



Department
for Transport

Consultation on proposed amendments to the Renewable Transport Fuel Obligations Order 2007

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1. Foreword

The Renewable Transport Fuel Obligation (RTFO) requires suppliers of fuel for use in road transport and non-road mobile machinery to ensure that a certain proportion of the fuel they supply comes from renewable sources.

In April 2014 the government published a post-implementation review of the RTFO¹. This outlined our intent to consult on a number of changes to the RTFO.

The proposed changes are to:

- reward renewable gaseous fuels in proportion to their energy content, rather than on the basis of their mass,
- harmonise the treatment of different sorts of biodiesel,
- update certain powers of the RTFO Administrator to require information,
- clarify that the RTFO Administrator can apply mathematical rounding when issuing certificates, and
- expand the RTFO to include synthetic fuels from renewable electricity.

We are proposing to bring the first four of these changes into force for the start of the RTFO obligation year in April 2015. The latter proposal, to provide support for synthetic fuels from renewable electricity, we intend to introduce at a later date.

We are keen to encourage potential investors in the development of emerging renewable transport technologies. At present these fuels will count only once towards the UK's targets set out in the Renewable Energy Directive. However, it is possible they may count double if amendments are agreed to the Directive. We will consider the evidence from this consultation, alongside decisions in Europe early next year, to inform proposals to incentivise synthetic fuels.

¹ Joint government response to Call for evidence and post implementation review, 30th April 2014
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307129/joint-government-response.pdf

Depending on the responses to the proposed methodology for supporting synthetic fuels from renewable electricity set out in this consultation, we may decide to consult again, with a revised approach, before making changes to legislation. This will therefore not form part of the proposed package of legislative amendments that would come into force in April 2015.

Your comments are invited on the proposed amendments and on the Impact Assessment.

2. Executive summary

2.1 Introduction

- 2.1** This consultation proposes changes to the current Renewable Transport Fuel Obligation (RTFO) to expand its scope and improve its performance. Each of the proposed changes is briefly explained below.

Change to support for renewable gaseous fuels

- 2.2** This proposal would support gaseous fuels on the basis of their energy content rather than their mass. Currently gaseous fuels are rewarded per kilogram of fuel supplied. However, the energy contained in a kilogram of gaseous fuel is generally higher than the energy found in a litre of liquid fuels. We believe that making this change will provide a more level playing field for suppliers of gaseous fuels for transport.

Support for synthetic fuels from renewable electricity

- 2.3** This proposal would allow synthetic fuels from renewable electricity to receive support under the RTFO. This would provide support for fuels that are produced from hydrogen made using renewable electricity.
- 2.4** We propose that these fuels should be required to meet the same minimum carbon savings as biofuels are required to meet under the RTFO Order 2007. We also propose that synthetic fuels should receive double rewards, in the same way that fuels made from wastes and residues currently do. This is in recognition of the fact that synthetic fuels have similar environmental performance to other fuels currently double counted under the RTFO.
- 2.5** Although we are consulting now on the proposal to incentivise the supply of synthetic fuels, it will not form part of the legislative changes which are proposing come into force in April 2015.

Change to support for hydrotreated vegetable oil

- 2.6** The third proposal is to amend the RTFO to treat hydrotreated vegetable oil (HVO) in the same way as FAME (fatty-acid-methyl-ester), so that both receive one Renewable Transport Fuel Certificate (RTFC) per litre.
- 2.7** In addition to the above three proposals, we also intend to amend legislation to clarify the administrator’s powers to request information from suppliers.
- 2.8** This consultation seeks views on the proposed amendments.

2.2 Geographical coverage

- 2.9** This consultation, and the proposed amendments to the Renewable Transport Fuel Obligations Order 2007 (“the RTFO Order”), applies across the whole of the United Kingdom.

2.3 Who should read this consultation?

- 2.10** This consultation will be of particular interest if you are:
- a supplier of fossil fuel;
 - a supplier of biofuel;
 - a body or individual with an interest in biofuels;
 - a body or individual with an interest in environmental concerns related to use and production of biofuels.
- 2.11** This consultation may be of interest to other parties and all are welcome to comment on our proposals.

2.4 How to respond

The consultation period began on 23 July and will run until 27 August. Please ensure that your response reaches us before the closing date.

Please send consultation responses to:

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When responding, please state whether you are responding as an individual or representing the views of an organisation. If responding on behalf of a larger organisation, please make it clear who the organisation represents and, where applicable, how the views of members were assembled.

If you have any suggestions of others who may wish to be involved in this process please contact us.

2.5 Freedom of Information

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the Freedom of Information Act 2000 (FOIA) or the Environmental Information Regulations 2004.

If you want information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information, we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

The Department will process your personal data in accordance with the Data Protection Act (DPA) and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.

3. Proposed Amendments

3.1 Renewable gaseous fuels

Background

- 3.1** Currently the RTFO rewards renewable gaseous fuels on the basis of the weight of the fuel. Gaseous fuels receive one RTFC per kilogram, this means that the reward for one kilogram of gaseous fuel is equivalent to that for one litre of liquid biofuel.
- 3.2** This treatment of fuels does not take into account the energy density of the fuel. Energy density is the amount of energy stored in a fuel per unit of volume or mass. Energy density is a significant characteristic of any fuel. Generally, if a vehicle is using a fuel with higher energy content it will be able to travel further on a given amount of that fuel.
- 3.3** The energy content of a kilogram of gaseous fuels tends to be higher than that of a litre of liquid biofuel. As Figure 1 shows, one kilogram of biomethane has almost twice the energy content of one litre of bioethanol, while a kilogram of hydrogen has over five times the energy content of a litre of bioethanol.

