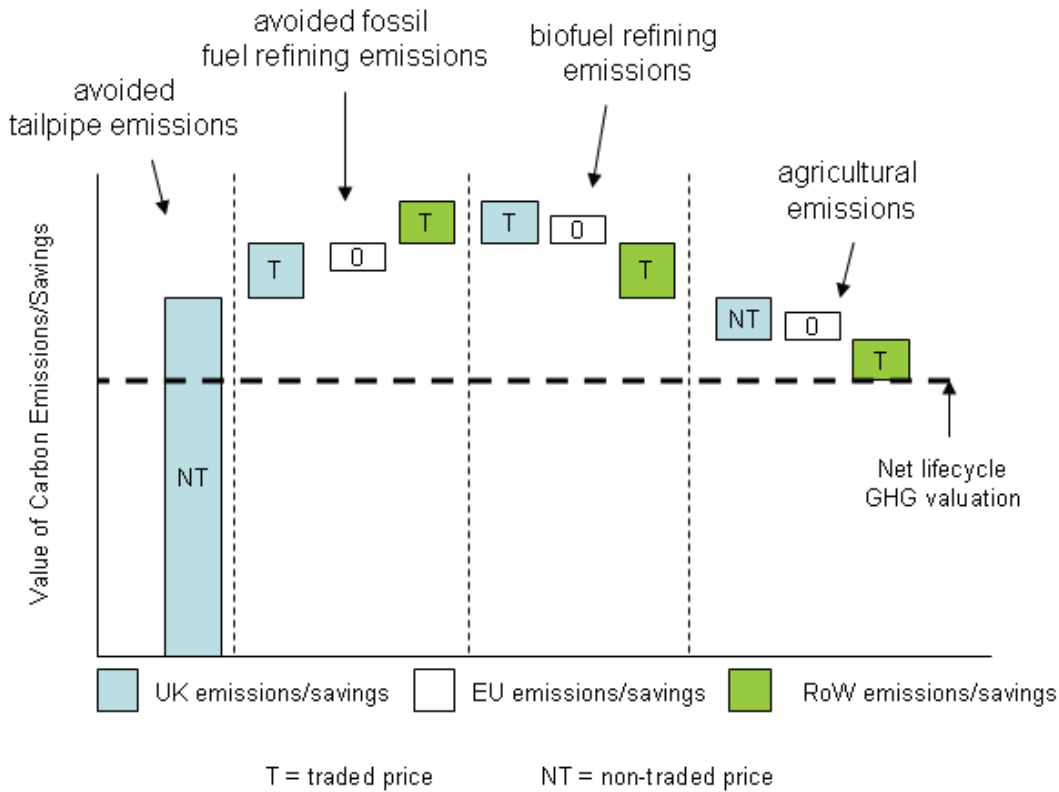
Figure 25: Allocation of GHG savings/emissions to carbon prices

	UK	EU	RoW
Tailpipe	non-traded	n/a	n/a
Industry	traded	zero	traded
Agriculture	non-traded	zero	traded

97. Geographically, emissions/savings have been split into the UK, the EU (ex-UK) and rest of the world. From a sectoral point of view, GHG emissions savings have been split into i) tailpipe savings from displaced fossil fuel (non-traded sector carbon price used); ii) industry

savings from lower emissions due to less fossil fuel refining (carbon price location dependent); industry emissions from biofuel refining (carbon price location dependent); and iv) agricultural emissions from feedstock production (carbon price location dependent). The allocation of savings/emissions to carbon price is summarised in figure 26.

Figure 26: Graphical Illustration of GHG accounting methodology



98. UK transport sector (tailpipe) and agricultural emissions are valued using the non-traded sector carbon price in line with cross-government GHG guidance<sup>1</sup>. There are no tailpipe emissions in the EU (ex-UK) or the rest of the world as this is a UK policy. EU (ex-UK) emissions/savings have not been valued as any change is assumed to be offset under individual member states' carbon reduction schemes and the EU ETS. Emissions/savings in the rest of the world are valued at the traded price in line with cross-government GHG guidance.

## **Annex 10 — OIOO ('one in one out')**

99. This measure is from a European origin and therefore it does not fall within the scope of OIOO.

<sup>1</sup> [http://www.decc.gov.uk/assets/decc/statistics/analysis\\_group/122-valuationenergyuseeggemissions.pdf](http://www.decc.gov.uk/assets/decc/statistics/analysis_group/122-valuationenergyuseeggemissions.pdf)

<b>Title:</b> <b>Amendments to the Renewable Transport Fuel Obligation for compliance with the Renewable Energy Directive - (2) Verification</b>  <b>Lead department or agency:</b> Department for Transport <b>Other departments or agencies:</b>	<b>Impact Assessment (IA)</b>
	<b>IA No:</b> DFT00050
	<b>Date:</b> 05/08/2011
	<b>Stage:</b> Final
	<b>Source of intervention:</b> EU
	<b>Type of measure:</b> Secondary legislation
<b>Contact for enquiries:</b> Craig Mills - 020 7944 4895 craig.mills@dft.gsi.gov.uk	

## Summary: Intervention and Options

### What is the problem under consideration? Why is government intervention necessary?

Greenhouse gas (GHG) emissions from transport are significant and impose costs on others through their contribution to climate change; those costs are not taken into account by those that emit them. Using renewable energy can reduce GHG emissions and there are therefore EU and UK renewable energy targets. However, these are not likely to be met by the market alone, because of the extra cost of renewable energy compared to fossil fuels in the near term at least. The UK intends to meet its Renewable Energy Directive (RED) target through the Road Transport Fuel Obligation (RTFO). To count towards the UK's renewable energy target, biofuels must be verified as meeting the minimum sustainability criteria set out in the RED.

### What are the policy objectives and the intended effects?

The set of amendments to the Renewable Transport Fuels Obligation (RTFO) considered in this Impact Assessment aim to ensure that the most cost-effective regime for verifying whether biofuels meet the sustainability criteria is implemented. Issue of Renewable Transport Fuel Certificates (RTFCs) (which are used to demonstrate compliance with the RTFO) would be contingent on verification of the minimum sustainability criteria. This impact assessment should be considered alongside that relating to "minimum sustainability criteria". These amendments would be intended to balance minimising the cost of RTFO compliance to different businesses in the market for biofuel with the cashflow needs of biofuel producers (in particular smaller businesses).

### What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The following policy options for verification of the minimum sustainability criteria (which have been analysed relative to a "do nothing" baseline) are:

- 2a) Issue RTFCs once per year after receipt of annual verifier's opinion. Allow a trading window after this.
  - 2b) Issue RTFCs in-year, but only after receipt of verifier's opinion on relevant batches. Trading as per now.
  - 2c) Issue 'provisional' RTFCs, or volume certificates (VCs), on validation of volume data. Annual conversion to RTFCs, if verifier's opinion is received. Trading allowed in both RTFCs and VCs.
  - 2d) Issue VCs and (if verified) RTFCs in year. Trading allowed in both RTFCs and VCs at same time.
- Option 2b is the preferred option, as it is expected to minimise cashflow impacts upon the majority of firms and the admin burden impact upon the RTFO administrator.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 4/2014

**What is the basis for this review?** Duty to review. **If applicable, set sunset clause date:** Month/Year

**Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?**

Yes

**SELECT SIGNATORY Sign-off** For final proposal stage Impact Assessments:

***I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.***

Signed by the responsible Minister:

*Norman Baker*

Date: 19 October 2011

# Summary: Analysis and Evidence

# Policy Option 1

## Description:

2a) Issue RTFCs once per year after receipt of annual verifier's opinion. Allow a trading window after this.

Price Base Year 2010	PV Base Year 2011	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: -22	High: -174	Best Estimate: -80

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low			22
High			174
Best Estimate		5.9	80

### Description and scale of key monetised costs by 'main affected groups'

Additional cashflow costs for some suppliers that are reliant on certificate trading revenues associated with generating in-year cashflow where there exists only one annual opportunity to collect RTFCs. All of the costs shown would be assumed to be net costs to business in the first instance but fully passed through to consumers through pump prices.

### Other key non-monetised costs by 'main affected groups'

Possible loss of competition and innovation if smaller suppliers are substantially disadvantaged by potential cashflow constraints. Potential reduction in the liquidity of the certificate trading market due to annual verification.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low			
High			
Best Estimate	0	0	0

### Description and scale of key monetised benefits by 'main affected groups'

Monetised benefits have not been identified relative to the baseline because the overarching purpose of the verification process is to facilitate the delivery of the benefits of the sustainability criteria i.e. the greenhouse gas savings. These have been assessed and quantified in the accompanying sustainability criteria impact assessment.

### Other key non-monetised benefits by 'main affected groups'

Verification facilitates the delivery of the benefits of minimum sustainability criteria by ensuring the integrity and credibility of the regulatory regime. Possible positive impacts on UK employment and output may result if strong and clear verification standards for minimum sustainability criteria strengthen the UK's reputation as a leader in sustainable biofuels, through increased investment in UK biofuels production.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5%

The valuations of costs due to potential cashflow impacts, verification and administrative impacts are dependent on advice received from a variety of sources. These are best estimates and represent the best available information on what are largely private costs but are subject to substantial uncertainty. The remaining key assumptions relate to petrol and diesel fuel demand and projected bioethanol and biodiesel blending rates, these are discussed with sensitivity tests and in the annex.

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			United Kingdom			
From what date will the policy be implemented?			15/12/2011			
Which organisation(s) will enforce the policy?			DfT			
What is the annual change in enforcement cost (£m)?			0			
Does enforcement comply with Hampton principles?			Yes			
Does implementation go beyond minimum EU requirements?			No			
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)			Traded: n/a	Non-traded: n/a		
Does the proposal have an impact on competition?			Yes			
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			Costs: n/a	Benefits: n/a		
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)		Micro	< 20	Small	Medium	Large
Are any of these organisations exempt?		No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	24
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	24
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	No	
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	Yes	24
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	Yes	25

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.



# Summary: Analysis and Evidence

# Policy Option 2

## Description:

2b) Issue RTFCs in year, but only after receipt of verifier's opinion on relevant batches. Trading as per now.

Price Base Year 2010	PV Base Year 2011	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: -3.2	High: -8.6	Best Estimate: -5.9

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.1	0.3	3.2
High	0.1	0.7	8.6
Best Estimate	0.1	0.5	5.9

### Description and scale of key monetised costs by 'main affected groups'

Additional costs associated with up to 3 in-year verifications on top of a baseline single annual verification have been estimated. These are subject to substantial uncertainty. Minor additional government administration costs associated with a somewhat increased administrative burden for the RTFO administrator may be incurred. All costs shown here would be assumed to be net costs to business in the first instance but then fully passed through to consumers through pump prices.

### Other key non-monetised costs by 'main affected groups'

There may be some costs to suppliers due to the need to familiarise themselves with the revised regulatory regime and the preparation of information in order that it can be verified - these have not been possible to quantify.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low			
High			
Best Estimate	0	0	0

### Description and scale of key monetised benefits by 'main affected groups'

Monetised benefits have not been identified relative to the baseline because the overarching purpose of the verification process is to facilitate the delivery of the benefits of the sustainability criteria i.e. the greenhouse gas savings. These have been assessed and quantified in the accompanying sustainability criteria impact assessment.

### Other key non-monetised benefits by 'main affected groups'

Verification facilitates the delivery of the benefits of minimum sustainability criteria by ensuring the integrity and credibility of the regulatory regime. Possible positive impacts on UK employment and output if strong and clear verification standards for minimum sustainability criteria strengthen the UK's reputation as a leader in sustainable biofuels, through increased investment in UK biofuels production.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5%

The valuations of costs due to cashflow, verification and administrative impacts are dependent on advice received from a variety of sources. These are best estimates and represent the best available information on what are largely private costs but are subject to substantial uncertainty. The remaining key assumptions relate to petrol and diesel fuel demand and projected bioethanol and biodiesel blending rates and sensitivity tests are presented in the annex.

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			United Kingdom		
From what date will the policy be implemented?			05/12/2011		
Which organisation(s) will enforce the policy?			DfT		
What is the annual change in enforcement cost (£m)?			0.03		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			No		
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)			Traded: n/a	Non-traded: n/a	
Does the proposal have an impact on competition?			Yes		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			Costs: n/a	Benefits: n/a	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	Micro	< 20	Small	Medium	Large
Are any of these organisations exempt?	No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	25
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	25
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	No	
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	Yes	25
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	Yes	26

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

# Summary: Analysis and Evidence

# Policy Option 3

## Description:

2c) Issue 'provisional' RTFCs, or VCs, on validation of volume data. Annual conversion to RTFCs, if verifier's opinion is received. Trading allowed in both types of certificate.

Price Base Year 2010	PV Base Year 2011	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: -22	High: -175	Best Estimate: -81

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	1	1.1	22
High		8.6	175
Best Estimate		0.1	4.0

### Description and scale of key monetised costs by 'main affected groups'

Additional costs associated with generating in-year cashflow may be incurred where there exists only one annual opportunity to collect RTFCs. Minor additional government administration costs associated with a somewhat increased administrative burden for the RTFO administrator. All costs shown here would be assumed to be net costs to business in the first instance but assumed to be fully passed through to consumers through pump prices.

### Other key non-monetised costs by 'main affected groups'

There may be a potential loss of competition and innovation if smaller suppliers are substantially disadvantaged by possible cashflow constraints and lower volume certificate prices for less well-known suppliers. There may also be costs associated with the need for suppliers to familiarise themselves with the revised regulatory regime and engage in two forms of certificate trading.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0		
High			
Best Estimate			0

### Description and scale of key monetised benefits by 'main affected groups'

Monetised benefits have not been identified relative to the baseline because the overarching purpose of the verification process is to facilitate the delivery of the benefits of the sustainability criteria i.e. the greenhouse gas savings. These have been assessed and quantified in the accompanying sustainability criteria impact assessment.

### Other key non-monetised benefits by 'main affected groups'

Verification facilitates the delivery of the benefits of minimum sustainability criteria by ensuring the integrity and credibility of the regulatory regime. Possible positive impacts on UK employment and output may result if strong and clear verification standards for minimum sustainability criteria strengthen the UK's reputation as a leader in sustainable biofuels, through increased investment in UK biofuels production.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5

The valuations of costs due to cashflow, verification and administrative impacts are dependent on advice received from a variety of sources. These are best estimates and represent the best available information on what are largely private costs; they are subject to substantial uncertainty. The remaining key assumptions consist of petrol and diesel fuel demand and projected bioethanol and biodiesel blending rates are presented with sensitivity tests in the annex.

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			United Kingdom			
From what date will the policy be implemented?			15/12/2011			
Which organisation(s) will enforce the policy?			DfT			
What is the annual change in enforcement cost (£m)?			0.04			
Does enforcement comply with Hampton principles?			Yes			
Does implementation go beyond minimum EU requirements?			No			
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)			Traded: n/a	Non-traded: n/a		
Does the proposal have an impact on competition?			Yes			
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			Costs: n/a	Benefits: n/a		
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)		Micro	< 20	Small	Medium	Large
Are any of these organisations exempt?		No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	25
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	25
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	No	
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	Yes	25
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	Yes	26

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

# Summary: Analysis and Evidence

# Policy Option 4

## Description:

2d) Issue VCs and (if verified) RTFCs in year. Trading allowed in both, both types on market at same time.

Price Base Year 2010	PV Base Year 2011	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: -2.7	High: -8.1	Best Estimate: -5.4

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low		0.2	2.7
High		0.6	8.1
Best Estimate	0.04	0.4	5.4

### Description and scale of key monetised costs by 'main affected groups'

Additional costs associated with up to 3 in-year verifications on top of a baseline single annual verification have been estimated. These are subject to substantial uncertainty. Minor additional government administration costs associated with a somewhat increased administrative burden for the RTFO administrator may be incurred. All costs shown here would be assumed to be net costs to business in the first instance but then fully passed through to consumers through pump prices.

### Other key non-monetised costs by 'main affected groups'

There may be a potential loss of competition and innovation if smaller suppliers are substantially disadvantaged by possible cashflow constraints and lower volume certificate prices for less well-known suppliers. There may also be costs associated with the need for suppliers to familiarise themselves with the revised regulatory regime and engage in two forms of certificate trading.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low			
High			
Best Estimate	0	0	0

### Description and scale of key monetised benefits by 'main affected groups'

Monetised benefits have not been identified relative to the baseline because the overarching purpose of the verification process is to facilitate the delivery of the benefits of the sustainability criteria i.e. the greenhouse gas savings. These have been assessed and quantified in the accompanying sustainability criteria impact assessment.

### Other key non-monetised benefits by 'main affected groups'

Verification facilitates the delivery of the benefits of minimum sustainability criteria by ensuring the integrity and credibility of the regulatory regime. Possible positive impacts on UK employment and output if strong and clear verification standards for minimum sustainability criteria strengthen the UK's reputation as a leader in sustainable biofuels, through increased investment in UK biofuels production.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5

The valuations of costs due to cashflow, verification and administrative impacts is dependant on advice received from a variety of sources. These are best estimates and represent the best available information on what are largely private costs and are subject to substantial uncertainty. The remaining key assumptions consist of petrol and diesel fuel demand and projected bioethanol and biodiesel blending rates - these along with sensitivity tests are presented in the annex.

Direct impact on business (Equivalent Annual) £m:			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			United Kingdom		
From what date will the policy be implemented?			15/12/2011		
Which organisation(s) will enforce the policy?			DfT		
What is the annual change in enforcement cost (£m)?			0		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			No		
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)			<b>Traded:</b> 0	<b>Non-traded:</b> 0	
Does the proposal have an impact on competition?			Yes/No		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			<b>Costs:</b> n/a	<b>Benefits:</b> n/a	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	<b>Micro</b>	<b>&lt; 20</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>
Are any of these organisations exempt?	No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	25
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	25
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	No	
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	Yes	25
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	Yes	26

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

## Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

### References

Include the links to relevant legislation and publications, such as public impact assessments of earlier stages (e.g. Consultation, Final, Enactment) and those of the matching IN or OUTs measures.

No.	Legislation or publication
1	EU Renewable Energy Directive – Promotion of the use of energy from renewable sources: <a href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF">http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF</a>
2	UK Renewable Energy Strategy 2009: Impact Assessment for the Transport Sector: <a href="http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/res/res.aspx">http://www.decc.gov.uk/en/content/cms/meeting_energy/renewable_ener/res/res.aspx</a>
3	Committee on Climate Change website – transport sector: <a href="http://www.theccc.org.uk/sectors/surface-transport">http://www.theccc.org.uk/sectors/surface-transport</a>
4	Climate Change Act 2008: <a href="http://www.legislation.gov.uk/ukpga/2008/27/contents">http://www.legislation.gov.uk/ukpga/2008/27/contents</a>
5	Renewable Transport Fuel Obligations (Amendment) Order (2009): <a href="http://www.legislation.gov.uk/uksi/2009/843/contents/made">http://www.legislation.gov.uk/uksi/2009/843/contents/made</a>
6	NFPA RTFC traded price data <a href="http://www.nfpas-auctions.co.uk/etoc/trackrecord.html">http://www.nfpas-auctions.co.uk/etoc/trackrecord.html</a>

+ Add another row

### Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

#### Annual profile of monetised costs and benefits\* - (£m) constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>
<b>Transition costs</b>										
<b>Annual recurring cost</b>										
<b>Total annual costs</b>										
<b>Transition benefits</b>										
<b>Annual recurring benefits</b>										
<b>Total annual benefits</b>										

\* For non-monetised benefits please see summary pages and main evidence base section



Microsoft Office  
Excel Worksheet

# Evidence Base (for summary sheets)

## Introduction

1. Transposition of the EU Renewable Energy Directive (RED) into UK law means that changes are required to the Renewable Transport Fuel Obligations Order (RTFO Order)<sup>1</sup> in order for the UK to be compliant.
2. This Impact Assessment is one of five final stage impact assessments covering transposition of transport elements of the RED. The focus of this impact assessment is potential options around verification of compliance with the RED sustainability criteria.
3. The suite of 5 impact assessments cover:
  - i) Sustainability Criteria
  - ii) Verification
  - iii) Double-Certification of Waste-Derived Biofuels
  - iv) Partially Renewable Fuels
  - v) Overarching Impacts
4. There are significant uncertainties in the analysis presented, not only because of the long timeframe considered (to 2030) but also uncertainty around underlying costs. The analysis is presented to 2030 to capture the potential long-run effects of the policy options.
5. The structure of this IA is as follows: it will set out the problem under consideration and the rationale for government intervention, before then explicitly stating the policy objectives of this intervention. Four options for systems of verification are described and the methodology for analysing the costs and benefits of each option is explained, including the key assumptions and areas of uncertainty. Wider impacts and relevant specific impact tests are described in the annex. The impact assessment concludes by describing the preferred option.

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<sup>1</sup> The Renewable Transport Fuel Obligations Order 2007 (SI no 2007/3072) as amended by the Finance Act 2008 and the Renewable Transport Fuel Obligations (Amendment) Order 2009 (SI no 2009/843)



## **Problem under consideration**

6. In 2008, transport accounted for around a quarter of UK greenhouse gas emissions (132 MtCO<sub>2</sub>e) and the majority (around 90%) of those emissions come from road transport (Committee on Climate Change, 2010). The UK has legally binding climate change targets both for the long term to reduce emissions by at least 80% below 1990 levels by 2050; and, in the short term to reduce emissions by 34% below 1990 levels by 2020 (Climate Change Act, 2008). The UK also has a renewable energy target for 15% of UK energy to be supplied from renewable sources by 2020, with a transport-specific target of 10% (Renewable Energy Directive).
7. Biofuels are currently the only significant option for increasing renewable energy usage in transport, particularly in the period up to 2020 when other options are limited due to the lead in times for technological developments.
8. The Renewable Energy Directive (RED) requires biofuels that are used to: count towards the Member State meeting its transport target; or towards any national renewable energy obligation (such as the Renewable Transport Fuel Obligation, or RTFO); or, that qualify for financial support, must have been verified as passing the sustainability criteria. The relationship between the provision of this proof and the issuing of the certificates used to demonstrate compliance with the RTFO (RTFCs) can be linked in a number of ways and several options have been considered in this IA.