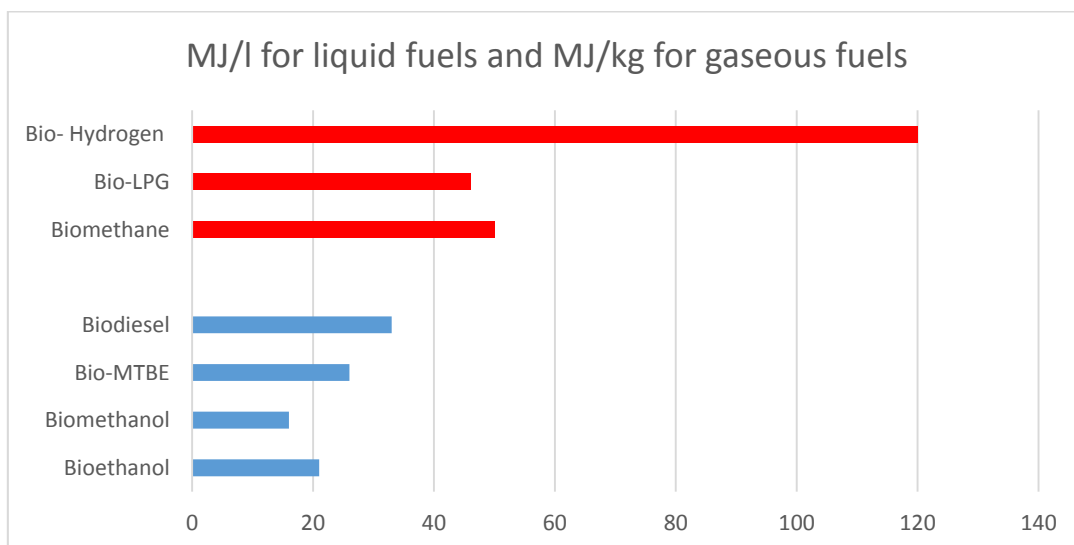


Figure 1 – Energy densities of different fuels
(bio-hydrogen is not currently supported under the RTFO)

- 3.4** The fact that there is generally more energy in a kilogram of gaseous fuel than a kilogram of liquid fuels results in a lower reward under the RTFO per unit of energy (ie per megajoule or MJ) for gaseous fuels.
- 3.5** We therefore propose to make an amendment to the RTFO so that gaseous fuels are awarded RTFCs in proportion to their energy content.
- 3.6** We are not proposing to make the same change for liquid fuels. Such a change would mean that liquid fuels were rewarded on the basis of the underlying energy content of the fuel. As set out in the recent government announcement², the government does not intend to make significant changes to the RTFO Order 2007 until ongoing European negotiations around indirect land-use change have concluded. Nor do we intend to raise the current RTFO obligation level.
- 3.7** We do not believe it would be beneficial to revise the current policy framework while it is unclear what the UK will be required to deliver under European targets. To do so would risk changing the RTFO scheme in 2015, only to have to reverse or amend those changes shortly after.
- 3.8** Awarding RTFCs in proportion to the energy content of gaseous fuels would require a methodology for calculating the number of RTFCs to be awarded for each kilogram of gaseous fuels supplied. The aim of this methodology should be to ensure that the incentive given is comparable to that granted to liquid fuels.
- 3.9** Such a methodology would require an assumption to be made about the average energy content of a litre of liquid renewable fuels to set a benchmark for the energy content of the average RTFC. By comparing the energy content of the average RTFC with the energy content of different gaseous fuels, we can calculate the number of RTFCs that a gaseous fuel would need to receive to provide a comparable level of support on the basis of RTFCs per MJ.
- 3.10** The calculations set out in Tables 1-3 below show the methodology that we have used for calculating the average

² Joint government response to Call for evidence and post implementation review, 30th April 2014
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/307129/joint-government-response.pdf

energy content of an RTFC, based on the supply of liquid fuels under the RTFC since it began in 2008. This value is then used to calculate the number of RTFCs that different gaseous fuels would receive under this approach.

	Biodiesel	Bioethanol	Biomethanol	MTBE	Total
2008/09	1058	225	0	0	1283
2009/10	1113	455	0	0	1568
2010/11	899.1	617.9	2	0	1519
2011/12	933	698	2	0	1633
2012/13	493	782	35	28	1338
Total	4496.1	2777.9	39	28	7341
Proportion of Total	61.2%	37.8%	0.5%	0.4%	

Table 1 – Share of different renewable liquid fuels supplied under the RTFO 2008-2013 (million litres)

	MJ per litre	Share of Liquid Renewable Fuels 2008-2013	Weighted average MJ per litre for each fuel type
Biodiesel	33	61.25%	20.21
Bioethanol	21	37.84%	7.95
Biomethanol	16	0.53%	0.09
MTBE	26	0.38%	0.10
		Implied average energy content of an RTFC	28.34

Table 2 – Weighted average energy density of fuels supplied under the RTFO

	MJ per kg	MJ/kg divided by implied average energy content of an RTFC	Adjusted number of RTFCs per kg
Biomethane	50	50 / 28.34	1.76
Bio-LPG	46	46 / 28.34	1.62

Table 3 – Adjusted number of RTFCs per kg of gaseous fuels

- 3.11** Table 3 above sets out the number of RTFCs each gaseous fuel would receive under our proposed approach. We propose that these numbers be set in legislation. We would expect the supply of different kinds of liquid renewable fuels to alter over time which could affect the calculations set out in the Tables above. However, given that the figures used in Tables 1-3 are based on five years of data, we do not anticipate altering the levels of support by amending the RTFO Order 2007 on a regular basis.
- 3.12** The adjusted number of RTFCs shown in Table 3 above would be applied to different renewable gaseous fuels regardless of whether or not they came from double counted feedstocks (such as wastes and residues).
- 3.13** In addition gaseous fuels from double counted feedstocks would receive double the adjusted number of RTFCs per kilogram. For example, biomethane from waste would receive 3.52 RTFCs per kilogram, as opposed to the two RTFCs it receives under the current legislation.

Question 1a) Do you agree with the proposed change in the allocation of RTFCs for gaseous fuels based on their energy content?

Question 1b) Do you have any comments on our proposed methodology for calculating the implicit energy content of an RTFC?

Question 1c) Do you have any other comments on this proposal?

3.2 Synthetic fuels from renewable electricity

Background

- 3.14** The RTFO currently only supports renewable fuels made from biomass. However, other forms of renewable energy can be used to make transport fuels, by converting various forms of energy into chemical energy.
- 3.15** One such process is the production of liquid and gaseous transport fuels using renewable electricity, carbon dioxide and water. These fuels are known as synthetic fuels from renewable electricity, referred to here as synthetic fuels³.
- 3.16** A typical chemical equation for this kind of process is set out below:

water + electricity → hydrogen + oxygen

Once hydrogen is produced it can then be further processed with carbon dioxide to make a range of hydrocarbon and alcohol-based fuels:

hydrogen + carbon dioxide → fuel + water

- 3.17** Using this process it is possible to make transport fuels that are compatible with existing vehicle and fuel supply infrastructure. Alternatively, the hydrogen can be used directly without any additional processing, in fuel cell electric vehicles or internal combustion engines.
- 3.18** This technology has a lot of potential. Synthetic fuels generally do not have the broader environmental impacts involved in the production of some forms of bioenergy. However, the technology is still at an early stage, with no

³ The term synthetic fuels can also be used to describe fuels derived from fossil or biomass feedstocks, such as 'coal to liquid' or 'biomass to liquid' techniques. In this document we use the term to refer purely to mean synthetic fuels derived from electricity.

commercial facilities and only a handful of demonstration plants around the world.