## **Consultation Exercise**

9. This final stage impact assessment follows a public consultation exercise carried out by the Department for Transport. Interested parties were invited to comment on the policy options and underlying analysis either at public meetings (2 of which were held) or through written responses.
10. Stakeholder views on the accuracy of verification cost estimates were split with some stating that they thought actual verification costs would be lower and others higher. In order to address this uncertainty, a range (50% lower and 50% higher) around the central verification estimates has been modelled and high and low scenarios are now presented in the impact assessment.
11. Stakeholders also presented evidence indicating that the RTFC price assumptions used in the consultation stage impact assessment were out of date. The RTFC price assumption has been revised and a high and low range (all based upon published auction prices) have also been added to reflect the uncertainty over future prices.

## **Rationale for intervention**

12. A market failure occurs when market outcomes do not maximise society's welfare. One example of this is climate change resulting from greenhouse gas emissions, which are formally known as a negative externality i.e. emissions are generated but those

responsible for them do not take into account the impact they are having on others. Where the market is not likely to rectify this, it may be appropriate for public policy to do so through government intervention.

13. Sustainable biofuels have the potential to deliver GHG savings relative to fossil fuels. However, the GHG savings of biofuels are not automatically captured in their market prices without public policy intervention, therefore there is no incentive to consider sustainability when meeting targets.
14. Currently, the RTFO does not directly price biofuels on the basis of % GHG savings or sustainability of the fuel, as it is a volume-based (rather than GHG-based) mandate. There is therefore no incentive for more sustainable or lower GHG fuels to be supplied. Government intervention to ensure sustainability is therefore justified. Implementing a verification system for sustainability criteria will ensure the credibility and integrity of the sustainability criteria.

### **Policy objective**

15. The transposition of the Renewable Energy Directive is intended to ensure all biofuels supplied in the UK meet the sustainability criteria, delivering a sufficient level of GHG savings to meet UK and EU renewable energy targets and demonstrating compliance with GHG saving targets.
16. The RTFO will need to be amended in order to be compliant with the RED. The particular amendment considered is for the integrity and credibility of the implementation of sustainability criteria to be secured through appropriate verification mechanisms.
17. Implementing a system for verifying the sustainability criteria have been complied with (before that fuel is counted towards being compliant with the RTFO) will enable the UK to meet the requirements of the RED, and contribute to the UK meeting its commitments to the Fuel Quality Directive (FQD) and climate change targets.
18. While implementing a verification system is needed to ensure that the sustainability criteria are met, there are a number of options as to how this verification can be linked to the issuing of RTFCs. We would like this linkage to minimise any additional costs and administrative burden on the suppliers of biofuel.

### **Description of options considered**

19. The baseline against which all options are assessed is assumed to be the current RTFO mechanism, rolled forward to 2030 with no further changes beyond 2014 (the final date that the current obligations are set to). Therefore all options are assessed as compared with a counterfactual baseline of an unamended RTFO.
20. Whilst the current RTFO does not link RTFC issuing to the provision of a verifier's opinion of the carbon and sustainability information, the RTFO administrator is able to request a

verifier's opinion to be provided on the company's annual report to the RTFO administrator (which includes all of their carbon and sustainability data for that obligation period). Therefore the costs of verification and the impact of the different options for linking verification to RTFC issue are compared against this baseline of a once per year, not linked to RTFC issue, assessment.

21. The government intends to require a minimum frequency of an annual verifier's opinion upon the additional sustainability information (termed the "appropriate and relevant" information).
22. The importance of verified RTFCs essentially derives from the guarantee that the fuel provided by a producer will count towards meeting a supplier's obligation. Suppliers have no incentive to buy fuel that they later find is not going to count towards their obligation. The requirement at RTFO year-end is to redeem sufficient RTFCs to meet their obligation (which is based on the total quantity of fuel each supplier has supplied), rather than the supply of biofuel per se – the incentive to supply biofuel derives from the requirement of the RTFO to produce sufficient RTFCs at the end of the obligation period.

#### *Volume Certificates (VCs)*

23. A VC could be supplied as a way to recognise the volume of biofuel supplied, without having the associated GHG saving verified. A verification system which creates unverified VCs would rely on supplier reputations to support any value in the market for VCs. This is because they would be purchased on the basis of trust that the biofuel that created them will be verified at the end of the obligation year and therefore the VCs converted into RTFCs. Any risk premium may be reflected in the price of the VC (i.e. the price would be lower). Therefore, smaller suppliers who have not had the same opportunities to build up their reputation with potential purchasers of VCs may potentially be at a disadvantage to larger suppliers.
24. Some suppliers and traders have suggested that the value of VCs would be significantly lower than RTFCs (due to the risk of non-verification), thereby calling into question the benefit of having them in operation. Their purpose would be to aid in the liquidity of the market by creating a potential mechanism to maintain cash flow for suppliers. At a high level, there are two approaches for mitigating the potential impacts of a cashflow interruption due to the requirement for verification against the sustainability criteria:
  - I. Issue provisional "volume certificates" (VCs) which can be traded pre-verification.
  - II. Allow regular issuing of final certificates throughout the year.

#### I. Issue provisional "volume certificates" (VCs) which can be traded pre-verification:

25. Issuing VCs would allow suppliers to buy and sell certificates as they currently do and maintain cash flow evenly throughout the year. This could imply the creation of a second market for VCs (in effect "shadow" RTFCs) in addition to the market for fully verified RTFCs.

26. However, given the risk inherent in verification (i.e. VCs may fail the verification process and therefore become worthless), VCs are likely to trade at a discount relative to fully verified RTFCs. A lower price for VCs could increase the overall cost of supplying biofuels if they were not later verified and converted to RTFCs. In turn, this could raise the overall cost of the RTFO and pump prices.
27. In a market for VCs, the risk premium (which reflects the risk of non verification) would be likely to vary depending on the reputation of the supplier (i.e. the higher the perceived risk, the lower the VC price). This may hand larger suppliers with proven reputations a competitive advantage relative to smaller suppliers who may not be able to secure a high price for their VCs as they may not be able to demonstrate their credibility in the market.

## II. Allow regular verification and issue certificates throughout the year

28. Regular verification against the sustainability criteria would increase the administrative costs for suppliers who will need to obtain a third party verification opinion before they are issued with an RTFC. Verification costs are likely to vary widely and will depend upon the complexity of the individual supply chain concerned. This can be seen between the prices quoted by 'simple' waste product biodiesel suppliers of ~£200 per verification and those quoted by companies that supply biofuel from crop-based feedstocks with complex supply chains (typically the larger suppliers) who have quoted prices of up to £8,000 for each verification.
29. Regular verification of whether fuel has passed the sustainability criteria would allow suppliers to claim RTFCs as often as they wished throughout the year (subject to the practicalities of the RTFO administrator issuing them). Such a system would give suppliers flexibility to maintain cash flow throughout the year. It would also facilitate the fluidity and efficient operation of the RTFC market.
30. Given the costs of verification, suppliers would balance these with the need for cash flow. Suppliers may be able to take measures to mitigate the increased burden of regular verification such as sourcing from less complex supply chains or potentially making contractual arrangements to sell certificates in advance of verification.
31. The specific changes to the RTFO for each option are therefore as follows:

### **2a) Only issue RTFCs once per year after receipt of an annual verifier's opinion. Allow an RTFC trading window after this.**

This would maintain a single market for RTFCs, and minimise verification costs to only one set of verifications per year. However, annual verification is likely to cause a significant cash flow interruption for biofuel suppliers as they will only be able to sell fully verified (full value) RTFCs after a certain point in the year. It could potentially distort the market due to lack of a year-round price signal (created by traded certificates), leading to inefficient production/supply decisions.

**2b) Issue RTFCs in year, but only after receipt of verifier’s opinion on relevant fuel. Trading as per now.**

This would maintain a single market for RTFCs, and would allow suppliers flexibility in managing cash flow year round as they will be able to verify and claim RTFCs on an “as and when basis”. However, there will be increased administrative costs through a greater number of verifications per year (though the number of verifications would be at the prerogative of each supplier).

**2c) Issue a ‘provisional’ RTFC (a volume certificate, or VC) on validation of volume data. Only annual conversion to RTFCs, if a verifier’s opinion is received. Trading allowed in both VCs and RTFCs.**

VCs would in theory allow suppliers to generate cash flow immediately after biofuel has been supplied (it would be for that supplier to pay for the final verification allowing conversion to RTFC). However, issuing VCs would lead to the creation of a secondary market which may see VCs trade at a discount relative to fully verified RTFCs potentially raising RTFO compliance costs. Under a VC system, smaller suppliers (who may be perceived to be riskier if the market does not believe their VCs will be verified) may be put at a competitive disadvantage as their VCs may fetch a lower market price or, as a worst case, may not sell at all.

**2d) Issue VCs and (if verified) RTFCs in year. Trading allowed in both types of certificate on the market at same time.**

VCs and in year verification will both allow suppliers flexibility to generate cash-flow through either trading VCs or trading RTFCs. “As and when” verification of RTFCs would however be likely to undermine the secondary market for VCs which may trade at a deeper discount than they would do otherwise. There would be no incentive to purchase VCs as they would compete with RTFCs for market share.

**Costs and benefits of each option**

32. This section sets out the approach that has been used to assess the estimated costs and benefits of each of the options outlined above, relative to the baseline. It will set out:

- The context in terms of what each of the options might mean in practice
- The methodology used to assess the estimated costs of each option
- The results of estimating the costs
- The methodology used to assess the benefits of these changes to the regulatory regime and results
- Key assumptions and uncertainties
- Summary and conclusion of the preferred option

33. Based on best available evidence but subject to uncertainty, the following analysis examines potential cash flow and wider market impacts of options for verification of biofuel against the sustainability criteria and the issuance of RTFCs.

34. It should be noted that the purpose of verification is to facilitate the delivery of the benefits of the sustainability criteria (and the associated GHG savings). As such, they are not assessed to deliver benefits in their own right, but are essential to the integrity and credibility of the sustainability criteria.

### **Context: the current RTFO mechanism and what the options are likely to mean in practice**

#### *The RTFO*

35. The Renewable Transport Fuel Obligation (RTFO) issues one renewable transport fuel certificate (RTFC) per litre of renewable transport fuel supplied, provided it meets existing qualifying provisions. The introduction of the sustainability criteria (discussed in the first impact assessment of this suite of five final stage impact assessments regarding amendments to the RTFO) will require changes to these qualifying provisions.
36. Under the current RTFO system, suppliers receive certificates (RTFCs) when they supply biofuel. The certificates can be used to prove compliance with the obligation. Certificates can be bought and sold, enabling suppliers to meet their obligation at least cost.
37. The introduction of the sustainability criteria means that the RTFO administrator must not issue a certificate that is capable of being used to meet the obligation until the sustainability criteria have been demonstrated to be met.
38. This derives both from the requirements of the RED that a biofuel can not count towards a national renewable energy obligation unless compliance with the sustainability criteria has been demonstrated and the requirement in the Energy Act 2004 that an RTFC carries all of the information needed to meet the obligation. This gives rise to the four options regarding the structure of the verification process for issuing RTFCs.
39. In the current RTFO, certificates are awarded on a monthly basis. This has enabled suppliers to trade these certificates on a regular basis, thereby enabling suppliers to realise cash flow from their sale in a timely manner, minimising potential financing costs if they are dependent on such revenues (e.g. reducing the need to use overdraft facilities) and facilitating the fluidity and effective operation of the RTFC market. It also reduces uncertainty for obligated suppliers for the level of RTFCs that may be available on the market for purchase.

#### **Methodology – Costs**

40. At present, RTFCs are issued each month for biofuel which has passed the duty point in that month, with the annual verification of the carbon and sustainability information having no impact upon this issuing. Relative to the current situation, the requirement that biofuel must be verified against the sustainability criteria before RTFCs can be issued would be likely to increase the time taken between purchase/supply of biofuel and the point at which

the value of the RTFC can be realised. This delay could have the potential to impact upon the cash flow of biofuel suppliers that are dependent on revenues from the sale of certificates. Given that the supply of biofuel is a relatively low margin and cash flow intensive business, an interruption to cash flow would have implications for some suppliers' business models and may require suppliers to incur additional financing costs or, in the extreme, cease trading. These cash flow impacts and constraints are the basis for the estimates of increased costs and potential pump price impacts below.

41. The costs of each option are discussed together, since many of the key issues overlap. Key differences between them have been highlighted, but essentially the options differ in terms of which categories' of costs (cashflow, verification, administrative) each option would be expected to imply. The value of each category of costs is constant across each option with the exception of a slight differential in administrative costs. Therefore, to avoid repetition, each category of costs is addressed before comparing the total of costs attributed to each option.

### Potential Additional Cashflow Costs

42. A verification process that was only, say, once a year could have two possible effects:
  - i) Biofuel producers may find it harder to sell their fuel to suppliers if they face tougher sustainability criteria and are unable to obtain official verification of meeting the criteria ahead of year-end.
  - ii) Suppliers who rely on the sale of surplus RTFCs (because they supply more than they are obligated) may not be able to gain that revenue in a timely way. This implies a potential cash-flow impact.
43. To give an estimate of the order of magnitude of potential financing costs required to maintain cash-flow in an annual verification scenario, we assume that some 20% (this figure was based upon discussions with the RTFO regulator. A low and high sensitivity of 10% and 30% have been taken to reflect the uncertainty) of the total certificate value in each year is borrowed at an interest rate of 10% for 8 months. Certificate values is calculated using a central RTFC price of £0.165 with low and high sensitivities (certificate price estimates are based upon historical data published by the NFPA<sup>2</sup>). Taking the central assumptions implies total financing costs (in real 2010 prices and discounted to 2011 as per Green Book guidance) of £80m (within a range of £22m to £174m) over the period 2010-2030. This equates to roughly a 0.01 ppl (within a range of 0.003 ppl to 0.02 ppl) average impact on pump prices, assuming full cost pass-through.
44. Those options that have more regular verification processes would not be expected to have such an impact on cash flow because RTFCs would be issued on a more regular basis and we assume suppliers would be unlikely to borrow money over short periods of time. In such cases we have assumed the impact on cash flow to be negligible.

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<sup>2</sup> Non Fossil Purchasing Agency

### Additional Verification Costs

45. Options 2b and 2d may create additional verification costs for biofuel suppliers, by allowing more frequent than annual verification and therefore higher verification costs (if a supplier chooses to verify more frequently than is allowed in options 2a and 2c). This process for being awarded RTFCs would however mean that RTFCs would be available throughout the obligation year, potentially avoiding any potential cash-flow effects.
46. Biofuels suppliers have estimated (and some have re-iterated during the consultation period) that, should they wish to obtain RTFCs in-year, it could potentially require three additional verification processes (i.e. to allow quarterly verification) compared with annual verification only. Under the central scenario 3 additional verifications were required at an estimated £15,000 each for say, 8 large suppliers; and 3 additional verifications at say £1,500 for around 15 small suppliers, which yields a total cost per year of around £427,500 (in real 2010 prices) if this were assumed to affect all relevant market players. These verification costs are derived from the Impact Assessment of the RTFO and are in line with range estimates by LowCVP / Fivebargate's report to the RTFO administrator on the impacts of the RTFO (links in references section). Summing these costs over the total period 2010-2030, and discounting to 2010 as per Green Book guidance, implies total verification costs of £5.4m. High (50% higher) and low (50% lower) sensitivities around the costs of verification have been taken which give a range of £2.7m to £8.1m around this central estimate. This equates to roughly a 0.001 ppl (plus or minus 0.0005 ppl) average impact on pump prices, assuming full cost pass-through.

### Additional Administrative Costs

47. Option 2c, and to a lesser extent 2b and 2d, are estimated to necessitate some small additional administrative costs to the RTFO administrator. These would be mainly caused by administrative changes to how frequently the RTFO administrator receives the verifier's opinion.
48. Option 2b is estimated to require one-off setup costs of up to £57,000 (assumed to comprise IT costs and staff costs for process design/user liaison). It could then require estimated annual costs of up to around £28,000 p.a. for staff to track and assess verification.
49. Option 2c is estimated to require one-off operating system and set-up costs of up to £88,000 (IT costs and staff costs for process design/user liaison). It could then require annual costs of up to around £38,000 p.a. for staff.
50. Option 2d is estimated to require a one-off operating system cost of £40k (IT costs and staff costs), but no annual costs, since staff costs would only be one-off.

### Costs - Summary



51. The following tables summarise estimated costs for each option 2a – 2d under central, low and high cost sensitivities.

Figure 1: Verification cost estimates (2010 - 2030, discounted, £2010m) for each option

CENTRAL COST SCENARIO

Option	Additional verification costs	Additional cashflow costs	Additional RFA administrative costs	Total Cost
2a	-	79.85	-	79.85
2b	5.40	-	0.45	5.85
2c	-	79.85	0.63	80.48
2d	5.40	-	0.04	5.44

LOW COST SENSITIVITY

Option	Additional verification costs	Additional cashflow costs	Additional RFA administrative costs	Total Cost
2a	-	21.80	-	21.80
2b	2.70	-	0.45	3.15
2c	-	21.80	0.63	22.43
2d	2.70	-	0.04	2.74

HIGH COST SENSITIVITY

Option	Additional verification costs	Additional cashflow costs	Additional RFA administrative costs	Total Cost
2a	-	174.20	-	174.20
2b	8.10	-	0.45	8.55
2c	-	174.20	0.63	174.83
2d	8.10	-	0.04	8.14

52. Options 2a and 2c appear substantially more costly than options 2b and 2d, due to the additional indicative cash-flow costs, which are significantly higher than either of the other two categories of costs. It should be noted however that the estimates of such costs that have been included are highly uncertain. While this table shows 2b to be a slightly higher cost option than 2d, it should be noted that 2b reduces any disadvantage to small suppliers through avoiding the creation of a market in VCs (the price of which would depend on the reputation of their seller; smaller suppliers may not have had the same opportunities to build reputation as larger suppliers).
53. Cash-flow constraints may be likely to impact small suppliers who wish to sell RTFCs to a relatively greater extent than larger suppliers with more established revenues and cash-flow, greater access to finance, and in some cases, the ability to supply their own biofuel (meaning that they do not trade a significant proportion of their RTFCs). Therefore those options which have the potential to impose cash-flow constraints may be relatively more burdensome for smaller suppliers.
54. The table below summarises these arguments together with the estimated pump price impacts and administrative costs of each option.

Figure 2: Economic assessment of options for verification of sustainability data (central cost scenario)

Option	Estimated pump price impact in 2020	Effects on small suppliers	RTFO administrator administrative burden
2a	0.01ppl	Potential cash-flow constraints	-
2b	0.001ppl	-	£57k one-off, £28k annual
2c	0.01ppl	Potential cash-flow constraints & reputational disadvantage in unverified RTFCs	£88k one-off, £38k annual
2d	0.001ppl	Reputational disadvantage in unverified RTFCs	£40k one-off

### Methodology – Benefits

55. There are no direct monetisable benefits attributable to any verification system option, beyond the benefits which all options would deliver through allowing suppliers to demonstrate that their biofuel has met the sustainability criteria. The verification process is essential to facilitate the delivery of those benefits. Therefore the sustainability criteria and the verification system employed to test compliance with them should be considered complementary as the benefits of one could not be delivered without the other. The benefits of the sustainability criteria have been assessed and presented in the first IA in this suite of seven IAs concerning proposed amendments to the RTFO so to avoid double-counting, these benefits are not attributed to the verification system cost benefit analysis.
56. In addition, the value of benefits delivered by each option for the verification system would not differ, so they would not provide any means of distinguishing between options 2a – 2d.

### Summary of Costs and Benefits

57. The above cost benefit analysis is summarised in the table below.

Figure 3: Summary table of estimated costs and benefits of verification system options (central cost scenario)

£2010 prices, discounted to 2011	Option 2a	Option 2b	Option 2c	Option 2d
<b>Present Value Costs (£m)</b>	79.9	5.4	80.5	5.4
<b>Present Value Benefits (£m)</b> <b>Net Present Value (£m)</b>	Not assessed here because these regulatory changes are essential to facilitate the delivery of all benefits of the sustainability criteria - already assessed in a separate IA			
<b>Pump price impact in 2020 - Petrol (ppl)</b>	0.01	0.001	0.01	0.001
<b>Pump price impact in 2020 - Diesel (ppl)</b>	0.01	0.001	0.01	0.001

## **Risks and assumptions**

58. The estimated costs due to potential impacts on cashflow, verification and administrative impacts are dependent on advice received from suppliers and the RTFO administrator. These are best estimates and represent the best available information on what are largely private costs, but are subject to uncertainty.
59. Full cost pass-through to pump prices – this is due in part to inelastic demand for transport fuel.

## **Wider impacts**

60. Under the options where small suppliers could be particularly impacted, either through relatively higher fixed costs of verification, or through reputational disadvantage if the market does not believe the VCs would be verified, wider knock-on impacts are possible. These could include a loss of future competitive pressure in the market for biofuels if small suppliers or new entrants are discouraged.

## **Conclusion: Summary and preferred option**

61. The preferred option is that RTFCs are issued in year, but only after receipt of verifier's opinion on relevant batches (2b), since it would be expected to:
  - I. Avoid excessive adverse cash flow impacts upon fuel suppliers.
  - II. Have a minimal impact on pump prices (estimated to be around 0.001 ppl).
  - III. Place a relatively small administrative burden upon the RTFO administrator, compared with the total cost of alternative options.
  - IV. Strike a balance between supporting the fluidity of the market and maintaining credibility of RTFCs, thus avoiding disadvantaging small suppliers.

## Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

### Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. If the policy is subject to a sunset clause, the review should be carried out sufficiently early that any renewal or amendment to legislation can be enacted before the expiry date. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

<p><b>Basis of the review:</b> [The basis of the review could be statutory (forming part of the legislation), i.e. a sunset clause or a duty to review, or there could be a political commitment to review (PIR)];</p> <p>A review of all the RTFO amendments proposed in this consultation exercise will be conducted in advance of April 2014.</p>
<p><b>Review objective:</b> [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?]</p> <p>The objective of the review will be to evaluate whether the RTFO amendments are performing as intended.</p>
<p><b>Review approach and rationale:</b> [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach]</p> <p>The review will consist of an analysis of the RTFO amendments and will draw upon collected market data and stakeholder views.</p>
<p><b>Baseline:</b> [The current (baseline) position against which the change introduced by the legislation can be measured]</p> <p>Current verification costs have been estimated in analysis carried out for LowCVP and the RFA which can be used to form a baseline.</p>
<p><b>Success criteria:</b> [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]</p> <p>A well functioning verification system for the RTFO sustainability criteria.</p>
<p><b>Monitoring information arrangements:</b> [Provide further details of the planned/existing arrangements in place that will allow a systematic collection of monitoring information for future policy review]</p> <p>Consultation with industry stakeholders and market data gathered by the RTFO administrator will inform the post implementation review.</p>
<p><b>Reasons for not planning a review:</b> [If there is no plan to do a PIR please provide reasons here]</p>

## **Annex 2 - Competition Assessment**

62. All options involve imposing an additional element of fixed costs on suppliers which may impact on smaller suppliers disproportionately. This impact is estimated to be substantially greater in options 2a and 2c where there is the potential for significant cashflow impacts.
63. Under the options where small suppliers could be particularly impacted, either through relatively higher fixed costs of verification, or through reputational disadvantage if the market did not believe that VCs would be verified, wider knock-on impacts are possible. These could include a loss of future competitive pressure in the market for biofuels if small suppliers or new entrants are discouraged.
64. Economic theory suggests that a less competitive market may be less likely to reduce costs in the long run, due to a lack of pressure to reduce costs through price competition. Therefore, barriers to entry, or barriers to small suppliers being able to compete for market share with major fuel suppliers, could reduce the long-run competitiveness of the market for transport fuels.
65. Options may have relatively smaller impacts on competition if they support a level playing field in the treatment of suppliers. This is because it avoids unnecessary cash flow impacts on fuel suppliers, an issue likely to have relatively greater impacts on small or potential future suppliers who may enter the market. Both would provide competition which would in turn increase the likelihood of competitive prices and innovation.

## **Annex 3 - Small Firms Assessment**

66. The Renewable Transport Fuel Obligations Order exempts small transport fuel suppliers (supplying less than 450,000 litres/year). From having to supply biofuel under the RTFO.
67. The discussion of the impacts of potential cash-flow constraints and VCs in the Methodology and Wider Impacts sections covers the potential competition aspects of the four options for verification systems. The preferred option (2b) is expected to have no substantial impacts on small firms relative to other suppliers, whereas all other options may have at least some impacts.
68. Familiarisation with the verification requirements and the provision of relevant information to allow appropriate verification to occur may create additional compliance costs that may affect smaller firms to a greater extent (given their assumed overall fewer resources). These have not been monetised in this assessment.

## **Annex 4 - Rural Proofing Assessment**

69. UK biofuel feedstocks have the potential to meet a proportion of UK biofuel demand, and some deliver relatively higher GHG savings than feedstocks from other countries (above the minimum GHG savings thresholds). There is also a lower potential for UK biofuel

feedstock to be sourced from areas of high carbon stock or biodiversity relative to other countries.

70. Therefore, if implementing strong and clear verification standards for the sustainability criteria could strengthen the UK's reputation as a leader in sustainable biofuels, then this may potentially encourage demand for UK feedstock-derived biofuels, meaning some new business and job opportunities in rural areas as part of an expanding UK biofuel supply chain.
71. The pump price effects resulting from the changes to the regulatory regime discussed in this impact assessment are not expected to be of a magnitude which would have a material effect on demand, nor on the users of fuel. Therefore, it is not possible to say how rural fuel users could be affected differently to non-rural.

### **Annex 5 - Sustainable Development**

72. Implementing a verification system for sustainability criteria will help ensure that the increase in the use of biofuels in transport delivers carbon reductions and helps tackle climate change. In addition, enforcing the restrictions on feedstocks that have been directly grown on land with high carbon stocks and/or high biodiversity will contribute more widely to sustainable development (although these impacts have not been quantified).

### **Annex 6 – OIOO**

This measure is from a European origin and therefore it does not fall within the scope of OIOO.

<b>Title:</b> <b>Amendments to the Renewable Transport Fuel Obligation for compliance with the Renewable Energy Directive - (3) Double Certification of Waste-Derived Biofuels</b>  <b>Lead department or agency:</b> Department for Transport (DfT) <b>Other departments or agencies:</b>	<b>Impact Assessment (IA)</b>
	<b>IA No:</b> DFT00053
	<b>Date:</b> 19/08/2011
	<b>Stage:</b> Final
	<b>Source of intervention:</b> EU
	<b>Type of measure:</b> Secondary legislation
	<b>Contact for enquiries:</b> Craig Mills - 020 7944 4895 (craig.mills@dft.gsi.gov.uk)

## Summary: Intervention and Options

### What is the problem under consideration? Why is government intervention necessary?

Greenhouse gas (GHG) emissions from transport are significant and impose costs on others through their contribution to climate change; those costs are not taken into account by those that emit them. Using renewable energy can reduce GHG emissions and there are therefore EU and UK renewable energy targets. However, these are not likely to be met by the market alone, because of the extra cost of renewable energy compared to fossil fuels in the near term at least. The UK intends to meet its Renewable Energy Directive (RED) transport target through the Road Transport Fuel Obligation (RTFO). The problem under consideration in this Impact Assessment is how to further incentivise the supply of highly sustainable waste derived biofuels.

### What are the policy objectives and the intended effects?

The policy aims to increase the use of highly sustainable waste-derived biofuels and encourage the development of advanced biofuel refining technologies in the transport sector. The objective of this policy is to provide an additional financial incentive for the supply of highly sustainable (non-food) biofuel derived from wastes, residues, non-food cellulosic material and ligno-cellulosic material as required by the Renewable Energy Directive. The intended effect is that these additional incentives are expected to increase the price obligated suppliers are willing to pay for these fuels, which should in turn lead to increased investment and an increase in the available supply of these fuels. We do not intend to implement this directive beyond the minimum requirements.

### What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The RTFO already exists to impose an obligation on fuel suppliers to supply biofuel. This impact assessment is the third in a set of five impact assessments considering amendments to the RTFO. The policy option considered here is to introduce a system of double certification for highly sustainable biofuel derived from wastes, residues, non-food cellulosic material and ligno-cellulosic material.

One option has been considered (against a "do nothing" baseline) in this impact assessment which is to reward each litre of highly sustainable biofuel with two Renewable Transport Fuel Certificates (RTFCs)

The preferred option is to allow the double reward of highly sustainable biofuels as it is expected to increase the supply of highly sustainable biofuel.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 4/2014

**What is the basis for this review?** Duty to review. **If applicable, set sunset clause date:** Month/Year

**Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?**

Yes

**Ministerial Sign-off** For final proposal stage Impact Assessments:

*I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.*

Signed by the responsible Minister:

*Norman Baker*

Date: 19 October 2011

# Summary: Analysis and Evidence

# Policy Option 1

## Description:

Implement double certification of waste-derived biofuel in line with requirements of Renewable Energy Directive.

Price Base Year 2010	PV Base Year 2011	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: 62.2	High: -17.7	Best Estimate: 61.7

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	NA	NA	NA
High	NA	NA	NA
Best Estimate	NA	NA	NA

### Description and scale of key monetised costs by 'main affected groups'

Introduction of double certification is not expected to result in additional costs as suppliers obligated under the RTFO (who are assumed to be cost minimising) will be able to meet their obligation using the same mix of fuels as they would in the baseline (i.e. the RTFO with no double counting). The costs of meeting the RTFO may fall as a result of double certification but it is not possible to quantify any such decline in costs.

### Other key non-monetised costs by 'main affected groups'

Lower demand for crop-derived biofuel, as a result of double certification of waste-derived biofuel, may lead to lower profitability for the producers of those biofuels. Higher demand for waste feedstocks (i.e. used cooking oil, tallow, municipal waste, wood chips, waste wood) may push up prices for these inputs, which may have a negative impact on the profitability of other industrial users.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	NA	NA	62.2
High	NA	NA	-17.7
Best Estimate	NA	NA	61.7

### Description and scale of key monetised benefits by 'main affected groups'

Under the central scenario, increased GHG savings resulting from increased supply of high GHG saving biofuels are estimated to produce monetised GHG savings benefits of £61.7m over the period 2012 to 2030. This sits within the sensitivity range owing to the very significant uncertainties around the volume and characteristics of potential fuel mixes.

### Other key non-monetised benefits by 'main affected groups'

The policy may increase investment and innovation in the production of advanced biofuels as this will become more profitable. Increased profitability for producers of these fuels is therefore likely, but this is not possible to quantify. The relative increase in GHG savings may be underestimated as potential GHG emissions from indirect land use change have not been taken into account in the calculations.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5

The GHG savings per litre of fuel are taken from Renewable Fuels Agency (RFA) data and the Renewable Energy Directive (annex V). The relative GHG savings are subject to significant uncertainty as they vary across types of fuels. GHG savings are valued at the non-traded carbon price for emissions in agriculture and the traded carbon price for other emissions in biofuel production, taken from central DECC guidance. The UK supply of waste-derived biofuels in the baseline is assumed to reduce to near-zero from 2011 when other EU member states when introduce double certification in line with RED thus making the supply of waste-derived biofuel significantly more profitable in these countries.

Direct impact on business (Equivalent Annual) £m):			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA



## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?		United Kingdom			
From what date will the policy be implemented?		15/12/2011			
Which organisation(s) will enforce the policy?		DfT			
What is the annual change in enforcement cost (£m)?		0			
Does enforcement comply with Hampton principles?		Yes			
Does implementation go beyond minimum EU requirements?		No			
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)		Traded: 0.21		Non-traded: 1.29	
Does the proposal have an impact on competition?		No			
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?		Costs: n/a		Benefits: n/a	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	Micro	< 20	Small	Medium	Large
Are any of these organisations exempt?	No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	20
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	21
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	No	14
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	No	21
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	No	21

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

## Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

### References

Include the links to relevant legislation and publications, such as public impact assessments of earlier stages (e.g. Consultation, Final, Enactment) and those of the matching IN or OUTs measures.

No.	Legislation or publication
1	EU Renewable Energy Directive – Promotion of the use of energy from renewable sources: <a href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF">http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF</a>
2	RTFC market price data <a href="http://www.nfpas-auctions.co.uk/etoc/trackrecord.html">http://www.nfpas-auctions.co.uk/etoc/trackrecord.html</a>
3	EU Fuel Quality Directive: <a href="http://ec.europa.eu/environment/air/transport/fuel.htm">http://ec.europa.eu/environment/air/transport/fuel.htm</a>
4	DECC IAG Carbon Prices (Table 3): <a href="http://www.decc.gov.uk/assets/decc/Statistics/analysis_group/81-iag-toolkit-tables-1-29.xls">http://www.decc.gov.uk/assets/decc/Statistics/analysis_group/81-iag-toolkit-tables-1-29.xls</a>
5	NNFCC advanced biofuels research (currently unpublished – soon to be published on DfT website)
6	The Renewable Transport Fuel Obligations Order <a href="http://www.legislation.gov.uk/uksi/2007/3072/contents/made">http://www.legislation.gov.uk/uksi/2007/3072/contents/made</a>

+ Add another row

### Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

#### Annual profile of monetised costs and benefits\* - (£m) constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>
Transition costs										
Annual recurring cost										
Total annual costs										
Transition benefits										
Annual recurring benefits										
Total annual benefits										

\* For non-monetised benefits please see summary pages and main evidence base section



Microsoft Office  
Excel Worksheet

# Evidence Base (for summary sheets)

## Introduction

1. Transposition of the EU Renewable Energy Directive (RED) into UK law means that changes are required to the current biofuels obligations in order for the UK to be compliant.
2. This Impact Assessment is one of five final stage impact assessments related to transposition of the RED. It focuses on one particular aspect of the RED: double certification of waste-derived biofuels and biofuels derived from residues, non-food cellulosic material, and ligno-cellulosic material<sup>1</sup>.
3. The suite of 5 impact assessments is:
  - i) Mandatory Sustainability Criteria
  - ii) Reporting & Verification
  - iii) Double-Certification of Waste-Derived Biofuels
  - iv) Partially Renewable Fuels
  - v) Overarching Impacts
4. This impact assessment examines the costs and benefits of implementing double-certification of waste-derived biofuels, as prescribed by the RED.
5. There are significant uncertainties in the analysis presented, not only because of the future timeframe considered (to 2030<sup>2</sup>) but also because of uncertainties in the underlying costs, benefits, GHG<sup>3</sup> savings etc.
6. The structure of this IA is as follows: it will set out the problem under consideration and the rationale for government intervention, before then explicitly stating the policy objectives of this intervention. The policy option is described and the methodology for analysing the costs and benefits of the policy option is explained, including the key assumptions and areas of uncertainty. Wider impacts and relevant specific impact tests are described in the annex. The impact assessment concludes by describing the preferred option.

## Consultation Exercise

7. This final stage impact assessment follows a public consultation exercise carried out by the Department for Transport. Interested parties were invited to comment on the policy options and underlying analysis either at public meetings (2 of which were held) or through written responses.
8. Stakeholders expressed concern that the introduction of double certification would shrink the UK market for crop derived biofuel. This policy impact was covered qualitatively in the

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<sup>1</sup> For simplicity waste-derived biofuels and biofuels derived from residues, non-food cellulosic material, and ligno-cellulosic material are collectively referred to as waste derived biofuels throughout the rest of the document.

<sup>2</sup> The analysis has been conducted out to 2030 as this is the length of time judged necessary to drive long term infrastructure investment needed to deliver biofuels target. In its current form, the RTFO is due to continue indefinitely.

<sup>3</sup> greenhouse gas

consultation stage impact assessment. In this final stage impact assessment further quantitative analysis has been undertaken in the supply scenarios.

9. Stakeholders also requested more detailed analysis of the potential for biofuels from advanced processes to be included. Recent research on this area has now been included in the analysis.
10. It was also highlighted that the implementation of double certification in other EU Member States would likely lead to lower levels of imports from these countries. This has now been explicitly captured in the analysis.
11. Since the consultation, further RTFO supply data has become available which has been used to inform a new set of uptake scenarios which underpin the analysis in this IA.

### **Problem under consideration**

12. At present, all renewable fuels supplied to the road transport sector are treated equally under the UK's Renewable Transport Fuel Obligation (RTFO) and count towards the obligation on a volume basis (i.e. one certificate is awarded for each litre of biofuel supplied). This approach does not therefore provide any additional incentive to supply highly sustainable biofuels.
13. Waste-derived biofuel is thought to be highly sustainable. It does not compete directly with food crops and is estimated to deliver high GHG savings. Waste derived biofuel is also thought less likely to lead to GHG emissions from indirect land use change (ILUC). It is therefore desirable to increase the supply of highly sustainable biofuels over and above what would be supplied under the current incentives framework (the unamended RTFO) which treats all biofuels equally.

### **Policy objective**

14. The objective of this policy is to provide additional incentives for these more sustainable fuels to be supplied. The intended effect is that these incentives are expected to increase the price obligated suppliers are willing to pay for these fuels, which in turn should lead to an increase in the available supply.

### **Rationale for intervention**

15. The EU Renewable Energy Directive (RED) requires biofuels that are derived from wastes, residues, non-food cellulosic material, and ligno-cellulosic material inputs to be counted twice towards compliance with any national renewable energy obligation (i.e. in the RTFO in the UK) and the 10% RED transport target, thus providing an increased incentive to supply these types of fuels. To ensure that the RTFO is compliant with the RED, an amendment is therefore required. Implementing this requirement in the RTFO — through the issuance of two, rather than one, certificates for each litre supplied — would

demonstrate compliance with the RED, as well as encouraging additional highly sustainable biofuels to be supplied in the UK.

16. Implementing double counting would increase obligated suppliers' willingness to pay for highly sustainable biofuel, increasing the market price and stimulating investment in increased supply. Failure to implement double counting is expected to result in significant volumes of highly sustainable biofuel which is currently supplied in the UK (and often sourced from overseas) being diverted to other EU Member States which have a higher willingness to pay as they have implemented double counting. Failure to implement double counting may also result in infraction proceedings being brought against the UK.

### **Description of options considered (including do nothing)**

17. Given the RTFO is already in place, there is the option to make an amendment to ensure that it is compliant with the RED and recognises the benefits delivered by waste-derived biofuels. The costs, benefits and impacts on the market of this option will be explored in this section.

### **Baseline (doing nothing)**

18. In the following cost benefit analysis, the costs and benefits of implementing double certification have been assessed against a 'do nothing' baseline. Doing nothing entails leaving the RTFO unamended and continuing to issue only one certificate for each litre of waste-derived biofuel supplied. This option leads to no additional costs or benefits.
19. In the baseline, it is estimated that the UK supply of waste-derived biofuel falls to almost zero in 2012. This is because other EU Member States are expected to implement double certification, as required by the RED, in this year. If the UK did not implement double certification, and other Member States did, then there would be double the incentive to supply the UK's current supply of waste-derived biofuel (which is currently largely sourced from abroad) to other Member States. As waste-derived biofuel is a globally traded commodity, it is expected that the supply will flow to the market where willingness to pay (and therefore the financial return for producers) is highest. Figure 1 shows the projected baseline RTFO fuel mix going out to 2020.

Figure 1: Projected baseline RTFO fuel mix (2012 to 2030)

	biodiesel	ethanol	UCO	Tallow	biomethane	Second generation ethanol	Second generation biodiesel
<b>2012</b>	1004	1141	0	0	0	0	0
<b>2013</b>	1092	1283	0	0	0	0	0
<b>2014</b>	1071	1304	0	0	0	0	0
<b>2015</b>	1043	1316	0	0	0	0	0
<b>2016</b>	1020	1328	0	0	0	0	0
<b>2017</b>	1001	1339	0	0	0	0	0
<b>2018</b>	984	1349	0	0	0	0	0
<b>2019</b>	969	1359	0	0	0	0	0
<b>2020</b>	956	1368	0	0	0	0	0
<b>2021</b>	946	1376	0	0	0	0	0

<b>2022</b>	937	1383	0	0	0	0	0
<b>2023</b>	929	1391	0	0	0	0	0
<b>2024</b>	923	1398	0	0	0	0	0
<b>2025</b>	919	1406	0	0	0	0	0
<b>2026</b>	913	1412	0	0	0	0	0
<b>2027</b>	906	1418	0	0	0	0	0
<b>2028</b>	899	1424	0	0	0	0	0
<b>2029</b>	892	1430	0	0	0	0	0
<b>2030</b>	885	1436	0	0	0	0	0

## **Costs and benefits of introducing double certification of waste-derived biofuel**

20. This section sets out the approach that has been used to assess the estimated costs and benefits of the option outlined above, relative to the baseline. It will set out:
- the context in terms of what this option might mean in practice;
  - the methodology used to produce supply scenarios;
  - the methodology used to assess the costs and benefits of the changes under consideration;
  - summary and conclusion of the preferred option.

### **Context**

#### *RTFO Market Impact*

21. Implementing double certification will mean that certain types of biofuel will count twice towards fuel suppliers' obligations under the RTFO. The fuels considered eligible for double counting in the following analysis are:
- Used cooking oil (UCO)-derived biodiesel
  - Tallow-derived biodiesel
  - Waste-derived biomethane
  - Bioethanol from advanced processes (second generation "2G" bioethanol)
  - Biodiesel from advanced processes (second generation "2G" biodiesel)
22. To meet a given obligation level, the introduction of double certification will mean that for each additional litre of waste-derived biofuel supplied two litres of conventional biofuel will be displaced from the overall supply.

$$\text{Obligation level (litres)} = \text{conventional\_biofuel (litres)} + 2 \times \text{waste\_biofuel (litres)}$$

23. Therefore, an obligated supplier will value supplying one litre of waste-derived biofuel as the equivalent of supplying two litres of conventional crop-derived biofuel. This will effectively increase suppliers' willingness to pay for waste-derived biofuel (by the value of a certificate), driving up prices and in turn providing the additional incentive for the market to increase its supply. To date the average traded value of a certificate has been £0.17 per certificate with a range of £0.09 to £0.24 per certificate.

24. Implementing double certification of waste-derived biofuel, whilst holding the overall obligation level constant, will however decrease the absolute volume of biofuel supplied under the RTFO, as two litres of crop-derived biofuel will be displaced for each litre of waste-derived biofuel supplied.

### *Historical Supply*

25. Under the RTFO to date, used cooking oil (UCO)-derived biodiesel, tallow-derived biodiesel and biomethane have been supplied. Historical supply data are set out in figure 2. No biofuels from advanced processes have been supplied. Full year data is available for obligation years 08/09 and 09/10. Data from the first 9 months of obligation year 11/12 has been pro-rated for ease of comparison.

Figure 2: Historical RTFO supply data for tallow, UCO and biomethane

#### *Tallow (litres)*

	<b>08/09</b>	<b>09/10</b>	<b>10/11 (pro-rated)</b>
<b>UK</b>	5,156,672	40,032,147	27,005,464
<b>EU</b>	5,220,474	50,376,553	26,691,997
<b>RoW</b>	96,070,974	65,347,536	15,352,395
<b>Unknown</b>	8,737,367	26,552,035	1,223,795
<b>Total</b>	115,185,487	182,308,271	70,273,651

#### *UCO (litres)*

	<b>08/09</b>	<b>09/10</b>	<b>10/11 (pro-rated)</b>
<b>UK</b>	35,921,395	29,809,440	98,329,331
<b>EU</b>	2,169,647	7,130,141	268,714,771
<b>RoW</b>		273,638	35,292,160
<b>Unknown</b>	1,431,380	5,912,516	16,962,277
<b>Total</b>	39,522,422	43,125,735	419,298,539

#### *Biomethane (kg)*

	<b>08/09</b>	<b>09/10</b>	<b>10/11 (pro-rated)</b>
<b>UK</b>	415,700	195,797	435,401

26. In the first two years of the RTFO, tallow was the most prevalent waste-derived biofuel supplied, accounting for around 74% of waste-derived biofuel supplied in the first year of the RTFO and 81% in the second. In the third year, it formed only 14% of the supply. Conversely, used cooking oil-derived biodiesel constituted 25% in the first year, 19% in the second year and 86% in the third year. The reason for the upsurge in the UCO supply was the introduction of a 20ppl (pence per litre) duty differential in April 2010 (which will expire in April 2012) which has created an additional incentive to supply UCO-derived biodiesel. Between 09/10 and 10/11, the UCO-derived biodiesel supply jumped by almost 1000%. This increase was driven primarily by imports from other EU Member States (which grew by 3800%) and also a large increase in UK sourced UCO (which grew by 330%). Since the introduction of the RTFO the biomethane supply has been relatively small, accounting for less than 0.5% of the waste-derived biofuel supply in any given year. No biodiesel or bioethanol from advanced processes has been supplied under the RTFO to date.