- 3.19** While no synthetic fuels are currently supplied in the UK, we want to be in a position where these fuels will be eligible for support if and when they are ready to be brought to market. Government support for these products could be critical in providing funding for initial investments in the sector. By providing support for synthetic fuels, we can ensure that the RTFO remains technology neutral, and provide fuel suppliers with an opportunity to reduce costs by offering a broader range of fuels with which they can meet their obligation.
- 3.20** We do not intend to bring synthetic fuels into the RTFO in the current round of legislative changes. Instead, we will wait until the next opportunity to amend the legislation.
- 3.21** At present synthetic fuels will count only once towards the UK's targets set out in the Renewable Energy Directive. However, it is possible they may count double if amendments are agreed to the Directive. We will consider the evidence from this consultation, and future decisions in Europe, early in 2015.

Proposed Methodology for Support

- 3.22** We intend to define synthetic fuels as fuels created using hydrogen produced through the electrolysis of water using renewable electricity. The only other physical input that would be allowed during the production of these fuels is carbon dioxide.
- 3.23** This is a definition that could offer support to a range of liquid and gaseous, alcohol and hydrocarbon fuels. It would also include the use of hydrogen used directly in vehicles.
- 3.24** It would exclude fuels created using renewable hydrogen processed with other chemicals such as, for example, carbon monoxide or nitrogen, regardless of the sources of these other chemicals. Innovative, low-carbon fuels can be made using components other than carbon dioxide. For example, hydrogen can be processed with nitrogen to produce ammonia, which can also be used as a transport fuel.
- 3.25** However, using too general a definition for synthetic fuels could lead to perverse consequences. For example, if these other components contain energy from fossil fuels, then this

could mean inadvertently providing support for the combustion of fossil fuels. For this reason, we propose that carbon dioxide should be the only other component that can be used in synthetic fuels.

Double certification

- 3.26** Under the RTFO, fuels produced from wastes and residues currently receive twice as many RTFCs. These fuels do not use land and tend to have high greenhouse gas (GHG) savings. Synthetic fuels, also tend to have high GHG savings, and do not use land, so have similar environmental performance to other fuels that are currently double counted under the RTFO.
- 3.27** In recognition of this fact, we are proposing to double count synthetic fuels supplied under the RTFO in the same way as fuel derived from wastes and residues.
- 3.28** Synthetic fuels from electricity are also included on the list of 'Annex IX' feedstocks the text of which was approved by the Council on 13th June 2014. If this list is approved after consideration by the European Parliament, then these fuels would be explicitly double counted towards 2020 European renewable energy targets.

Support from other renewable energy support schemes

- 3.29** The RTFO is a renewable energy support scheme. Renewable electricity is currently supported across Europe through a number of similar government support schemes.
- 3.30** In providing support to synthetic fuels, we do not wish to provide additional government support for electricity that has already been supplied with sufficient financial support to bring it to market. Therefore we are proposing to limit support to synthetic fuels that have been made using renewable electricity that has not already received support under a renewable energy support scheme. In the UK, this would mean that synthetic fuel producers would be required to choose between receiving support for renewable electricity under the government's Renewables Obligation, Contracts for Difference and Feed in Tariff schemes;⁴ or receiving RTFCs for the fuel they produce. This way the final energy use only receives government support once.

⁴ Or any other support scheme for renewable electricity.

3.31 Therefore, we propose that fuel suppliers should be required to make a declaration that the renewable electricity used in the production has not already been, and will not be, counted under the support scheme of another EEA state, or another UK renewable energy support scheme.

Evidence of renewable electricity supply

3.32 Fuel suppliers will be required to demonstrate that the electricity involved in the production of their fuel comes from renewable sources. To demonstrate this fact we propose that suppliers will be able to produce either

- evidence that the electricity comes from their own privately owned renewable electricity plant, or
- evidence of the purchase of the renewable electricity from a domestic renewable electricity supplier, such as a power purchase agreement.

Sustainability criteria for biomass used in renewable electricity production

3.33 The renewable energy used to produce the electricity that will then be used for synthetic fuel production can come from any renewable source, including biomass. In 2012, the government published a bioenergy strategy, which concluded that biomass feedstocks can present sustainability risks that must be actively managed. In August 2013, the government set out its plan for introducing sustainability criteria for the use of biomass in electricity production under the Renewables Obligation.

3.34 While we recognise the sustainability risks with using biomass in electricity production, we are not proposing to introduce sustainability requirements for the biomass used to produce renewable electricity for the production of synthetic fuels at this time. However, we will keep the matter under review depending on the kinds of production facility for synthetic fuels that we see being brought forward.

Sources of carbon dioxide

3.35 In order to avoid the risk that carbon dioxide is produced solely for the production of synthetic fuels, we intend to limit the sources of carbon dioxide that can be used in the production of synthetic fuels to certain sources. These are as follows:

- Carbon dioxide from naturally occurring sources (such as geological emissions).
 - Carbon dioxide from waste sources.
- 3.36** We propose that the definition of waste would be the same as used under the RTFO for determining double counted feedstocks from wastes and residues. This would include waste carbon dioxide from the combustion of fossil fuels and biomass.
- 3.37** At this stage, we are not proposing to put any additional sustainability criteria or restrictions on the sources of water used in the production of synthetic fuels.

Partially-renewable synthetic fuels

- 3.38** In certain cases, suppliers of synthetic fuels may use a mix of renewable and non-renewable electricity to produce the hydrogen. In this case, we propose that the resultant fuels should receive support in the same way that partially renewable biofuels receive support under the RTFO. For example, a synthetic fuel producer who used 80% renewable electricity and 20% non-renewable electricity would receive 0.8 RTFCs per litre (or 1.6 if it were double counted).

Calculation of life cycle greenhouse gas emissions from synthetic fuels

- 3.39** The methodology for calculating the life cycle greenhouse gas emissions for low-carbon fuels under the RTFO is set out in the Renewable Energy Directive⁵ (RED) and the RTFO Carbon and Sustainability Guidance⁶. It is our understanding that the lifecycle assessment methodology for determining GHG emissions from biofuels can be applied to synthetic fuels. We would be interested in stakeholder views on the extent to which the RED methodology is compatible with synthetic fuel pathways.

Sustainability requirements and minimum GHG savings

- 3.40** There are non-renewable energy inputs to the production of biofuels. For example, electricity used in the processing of biofuel feedstocks can come from non-renewable sources.