## Methodology – Supply scenarios (under Double Certification)

27. The future supply of waste-derived biofuel under double certification is highly uncertain. This uncertainty derives from a number of factors including: (1) a lack of clarity on the potential global availability of feedstocks, (2) the potential global capacity to process the feedstocks, (3) the future technical development and availability of advanced processes (which are not mature technologies) (4) the level of competing demand for waste-derived biofuel from other EU Member States.
28. To reflect this uncertainty, three potential supply trajectories have been modelled. Supply scenarios have been developed using historical supply data, supply potential assumptions developed by AEA technology (see annex 6) and advanced processes scenarios developed by the National Non Food Crop Centre (see annex 7).
29. In response to the consultation, a number of comments were received with regard to double certification which have been taken into account, as far as is possible in the following analysis. Stakeholders highlighted recent (obligation year 10/11) supply data (following the introduction of the 20ppl duty differential for UCO-derived biodiesel) which could be taken into account. Another noted that implementation of double certification across the EU would diminish the incentive for cross border trading of these fuels. No actual numbers on projected supply volumes were received from consultation respondents.

### *Central Supply Scenario*

30. Under the central scenario, the overall RTFO supply of UCO derived-biodiesel is expected to fall significantly in 2012. This is because imports from other EU Member States (which form the majority of the reported 10/11 supply) are expected to fall to almost zero as financial incentives are equalised across all EU Member States (i.e. all Member States introduce double certification removing the incentive for significant volumes of cross-border trading). Production of UK-sourced biodiesel is projected to remain at 10/11 volumes (which are already elevated due to the impact of the duty differential) in 2012 and then grow gradually to 161 million litres (100% of identified potential – AEA central scenario) by 2020. Imports from the rest of the world are estimated to stay constant at (already elevated) 10/11 volumes.
31. Under the central scenario, the overall RTFO supply of tallow-derived biodiesel is expected to increase significantly in 2012. The UK sourced supply of tallow is projected to jump to 202 million litres in 2012 (75% supply of identified potential - AEA central scenario) and then grow gradually to 270 million litres (100% of identified potential) by 2020. The initial sudden jump in supply (rather than a gradual increase) is expected as tallow is currently traded and is readily available. EU imports are assumed to fall to almost zero as incentives are equalised across Member States. Imports from the rest of the world are assumed to increase to 130 million litres (double the 08/09 level) and to remain at this level thereafter. The supply from the rest of the world is expected to increase (in spite of competing demand from other EU Member States) due to the scale of the global meat processing industry and therefore tallow production.



32. The supply of biomethane is projected to remain at current supply levels. The reason this level is not forecast to increase is because alternative financial incentives (i.e. the Renewable Heat Incentive) offer a higher price for biomethane. Therefore new biomethane capacity is assumed to be used for grid injection rather than transport uses.
33. The supply of bioethanol from advanced processes is projected to increase from zero to 189 million litres from 2015. The supply of biodiesel from advanced processes is projected to provide the remainder of biodiesel from 2015 onwards.
34. The crop-derived biodiesel supply is estimated to fall from 309 million litres to zero in 2020. The Crop-derived bioethanol supply is estimated to drop from around a billion litres to 666 million litres as 2G bioethanol capacity comes online in 2015.

Figure 3: Projected RTFO fuel mix under the central scenario (million litres/kg)

	biodiesel	ethanol	UCO	Tallow	biomethane	2G ethanol	2G biodiesel
2012	309	1004	151	265	0.4		
2013	401	1092	158	282	0.4		
2014	374	1071	166	299	0.4		
2015	336	666	174	316	0.4	189	
2016	298	643	182	333	0.4	189	
2017	260	623	190	349	0.4	189	
2018	221	606	198	366	0.4	189	
2019	181	591	205	383	0.4	189	
2020	0	579	213	400	0.4	189	70
2021	0	568	213	400	0.4	189	74
2022	0	559	213	400	0.4	189	78
2023	0	552	213	400	0.4	189	82
2024	0	546	213	400	0.4	189	85
2025	0	542	213	400	0.4	189	89
2026	0	535	213	400	0.4	189	92
2027	0	528	213	400	0.4	189	95
2028	0	521	213	400	0.4	189	98
2029	0	514	213	400	0.4	189	101
2030	0	507	213	400	0.4	189	104

*low supply scenario*

35. The low scenario reflects comments from consultation respondents which suggest that increased competition from EU Member States will reduce the potential supply of waste feedstocks available to UK suppliers and also that the incentive from double certification may not match the incentive for UCO relative to duty differential (leading to a fall in supply). In the low scenario, the supply of tallow-derived biodiesel, UCO-derived biodiesel and biomethane is projected to be half the level seen of the central scenario. There is no biodiesel or bioethanol from advanced processes in the low scenario (which could result from a slow rate of technological progress). In the low scenario supplies of 1G crop-derived bioethanol and biodiesel remain at relatively high levels.

Figure 4: Projected RTFO fuel mix under the low scenario (million litres/kg)

	biodiesel	ethanol	UCO	Tallow	biomethane
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<b>2012</b>	725	1004	75	133	0.2
<b>2013</b>	842	1092	79	141	0.2
<b>2014</b>	839	1071	83	149	0.2
<b>2015</b>	826	1043	87	158	0.2
<b>2016</b>	813	1020	91	166	0.2
<b>2017</b>	800	1001	95	175	0.2
<b>2018</b>	785	984	99	183	0.2
<b>2019</b>	770	969	103	192	0.2
<b>2020</b>	754	956	107	200	0.2
<b>2021</b>	762	946	107	200	0.2
<b>2022</b>	770	937	107	200	0.2
<b>2023</b>	777	929	107	200	0.2
<b>2024</b>	784	923	107	200	0.2
<b>2025</b>	792	919	107	200	0.2
<b>2026</b>	798	913	107	200	0.2
<b>2027</b>	804	906	107	200	0.2
<b>2028</b>	810	899	107	200	0.2
<b>2029</b>	817	892	107	200	0.2
<b>2030</b>	823	885	107	200	0.2

*high supply scenario*

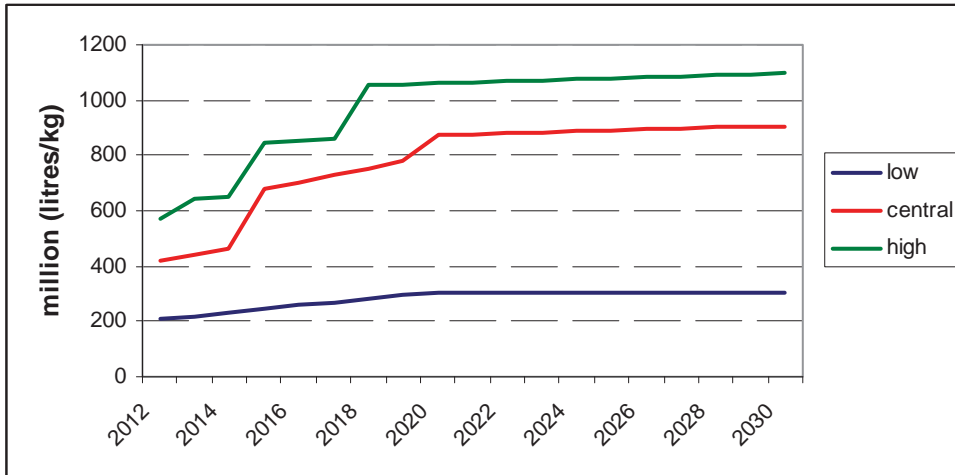
36. The high scenario reflects the fact that there is the potential for a large surge in the supply of waste-derived biofuel (as was witnessed when the UCO-derived biodiesel supply jumped by 1000% following the introduction of the 20ppl duty differential in obligation year 10/11). Several consultation respondents requested that we take into account recently published RTFO supply data relating to this period. In the high scenario, the entire biodiesel supply is assumed to be met through fuels which are double certified (UCO, tallow, biomethane, 2G biodiesel). No specific assumptions have been made about the feedstock mix. The supply of bioethanol from advanced processes is projected to increase from zero to 189 million litres in 2015 and to 378 million litres from 2018 onwards (NNFCC advanced biofuels scenario 2). In the high scenario, the crop-derived biodiesel supply disappears in 2012. Crop-derived ethanol falls off markedly in 2015 and 2018 as 2G bioethanol capacity comes online.

Figure 5: Projected RTFO fuel mix under the high scenario (million litres/kg)

	1G crop biodiesel	1G crop ethanol	2G ethanol	rest
<b>2012</b>	0	1004		571
<b>2013</b>	0	1092		641
<b>2014</b>	0	1071		652
<b>2015</b>	0	666	189	658
<b>2016</b>	0	643	189	664
<b>2017</b>	0	623	189	670
<b>2018</b>	0	228	378	675
<b>2019</b>	0	213	378	679
<b>2020</b>	0	201	378	684
<b>2021</b>	0	190	378	688
<b>2022</b>	0	181	378	692
<b>2023</b>	0	174	378	695
<b>2024</b>	0	168	378	699
<b>2025</b>	0	164	378	703
<b>2026</b>	0	157	378	706

<b>2027</b>	0	150	378	709
<b>2028</b>	0	143	378	712
<b>2029</b>	0	136	378	715
<b>2030</b>	0	129	378	718

Figure 6: aggregated supply scenarios



## **Costs**

### *RTFO compliance cost*

37. For a given obligation level (i.e. volume of biofuel to be supplied), the cost of supplying biofuel required to meet the obligation (which is borne by obligated suppliers and assumed to be passed through to consumers of road transport fuel) is dependent on the market prices for various biofuel options and is not expected to increase as suppliers will still have the option of supplying only crop-derived biofuel if that is the cost effective option. However, costs may fall if suppliers are able to source waste derived biofuel for less than twice the additional cost (per litre) of supplying crop-derived biofuel and therefore choose to supply this instead.
38. As it is expected that the market price of waste-derived biofuel will increase as demand increases, it is not possible to estimate what potential cost saving could be made through the increased supply of waste-derived biofuel. Instead, the analysis makes the conservative assumption that the price of waste-derived biofuel rises such that it would cost the supplier the same whether they provide 2 litres of crop-derived biofuel or one litre of waste-derived biofuel (and therefore no supply constraints on the latter are assumed). Therefore, this estimate should be thought of as an upper bound on potential costs. It is possible that the overall cost of delivering the RTFO could fall as a result of double certification.
39. Additional non-monetised costs (i.e. impacts on other industries which use waste feedstocks, impacts on crop-derived biofuel producers) have been captured in the 'wider impacts' section on p.17.

## **Benefits**

40. The primary benefit created from biofuel deployment is GHG savings. Double certification will impact GHG savings delivered by the RTFO which act in two different ways:
- A. Additional GHG savings from increased supply of high GHG saving waste-derived biofuel.
  - B. Fewer GHG savings due to crop-derived biofuel being displaced at the rate of 2 litres for every litre of biofuel of waste derived biofuel supplied.
41. The net GHG impact of double certification can be estimated using the deployment trajectories outlined in figure 3 and assumptions around GHG savings for each type of biofuel (figure 4 - below). GHG savings for crop-derived bioethanol and biodiesel and 1<sup>st</sup> generation waste-derived feedstocks are based upon actual reported (average) figures taken from RTFO data (all data up to January 2011). Figures for bioethanol and biodiesel from advanced processes have are based upon ‘typical values’ taken from Annex V of the Renewable Energy Directive. GHG savings are shown both as ‘volume equivalent’ (i.e. the proportional carbon saving associated with displacing one litre of fossil fuel with one litre of biofuel) and ‘energy equivalent’ (i.e. the proportional carbon saving associated with displacing one unit energy of fossil fuel with one unit energy of biofuel). The relevant measurement for RTFO analysis is ‘volume equivalent’ as the RTFO is a volume-based target. However, GHG savings are typically presented on an ‘energy equivalent’ basis, therefore these values have also been included for information.

Figure 4: GHG saving assumptions

<b>Biofuel Type</b>	<b>Energy Equivalent</b>	<b>Volume Equivalent</b>
1G crop biodiesel	36%	33%
1G crop bioethanol	62%	40%
1G waste biodiesel	83%	76%
2G bioethanol	87%	56%
2G biodiesel	93%	93%

42. The average GHG savings values can then be used to calculate net changes in overall RTFO GHG savings which are presented in figure 5.

Figure 5: estimated GHG impacts due to double certification (MT CO<sub>2</sub>e)

	low	central	High
2012	0.06	0.12	0.16
2013	0.06	0.12	0.18
2014	0.07	0.13	0.18
2015	0.07	-0.01	0.04
2016	0.07	0.00	0.04
2017	0.08	0.01	0.04
2018	0.08	0.01	-0.10
2019	0.08	0.02	-0.10
2020	0.09	0.08	-0.10
2021	0.09	0.09	-0.09
2022	0.09	0.09	-0.09
2023	0.09	0.09	-0.09
2024	0.09	0.10	-0.09
2025	0.09	0.10	-0.09
2026	0.09	0.10	-0.09

2027	0.09	0.10	-0.09
2028	0.09	0.11	-0.09
2029	0.09	0.11	-0.09
2030	0.09	0.11	-0.09
<b>total</b>	<b>1.51</b>	<b>1.50</b>	<b>-0.55</b>

43. The net change in GHG emissions is determined by the ‘volume equivalent’ GHG savings of the biofuel being supplied/displaced as a result of double certification. In general, crop-derived biodiesel (which is assumed to deliver a relatively low GHG saving) being displaced a double certified alternative biodiesel (e.g. UCO, tallow, 2G biodiesel) will produce a net GHG saving relative to the baseline. On the other hand, crop-derived bioethanol (which is assumed to deliver a relatively high GHG saving) being displaced by 2G bioethanol delivers a net decrease in GHG savings relative to the baseline.
44. Therefore, the low and central scenarios which involve a greater proportion of biodiesel displacement deliver positive net GHG savings. The high scenario which has a relatively high proportion of 2G bioethanol delivers negative net GHG savings.
45. It is important to note that the GHG emissions/savings covered by this analysis are direct emissions/savings only. GHG emissions attributable to indirect land use change (ILUC) have not been captured and could potentially lead to higher than stated benefits. Other non-monetised sustainability benefits (i.e. food market impacts) have been captured qualitatively in the ‘wider impacts’ section on p.17 of this impact assessment.
46. GHG savings have been monetised using DECC carbon values. Estimated monetised GHG benefits are presented in figure 6.

Figure 6: monetised GHG savings (£m, 2010 prices, discounted to 2011)

	<b>low</b>	<b>central</b>	<b>high</b>
<b>2012</b>	2.8	5.6	7.6
<b>2013</b>	2.9	5.8	8.4
<b>2014</b>	3.0	6.0	8.4
<b>2015</b>	3.1	-0.3	1.8
<b>2016</b>	3.2	0.0	1.9
<b>2017</b>	3.3	0.3	1.9
<b>2018</b>	3.4	0.6	-4.2
<b>2019</b>	3.4	0.9	-4.0
<b>2020</b>	3.5	3.5	-3.9
<b>2021</b>	3.5	3.6	-3.9
<b>2022</b>	3.5	3.7	-3.8
<b>2023</b>	3.4	3.8	-3.7
<b>2024</b>	3.4	3.9	-3.7
<b>2025</b>	3.4	3.9	-3.6
<b>2026</b>	3.4	4.0	-3.5
<b>2027</b>	3.3	4.1	-3.5
<b>2028</b>	3.3	4.1	-3.4
<b>2029</b>	3.3	4.2	-3.3
<b>2030</b>	3.2	4.2	-3.2
<b>total</b>	<b>62.2</b>	<b>61.7</b>	<b>-17.7</b>

47. The estimated GHG savings for the levels of supply shown by the three scenarios are shown below.

- The “low” scenario is estimated to create additional GHG savings of 1.5 megatonnes of CO<sub>2</sub>e<sup>4</sup> over the period to 2030, with a net present monetised value of £62m.
- The “central” scenario is estimated to create additional GHG savings of 1.5 megatonnes of CO<sub>2</sub>e over the period to 2030, with a net present monetised value of £62m.
- The “high” scenario is estimated to create an additional -0.6 megatonnes of CO<sub>2</sub>e emissions over the period to 2030, with a net present monetised value of -£18m.

Figure 7: Summary table of carbon savings delivering under low, central and high scenarios (2012 – 2030)

Scenario	Carbon Savings (MTCO <sub>2</sub> e)	Monetised Carbon Benefit (NPV - £m)
Low	1.5	62
Central	1.5	62
High	-0.6	-18

### *Interaction with GHG savings from sustainability criteria*

48. Implementation of double certification reduces the potential for additional GHG savings to result from implementation of the minimum sustainability criteria (which introduces a minimum GHG saving requirement – see impact assessment #1 in this series). This is because double certification: (1) leads to a reduction in overall volume of biofuel supplied under the RTFO; and (2) increases average GHG savings of biofuel supplied under the RTFO. The combined impact of double certification and the sustainability criteria on GHG savings has been captured in the combined impact assessment has been published alongside this impact assessment.

### **Risks**

49. Double certification may create an incentive for fraud as suppliers would be able to receive additional value by passing off virgin oils as wastes. Suppliers are required to have biofuel independently verified under the RTFO which should mitigate the potential for fraud to some extent. The DfT has responsibility for monitoring potential fraud in the RTFO.

### **Assumptions**

50. The eligible (for double certification) fuels considered in this analysis are tallow-derived biodiesel, UCO-derived biodiesel, municipal waste-derived biomethane and 2G bioethanol and biodiesel. It is possible that additional fuels/feedstocks may become eligible and some of the fuels included in the analysis may not be eligible.

51. It is assumed that obligated suppliers will meet their obligation by blending biodiesel/diesel and bioethanol/petrol in line with the RTFO target (i.e. the petrol/ethanol blend and the diesel/biodiesel blend are 5% biofuel from 2014 onwards). Obligated suppliers are assumed to continue to meet their obligation through ethanol and biodiesel in these

<sup>4</sup> The CO<sub>2</sub>e metric stands for CO<sub>2</sub> equivalent and captures other GHG in relative terms to CO<sub>2</sub>.

proportions following implementation of double counting. In reality, blending ratios may turn out to be different.

52. 14% of net GHG savings attributable to policy are assumed to take place in the ‘traded sector’ (e.g. within refineries captured by the EU Emissions Trading Scheme) and are priced using the traded price of carbon values. The remaining 86% of net GHG savings are assumed to take place within the ‘non-traded sector’ (e.g. agricultural emissions) and are valued using non-traded sector carbon values. This assumption is based upon internal analysis.

### **Administrative burden and policy savings calculations**

53. There is no expected increase in administrative burden other than potentially the need for increased anti-fraud measures. This has not been quantified.

### **Wider Impacts**

#### *Feedstock markets*

54. Double certification will increase obligated suppliers’ demand for biofuel derived from eligible feedstocks. Which feedstocks are ‘wastes and residues’ and thus eligible for double counting are likely to include fuels derived from feedstocks such as used cooking oil, some forms of tallow, waste wood, wood chips etc. Increased demand for these biofuels is expected, in some cases, to lead to higher feedstock prices which may have knock-on impacts in other sectors which currently use these feedstocks.
55. In the case of tallow-derived biodiesel, double certification could potentially increase obligated suppliers’ willingness to pay for tallow by around £220/tonne<sup>5</sup> which could potentially drive a price increase of between 30% and 40% for ‘category 3’ tallow (higher grade typically used by the oleochemicals industry and for animal feed) and between 44% and 55% for ‘category 1’ tallow (lower grade typically used for energy production through combustion) relative to current market prices.

Figure 8: Current tallow prices

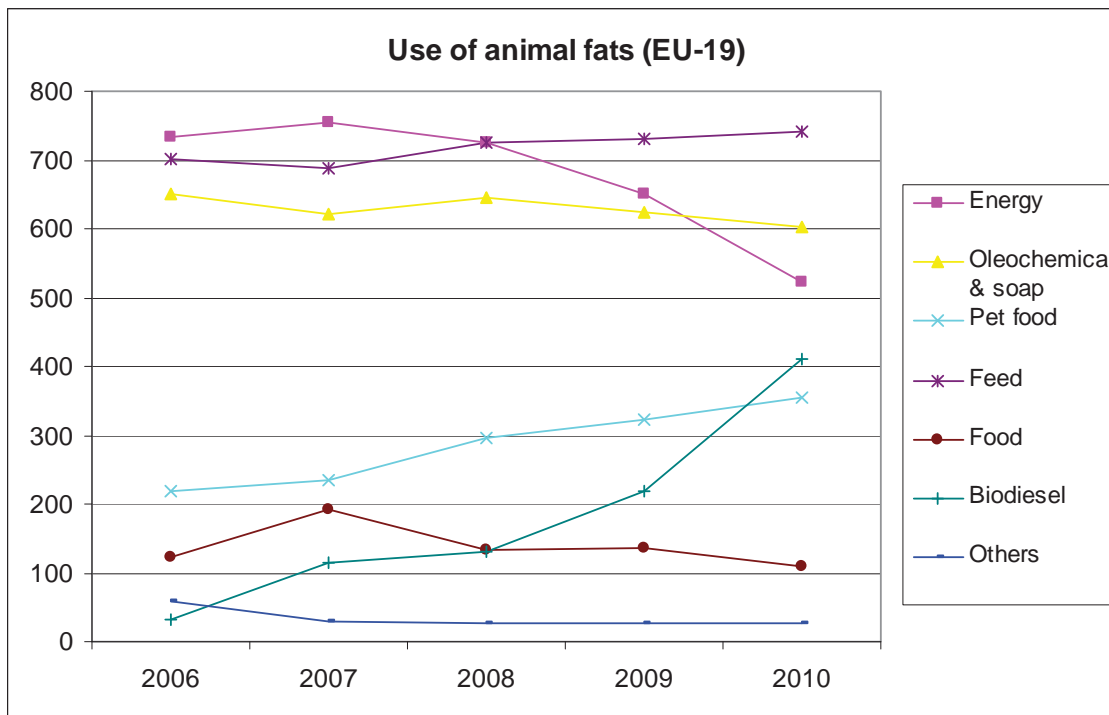
<b>tallow grade</b>	<b>current price (£/tonne)</b>
'category 1 & 2' tallow	400 - 500
'category 3' tallow	550 - 750

Source: Ecofys analysis for DfT

56. In the case of the oleochemical industry, a significant increase in the price of category 3 tallow would be expected to have a negative impact on profitability and could potentially lead to the use of more expensive substitutes (i.e. virgin vegetable oil in place of tallow). If feedstock price increases were sufficiently large they could threaten the economic viability of the industry which has an estimated turnover of around £400m per annum and is thought to account for 1350 -1450 UK jobs.