⁵ Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

⁶ RTFO carbon and sustainability guidance can be found here:
<https://www.gov.uk/government/publications/rtfo-guidance>

However, these inputs are limited under the Renewable Energy Directive methodology by the minimum greenhouse gas savings requirements. Provided that these minimum GHG savings are met, and the fuel is based on a biomass feedstock, these fuels are eligible for support.

3.41 To ensure a level playing field between biofuels and synthetic fuels, we intend to apply the same requirements for minimum GHG savings. The electrolysis of water to produce hydrogen has to come from renewable electricity for synthetic fuels to be eligible for support. However, other non-renewable energy inputs to the production process are possible, provided that the total life cycle emissions of the fuel meet the minimum GHG savings criteria for biofuels set out in the RED. These minimum GHG savings criteria are currently 35%, rising to 50% in 2017 (and from 2018, 60% for biofuels produced in facilities that began production after 2017). We intend to restrict support for synthetic fuels to fuels that also meet these minimum GHG savings.

Question 2a) Do you agree that we should amend the RTFO to allow synthetic fuels to be eligible for support?

Question 2b) Do you agree the only two inputs that should be allowed in the production of synthetic fuels should be carbon dioxide and hydrogen? If not, what other inputs should be included and why?

Question 2c) Do you agree that synthetic fuels should receive two RTFCs per litre of fuel?

Question 2d) Do you agree with our proposal for proving whether electricity used to produce synthetic fuel is renewable? Are there any other sources of evidence that should be considered?

Question 2e) Do you agree that we should limit the sources of carbon dioxide that can be used in the production of synthetic fuel? Do you have any comments on the sources of carbon dioxide that we have chosen?

Question 2f) Do you agree with our proposal for fuel that has been produced using a mixture of renewable and non-renewable electricity?

Question 2g) Do you have any comments on how the RED methodology for determining the lifecycle emissions of renewable fuels might need to be adapted for synthetic fuels?

Question 2h) Do you have any other comments on this proposal?

3.3 Harmonisation of support for biodiesel

- 3.42** The two main forms of renewable transport fuel used in the UK are ethanol and FAME (fatty-acid-methyl-ester), a form of biodiesel. Ethanol is a wholly renewable transport fuel which is 100% derived from biomass. FAME is a nearly wholly renewable transport fuel, in that it is derived from around 90% biomass and around 10% methanol from fossil fuel.
- 3.43** Under the RTFO, FAME is treated as wholly renewable and receives one RTFC per litre. We consulted on our treatment of FAME in 2011 as part of the consultation on the transposition of the Renewable Energy Directive. Following this consultation the government determined that FAME should continue to be treated as wholly renewable.
- 3.44** Hydrotreated vegetable oil (HVO) is another form of biodiesel that, like FAME, involves some non-renewable inputs in its production process. The amount of renewable inputs to the production process for HVO is similar to that of FAME, and in many cases higher.
- 3.45** Although FAME is around 90% renewable, for the purposes of the RTFO it is regarded as 100% renewable. However, HVO is currently treated as partially renewable under the RTFO and fuel suppliers only receive RTFCs for the components of HVO that derive from biomass.
- 3.46** We are proposing to harmonise the treatment of FAME and HVO so that HVO also receives one RTFC per litre of fuel (or two RTFCs if the fuel is produced from a waste or a residue).

Question 3a) Do you agree with the proposal to award HVO one RTFC per litre?

Question 3b) Do you have any other comments on this proposal?

3.4 Clarification on the powers to request information from suppliers

- 3.47** In the current text of RTFO Order 2007, Article 13 (1) provides a general power for the Administrator to impose a requirement on any transport fuel supplier (ie not just those obligated by the Order) to deliver such information as the Administrator may require for purposes connected with the carrying out of the Administrator's functions.
- 3.48** Article 13(4) also provides a list of the type of information that may be required by the RTFO Administrator without prejudice to article 13(1). This includes:
- (a) carbon emissions,
 - (b) agriculture,
 - (c) other economic activities,
 - (d) sustainable development, or
 - (e) the environment generally.
- 3.49** The indicative list in Article 13(4) has been overtaken by subsequent amendments to the RTFO Order 2007 made in 2011. The list in 13(4) was useful when RTFO compliance involved carbon and sustainability reporting by non-obligated suppliers on a "voluntary" basis. Since 2011 in order to receive RTFCs, reporting is mandatory for suppliers. There are now corresponding powers throughout the RTFO Order 2007, which provide greater clarity than 13(4) with regard to mandatory carbon and sustainability reporting requirements.
- 3.50** We propose removing the list in Article 13(4) of the RTFO Order 2007, which adds little, other than to suggest that we might require a wide range of general economic and environmental information from any transport fuel supplier. This is not how we have used, or intend to use, the power. We propose to make clear that the purpose of the use of the general power in Article 13 is to support the exercise of the Administrator's current functions and in particular to continue the effective administration and enforcement of the scheme.

Question 4a) Do you agree with the proposed amendment of Article 13 to clarify the powers to request information from suppliers?

3.5 Rounding of Certificates

- 3.51** The RTFO Order 2007 suggests that the Administrator should issue RTFCs only to whole litres of fuel. This presents a minor administrative issue where partially renewable fuels result in a part litre of renewable fuel being reported.
- 3.52** We propose to amend the RTFO Order 2007 to put beyond doubt that the Administrator can apply mathematical rounding to such applications for RTFCs.
- 3.53** There is no cost-benefit analysis for this proposal. We estimate that rounding is applicable to at most 0.00004% of biofuel supplied, the equivalent of 536 litres per annum. A full cost-benefit analysis of this proposal would therefore be disproportionate.

Question 5a) Do you agree with the proposal put beyond doubt that the Administrator can apply mathematical rounding where part litres of renewable fuel are reported?

Annex A: Draft Cost Benefit Analysis

- A.1** When responding to the consultation, please comment on the analysis of costs and benefits, giving supporting evidence wherever possible.
- A.2** Please also suggest any alternative methods for reaching the objective and highlight any possible unintended consequences of the policy, and practical enforcement or implementation issues.

Problem under consideration

- A.3** The UK has some discretion regarding how the RED is implemented and the RTFO is the UK's mechanism for incentivising the supply of biofuels in the road transport sector. The RTFO obligates fossil road fuel suppliers to ensure, by producing evidence, that a certain amount of biofuel has been supplied for each litre of fossil fuel supplied. Based on feedback from stakeholders and technological developments in the industry, we are proposing to make some amendments to the RTFO.
- A.4** Since the RED target for the UK to source 10% of its transport energy from renewable sources, runs to 2020. We do not make any assumptions regarding what may happen to the RTFO post-2020 and this impact assessment covers only six years, 2015 to 2020, not the recommended ten years.