<sup>5</sup> assuming a 20p Renewable Transport Fuel Certificate Price

Figure 9 - Use of animal fats ('000 tonnes) in EU 19 2006-2010



Source: European Fat Processors and Renderers Association (EFPRA). Numbers are derived from EFPRA members, so not an EU total, but the leading producers are included.

57. Figure 9 shows the final use of tallow across the EU-19 from 2006 to 2010. Although it is not possible to say precisely which categories of tallow were used for each end use, for regulatory reasons it is assumed that only 'category 3' tallow was used in 'oleochemical & soap', 'feed' and 'food' end uses.
58. If tallow were to be made eligible for double certification, it is expected that biodiesel producers would first use lower-priced 'category 1' and potentially 'category 2' tallow before moving up the cost curve to 'category 3' tallow. This view is supported by historical EU consumption data which appears to show a trend whereby tallow which has been previously used for energy production has been diverted into biodiesel production (figure 9). As tallow (and tallow-derived biodiesel) is a globally traded commodity, the extent to which more expensive grades of tallow would be used for biodiesel production will not only depend upon double certification classification within the UK but also the classifications applied in other EU Member States (i.e. if more Member States double count all grades of tallow, it is more likely that 'category 3' tallow will be diverted into biodiesel production).
59. If double certification were limited to lower grades of tallow, there is a risk that category 1 and 2 could become more valuable than category 3 due to the additional incentives and categories 3 materials could 'disappear' as renderers choose not to produce the higher grade materials (if the value of category 1 tallow was to rise sufficiently there would be a financial incentive for this to happen). The category of tallow is defined by the inputs, and the production of category 1 and 2 tallow required less pre-processing and is thus a simpler process than production of category 3).
60. At present only a minority of Member States have announced how they intend to classify fuels for double certification. Of those which have publicly committed to a classification,



Germany has opted to exclude tallow entirely from their biofuel mandate from 2012 onwards and France has opted to double count tallow but has imposed a cap on how much can be used in any given year.

#### *Indirect land use change*

61. Increased use of waste-derived biofuel (at the expense of crop-derived biofuel – particularly biodiesel) may lead to lower GHG emissions from Indirect Land Use Change (ILUC). It has not been possible to quantify this potential impact due to a lack of robust evidence. In general, indirect GHG emissions from waste-derived biofuel are thought to be lower than for crop-derived biofuel. However, this may not be the case for all wastes. For example, palm oil (which is typically associated with high GHG emissions from land use change) is thought to be a direct substitute for some grades of tallow in the oleochemical industry. If this is the case, increased supply of tallow-derived biofuel may not lead to overall lower emissions owing to ILUC. As noted in paragraph 49, a further classification and consultation process will be undertaken before the list of fuels eligible for double counting will be finalised.

#### *Food prices*

62. Increasing the share of waste-derived biofuels in the UK biofuel mix decreases the risk of biofuels contributing to increases in food prices. However, there is as yet no clear consensus on how to quantify and value any potential links between biofuel demand and food prices. Therefore any such possible impacts have been excluded from the analysis.

#### *Crop-derived biofuel producers*

63. A decrease in demand for crop-derived biofuels due to double certification of waste-derived biofuel will reduce RTFO-driven demand for crop-derived biofuel which may have a negative impact on the profitability of crop-derived biofuel producers.

#### *Fuel Quality Directive*

64. Double certification may impact upon the UK's ability to meet Fuel Quality Directive (FQD) transport sector GHG saving targets (6% reduction in lifecycle GHGs by 2020) if it leads to a change in GHG savings. The changes in GHG savings modelled in this impact assessment are relatively small (both positive and negative), therefore it is expected that any impact on meeting the GHG target will also be small.

### **Summary and preferred option**

65. The preferred option is to introduce double certification of wastes, as this will demonstrate compliance with the RED and is expected to increase the supply of highly sustainable biofuels, mitigating concerns over adverse impacts on food markets and GHG emissions from ILUC.

# Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

## Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. If the policy is subject to a sunset clause, the review should be carried out sufficiently early that any renewal or amendment to legislation can be enacted before the expiry date. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

<p><b>Basis of the review:</b> [The basis of the review could be statutory (forming part of the legislation), i.e. a sunset clause or a duty to review, or there could be a political commitment to review (PIR)]; A review of all the RTFO amendments proposed in this consultation exercise will be conducted in advance of April 2014.</p>
<p><b>Review objective:</b> [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?] The objective of the review will be to ensure that the RTFO amendments are performing as intended.</p>
<p><b>Review approach and rationale:</b> [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach] The review will consist of an analysis of the impact of the RTFO amendments and will draw upon collected market data and stakeholder views.</p>
<p><b>Baseline:</b> [The current (baseline) position against which the change introduced by the legislation can be measured] Detailed data on the RTFO which is currently gathered by the RTFO administrator will be used to form the baseline.</p>
<p><b>Success criteria:</b> [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives] Success will be determined by an increase in the supply of highly sustainable biofuel.</p>
<p><b>Monitoring information arrangements:</b> [Provide further details of the planned/existing arrangements in place that will allow a systematic collection of monitoring information for future policy review] The RTFO administrator collects detailed data on RTFO performance.</p>
<p><b>Reasons for not planning a review:</b> [If there is no plan to do a PIR please provide reasons here]</p>

## Annex 2 - Competition Assessment

66. Waste may be supplied by small firms, as well as processed into biofuel by small firms. Double-certification of waste-derived biofuel may increase the opportunities for greater competition in the biofuels market, as smaller suppliers of waste-derived biofuels would have a greater opportunity to capture market share of overall biofuels demand. Double certification for waste-derived biofuels gives an advantage to suppliers of waste-derived biofuels over suppliers of crop-based biofuels.

### **Annex 3 - Small Firms Assessment**

67. The Renewable Transport Fuel Obligations Order exempts small transport fuel suppliers (supplying less than 450,000 litres/year). From having to supply biofuel under the RTFO.
68. Waste may be supplied by small firms as well as processed into biofuel by small firms. Double-certification of waste-derived biofuels would improve these firms' cashflow through increasing the revenues they can earn from waste-derived biofuel. This would lead to better conditions for the expansion of such firms, as their revenues and cashflow, as well as their ability to leverage investment, would be improved. However, small firms could also be suppliers of non-waste-derived biofuels which are partly displaced.

### **Annex 4 - Rural Proofing Assessment**

69. Several suppliers of waste-derived biofuels, and their input waste feedstocks, are likely to be based in rural locations. Double certification of waste-derived biofuels would increase the demand for such biofuels. Such an increase in demand may result in expansion of such firms (and possibly their supply chains), potentially leading to an increase in rural employment and productivity. However, many suppliers of crop-based biofuels (which would be partly displaced) are also in rural areas. It is not possible to assess the magnitude of these potential effects due to a lack of available evidence.

### **Annex 5 - Sustainable Development**

70. Any increase in GHG savings delivered through an increase in waste-derived biofuels will help ensure that the growth in biofuels in transport delivers substantial carbon reductions and helps tackle dangerous climate change. Waste-derived biofuels are thought to be among the most sustainable forms of biofuel, and they reduce risks of indirect land use change and increasing food prices through reducing demand for agricultural land (which would be required for crop-based biofuels).

### **Annex 6 - Resource Potential Estimates**

71. AEA technology and E4tech (research consultancies) have produced estimates of UK-sourced used cooking oil and tallow available to the transport sector. These resource potentials are captured in the following tables.

*Figure 10: UCO and tallow resource potential scenarios*

#### **Low scenario**

	2010	2015	2020	2025	2030
UCO biodiesel - PJ	3.5	4.0	4.6	5.0	5.5
UCO biodiesel - litres	105.6	122.3	138.9	152.8	166.7
Tallow biodiesel - PJ	1.5	2.8	4.2	4.8	5.4
Tallow biodiesel - litres	44.9	86.8	128.8	146.7	164.7

#### **Central scenario**

	2010	2015	2020	2025	2030
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UCO biodiesel - PJ	4.4	4.8	5.3	6.2	7.1
UCO biodiesel - litres	133.4	147.3	161.2	188.9	216.7
Tallow biodiesel - PJ	8.8	8.8	8.8	8.8	8.8
Tallow biodiesel - litres	269.5	269.5	269.5	269.5	269.5

### **High scenario**

	2010	2015	2020	2025	2030
UCO biodiesel - PJ	5.5	5.9	6.4	6.8	7.3
UCO biodiesel - litres	166.7	180.6	194.5	208.4	222.3
Tallow biodiesel - PJ	9.8	9.8	9.8	9.8	9.8
Tallow biodiesel - litres	299.5	299.5	299.5	299.5	299.5

## **Annex 7 - NNFCC Advanced Biofuels Scenarios**

72. Assumptions around the future deployment of biofuel from advanced processes were based upon NNFCC research, the results of which are summarised in Figure 9.

*Figure 11: NNFCC advanced biofuel scenarios (million litres)*

	<b>scenario 1 (central)</b>		<b>scenario 2 (high)</b>	
	2G bioethanol	2G biodiesel	2G bioethanol	2G biodiesel
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	189	0	0	0
2016	189	0	189	0
2017	189	0	189	0
2018	189	0	189	0
2019	189	0	378	239
2020	189	0	378	239
2021	189	239	378	478
2022	189	239	378	478
2023	189	239	378	478
2024	189	239	378	478
2025	189	239	378	478
2026	189	239	378	478
2027	189	239	378	478
2028	189	239	378	478
2029	189	239	378	478
2030	189	239	378	478

## **Annex 8 One In One Out**

This measure is out of scope as it is from a European origin and we do not propose to go beyond the minimum European requirements.

<b>Title:</b> <b>Amendments to the Renewable Transport Fuel Obligation for compliance with the Renewable Energy Directive - (4) Partially Renewable Fuels</b>  <b>Lead department or agency:</b> Department for Transport (DfT) <b>Other departments or agencies:</b>	<b>Impact Assessment (IA)</b>
	<b>IA No:</b> DFT00055
	<b>Date:</b> 03/08/2011
	<b>Stage:</b> Final
	<b>Source of intervention:</b> EU
	<b>Type of measure:</b> Secondary legislation
	<b>Contact for enquiries:</b> Craig Mills - 020 7944 4895 (craig.mills@dft.gsi.gov.uk)

## Summary: Intervention and Options

### What is the problem under consideration? Why is government intervention necessary?

Greenhouse gas (GHG) emissions from transport are significant and impose costs on others through their contribution to climate change; those costs are not taken into account by those that emit them. Using renewable energy can reduce GHG emissions and there are therefore EU and UK renewable energy targets. However, these are not likely to be met by the market alone, because of the extra cost of renewable energy compared to fossil fuels in the near term at least. The UK intends to meet its Renewable Energy Directive (RED) target through the Renewable Transport Fuel Obligation (RTFO). The RED enables Member States to take into account the renewable energy from a number of partially renewable fuels which are not currently eligible under the RTFO.

### What are the policy objectives and the intended effects?

The policy aims to increase the use of renewable energy in the transport sector, in a cost effective way. The amendment to the Renewable Transport Fuels Obligation (RTFO) considered in this Impact Assessment aims to allow partially renewable fuels to count towards the RTFO biofuel targets. This will increase the possibilities for fuel suppliers to meet their RTFO (supply of biofuels) targets, enabling a wider set of sustainable biofuels to deliver GHG savings. We do not intend to implement this directive beyond the minimum requirements.

### What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The RTFO already exists to impose an obligation on fuel suppliers. This IA considers allowing partially renewable fuels to count towards the RTFO biofuel targets in order to increase the options for meeting those obligations. Suppliers are left to choose whether they wish to supply those fuels. The policy options considered are a) to leave unchanged the current specified list of renewable fuels eligible for award of renewable transport fuel certificates (RTFCs) and b) to allow the renewable element of partially renewable fuels to be eligible for RTFCs. This impact assessment identifies the preferred option as allowing partially renewable fuels to count towards the RTFO biofuel targets, as it would be expected to:

- Widen the options available to obligated suppliers to meet their RTFO targets in the most cost-effective manner; it would serve only to potentially allow lower costs of meeting obligations, and not increase them.
- Provide an additional option to the UK to overcome biofuel blending limits in the current vehicle fleet.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 4/2014

**What is the basis for this review?** Duty to review. **If applicable, set sunset clause date:** Month/Year

<b>Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?</b>	Yes
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**Ministerial Sign-off** For final proposal stage Impact Assessments:

***I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.***

Signed by the responsible Minister:

*Norman Baker*

Date: 19 October 2011

# Summary: Analysis and Evidence

# Policy Option 1

## Description:

Allow partially renewable fuels to count towards the RTFO biofuel targets

Price Base Year 2010	PV Base Year 2011	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: NA	High: NA	Best Estimate: NA

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	Not available	0	Not available
High	Not available	0	Not available
Best Estimate	Not available	0	Not available

### Description and scale of key monetised costs by 'main affected groups'

NA

### Other key non-monetised costs by 'main affected groups'

No net costs are expected to business or consumers because the policy option allows additional flexibility to potentially lower the costs of meeting RTFO obligations. Reductions in net costs have not been possible to monetise owing to the lack of evidence on how partially renewable fuel would be used and what the per-unit cost saving would be. There may be additional one-off administrative costs to the RTFO administrator if novel fuels are supplied.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Not available	0	Not available
High	Not available	0	Not available
Best Estimate	Not available	0	Not available

### Description and scale of key monetised benefits by 'main affected groups'

N/A

### Other key non-monetised benefits by 'main affected groups'

There could be greater GHG savings from the RTFO if partially renewable fuels are used towards the obligation. The GHG savings vary across types of partially renewable fuels. There could be wider benefits of tackling the 'blend wall'.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5

The potential costs and/or benefits of allowing partially renewable fuels to count towards RTFO targets are inherently uncertain because it is not possible to form a robust estimate of what proportion of the UK biofuel supply such fuels might eventually contribute and which type of partially renewable fuels these will be.

Direct impact on business (Equivalent Annual) £m):			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?		United Kingdom			
From what date will the policy be implemented?		15/12/2011			
Which organisation(s) will enforce the policy?		DfT			
What is the annual change in enforcement cost (£m)?		£0m			
Does enforcement comply with Hampton principles?		Yes			
Does implementation go beyond minimum EU requirements?		No			
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)		Traded: 0		Non-traded: 0	
Does the proposal have an impact on competition?		No			
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?		Costs: NA		Benefits: NA	
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	Micro	< 20	Small	Medium	Large
Are any of these organisations exempt?	No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	10
Small firms <a href="#">Small Firms Impact Test guidance</a>	Yes	11
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	No	8
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	No	
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	No	

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

## Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

### References

Include the links to relevant legislation and publications, such as public impact assessments of earlier stages (e.g. Consultation, Final, Enactment) and those of the matching IN or OUTs measures.

No.	Legislation or publication
1	The Renewable Transport Fuel Obligations Order <a href="http://www.legislation.gov.uk/ukxi/2007/3072/contents/made">http://www.legislation.gov.uk/ukxi/2007/3072/contents/made</a>
2	Committee on Climate Change website – transport sector: <a href="http://www.theccc.org.uk/sectors/surface-transport">http://www.theccc.org.uk/sectors/surface-transport</a>
3	Climate Change Act 2008: <a href="http://www.legislation.gov.uk/ukpga/2008/27/contents">http://www.legislation.gov.uk/ukpga/2008/27/contents</a>
4	EU Renewable Energy Directive – Promotion of the use of energy from renewable sources: <a href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF">http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF</a>

+ Add another row

### Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

#### Annual profile of monetised costs and benefits\* - (£m) constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>
Transition costs										
Annual recurring cost										
<b>Total annual costs</b>										
Transition benefits										
Annual recurring benefits										
<b>Total annual benefits</b>										

\* For non-monetised benefits please see summary pages and main evidence base section



Microsoft Office  
Excel Worksheet



# Evidence Base (for summary sheets)

## Introduction

1. Transposition of the EU Renewable Energy Directive (RED) into UK law means that changes are required to the current biofuels obligations in order for the UK to be compliant. These are being consulted on and are described in full in the accompanying consultation document.
2. This Impact Assessment is one of five final stage impact assessments covering transposition of transport elements of the RED. It focuses on one particular aspect of the RTFO: the accounting of partially renewable fuels.
3. The suite of 5 final stage impact assessments is:
  - i) Mandatory Sustainability Criteria
  - ii) Reporting & Verification
  - iii) Double-Counting of Waste-Derived Biofuels
  - iv) Partially Renewable Fuels
  - v) Overarching Impacts
4. This impact assessment examines the costs and benefits of allowing the renewable element of partially renewable fuels to count towards meeting RTFO targets. Under the current RTFO only a specified list of renewable fuels is eligible for award of Renewable Transport Fuel Certificates (RTFCs) and thus only fuels in this list are eligible to be counted towards meeting an obligated supplier's target. The RED allows virtually all renewable fuels to be eligible for reward under national schemes and to be counted towards meeting the relevant RED targets. The RED also allows the renewable portions of partially renewable fuels to be similarly rewarded and counted towards targets.
5. The structure of this IA is as follows: it will set out the problem under consideration and the rationale for government intervention, before then explicitly stating the policy objectives of this intervention. The policy option is described and the methodology for analysing the costs and benefits of the policy option is explained, including the key assumptions and areas of uncertainty. Wider impacts and relevant specific impact tests are described in the annex. The impact assessment concludes by describing the preferred option.

## **Problem under consideration**

6. Transport accounts for around a quarter of UK greenhouse gas emissions (around 130 MtCO<sub>2</sub>e<sup>1</sup>) and the majority (around 90%) of those emissions come from road transport (Committee on Climate Change, 2010). The UK has legally binding climate change targets both for the long term to reduce emissions by at least 80% below 1990 levels by 2050; and, in the short term to reduce emissions by 34% below 1990 levels by 2020 (Climate Change Act, 2008). We also have a renewable energy target which is for 15% of UK energy to be supplied from renewable sources by 2020, with a transport-specific target of 10% (RED).
7. Sustainable biofuels are currently one of the main available options for increasing renewable energy usage in transport, particularly in the period up to 2020 when other options are limited due to the lead in times for technological developments.
8. It is possible to combine renewable bio-chemicals with crude oil derived fossil fuel at the molecular level to produce partially renewable fuels. Examples include Co-processed hydrotreated vegetable oil (co-processed HVO), bio-ethyl-tertiary-butyl-ether (bio-ETBE), bio-methyl-tertiary-butyl-ether (bio-MTBE) and bio-tertiary-amyl-ethyl-ether (bio-TAEE). Partially renewable biofuels can be made from the same feedstocks as other biofuels. The bio-chemicals are chemically combined with the fossil fuel to form a uniform type of fuel rather than blending biofuel with fossil fuel for use. This means that partially renewable biofuels can offer greater compatibility with existing technologies (e.g. engine seals) and fewer supply issues than other biofuels. Partially renewable fuels are not currently eligible to be counted towards the RTFO (i.e. suppliers do not receive RTFCs when they supply renewable energy in this form) and therefore there is no current incentive for their supply.

## **Rationale for intervention**

9. Inclusion of partially renewable fuels in the RTFO will give fuel suppliers increased flexibility to supply renewable transport fuel at least cost. A number of industry stakeholders have indicated that they would like the list of renewable fuels eligible for RTFCs to be 'left open' in order to reward any others that they supply. It is therefore believed that increasing this list could be an effective policy. However, this list is set out in the RTFO Order and therefore government must intervene to amend this list.

## **Policy objective**

10. The objective of this policy change is to provide an incentive for the supply of partially renewable fuels, with the intended effect that it would allow a level playing field in the supply of biofuels across a wider range of potential renewable fuels.

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<sup>1</sup> The CO<sub>2</sub>e metric stands for CO<sub>2</sub> equivalent and captures other GHG in relative terms to CO<sub>2</sub>.

## **Description of options considered (including do nothing)**

11. Given the RTFO is already in place, there is an option to make an amendment to ensure that it allows the widest possible set of biofuels to deliver GHG savings. The costs, benefits and impacts on the market of this option will be explored in this section.
12. The policy option considered in this impact assessment is assessed against a 'do nothing' baseline.

## **Baseline**

13. A "do nothing" baseline assumes no changes to the current RTFO, i.e., the renewable energy from partially renewable fuels would continue to be ineligible for RTFO certificates (RTFCs) and would not be counted towards meeting RTFO targets.
14. There are no additional policy costs or benefits associated with a 'do nothing' baseline. Any potential for partially renewable fuels to deliver increased GHG savings and efficiency savings would be unrealised.

## **Costs and benefits of each option**

15. The policy option considered is to allow the renewable element of partially renewable fuels to be eligible for RTFCs and thus to count towards the RTFO obligation.

## **Costs**

16. Suppliers are assumed to minimise costs and maximise profits. As suppliers will still be able to make the same supply decisions, with regard to the eligibility of wholly renewable fuels, it is assumed that costs will not rise (i.e. suppliers could continue to supply wholly renewable fuels with no additional costs above practices taking place under the current RTFO, the baseline) and could potentially fall if partially renewable fuels become eligible for RTFCs under the RTFO. This fall in costs would be expected because allowing a wider range of renewable fuels to be used to meet a given target would lead to suppliers having more options to meet targets and, depending on the cost, commercial considerations will determine the uptake of the partially renewable fuels. This potential cost saving has not been quantified as it is not possible to make a robust estimate of how partially renewable fuel would be used if it were allowed or what the per-unit cost saving would be. Given that the renewable part of any currently commercially available partially renewable fuels are derived from identical feedstocks to conventional biofuels, it is not thought that any potential cost savings would be large. Lower costs for biofuel suppliers may be passed on to consumers through lower pump prices relative to in the baseline. Increased supply of partially renewable fuels would be offset by a decrease in the supply of wholly renewable fuels, with no net change in the overall volume of biofuel supplied.