Policy Objective

- A.5** The objectives of the policy changes in the impact assessment are to provide a level playing field for suppliers of certain renewable fuels, and also to clarify the RTFO administrator's power to require information from any transport fuel supplier.
- A.6** This impact assessment focusses on a number of legislative changes to the RTFO.

A.7 Each amendment is evaluated individually against the baseline with the rationale for intervention for each explained in more detail below. For the synthetic fuel amendment, we consider two alternative options against the baseline and therefore the amendments are packaged into Policy Option A and Policy Option B.

A.8 A summary of the amendments in each policy option is below:

Policy Option A:

- Change incentives for gaseous fuels so that they are awarded RTFCs on the basis of their energy content rather than their weight
- Allow the RTFO to support liquid and gaseous fuels produced from renewable electricity (“synthetic” renewable fuels from electricity) and award one RTFC per litre of synthetic fuel (“single counting”)
- Harmonise the treatment of ‘Hydrotreated vegetable oil’ (HVO) with that of the most common form of biodiesel (FAME), so both receive the same level of support (ie one RTFC per litre)
- Clarify the powers of the Administrator of the RTFO to request information from transport fuel suppliers under the Red Tape Challenge commitment

Policy Option B:

(As option A but with some changes to point 2 below – highlighted in bold)

- Change incentives for gaseous fuels so that they are awarded RTFCs on the basis of their energy content rather than their weight
- Allow the RTFO to support liquid and gaseous fuels produced from renewable electricity (“synthetic” renewable fuels from electricity) **and award two RTFCs per litre of fuel (“double counting”)**
- Harmonise the treatment of ‘Hydrotreated Vegetable Oil’ (HVO) with that of the most common form of biodiesel

(FAME), so both receive the same level of support (ie one RTFC per litre)

- Clarify the powers of the administrator of the RTFO to request information from transport fuel suppliers under the Red Tape Challenge commitment

1. Renewable Gaseous Fuels

1.1 Rationale for intervention

A.9 Currently the RTFO incentivises renewable gaseous fuels with one RTFC per kilogram for crop-derived biomethane and two RTFCs per kilogram for waste-derived biomethane. This means that the potential financial benefit for supplying one kilogram of gaseous fuel is equivalent to that of one litre of liquid biofuel⁷.

A.10 However, the energy content of gaseous fuels is typically significantly higher than liquid biofuels. For example biomethane has almost twice the energy content of bioethanol, and hydrogen has over five times the energy content of bioethanol. Therefore, on an energy adjusted basis, the financial incentive to supply biomethane is significantly lower than the financial incentive to supply liquid biofuels. Changing incentives for gaseous fuels so that they are awarded RTFCs on the basis of their energy content rather than their weight would provide more of a level playing field for competitive suppliers of different biofuels.

1.2 Policy options cost benefit analysis

- **Do nothing:** gaseous fuels are issued 1 RTFC per kg.
- **Option A and B:** gaseous fuels are issued a number of RTFCs proportional to their energy content (eg biomethane is issued 1.76 RTFCs per kg).

A.11 Our proposed mechanism for calculating the number of RTFCs to be issued to various gaseous fuels on an energy basis is to calculate a weighted average based on the liquid fuels historically supplied under the RTFO as the denominator for the energy rate (MJ kg/MJ litre). The calculations set out in Tables 1–3 below show the methodology that we have used for calculating the number of RTFCs that different gaseous fuels would receive under this approach.

⁷ RTFCs can be freely traded and have a market value. In this sense the award of RTFCs is equivalent to a financial subsidy for the supply of biofuel, albeit a variable one.

	Biodiesel	Bioethanol	Biomethanol	MTBE	Total
2008/09	1058	225	0	0	1283
2009/10	1113	455	0	0	1568
2010/11	899.1	617.9	2	0	1519
2011/12	933	698	2	0	1633
2012/13	493	782	35	28	1338
Total	4496.1	2777.9	39	28	7341
Proportion of Total	61.2%	37.8%	0.5%	0.4%	

Table 1 – Share of different renewable liquid fuels supplied under the RTFO 2008-2013 (million litres)

	MJ per litre	Share of Liquid Renewable Fuels 2008-2013	Weighted average MJ per litre for each fuel type
Biodiesel	33	61.25%	20.21
Bioethanol	21	37.84%	7.95
Biomethanol	16	0.53%	0.09
MTBE	26	0.38%	0.10
		Implied average energy content of an RTFC	28.34

Table 2 – Weighted average energy density of fuels supplied under the RTFO

	MJ per kg	MJ/kg divided by implied average energy content of an RTFC	Adjusted number of RTFCs per kg
Biomethane	50	50 / 28.34	1.76
Bio-LPG	46	46 / 28.34	1.62

Table 3 – Adjusted number of RTFCs per kg of gaseous fuels

A.12 This approach would imply 1.76 RTFCs per kilogram of single counted double methane, and 3.52 RTFCs per kilogram of double counted biomethane.

A.13 For this impact assessment, we use 28.34 MJ as the denominator and assume that biomethane is allocated either 1.76 or 3.53 RTFCs per kilogram. This proposed change represents a significant increase in the incentive for using biomethane as a transport fuel. As such we would expect this change to result in either unchanged or increased supply of this fuel under the RTFO.

1.2.1 Benefits

A.14 In principle, changing the number of RTFCs awarded per kilogram of renewable gaseous fuel means that for the same amount of biomethane used, more RTFCs would be awarded. As a fixed number of RTFCs are required to meet a fuel supplier's obligation under the RTFO, increasing the supply of RTFCs that are awarded for the use of gaseous fuels will reduce the demand for RTFCs from the supply of liquid fuels, therefore reducing the supply of liquid biofuels under the RTFO.

A.15 As the RTFO is a market-based instrument under which suppliers are incentivised to minimise costs, we would expect this reduction in the use of liquid biofuels to impact on the most expensive 'marginal' biofuels supplied under the RTFO.

- A.16** Gaseous fuels (eg biomethane from municipal waste) typically have good greenhouse gas (GHG) savings characteristics. In the short run, it is expected that this change would have either slightly negative impacts (if waste-derived biodiesel is displaced) or highly positive impacts (if crop-derived biodiesel is displaced).
- A.17** In the long run, if the RTFO targets are increased to meet the 2020 RED target, we would expect that this change would have highly positive GHG impacts (when taking indirect land-use change⁸ into account). This is because crop-derived biodiesel is expected to become the marginal biofuel supplied under the RTFO as targets increase. Crop biodiesel is estimated to cause increased GHG emissions relative to fossil fuel when indirect effects are taken into account.
- A.18** The extent to which these impacts will materialise depends on the extent to which gaseous renewable fuels will be used in road transport. Biomethane currently makes up around 0.003% of fuel reported under the RTFO. In the short run, the potential to increase the supply of biomethane is tightly limited by 'demand constraints' (ie there are relatively few vehicles currently on the road which can use this fuel). Bio-LPG is limited by supply constraints (while LPG vehicles are reasonably widespread, bio-LPG is not currently sold in the UK). We therefore assume that biomethane will continue to be the only gaseous renewable fuel supplied under the RTFO between now and 2020.
- A.19** Approximately 500 HGVs are using gas today. For comparison, 23,000 new HGVs over 18t were registered in 2012, so only a very small percentage of all HGVs are currently equipped to use gaseous fuels instead of liquid fuels. Since April 2014, gaseous transport fuels benefit from a guarantee that the current fuel duty differential will continue until 2024. We expect that this will contribute to a higher future uptake of dual-fuel or gas-powered vehicles, which would in turn increase the potential for biomethane to be used.

⁸ Indirect Land Use Change occurs where biofuel feedstock is grown on existing crop land but several steps removed land is cleared to grow the food crops replaced. These means that for some biofuel feedstocks, when indirect emissions are taken into account, emissions can be higher than that of fossil fuels. The ILUC Factors used here are taken from International Food Policy Research Institute modelling for the European Commission.

Modelling assumptions:

A.20 Three scenarios were developed to assess potential impacts of the gaseous fuel amendment. Given the uncertainty, assumptions are made around HGV uptake (taken from DfT forecasts) and marginal fuel displacement to assess the scale of the impact. We expect that the main user of biomethane supplied under the RTFO will be HGVs where the fuel is taken directly from a production site and liquefied. Other kinds of natural gas vehicle, such as buses and municipal vehicles, are more likely to use methane taken from the natural gas grid. Where possible, carbon impacts are quantified and also include estimates of emissions from indirect land-use change (ILUC).

A.21 The process of displacement is assumed to be indirect. Biomethane displaces natural gas and not diesel or biodiesel, but the RTFCs that are awarded to biomethane displace RTFCs which would otherwise be awarded for liquid biofuels. However, it should be noted that as the RTFO is a market based system the marginal biofuel is not fixed and may change if relative prices shift or if targets are increased in the future.

GHG saving from displacement is calculated using the following formula:

(Counterfactual Compressed Natural Gas (CNG) emissions – Biomethane emissions) – (Counterfactual diesel emissions – Displaced biodiesel emissions) = GHG savings from displacement

GHG savings are based on an average carbon intensity factor for biodiesel in gCo₂/MJ:

(Crop biodiesel carbon intensity (57g plus ILUC factor 54g) + UCO carbon intensity (11g))/2

= (101+11)/2

= 56gCo₂/MJ.

The following carbon intensity factors are also used:

Diesel = 83.8 gCo₂/MJ

CNG = 76.7 gCo₂/MJ

Biomethane = 17gCo₂/MJ

Monetised benefits – Central Scenario

A.22 The guarantee of the existing fuel duty differential drives the assumptions underlying our central scenario for biomethane uptake. If 5% of new HGVs (1150 per year) from 2015 onwards were gas vehicles (including dual fuel) and new vehicle registrations remain constant, then there would be approximately 7400 gas HGVs by 2020. This also assumes vehicles reaching their end-life are replaced in addition and additional re-fuelling infrastructure is put in place.

A.23 Given a long-term duty differential commitment, we estimate that 12.5% of the fuel used by this fleet will be biomethane. Based on the fact that so far, gas-powered vehicles are almost exclusively dual-fuel, we then make the following assumptions:

- that dual fuel vehicles run on diesel half of the time and gas half of the time;
- that half of natural gas vehicles in 2020 will use 100% fossil gas;
- that half of natural gas vehicles in 2020 will use a mix of 50% fossil gas and 50% biomethane.

A.24 Therefore, of all the energy used by these dual-fuel vehicles, only around 12.5% comes from biomethane, and we expect this trend to continue.

A.25 At present, the marginal biofuel supplied under the RTFO is thought to be FAME biodiesel (either waste-derived or crop-derived). Given the uncertainty over which marginal biodiesel is displaced, our central modelling assumes a 50/50 mix of Used Cooking Oil (UCO) and crop-biodiesel being displaced by biomethane.

Table 1.3 Central Scenario – HGV biomethane uptake

Central Gas HGVs	2014	2015	2016	2017	2018	2019	2020
No. of gas HGVs in fleet, 12.5% of fuel is biomethane	500	1650	2800	3950	5100	6250	7400
energy from biomethane, TWh	0.02	0.05	0.09	0.13	0.17	0.21	0.24

A.26 Based on an average fuel use of 264 MWh/year per gas-powered HGV, an overall total of 0.9 TWh would be supplied from biomethane in the RTFO in the period 2015-2020.

A.27 Our scenario estimates that UCO and crop-derived biodiesel displacement will lead to overall GHG savings of 0.04 MtCo2 in period 2015-20 including ILUC. The monetised discounted GHG benefits would be £2.21m in the period 2015-20, based on non-traded carbon prices from DECC’s valuation of energy use and greenhouse gas emissions for appraisal toolkit.

A.28 Therefore, central scenario benefits estimates:

Table 1.4 Central scenario – benefits from biomethane use

	2015	2016	2017	2018	2019	2020	Total	Total PV
MtCo2 Saved	0.002	0.004	0.006	0.007	0.009	0.011	0.04	
£m, based on DECC’s non-traded carbon prices (2014)	0.14	0.25	0.36	0.48	0.59	0.72	2.56	2.21

A.29 A sensitivity test is carried out on the central scenario and is detailed in section 8.

Monetised Benefits – Low Scenario

A.30 In the case of demand constraints, there will be no additional take-up of gas HGVs. Gas HGVs will remain constant at 500 vehicles and only a 5% share of their fuel will be from biomethane. There will be no additional increase in uptake of biomethane.

A.31 The marginal fuel in this scenario is UCO and displacement will lead to a negative impact with additional GHG emissions of 0.003 MtCo₂ in period 2015-20 (including ILUC). This negative impact is due to biomethane being more carbon intensive (17 gCo₂/MJ) than UCO (11 gCo₂/MJ). However, it should be noted that if crop biodiesel were the marginal fuel we would expect a small positive GHG saving.

Monetised Benefits – High Scenario

A.32 The high scenario assumes new gas HGV uptake will stay at 5% between 2015 and 2017 (as in the central scenario). But from 2018 onwards, we expect increasing uptake. This is based on a maximum uptake scenario where by 2030 all newly registered HGVs are gas-powered and their share of new vehicles increases gradually between 2018 and 2030. This would result in approximately 13,950 gas HGVs in 2020. To achieve annual increases above 5%, we assume there will be significant new nationwide refuelling infrastructure and a well-established second-hand market for HGVs. We also assume the introduction of the fuel duty differential has a greater impact on uptake of biomethane in 2018-20 than in the central scenario.