## Benefits

17. Partially renewable fuels may have different GHG savings characteristics relative to wholly renewable fuels, therefore overall GHG savings delivered under the RTFO may change as a result of the inclusion of partially renewable fuels. However, it is not expected that any change in overall GHG savings will be significant.
18. The Renewable Energy Directive (annex V) lists estimates of 'typical' GHG savings from a number of wholly renewable and partially renewable biofuels. Of the partially renewable fuels covered bio-ETBE and bio-TAEE are estimated to have the same GHG impacts as bioethanol (a wholly renewable fuel) from the same production pathway and co-processed HVO biodiesel (partially renewable) is estimated to deliver higher GHG savings (by around 8% to 14% depending on the feedstock) than FAME biodiesel (wholly renewable) produced using the same feedstock (see figure 1).

Figure 1: partially vs wholly renewable biodiesel GHG savings (RED annex V)

	FAME	HVO
Rape	45%	51%
Sunflower	58%	65%
Palm	36%	40%

19. The extent to which overall GHG savings will change following the implementation inclusion of partially renewable fuels in the RTFO will depend upon (1) the volume of partially renewable fuels supplied (2) the type of partially renewable fuel supplied (3) the type of wholly renewable fuel displaced. At this stage, it is not possible to make a robust estimate of these changes, however, given the relative similarity in GHG savings delivered by partially and wholly renewable fuels it is thought there is very little risk of partially renewable fuels delivering significantly lower GHG savings than the fuels they displace.

## Market Impacts

20. Inclusion of partially renewable fuels in the RTFO will give suppliers the opportunity to meet their obligation through the supply of partially renewable fuels. If they choose to do so, this will mean that less biodiesel/bioethanol will be supplied to meet a given obligation level (as the biodiesel/bioethanol will have been substituted for a partially renewable fuel).
21. Inclusion of partially renewable fuels may also provide alternative biofuel supply options to suppliers who wish to supply fuel in excess of the 'blend wall' (the mandatory bioethanol/petrol, biodiesel/diesel blending limit). This may mean that greater quantities of renewable transport fuel can be supplied before dedicated 'high blend' biodiesel/bioethanol fuel streams become necessary.
22. Inclusion of partially renewable fuels is not expected to have an adverse impact on the quality of fuel supplied, as fuel supplied will still have to meet specified standards.

## **Administrative burden**

23. Additional admin costs (for the RTFO administrator and fuel suppliers) may be incurred where a partially renewable fuel which isn't listed in Annex III (of the RED) and doesn't have a readily available industry standard value (for GHG savings) is supplied. Due to the uncertain nature of these costs they haven't been estimated - they will only be incurred if a supplier wished to supply a novel type of fuel and would only be incurred once for each type of fuel. In addition, we would not expect a supplier to change behaviour and supply a partially renewable fuel unless the net benefit was profitable (i.e. the potential cost saving by supplying a partially renewable fuel would have to outweigh any increased administrative burden in order for a supplier to make a sensible commercial decision to supply).

## **Wider Impacts**

24. As some partially renewable fuels can be blended at higher concentrations than conventional biofuel, they may offer a low-cost route for overcoming the "blend wall" (the limit at which conventional biofuel can be blended with fossil fuel as dictated by engine design in the current car fleet and regulations that limit the amount of biofuel that can be blended with fossil fuel). This potential benefit cannot be quantified because it is not possible to make a robust estimate of how much partially renewable biofuel would be used if it were eligible under the RTFO. The cost and practicality of alternative solutions to the blend wall is also currently subject to research and there are not yet any robust estimates of competitor solutions.

## **Summary and preferred option**

25. Making partially renewable fuels eligible under the RTFO will allow obligated suppliers increased flexibility to meet their obligations, potentially leading to cost savings and not increasing costs if suppliers are profit maximising. The additional flexibility in meeting obligations is likely to work to the benefit of fuel suppliers and to consumers, if the costs of meeting obligations were lower, hence lowering the pump price increase associated with the supply of biofuels. Partially renewable fuel typically delivers higher GHG savings than the wholly renewable alternative. Allowing the use of partially renewable fuel would therefore be likely to increase overall GHG savings and assist obligated suppliers in complying with minimum EU GHG savings requirements. However, it is possible some partially renewable fuels could reduce GHG savings as compared to the fuels they displace. There may be some extra administrative costs to the RTFO administrator if novel partially renewable fuels are supplied.
26. Therefore, although it has not been possible to quantify the costs and benefits, this Impact Assessment suggests that there may be net benefits from Option 1 given the potential for cost savings (due to increased flexibility for obligated suppliers), and therefore identifies the preferred option as allowing partially renewable fuels to be counted towards the RTFO.

## Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

### Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. If the policy is subject to a sunset clause, the review should be carried out sufficiently early that any renewal or amendment to legislation can be enacted before the expiry date. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

<p><b>Basis of the review:</b> [The basis of the review could be statutory (forming part of the legislation), i.e. a sunset clause or a duty to review, or there could be a political commitment to review (PIR)];</p> <p>A review of all the RTFO amendments proposed in this consultation exercise will be conducted in advance of April 2014.</p>
<p><b>Review objective:</b> [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?]</p> <p>The objective of the review will be to ensure that the RTFO amendments are performing as intended.</p>
<p><b>Review approach and rationale:</b> [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach]</p> <p>The review will consist of an analysis of the impact of the RTFO amendments and will draw upon collected market data and stakeholder views.</p>
<p><b>Baseline:</b> [The current (baseline) position against which the change introduced by the legislation can be measured]</p> <p>Detailed data on the RTFO which is gathered by the RTFO Unit at DfT will be used to form the baseline.</p>
<p><b>Success criteria:</b> [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]</p> <p>Success will be determined by the effective allowance for inclusion of partially renewable fuels in the RTFO.</p>
<p><b>Monitoring information arrangements:</b> [Provide further details of the planned/existing arrangements in place that will allow a systematic collection of monitoring information for future policy review]</p> <p>The RTFO administrator collects detailed data on RTFO performance.</p>
<p><b>Reasons for not planning a review:</b> [If there is no plan to do a PIR please provide reasons here]</p>

### Annex 2 – Competition Assessment

27. The widening of the RTFO to ensure that partially renewable fuels are eligible increases the options open to fuel suppliers in meeting their obligations, therefore increasing the extent to which there is competition among the types of fuels supplied. This should act to lower the overall costs of meeting obligations.

28. As no additional obligations are being placed on fuel suppliers, no adverse competition effects are expected. Allowing a larger range of fuels to be eligible for RTFCs may provide the additional incentive for them to be supplied, if they were cost competitive for the supplier, hence increase the number of fuel types in the market. This may increase the competition between fuels to some degree, though this effect is not likely to be significant.
29. Allowing more fuels to be eligible for RTFCs may also provide the incentive for new fuel suppliers to enter the market if they are able to benefit from this opportunity to provide fuels which now have a higher market value (because they now are worth the value of an RTFC).

### **Annex 3 – Small Firms Assessment**

30. The Renewable Transport Fuel Obligations Order exempts small transport fuel suppliers (supplying less than 450,000 litres/year). From having to supply biofuel under the RTFO.
31. Small firms may benefit if they supply partially renewable fuels, because their value to fuel suppliers will increase (equivalent to the RTFC value). This means there may be new market opportunities for certain fuel suppliers.

### **Annex 4– OIOO**

32. This measure is from a European origin and therefore it does not fall within the scope of OIOO.

<b>Title:</b> <b>Amendments to the Renewable Transport Fuel Obligation for compliance with the Renewable Energy Directive - (5) Overarching Impact Assessment</b>  <b>Lead department or agency:</b> Department for Transport <b>Other departments or agencies:</b>	<b>Impact Assessment (IA)</b>
	<b>IA No:</b> DfT00122
	<b>Date:</b> 12/08/2011
	<b>Stage:</b> Final
	<b>Source of intervention:</b> EU
	<b>Type of measure:</b> Secondary legislation
	<b>Contact for enquiries:</b> Craig Mills - 020 7944 4895 (craig.mills@dft.gsi.gov.uk)

## Summary: Intervention and Options

### What is the problem under consideration? Why is government intervention necessary?

Greenhouse gas (GHG) emissions from transport are significant and impose costs on others through their contribution to climate change; those costs are not taken into account by those that emit them. Using renewable energy can reduce GHG emissions and there are therefore EU and UK renewable energy targets. However, these are not likely to be met by the market alone, because of the extra cost of renewable energy compared to fossil fuels in the near term at least. The UK intends to meet its Renewable Energy Directive (RED) transport target through the Road Transport Fuel Obligation (RTFO). This impact assessment aggregates the cost and benefits of measures outlined in 4 additional impact assessments so that the impact of these measures can be considered in their entirety.

### What are the policy objectives and the intended effects?

The policy changes covered in this overarching impact assessment are aimed at improving the sustainability characteristics of biofuel supplied under the RTFO ('sustainability criteria' and 'double certification'), encouraging the development of '2<sup>nd</sup> generation' advanced biofuels and waste-derived biofuels which do not use food as feedstock ('double certification') and widening the scope of the RTFO to give obligated suppliers more flexibility in meeting their obligation under the RTFO at least cost ('partially renewable fuels').

### What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

The policy changes described in this overarching impact assessment are:

- (1) introduction of minimum sustainability criteria for biofuels supplied under the RTFO
- (2) introduction of a system of verification which ensures that the sustainability criteria have been met
- (3) introduction of double certification of highly sustainable waste-derived biofuels
- (4) inclusion of partially renewable fuels under the RTFO

These policy changes are being pursued so as to improve the sustainability characteristics of biofuel supplied under the RTFO, encourage the development of advanced biofuel technologies and give obligated suppliers more flexibility to supply biofuel at least cost. Alternative options have been described in the individual impact assessments which underpin this overarching impact assessment.

**Will the policy be reviewed?** It will be reviewed. **If applicable, set review date:** 4/2014

**What is the basis for this review?** Duty to review. **If applicable, set sunset clause date:** Month/Year

**Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?**

Yes

**Ministerial Sign-off** For final proposal stage Impact Assessments:

***I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.***

Signed by the responsible Minister:

*Norman Baker*

Date: 19 October 2011



# Summary: Analysis and Evidence

# Policy Option 1

## Description:

Implement sustainability criteria, verification of sustainability criteria, double certification of waste-derived biofuel and inclusion of partially renewable fuels in the RTFO.

Price Base Year 2010	PV Base Year 2011	Time Period Years 18	Net Benefit (Present Value (PV)) (£m)		
			Low: 974	High: -818	Best Estimate: 282

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.03	7	109
High	0.09	68	1,083
Best Estimate	0.06	20	324

### Description and scale of key monetised costs by 'main affected groups'

The majority of the costs arise from a temporary increase in biofuel prices which is expected to result from implementation of the sustainability criteria (£318m over the period 2012 to 2030 - central estimate). The remainder of the estimated costs result from the requirement to have compliance with the sustainability criteria independently verified (£6m). These costs will be incurred by fuel suppliers obligated under the RTFO who are expected to pass them through to fuel consumers.

### Other key non-monetised costs by 'main affected groups'

Implementation of double certification of waste-derived biofuel is expected to shrink the RTFO market for crop-derived biofuel. As a result crop-derived biofuel producers may experience lower profitability. Double certification is also expected lead to greater demand for waste feedstocks (e.g. tallow, waste wood, wood chips) pushing up prices in these markets. Higher prices for waste feedstocks may result in lower profitability in industries which currently make use of these resources.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	-1	0
High	0	83	1083
Best Estimate	0	46	606

### Description and scale of key monetised benefits by 'main affected groups'

Monetised benefits have been calculated by estimating changes in net RTFO GHG savings (relative to the baseline). These GHG savings have been monetised using Department of Energy and Climate Change carbon values.

### Other key non-monetised benefits by 'main affected groups'

Non-monetised benefits include potential innovation benefits from advanced biofuel production technologies which may result from double certification. Increased uptake of waste-derived biofuel may also lead to indirect GHG emissions and less pressure from crop-derived biofuel driven demand in food markets.

### Key assumptions/sensitivities/risks

Discount rate (%) 3.5

It is assumed that the baseline GHG savings and the supply of waste-derived biofuel in the baseline RTFO fall (relative to current levels) as other EU member states implement the Renewable Energy Directive and, as a result, offer a higher financial incentive for sustainability criteria-compliant and waste-derived biofuel. Sensitivities have been modelled around the level of GHG savings in the baseline. Biofuel prices are assumed to rise as a result of the implementation of the sustainability criteria. The extent to which prices will increase is highly uncertain. Low and high sensitivities have modelled around central estimates to reflect this uncertainty. Three different supply scenarios, based upon research and historical data, have been used to analyse the impact of double certification.

Direct impact on business (Equivalent Annual) £m):			In scope of OIOO?	Measure qualifies as
Costs: NA	Benefits: NA	Net: NA	No	NA

## Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?			United Kingdom		
From what date will the policy be implemented?			05/12/2011		
Which organisation(s) will enforce the policy?			DfT		
What is the annual change in enforcement cost (£m)?			0.0028		
Does enforcement comply with Hampton principles?			Yes		
Does implementation go beyond minimum EU requirements?			No		
What is the CO <sub>2</sub> equivalent change in greenhouse gas emissions? (Million tonnes CO <sub>2</sub> equivalent)			<b>Traded:</b> 2.1	<b>Non-traded:</b> 12.6	
Does the proposal have an impact on competition?			Yes		
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?			<b>Costs:</b> NA		<b>Benefits:</b> NA
Distribution of annual cost (%) by organisation size (excl. Transition) (Constant Price)	<b>Micro</b>	<b>&lt; 20</b>	<b>Small</b>	<b>Medium</b>	<b>Large</b>
Are any of these organisations exempt?	No	No	No	No	No

## Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
<b>Statutory equality duties<sup>1</sup></b> <a href="#">Statutory Equality Duties Impact Test guidance</a>	No	
<b>Economic impacts</b>		
Competition <a href="#">Competition Assessment Impact Test guidance</a>	Yes	21
Small firms <a href="#">Small Firms Impact Test guidance</a>	No	
<b>Environmental impacts</b>		
Greenhouse gas assessment <a href="#">Greenhouse Gas Assessment Impact Test guidance</a>	Yes	18
Wider environmental issues <a href="#">Wider Environmental Issues Impact Test guidance</a>	No	
<b>Social impacts</b>		
Health and well-being <a href="#">Health and Well-being Impact Test guidance</a>	No	
Human rights <a href="#">Human Rights Impact Test guidance</a>	No	
Justice system <a href="#">Justice Impact Test guidance</a>	No	
Rural proofing <a href="#">Rural Proofing Impact Test guidance</a>	No	
<b>Sustainable development</b> <a href="#">Sustainable Development Impact Test guidance</a>	Yes	22

<sup>1</sup> Public bodies including Whitehall departments are required to consider the impact of their policies and measures on race, disability and gender. It is intended to extend this consideration requirement under the Equality Act 2010 to cover age, sexual orientation, religion or belief and gender reassignment from April 2011 (to Great Britain only). The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

## Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

### References

Include the links to relevant legislation and publications, such as public impact assessments of earlier stages (e.g. Consultation, Final, Enactment) and those of the matching IN or OUTs measures.

No.	Legislation or publication
1	EU Renewable Energy Directive – Promotion of the use of energy from renewable sources: <a href="http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF">http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF</a>
2	The individual impact assessments which look at each each of policies outlined in this overarching impact assessment can be found at <a href="http://www.[insert].com">www.[insert].com</a>
3	Renewable Fuels Agency carbon and sustainability data (archived) <a href="http://webarchive.nationalarchives.gov.uk/20110410141814/http://renewablefuelsagency.gov.uk/carbon-and-sustainability/rtfo-reports">http://webarchive.nationalarchives.gov.uk/20110410141814/http://renewablefuelsagency.gov.uk/carbon-and-sustainability/rtfo-reports</a> DfT biofuels statistics webpage <a href="http://www2.dft.gov.uk/pgr/statistics/datatablespublications/biofuels/">http://www2.dft.gov.uk/pgr/statistics/datatablespublications/biofuels/</a>
4	NNFCC advanced biofuels research (currently unpublished – soon to be published on DfT website)

+ Add another row

### Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

#### Annual profile of monetised costs and benefits\* - (£m) constant prices

	Y <sub>0</sub>	Y <sub>1</sub>	Y <sub>2</sub>	Y <sub>3</sub>	Y <sub>4</sub>	Y <sub>5</sub>	Y <sub>6</sub>	Y <sub>7</sub>	Y <sub>8</sub>	Y <sub>9</sub>
Transition costs										
Annual recurring cost										
Total annual costs										
Transition benefits										
Annual recurring benefits										
Total annual benefits										

\* For non-monetised benefits please see summary pages and main evidence base section



Microsoft Office  
Excel Worksheet

# Evidence Base (for summary sheets)

## Introduction & Context

1. The Renewable Transport Fuel Obligation (RTFO) is the UK's mechanism for incentivising the supply of biofuels in the road transport sector. A series of amendments to the RTFO are proposed in order to implement the transport elements of the Renewable Energy Directive. These are:
  - Sustainability Criteria
  - Verification of compliance with the sustainability criteria
  - Double certification of waste-derived and '2<sup>nd</sup> generation' advanced biofuel
  - Inclusion of partially renewable fuels
2. This impact assessment provides a high level summary and overview of the market impacts and costs and benefits of all the proposed amendments in their totality. A more detailed analysis of these changes, including the underlying rationale for making the changes and alternative options which have been considered can be found in the individual impact assessments
3. At a high level the measures outlined in this impact assessment are aimed at improving the sustainability of biofuels supplied under the RTFO ('Sustainability Criteria' and 'Verification' – impact assessments 1 and 2), incentivising increased supply of waste-derived and '2<sup>nd</sup> generation' advanced biofuels ('Double Certification' – impact assessment 3) and providing increased flexibility for obligated suppliers to meet their obligations at least cost through the use of partially renewable fuels ('Partially Renewable Fuels' – impact assessment 4).

## **RTFO overview**

4. Under the RTFO road transport fuel suppliers ('obligated suppliers') are required by law to deliver a given proportion of the fuel supply as biofuel. The proportion of biofuel supplied is determined by the level of RTFO target (figure 1). The RTFO creates demand for biofuel which may not be there in its absence. If biofuel is more expensive than fossil fuel (as is typically the case), the RTFO in effect provides a subsidy for biofuel. For each litre of biofuel (or kg of biogas) supplied a tradable Renewable Transport Fuel Certificate (RTFC) is issued. Obligated suppliers demonstrate compliance with their obligation under the RTFO by surrendering certificates at the end of the year. They can obtain these certificates by either supplying biofuel directly or purchasing RTFCs on the market. Given that fuel suppliers are assumed to minimise costs and maximise profits, it is assumed that the RTFO is the 'least cost' mechanism for supplying biofuel.

Figure 1: RTFO target trajectory

2012/13	4.5%
2013/14 onwards	5%

## **Overview of RTFO amendments**

### Sustainability Criteria – overview & recommended option

5. The Renewable Energy Directive sustainability criteria require that biofuel supplied under the RTFO:

- (1) Meet minimum GHG savings thresholds (*GHG Savings Criteria*)
- (2) Are not sourced from areas of high biodiversity (*Land Based Criteria*)
- (3) Are not sourced from areas of high carbon stocks (*Land Based Criteria*)

### GHG Savings Criteria

6. The biofuel GHG saving (relative to fossil fuel) required by the sustainability criteria increases over time and varies by the point in time at which a refinery commenced operation (i.e. older refineries do not have to comply with the criteria before 2013 and refineries commencing operation post-2017 are subject to a higher GHG saving threshold). From 2011, refineries which commenced operation post 2012 are required to deliver GHG savings of at least 35%. From 2013, all refineries are required to deliver at least 35% GHG savings. From 2017, all refineries are required to deliver at least 50% GHG savings. From 2018, refineries which commence operation post 2017 are required to deliver at least 60% GHG savings.

Figure 1: Minimum GHG & grandfathering periods for biofuel installations (RED)

Period	Date production started at an installation		
	Pre 24/01/08	Post 24/01/08	Post 01/01/17
05/12/2010 – 31/03/2013	No criteria	35%	-
01/04/2013- 31/12/2016	35%	35%	-
01/01/2017- 31/12/2017	50%	50%	50%
01/01/2018- 31/12/2020	50%	50%	60%

7. Figures 2 and 3 show the levels of GHG savings being obtained by biofuels supplied under the RTFO up to Jan 2011.

Figure 2: Profile of reported biodiesel GHG savings (RTFO data Apr 2008 – Jan 2011)

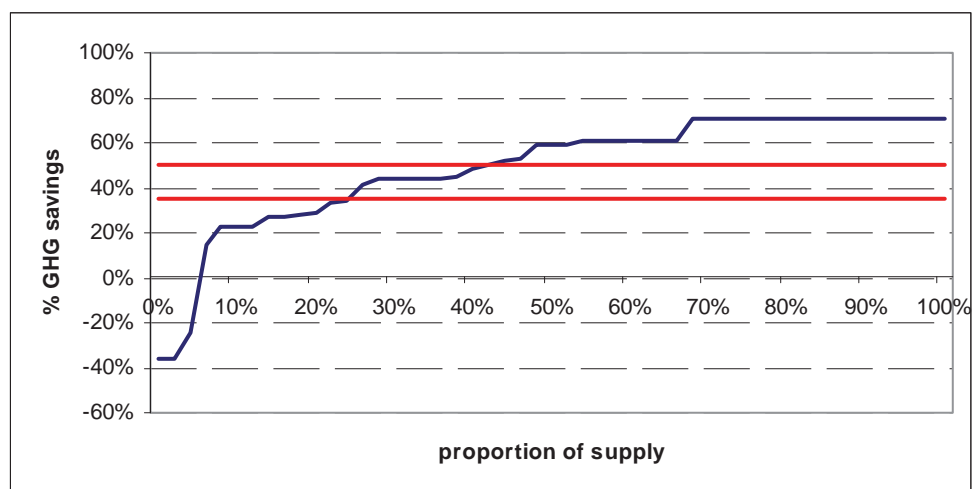
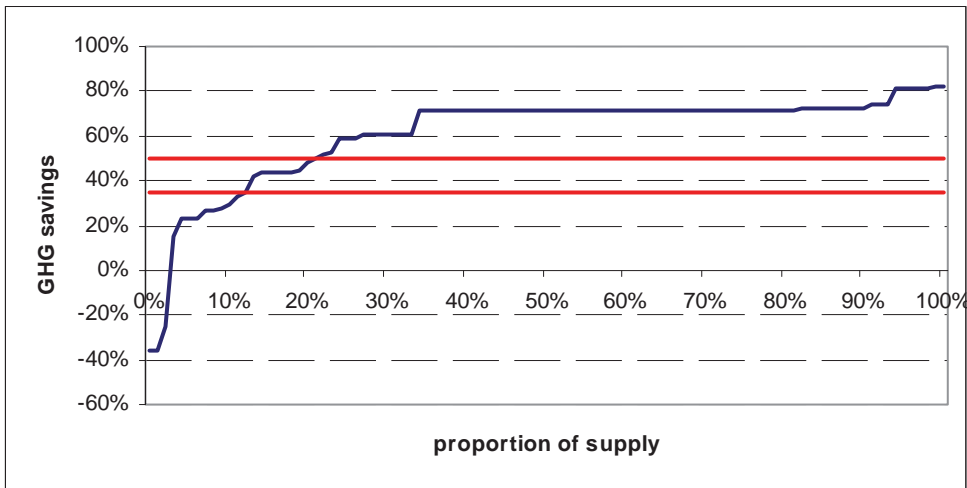


Figure 3: Profile of reported bioethanol GHG savings (RTFO data Apr 2008 – Jan 2011)

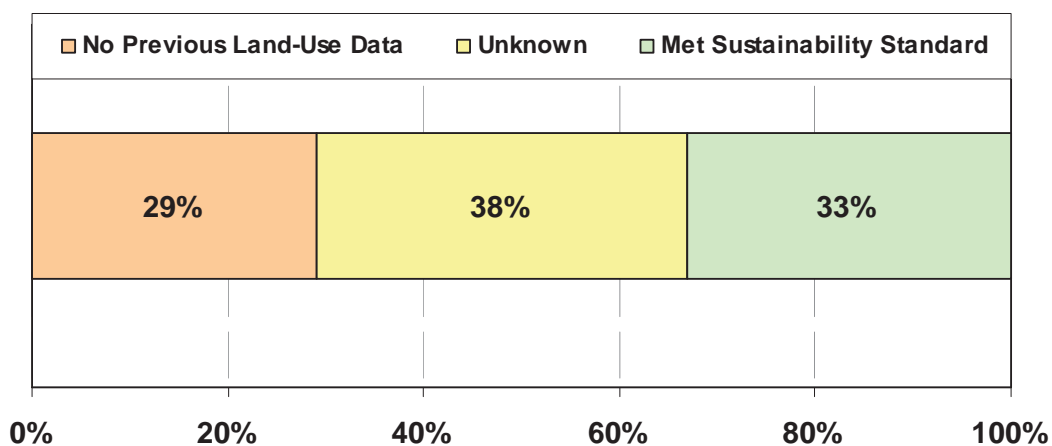


8. The horizontal red lines in figures 2 & 3 represent the sustainability criteria proposed. Biofuels supplied are required to achieve a 35% GHG saving in 2012 to 2016 and 50% saving from 2017 onwards. On the basis of fuels supplied under the RTFO up to January 2011, 71% of biodiesel would have been exceeded the 35% GHG savings threshold and 26% would have exceeded the 50% GHG savings threshold. 87% of bioethanol would have been exceeded the 35% GHG savings threshold and 79% would have exceeded the 50% GHG savings threshold. The sustainability criteria would be expected to raise the minimum and average levels of GHG savings delivered by biofuels supplied in the UK. In order to achieve higher GHG savings, there may be some increase in the cost of biofuels.
9. Biofuel producers are expected to increase average GHG savings following the implementation of the sustainability criteria. This can be achieved in a number of ways including increasing crop yields, reducing fertiliser use, improving energy efficiency / GHG intensity of refining processes and changing the geographical source of the biofuel feedstock.

*Land Based Criteria*

10. The implications of the requirement that biofuels are not sourced from areas of high carbon stock or high biodiversity areas are particularly uncertain and difficult to evaluate.
11. Figure 4 gives an indication of the proportions of the current UK biofuel supply that could be affected by the land-based criteria. Those with no previous land-use data could be considered more likely to not satisfy the land-based criteria. Those which have supplied land-use data but not demonstrated compliance with current RFA sustainability standards may or may not satisfy the land-based criteria. Those which have demonstrated compliance with current RFA sustainability standards could be considered more likely to satisfy the land-based criteria.

Figure 4: UK biofuel supply by land-use sustainability data (2009/10 RTFO data)



12. Given that there is significant global agricultural production occurring in areas which do not have high carbon stocks or biodiversity, it is anticipated that the market will adapt and obligated suppliers will be able to obtain increased volumes of compliant biofuel following the introduction of the sustainability criteria. However, there may be some short term price pressures as biofuel producers gradually adapt to the requirements of the criteria.

### Verification

13. The Renewable Energy Directive requires that biofuel supplied under the RTFO must be independently verified in order to demonstrate compliance with the sustainability criteria. As such is proposed that biofuel supplied under the RTFO must be independently verified before an RTFC (tradable certificate) is issued.

### Double Certification

14. The EU Renewable Energy Directive (RED) requires biofuels that are derived from wastes, residues, non-food cellulosic material, and ligno-cellulosic material inputs (i.e. biofuels which are not derived directly from food) to be counted twice towards compliance with any national renewable energy obligation (i.e. in the RTFO in the UK) and the 10% RED transport target, thus providing an increased incentive to supply these types of fuels. The intended effect is that these incentives are expected to increase the price obligated suppliers are willing to pay for these fuels, which in turn should lead to an increase in the available supply.
15. The technologies/feedstocks covered in following analysis of double certification are '2<sup>nd</sup> generation' Fischer-Tropsch biodiesel, '2<sup>nd</sup> generation' bioethanol (from both gasification and biological pathways), used cooking oil (UCO)-derived biodiesel, tallow-derived biodiesel and biomethane.
16. The RTFO supply of waste-derived biofuel (in absence of double counting) up to January 2011 is shown in figure 5. To date, no biofuel from '2<sup>nd</sup> generation' advanced processes has been supplied under the RTFO. In obligation year 1 and 2, tallow-derived biodiesel was the most prevalent of the waste-derived biofuels in the RTFO. In year 3 of the RTFO, UCO-derived biodiesel was the most prevalent of the waste-derived biofuels following the introduction of a (temporary) 20 pence per litre duty differential which will provides an additional financial incentive for the supply of UCO-derived biodiesel. Supply of biomethane has been consistently low (less than 1 million kg per year) since the introduction of the RTFO.

Figure 5: Waste-derived biofuel supply under the RTFO to date

#### *Tallow (litres)*

	08/09	09/10	10/11 (pro-rated)
<b>UK</b>	5,156,672	40,032,147	27,005,464
<b>EU</b>	5,220,474	50,376,553	26,691,997
<b>RoW</b>	96,070,974	65,347,536	15,352,395
<b>Unknown</b>	8,737,367	26,552,035	1,223,795
<b>Total</b>	115,185,487	182,308,271	70,273,651

#### *UCO (litres)*

	08/09	09/10	10/11 (pro-rated)
<b>UK</b>	35,921,395	29,809,440	98,329,331
<b>EU</b>	2,169,647	7,130,141	268,714,771
<b>RoW</b>		273,638	35,292,160
<b>Unknown</b>	1,431,380	5,912,516	16,962,277
<b>Total</b>	39,522,422	43,125,735	419,298,539

*Biomethane (kg)*

	<b>08/09</b>	<b>09/10</b>	<b>10/11 (pro-rated)</b>
<b>UK</b>	415,700	195,797	435,401

Partially Renewable Fuels

17. At present, only biofuel considered to be 'wholly renewable' are eligible under the RTFO. As a result, many partially renewable biofuels are not eligible under the RTFO and therefore cannot be used by suppliers to meet their obligation.
18. Inclusion of partially renewable fuels in the RTFO is intended to create a level playing field in the supply of biofuels across a wide range of potential renewable fuels. This will give obligated suppliers increased flexibility to meet their obligation to supply biofuel at least cost. Inclusion of partially renewable fuels is also expected to give suppliers more scope to supply biofuel in excess of the 'blend wall' (i.e. the maximum limit to which bioethanol and FAME biodiesel can be blended into standard 'protection grade' petrol and diesel fuel streams).

**Consultation**

19. The final stage impact assessments which underlie this overarching impact assessment have been updated and amended extensively following a public consultation exercise carried out by the Department for Transport and upon receiving comments from the Regulatory Policy Committee. During the consultation interested parties were invited to comment on the policy options and underlying analysis either at public meetings (2 of which were held) or through written responses. Some of the major changes to the analysis include:

*Sustainability Criteria*

- Market price data has been used to inform and validate the (biofuel) price impacts of the sustainability criteria.
- Sensitivities around the length of time taken for biofuel prices to return to trend following implementation of the criteria have been added.

*Verification*

- Sensitivities have been added to the assumed cost of verification.
- Market data for RTFC prices have been taken into account in the analysis.

*Double Certification*

- Development of more detailed biofuel supply scenarios for Double Certification, taking into account recent research into '2<sup>nd</sup> generation' advanced biofuel and the most recent supply data from the RTFO.
- Analysis of the potential impact of double certification on the size of the RTFO market for crop-derived biofuel.

*Partially Renewable Fuels*

- More detail on the potential market impact of including partially renewable fuels into the RTFO has been added to the analysis

20. For a more detailed discussion of changes made to the analysis following on from the public consultation, please refer to the individual underlying impact assessments.



# Cost-Benefit Analysis

## Baseline (do nothing)

21. In the baseline scenario no changes are made to the RTFO. That is to say no sustainability criteria (and accompanying verification process) are introduced, all biofuel continues to receive one certificate per litre irrespective of the feedstock or production process used (i.e. there is no additional financial incentive for biofuels derived from wastes, residues, non-food cellulosic material, and ligno-cellulosic material inputs) and partially renewable fuels remain ineligible under the RTFO.

### Baseline – Sustainability Criteria

22. It is assumed that the sustainability characteristics of biofuel supplied under the baseline RTFO worsens as other EU member states implement the sustainability criteria (as required by the Renewable Energy Directive). This is because fuel suppliers in other EU Member States are therefore assumed to purchase more sustainable biofuel, leaving UK suppliers with the (relatively unsustainable) remainder. The projected distribution of baseline GHG savings has been modelled taking the bottom half of the GHG savings distribution which has been supplied to date under the RTFO (figure 1).
23. Given the uncertainty around the baseline GHG savings distribution, ‘high baseline GHG savings’ and ‘low baseline GHG savings’ sensitivities have also been explored in the following analysis of GHG saving benefits. The ‘high baseline GHG savings’ scenario has been modelled by assuming that the baseline profile of GHG savings reflects the GHG saving profile of the actual GHG savings distribution reported under the RTFO up to Jan 2011. The ‘low baseline GHG savings’ takes the bottom 25%.

Figure 1: Assumed distribution of baseline biodiesel GHG savings and sustainability criteria GHG saving thresholds (35% and 50%)

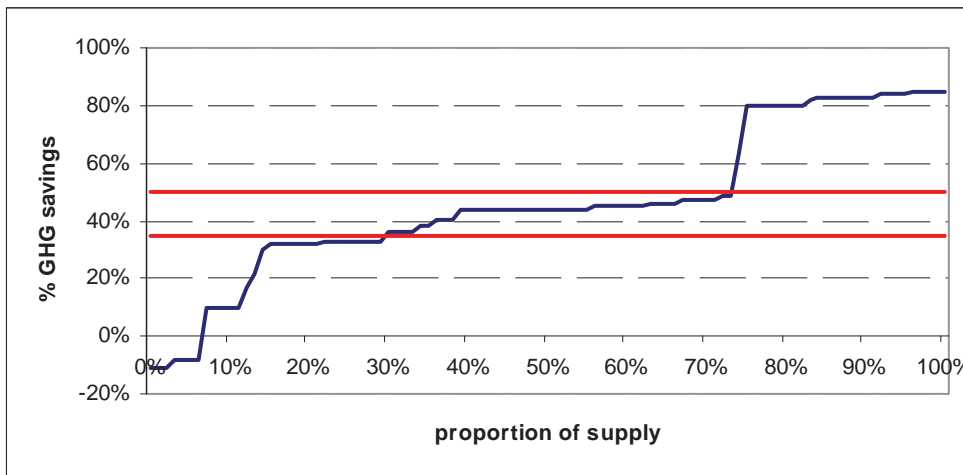
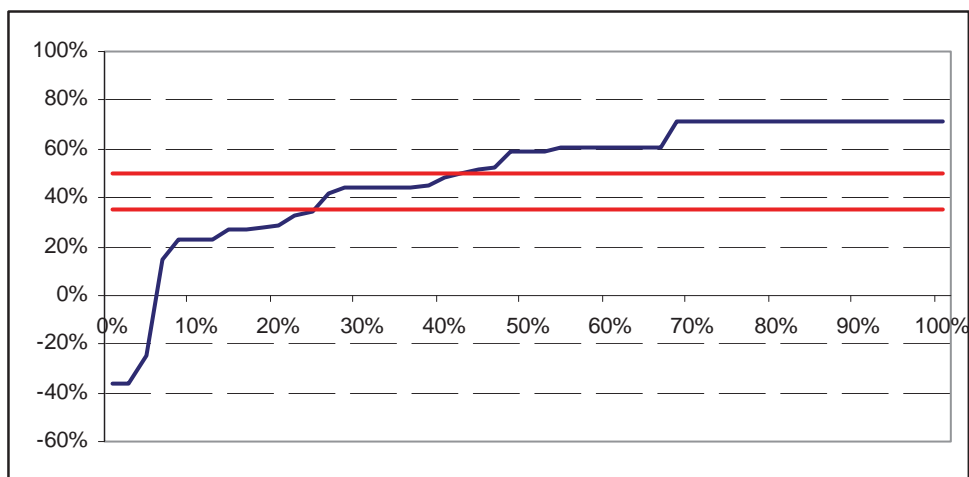


Figure 2: Assumed distribution of baseline bioethanol GHG savings and sustainability criteria GHG saving thresholds (35% and 50%)



*Baseline – Double Certification*

24. Other EU Member States are also assumed to implement double certification of waste-derived biofuel (as required by the Renewable Energy Directive). As a result, biofuel which could be supplied in the UK is now diverted into other EU member state biofuel markets due to the greater financial incentive on offer in these markets. The UK supply of biofuel eligible for double certification is therefore estimated to fall to almost zero in the baseline.

Figure 3: Projected baseline RTFO fuel mix 2012 to 2030 (million litres/kg)

	biodiesel	Ethanol	UCO	Tallow	biomethane	2G ethanol	2G biodiesel
<b>2012</b>	1004	1141	0	0	0	0	0
<b>2013</b>	1092	1283	0	0	0	0	0
<b>2014</b>	1071	1304	0	0	0	0	0
<b>2015</b>	1043	1316	0	0	0	0	0
<b>2016</b>	1020	1328	0	0	0	0	0
<b>2017</b>	1001	1339	0	0	0	0	0
<b>2018</b>	984	1349	0	0	0	0	0
<b>2019</b>	969	1359	0	0	0	0	0
<b>2020</b>	956	1368	0	0	0	0	0
<b>2021</b>	946	1376	0	0	0	0	0
<b>2022</b>	937	1383	0	0	0	0	0
<b>2023</b>	929	1391	0	0	0	0	0
<b>2024</b>	923	1398	0	0	0	0	0
<b>2025</b>	919	1406	0	0	0	0	0
<b>2026</b>	913	1412	0	0	0	0	0
<b>2027</b>	906	1418	0	0	0	0	0
<b>2028</b>	899	1424	0	0	0	0	0
<b>2029</b>	892	1430	0	0	0	0	0
<b>2030</b>	885	1436	0	0	0	0	0

*Baseline - Verification*

25. In absence of a sustainability criteria verification requirement, RTFCs (tradable certificates which demonstrate compliance with the RTFO) are issued immediately after biofuel has been supplied and obligated suppliers continue to have their biofuel supply data verified once a year.

*Baseline – Partially Renewable Fuels*

26. In the baseline, partially renewable fuels remain ineligible and are not supplied under the RTFO.

## Market Impact of preferred option

### Market impact – Sustainability Criteria

27. Implementation of the sustainability criteria will require suppliers obligated under the RTFO to supply biofuel which delivers at least 35% lifecycle GHG savings from 2012 onwards and 50% from 2017 onwards.
28. Biofuels which deliver GHG savings below these thresholds in the baseline are assumed to be replaced with biofuels which meet the minimum GHG saving criteria (i.e. deliver at least 35% GHG savings from 2012 – 2016 and 50% GHG savings from 2017).

### Market Impact - Verification

29. A system of verification whereby suppliers must have compliance with sustainability criteria verified (prior to a certificate being issued) by an independent auditor is introduced. On average suppliers are assumed to use the services of a verifier 4 times each year (3 additional verifications per year relative to the baseline).

### Market Impact – Double Certification

30. Following implementation of double certification, suppliers obligated under the RTFO will receive two certificates (rather than one, as in the baseline) for each litre of waste-derived biofuel that they supply. This will increase suppliers' willingness to pay for these biofuels which is expected to drive an increase in the available supply.
31. Double certification is also expected to result in lower overall volumes of biofuel being supplied under the RTFO as 2 litres of crop-derived biofuel is displaced by each litre of waste-derived biofuel
32. Three scenarios have been developed which show how the RTFO fuel mix might change following the implementation of double counting. These scenarios are shown in figure 4.

Figure 4: double certification RTFO fuel mix scenarios (million litres/kg)

#### Central Scenario

	biodiesel	ethanol	UCO	Tallow	biomethane	2G ethanol	2G biodiesel
2012	309	1004	151	265	0.4		
2013	401	1092	158	282	0.4		
2014	374	1071	166	299	0.4		
2015	336	666	174	316	0.4	189	
2016	298	643	182	333	0.4	189	
2017	260	623	190	349	0.4	189	
2018	221	606	198	366	0.4	189	
2019	181	591	205	383	0.4	189	
2020	0	579	213	400	0.4	189	70
2021	0	568	213	400	0.4	189	74
2022	0	559	213	400	0.4	189	78
2023	0	552	213	400	0.4	189	82
2024	0	546	213	400	0.4	189	85
2025	0	542	213	400	0.4	189	89
2026	0	535	213	400	0.4	189	92
2027	0	528	213	400	0.4	189	95
2028	0	521	213	400	0.4	189	98
2029	0	514	213	400	0.4	189	101
2030	0	507	213	400	0.4	189	104

*Low Scenario*

	biodiesel	ethanol	UCO	Tallow	biomethane
<b>2012</b>	725	1004	75	133	0.2
<b>2013</b>	842	1092	79	141	0.2
<b>2014</b>	839	1071	83	149	0.2
<b>2015</b>	826	1043	87	158	0.2
<b>2016</b>	813	1020	91	166	0.2
<b>2017</b>	800	1001	95	175	0.2
<b>2018</b>	785	984	99	183	0.2
<b>2019</b>	770	969	103	192	0.2
<b>2020</b>	754	956	107	200	0.2
<b>2021</b>	762	946	107	200	0.2
<b>2022</b>	770	937	107	200	0.2
<b>2023</b>	777	929	107	200	0.2
<b>2024</b>	784	923	107	200	0.2
<b>2025</b>	792	919	107	200	0.2
<b>2026</b>	798	913	107	200	0.2
<b>2027</b>	804	906	107	200	0.2
<b>2028</b>	810	899	107	200	0.2
<b>2029</b>	817	892	107	200	0.2
<b>2030</b>	823	885	107	200	0.2

*High Scenario*

	1G crop biodiesel	1G crop ethanol	2G ethanol	rest
<b>2012</b>	0	1004		571
<b>2013</b>	0	1092		641
<b>2014</b>	0	1071		652
<b>2015</b>	0	666	189	658
<b>2016</b>	0	643	189	664
<b>2017</b>	0	623	189	670
<b>2018</b>	0	228	378	675
<b>2019</b>	0	213	378	679
<b>2020</b>	0	201	378	684
<b>2021</b>	0	190	378	688
<b>2022</b>	0	181	378	692
<b>2023</b>	0	174	378	695
<b>2024</b>	0	168	378	699
<b>2025</b>	0	164	378	703
<b>2026</b>	0	157	378	706
<b>2027</b>	0	150	378	709
<b>2028</b>	0	143	378	712
<b>2029</b>	0	136	378	715
<b>2030</b>	0	129	378	718

*Market impact – Partially Renewable Fuels*

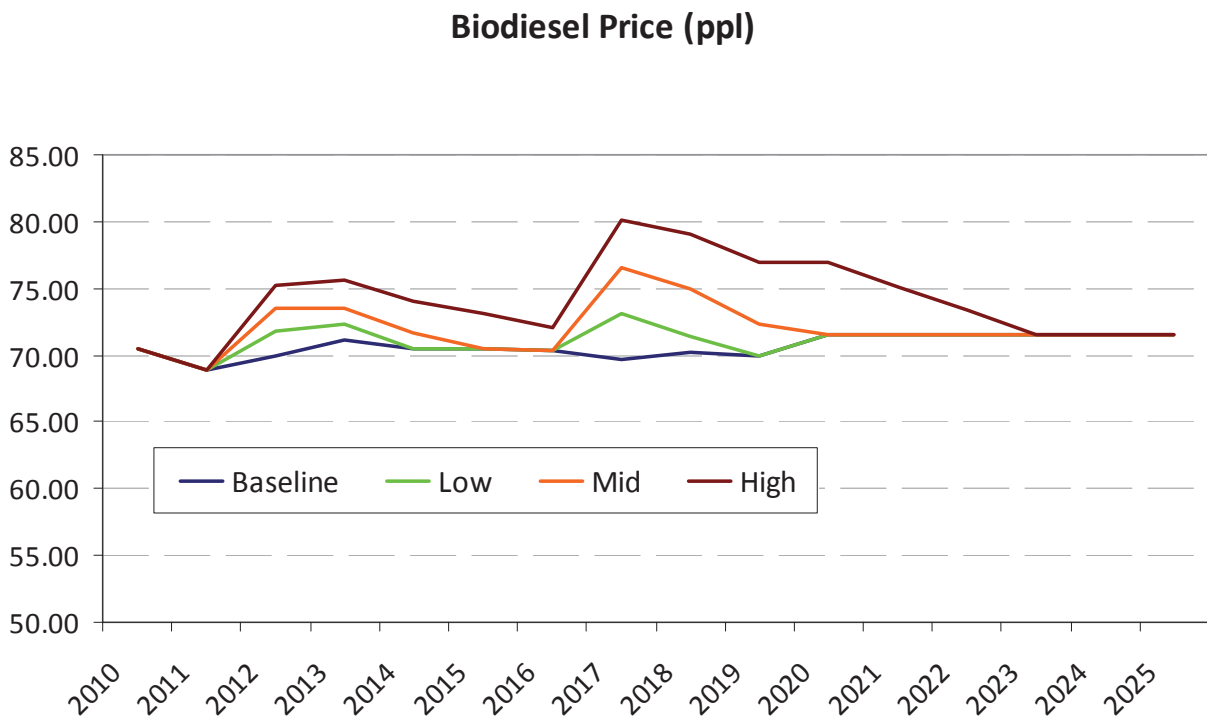
33. As a result of partially renewable fuels becoming eligible under the RTFO, obligated suppliers will be able to meet their obligation through supplying a wider range of fuels than in the baseline. It has not been possible to model what effect this will have on the RTFO biofuel mix. As suppliers are assumed to be profit maximising, it is expected the suppliers will choose to supply newly eligible fuels if they more cost effective than fuels which would have otherwise been supplied in the baseline.