A.33 We assume that the fleet will still be dual-fuel, so that 50% of their fuel comes from diesel. We also assume that all the gas used by the fleet is a 50/50 mix of fossil and biomethane, so that the biomethane share of fuel goes up to 25%. Crop-derived biodiesel is assumed to be the displaced fuel.

Table 1.5 High Scenario – HGV biomethane uptake

High Gas HGVs	2014	2015	2016	2017	2018	2019	2020
No. of gas HGVs in fleet, 25% of fuel is biomethane	500	1650	2800	3950	5950	8950	13950
Energy from biomethane, TWh	0.03	0.11	0.18	0.26	0.39	0.59	0.92

A.34 Based on average fuel use, a total of 2.5 TWh will be supplied from biomethane. Displacement will lead to overall GHG savings of 0.9 MtCo₂ in the period 2015-20 (including ILUC factor), given crop biodiesel’s carbon intensity of 101gCo₂/MJ. This equates to monetised and discounted carbon savings of £49m.

A.35 These levels of biomethane use are well within expected supply volumes. Approximately 25TWh of biomethane (from various sources) was used in 2012.

Scenario Summary

Table 1.6 Summary, benefits of biomethane use

Scenario	MtCo ₂ saved in 2015-2020	£m, discounted monetised value based on non-traded carbon price (2014)
Low	- 0.003	-0.2
Central	0.039	2.2
High	0.9	49.2

Non-monetised benefits

A.36 Increased supply of gaseous biofuels would be expected to marginally reduce the price of traded RTFCs and therefore the cost of meeting a given RTFO target. Suppliers will have more flexibility to meet their obligation under the RTFO which will allow potential to reduce compliance costs.

1.2.2 Costs

Monetised costs

A.37 Since the biofuel industry is competitive and the RTFO mechanism is cost minimising, we do not expect suppliers to use the fuels incentivised by the proposed legislative changes, unless the cost of doing so is equal to or lower than the cost of supplying the biofuels which they would replace. Therefore we do not expect any of the proposed changes to increase the cost imposed by the RTFO.

Non-monetised costs

A.38 The amendment is expected to reduce demand for marginal fuels from waste and crop biodiesel. These fuel suppliers may experience lower turnover and profitability. The impact on the cost of meeting underlying Renewable Energy Directive and Fuel Quality Directive targets is not thought likely to be significant. Given the inherent uncertainty over the type and quantity of marginal fuels, the cost to firms described above have not been quantified in the impact assessment. However, supplier costs and cost to society are not always aligned due to the fact that the RTFO is a volume based obligation and fuels have varying energy densities. The low scenario illustrates that the more UCO displaced in the RTFO the greater the increase in GHG emissions which would potentially present a cost to society.

1.3 Required changes in legislation

A.39 Amend the RTFO Order 2007 to specify the number of RTFCs that will be awarded to particular types of gaseous fuels per kilogram according to their energy content.

1.4 Practical Implementation issues

- A.40** This legislative change involves changing the RTFO guidance and also the IT system (ROS). In particular, it will need to change the mechanism by which gases are awarded RTFCs, changing the current IT system is not expected to lead to any difficulties or significant costs.
- A.41** There are difficulties with fuel volume verification for biomethane, as the RTFO Administrator cannot rely on the existing HMRC framework which is used for liquid fuels.
- A.42** The proposed change will involve issuing a number of RTFCs for biomethane (1.76 per kilogram if the methodology below is used). We may therefore need to consider how to verify biomethane volumes if this starts to be supplied at scale (for example by suppliers' direct reporting). This change is not expected to be required immediately.

2 Synthetic fuels from renewable electricity

2.1 Rationale for intervention

- A.43** The RTFO currently does not incentivise synthetic fuels from renewable electricity (referred to here as ‘synthetic fuels’) as it only offers support to fuels made from biological material. Synthetic fuels can offer good GHG savings and generally do not have the broader environmental impacts involved in the production of some forms of bioenergy. We are proposing to amend the RTFO so that synthetic fuels are eligible for RTFCs.
- A.44** There are a range of technologies which can produce synthetic fuels, and which offer very good GHG savings. Most of these technologies are currently at an early stage of development, though some are already being commercialised.

2.2 Policy options cost benefit analysis

- **Do nothing:** Synthetic renewable fuels from electricity are not incentivised under the RTFO.
- **Option A:** Synthetic renewable fuels from electricity are eligible for 1 RTFC per litre of renewable fuel, "single counting".
- **Option B:** Synthetic renewable fuels from electricity are eligible for 2 RTFCs per litre of renewable fuel, "double counting".

2.2.1 Benefits – Option A

- A.45** Awarding RTFCs for the supply of synthetic fuels would be expected to increase suppliers’ willingness to pay for these fuels (as inclusion in the RTFO in effect provides a subsidy for the purchase of these fuels), which would in turn be expected to increase the volume of these fuels which are supplied in the UK. At present, these fuels are at an early stage of technological development, so in the short run it seems likely that supply volumes would be low.

- A.46** As a fixed number of RTFCs are required to meet a fuel supplier's obligation under the RTFO, awarding RTFCs for the supply of synthetic fuels will reduce the supply of other renewable fuels required to meet a given RTFO target. The type of fuel displaced will depend upon whether the synthetic fuel is a petrol or diesel substitute. If the synthetic fuel is a petrol substitute then it is likely that bioethanol will be displaced. If the synthetic fuel is a diesel substitute then it is likely that biodiesel will be displaced.
- A.47** It is unclear what impact inclusion of synthetic fuels will have on GHG savings as this will depend on how the GHG savings attributable to the synthetic fuel compare to the GHG savings of the displaced biofuel. However, given that most synthetic fuels are expected to have very positive GHG savings it seems likely that the GHG impact of allowing these fuels to be counted towards RTFO targets would be positive.

Modelling Assumptions

- A.48** Three scenarios were developed to assess potential impacts of the synthetic fuel amendment with single counting (one RTFC). Given the competitive nature of global markets, there is inherent uncertainty over how much supply of synthetic fuels will be directed to the UK. This depends among other things on how these fuels are treated by regulations and incentives in other countries. Due to this, we have had discussions with prospective companies to make assumptions on potential UK supply and which marginal fuel will be displaced. Where possible, carbon impacts are quantified and also include ILUC. Synthetic fuel is assumed to have a carbon intensity of 8gCo₂/MJ.