## Costs and Benefits

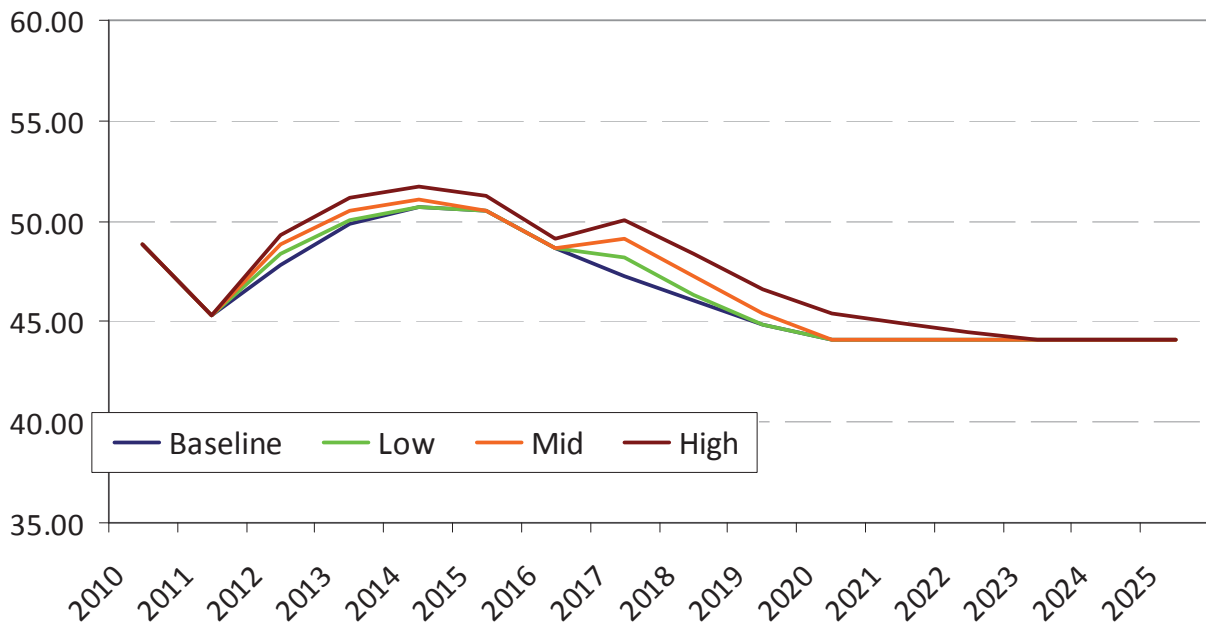
### Costs – Sustainability Criteria

34. Implementation of the sustainability criteria is expected to lead to a temporary increase in the cost of supplying biofuel under the RTFO. Prices are expected to rise due to a sudden increase in demand for compliant biofuel (as the sustainability criteria are implemented across all EU member states) and as biofuel producers incur costs from making investments to improve their refining processes. Prices are then expected to fall gradually as market supply adapts to the requirements of the sustainability criteria and as suppliers recoup money invested.
35. The sustainability criteria price impacts have been modelled as ‘pinch points’ (figure 5) over 3 scenarios (low, central, high). The magnitude of the sustainability criteria driven price increase and the length of the adjustment phase (as prices return to trend) is varied by scenario. Estimated price impacts are higher for biodiesel (than for bioethanol) as it is expected to be more difficult to meet the minimum GHG saving requirements. Estimated price impacts are also expected to be higher in 2017 (than in 2012) due to the more stringent (harder to achieve) GHG criteria. The central estimate for the 2012 biodiesel sustainability criteria price premium is in line with current market data (June 2011). High and low ranges have been taken to reflect uncertainty over future market movements. Price premium estimates for biodiesel in 2017 and for bioethanol in 2012 and 2017 are subject to a higher degree of uncertainty as there is no market price data available for validation.

Figure 5: Projected price impacts of the sustainability criteria (2010 prices)



## Bioethanol Price (ppl)



### Costs – Verification

36. Suppliers are assumed to require 3 additional verifications each year relative to the baseline. Under central assumptions 3 additional verifications were required at an estimated £15,000 each for say, 8 large suppliers; and 3 additional verifications at say £1,500 for around 15 small suppliers, which yields a total cost per year of around £427,500. Additional verification is also expected to increase government administrative costs with a one-off cost of £57,000 in 2012 and £28,000 each year from 2012 onwards.

### Costs – Double Certification

37. For a given obligation level (i.e. volume of biofuel to be supplied), the cost of supplying biofuel required to meet the obligation (which is borne by obligated suppliers and assumed to be passed through 100% to consumers of road transport fuel) is dependent on the market prices for various biofuel options and is not expected to increase as suppliers will still have the option of supplying only crop-derived biofuel if that is the cost effective option. However, costs may fall if suppliers are able to source waste derived biofuel for less than twice the additional cost (per litre) of supplying crop-derived biofuel and therefore choose to supply this instead.

38. As it is expected that the market price of waste-derived biofuel will increase as demand increases, it is not possible to estimate what potential cost saving could be made through the increased supply of waste-derived biofuel. Instead, the analysis makes the conservative assumption that the price of waste-derived biofuel rises such that it would cost the supplier the same whether they provide 2 litres of crop-derived biofuel or one litre of waste-derived biofuel (and therefore no supply constraints on the latter are assumed). Therefore, this estimate should be thought of as an upper bound on potential costs. It is possible that the overall cost of delivering the RTFO could fall as a result of double certification.

### Costs – Partially Renewable Fuels

39. Suppliers are assumed to minimise costs and maximise profits. As suppliers will still be able to make the same supply decisions, with regard to the eligibility of wholly renewable fuels, it is assumed that costs will not rise (i.e. suppliers could continue to supply wholly renewable fuels

with no additional costs above practices taking place under the current RTFO, the baseline) and could potentially fall if partially renewable fuels become eligible for RTFCs under the RTFO. This fall in costs would be expected because allowing a wider range of renewable fuels to be used to meet a given target would lead to suppliers having more options to meet targets and, depending on the cost, commercial considerations will determine the uptake of the partially renewable fuels. This potential cost saving has not been quantified as it is not possible to make a robust estimate of how partially renewable fuel would be used if it were allowed or what the per-unit cost saving would be. Given that the renewable part of any currently commercially available partially renewable fuels are derived from identical feedstock to conventional biofuels, it is not thought that any potential cost savings would be large. Lower costs for biofuel suppliers may be passed on to consumers through lower pump prices relative to in the baseline. Increased supply of partially renewable fuels would be offset by a decrease in the supply of wholly renewable fuels, with no net change in the overall volume of biofuel supplied.

#### *Benefits – Sustainability Criteria*

40. Implementation of the sustainability criteria is expected to lead to an increase in GHG savings (relative to the baseline) as those fuels in the baseline which do not meet minimum GHG savings thresholds are replaced by higher GHG saving fuels which meet the requirements of the sustainability criteria. The change in GHG savings is monetised using Department of Energy and Climate Change carbon values. Implementation of the sustainability criteria is also expected to deliver other benefits (i.e. improved biodiversity outcomes) which have not been possible to quantify.

#### *Benefits – Verification*

41. There are no additional benefits associated with verification.

#### *Benefits – Double Certification*

42. Implementation of double certification is expected to lead to a change in GHG saving benefits as biofuel eligible for double certification will displace crop-derived biofuel at a rate of two to one (on a volume basis). In general, the displacement of crop-derived biodiesel with waste-derived biodiesel is expected to yield higher net GHG savings than displacing crop-derived ethanol with waste-derived bioethanol. This is because crop-derived bioethanol typically delivers higher GHG savings than crop-derived biodiesel.
43. In addition, the implementation of double certification is also expected to yield benefits which it has not been possible to quantify. These include innovation benefits from providing increased support to emerging technologies and also potentially lower GHG emissions from Indirect Land Use Change (i.e. where increased demand for waste-derived biofuel feedstock leads to lower indirect GHG emissions from land use change caused by the knock-on impacts of increased demand for feedstock substitutes).

#### *Benefits – Partially Renewable Fuels*

44. There are a number of benefits which could arise from the inclusion of partially renewable fuels in the RTFO. These include the potential for higher GHG savings (e.g. HVO biodiesel – a partially renewable fuel – typically delivers higher GHG savings than FAME biodiesel which it could potentially displace). The option to supply partially renewable fuels will give suppliers increased flexibility to meet their RTFO biofuel supply target at lower cost. It has not been possible to quantify these potential benefits due to a lack of robust data.

#### *Aggregated Costs*

45. Additional costs are estimated to result from implementation of the sustainability criteria (which are expected to result in a temporary increase in biofuel prices) and from verification of compliance with the sustainability criteria. Including partially renewable fuels and implementation of double counting are not expected to result in any quantifiable change to the cost of delivering

the RTFO. The aggregated costs attributed to the policy changes described in this impact assessment are estimated to be £324m (within a range of £109m to £818m), discounted to 2011. These are simply the costs which are presented for the preferred options in the disaggregated policy impact assessments.

Figure 6: Aggregated Cost Estimates for period 2012 - 2030 (£m, 2010 prices, discounted to 2011)

	low	central	High
Verification	3.2	5.9	8.6
Sustainability Criteria	105.9	318.1	809.0
Total	109.1	324.0	817.6

### Aggregated Benefits

46. Aggregated benefits have been monetised by modelling the change in (direct) GHG savings which are estimated to occur as a result of the changes outlined in this impact assessment. The estimated change in GHG savings has been monetised using DECC carbon values. It has not been possible to quantify or monetise other highlighted benefits.
47. Calculation of aggregated GHG savings is complicated by the fact that there are interactions between implementation of the sustainability criteria and implementation of double certification. These interactions have been modelled by varying (1) the level of baseline GHG savings from crop-derived biofuels (see paragraph 23) and (2) by varying the penetration of waste-derived biofuel (see figure 4).
48. In general GHG savings are higher (relative to the baseline) when: (1) baseline GHG savings are lower (and therefore the additional GHG savings from the introduction of minimum GHG thresholds and increased use of waste-derived biofuel are higher); (2) the penetration of double certified waste-derived biofuel is lower. This is because each litre of waste-derived biofuel supplied will displace two litres of crop-derived biofuel as a result of double certification. As a result of the sustainability criteria, crop-derived biofuel must deliver minimum GHG savings of 50% from 2017 onwards. Although waste-derived biofuels generally deliver high GHG savings (e.g. in the region of 80%), these are not sufficient to outweigh the displacement of twice the volume of biofuel which will have minimum GHG savings of 50% (i.e. twice the volume will have GHG savings of at least 100%).
49. Therefore the 'high benefit' sensitivity is a scenario comprised of low baseline GHG savings and low penetration of waste-derived biofuel sensitivities. The 'low benefit' sensitivity is comprised of high baseline GHG savings and high penetration of waste-derived biofuel sensitivities.
50. It is important to note the quantitative analysis of benefits only takes into account estimated direct GHG impacts and other potential benefits (e.g. lower GHG emissions due to Indirect land Use Change, lower 'food vs fuel' market tension, increased investment in advanced technology) of an increased uptake of non-food-derived biofuel and more stringent sustainability requirements have not been explicitly monetised in this analysis due to a lack of robust data.

Figure 7: Estimated net change in RTFO GHG savings (MT CO<sub>2</sub>e)

	Low	central	High
2012	0.20	0.61	0.89
2013	0.22	0.66	0.98
2014	0.22	0.68	1.00
2015	0.07	0.61	1.01
2016	0.07	0.62	1.02
2017	0.09	0.78	1.51
2018	-0.08	0.78	1.51
2019	-0.08	0.78	1.51
2020	-0.08	0.81	1.52
2021	-0.08	0.81	1.52
2022	-0.08	0.82	1.53
2023	-0.08	0.82	1.53



2024	-0.08	0.83	1.53
2025	-0.08	0.83	1.54
2026	-0.08	0.84	1.54
2027	-0.08	0.84	1.55
2028	-0.08	0.85	1.55
2029	-0.08	0.85	1.55
2030	-0.08	0.85	1.56

Figure 8: Monetised value of GHG savings (£m, 2010 prices, discounted to 2011)

	Low	central	High
2012	9	29	42
2013	10	31	46
2014	10	31	46
2015	3	27	45
2016	3	28	45
2017	4	34	65
2018	-3	33	64
2019	-3	33	63
2020	-3	33	62
2021	-3	33	62
2022	-3	33	62
2023	-3	33	61
2024	-3	33	61
2025	-3	33	61
2026	-3	33	60
2027	-3	33	60
2028	-3	32	60
2029	-3	32	59
2030	-3	32	58

51. Figure 9 shows the aggregated GHG savings and monetised values over the period 2012 to 2030 estimated to occur as a result of the policy changes outlined in the preceding analysis. The policy changes described in this impact assessment are estimated to deliver an additional 14.7 MT CO<sub>2</sub>e (within a range of -0.1 to 26.4 MTCO<sub>2</sub>e) over the period 2012 to 2030 relative to an unamended RTFO baseline. Using DECC carbon values these CO<sub>2</sub>e savings are valued at £606m (within a range of £0m to £1,083m) over the period 2012 to 2030 (discounted to 2011).

Figure 9: Aggregated GHG savings (MTCO<sub>2</sub>e) and aggregated monetised benefits (£m, 2010 prices, discounted to 2011)

		Low	central	High
GHG savings	MTCO <sub>2</sub> e	-0.1	14.7	26.4
GHG savings	£m	-0.1	606.0	1083.2

### Aggregated Cost Benefit Summary

52. Aggregated costs, benefits and combined net benefit across 'low', 'central' and 'high' net benefit scenarios (i.e. the high cost scenario is combined with low benefit scenario and vice versa) are presented in figure 10. These are the cost-benefit numbers which have been used in the summary sheet of the impact assessment. The central monetised net benefit of the policy changes outlined in this impact assessment is estimated to be £282m (2010 prices) within a range of -£818m to £974m.

Figure 10: Aggregated cost-benefit analysis

	low	central	high
benefits	-0.1	606.0	1083.2

costs	817.6	324.0	109.1
Net benefit	-817.7	282.0	974.1

## Wider Impacts

### *Sustainability Criteria*

53. The UK typically supplies biofuels that offer higher GHG savings than across the EU; according to RTFO data (around 90% of biofuel produced in the UK meets the current qualifying standard). Increased sustainability of biofuels supplied in the UK could incentivise greater UK production of biofuels, as fuel suppliers would be incentivised to use sustainability criteria-compliant biofuels, including those produced in the UK. This could lead to greater output and employment opportunities in agriculture and the production of more sustainability criteria-compliant biofuels. Sustainability criteria could potentially improve biodiversity outcomes in the UK and the rest of the world if biofuels with negative biodiversity impacts were disincentivised through the RTFO. However, there is no obvious or clear methodology for monetising any of these impacts, as the size of the potential benefits would be highly uncertain.

### *Verification*

54. The requirement to have compliance with sustainability criteria independently verified before a certificate is issued will impose additional fixed costs on biofuel suppliers. This may be of relative benefit to larger suppliers who supply larger volumes of biofuel. The extent of any adverse competitive impact is likely to be offset somewhat by the fact that most small suppliers tend to supply waste-derived biofuel for which the verification process is straightforward and therefore relatively cheap.

### *Double Certification*

55. A decrease in demand for crop-derived biofuels due to double certification of waste-derived biofuel will reduce RTFO-driven demand for crop-derived biofuel which may have a negative impact on the profitability of crop-derived biofuel producers.
56. Increasing the share of waste-derived biofuels in the UK biofuel mix decreases the risk of biofuels contributing to increases in food prices. However, there is as yet no clear consensus on how to quantify and value any potential links between biofuel demand and food prices. Therefore any such possible impacts have been excluded from the analysis.
57. Double certification will increase RTFO obligated suppliers' demand and willingness to pay for eligible feedstocks (i.e. used cooking oil, tallow, waste wood, wood chips etc). Increased demand is expected to lead to a higher market price for these feedstocks. Therefore, industries which currently make use of these feedstocks (e.g. tallow in the oleochemical industry) are, as a result of double certification, expected to experience price increases for production inputs. This may have a negative impact on the profitability and may lead to the use of more expensive substitutes (i.e. virgin vegetable oil in the case of tallow and the oleochemicals industry) and lead to price increases in the product markets which they serve.

### *Partially renewable Fuels*

58. An increase in the supply of partially renewable fuels may lead to a lower RTFO supply of fuels which are currently eligible. It has not been possible to quantify this impact as it has not been possible to model the extent to which partially renewable fuels will be supplied.

## Assumptions and Risks

### *Sustainability Criteria*

59. It is assumed that the price of sustainability criteria-compliant biofuel will rise (and then return gradually back to trend) following the implementation of the sustainability criteria. This is highly uncertain and as such 'low' and 'high' sensitivities have been taken on both the magnitude of the price increase and the length of time taken for prices to return to trend.

#### *Verification*

60. It is assumed that suppliers will have to pay independent verifiers a given sum to have compliance with sustainability criteria verified. 'Low' and 'high' sensitivities have been taken to reflect the uncertainty surrounding this cost.

#### *Double Certification*

61. It is important to note the final list of feedstocks/processes eligible for double certification will be determined following a classification process and public consultation. The feedstocks/processes presented in this analysis are based upon a consideration of what is likely to be included following the consultation. However, it is possible that the final list of eligible feedstocks/technologies may be different.

62. The trajectories of future waste-derived biofuel supply following the implementation of double certification are based upon historical RTFO supply data and research in to the potential for '2<sup>nd</sup> generation' advanced biofuels. However, future uptake is highly uncertain and 'low' and 'high' sensitivities have been taken to reflect this uncertainty.

63. It is assumed that the entire supply of biofuel eligible for double certification will be supplied to other EU member states if the UK does not implement double certification. This assumption is based upon observed market behaviour (e.g. the surge in imports of UCO-derived biodiesel following the unilateral introduction of a tax incentive in the UK).

#### *Partially renewable Fuels*

64. Partially renewable fuels are assumed to have no cost impact on the RTFO. This is a conservative assumption because it is potentially possible that inclusion of partially may lead to lower compliance costs as suppliers will have greater flexibility to meet their obligation at least cost.

#### *General – GHG savings*

65. 14% of net GHG savings attributable to policy are assumed to take place in the 'traded sector' (e.g. within refineries captured by the EU Emissions Trading Scheme) and are priced using the traded price of carbon values. The remaining 86% of net GHG savings are assumed to take place within the 'non-traded sector' (e.g. agricultural emissions) and are valued using non-traded sector carbon values. This assumption is based upon internal analysis.

## Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

### Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. If the policy is subject to a sunset clause, the review should be carried out sufficiently early that any renewal or amendment to legislation can be enacted before the expiry date. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

<p><b>Basis of the review:</b> [The basis of the review could be statutory (forming part of the legislation), i.e. a sunset clause or a duty to review, or there could be a political commitment to review (PIR)]; A review of all the RTFO amendments will be conducted in April 2014.</p>
<p><b>Review objective:</b> [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?] The objective of the review will be to ensure that the RTFO amendments are performing as intended.</p>
<p><b>Review approach and rationale:</b> [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach] The review will consist of an analysis of the impact of the RTFO amendments and will draw upon collected market data and stakeholder views.</p>
<p><b>Baseline:</b> [The current (baseline) position against which the change introduced by the legislation can be measured] Detailed data on the RTFO which is currently gathered by the RFA will be used to form the baseline.</p>
<p><b>Success criteria:</b> [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives] Success will be determined by an increase in the supply of highly sustainable biofuel.</p>
<p><b>Monitoring information arrangements:</b> [Provide further details of the planned/existing arrangements in place that will allow a systematic collection of monitoring information for future policy review] The RTFO administrator collects detailed data on RTFO performance.</p>
<p><b>Reasons for not planning a review:</b> [If there is no plan to do a PIR please provide reasons here]</p>

### Annex 2 – Competition Impact Test

66. The requirement to have compliance with sustainability criteria independently verified before a certificate is issued will impose additional fixed costs on biofuel suppliers. This may be of relative benefit to larger suppliers who supply larger volumes of biofuel. The extent of any adverse competitive impact is likely to be offset somewhat by the fact that most small suppliers tend to supply waste-derived biofuel for which the verification process is straightforward and therefore relatively cheap.

### **Annex 3 – Sustainable Development**

67. Implementation of the sustainability criteria and double certification of waste-derived biofuels are intended to improve the sustainability characteristics of the biofuel supplied under the RTFO. Sustainability criteria will mean that biofuel which comes from particularly sensitive areas (in terms of biodiversity or carbon stock) will not be eligible under the RTFO. Biofuels which do not meet minimum GHG savings thresholds will also be ineligible under the RTFO. Implementation of double certification will increase the relative incentive for the supply of highly sustainable waste-derived biofuel.

### **Annex 3– OIOO ('one in one out')**

68. The measures outlined in this impact assessment are EU in origin and therefore they do not fall within the scope of OIOO ('one in one out')