Monetised Benefits – Low

- A.49** The low scenario assumes no synthetic fuel will be supplied by 2020 and therefore has no impact on the RTFO.

Monetised Benefits – Central

- A.50** Central scenario assumes 5m litres of synthetic fuel will be supplied annually in period 2015-20 with 50% of it (2.5m litres) being used in the UK. If synthetic fuel is used for low blending,

crop bioethanol is likely to be displaced and this could save approximately 0.07 TWh over the period 2015-20, saving 0.01 MtCo₂. This is based on a carbon intensity factor of 51 gCo₂/MJ for crop bioethanol and 8 gCo₂/MJ for synthetic fuel. This equates to monetised discounted GHG savings of £0.8m over the period 2015-2020, using DECC's appraisal toolkit.

Monetised Benefits – High

A.51 The high scenario assumes 200m litres will be supplied by 2020, with 50% of it being used in the UK. This will be approximately 1.5TWh in 2020. In the case of crop bioethanol being displaced, 0.29 MtCo₂ could be saved in period 2015-20. This equates to monetised discounted GHG savings of £16m. If it replaces crop biodiesel as a drop-in fuel, the savings could be substantially higher. However, we do not think this is likely to occur over the appraisal period. This is because we anticipate that the most significant source of synthetic fuels up to 2020 will be synthetic methanol. This is most likely to be used by blending with petrol.

Non-monetised Benefits – Central & High

A.52 Increased supply of synthetic fuels would be expected to marginally reduce the price of traded RTFCs and therefore the cost of meeting a given RTFO target. Suppliers will have more flexibility to meet their obligation under the RTFO which will allow potential to reduce compliance costs.

A.53 Given the inherent uncertainties over the type and quantity of marginal fuel replaced, potential reduced compliance cost has not been monetised.

2.2.2 Costs – Option A

Monetised Costs – Central & High

A.54 The fuel industry is highly competitive and the RTFO is a cost minimising policy mechanism. Therefore we do not expect suppliers to use significant amounts of synthetic fuel unless the price is equal to or lower than the prices of the first generation biofuels it would replace. Therefore we do not

expect any of the proposed changes to increase the cost imposed by the RTFO.

Non-monetised Costs – Central & High

A.55 The amendment is expected to reduce demand for ethanol and these fuel suppliers may experience lower turnover and profitability. Given the uncertainty over the quantity of marginal fuels displaced, the cost to firms have not been quantified in the impact assessment.

2.2.3 Benefits – Option B

A.56 Double counting (awarding two RTFCs per litre of synthetic fuel supplied) will increase the subsidy for supplying synthetic fuel and may therefore increase the market price and supply of these fuels. This would create additional demand for a new, innovative technology, which we expect to contribute to the production of sustainable renewable fuels in the long run. We expect that uptake would be higher under option B but due to the large uncertainty around how much higher it may be, we have not attempted to quantify this.

Monetised Benefits – Low

A.57 The low scenario assumes no synthetic fuel will be supplied by 2020 and therefore has no impact on the RTFO.

Monetised Benefits – Central & High

A.58 We have assumed that synthetic fuels cannot be double counted towards the 10% transport sub-target under the RED. This would mean that if it is double counted under the RTFO it will still displace the same amount of biofuels as under single counting and the same amount of carbon savings would be achieved under double counting as under single counting. (See above, option A.)

Non-monetised Benefits – Central & High

A.59 We would expect to see some non-monetised benefits from innovation, if the additional incentive of double counting encourages the increased supply and uptake of synthetic fuels. Through this, we would expect a higher supply to result in larger GHG savings compared to single counting.

2.2.3 Costs – Option B

A.60 If synthetic fuel is double counted towards suppliers targets under the RTFO, but not towards the UK's 10% transport sub-target under the RED, this could pose additional costs to suppliers as a higher target would be required for the UK to meet its obligation in 2020.

A.61 Should the RTFO target level be increased in order to meet the 10% energy transport sub-target in 2020, additional biofuel will be required to account for the quantity of synthetic fuel not double counted. This imposes a cost on fuel suppliers who will need to supply the additional biofuel required to meet the UK's RED obligations. This cost is assumed to be incurred as a one-off in 2020 when extra RTFCs may be required and the RED obligation is met.

A.62 The cost of extra RTFCs associated with this will depend on the cost of supplying synthetic fuels in 2020. We use an RTFC price premium of 8 pence per litre, 12 pence per litre and 16 pence per litre to calculate a range of costs of additional biofuel that need to be supplied to meet the RED.

A.63 The price premium of 8–16 pence per litre is based on the historic price premia observed as well as our expectation of a fall in price premia over the appraisal period. But this is uncertain due to impact of the global economy on how prices of renewable fuels develop, both organic and synthetic.

A.64 Synthetic fuels from electricity are also included in recent proposals to address ILUC⁹ on the list of Annex IX feedstocks that was approved by the European council in June 2013. If this list is approved, then these fuels would be explicitly

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Proposal for a Directive of the European Parliament and of the Council amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources

double counted towards 2020 European renewable energy targets.

Monetised Costs – Central

A.65 Under this scenario, we estimate additional costs to be approximately between £0.2-0.4million in 2020.

Monetised Costs – High

A.66 Under this scenario, the cost of double counting could rise to £8–16 million in 2020, based on the fuel price premium.

Non-monetised Costs – Central & High

A.67 Providing incentives for synthetic renewable fuels is expected to reduce the market for first generation biofuels. Producers of these fuels may experience lower turn-over and profitability due to decreased demand.

A.68 Given the huge uncertainty over the quantity of marginal fuels displaced, the cost to firms has not been quantified in the impact assessment

Table 2.2 Costs of option B, which are only incurred in 2020

	Total cost in 2020 based on 8ppl price premium	Total cost in 2020 based on 16 ppl price premium	Central 2020 cost estimate, based on 12ppl price premium	Central cost estimate, based on 12ppl price premium discounted to 2014 prices
Low scenario, no synthetic fuel	0	0	0	0
Central scenario, 2.5 million litres	£0.2 million	£0.4 million	£0.3 million	£0.24 million
High synthetic, 100 million litres	£8.0 million	£16.0 million	£12.9million	£9.7 million

2.2.3 Summary of option A and option B costs and benefits

Table 2.3 Costs and benefits of options A and B (2014 prices)

		BENEFITS	COSTS
	MtCo2 saved in 2015-2020, assuming ethanol is displaced	£m, monetised value based on non-traded carbon price (discounted to 2014 prices)	Total cost (£m) in 2020 based on central estimate 12 ppl price premium (discounted to 2014 prices)
A Low	0	0	0
A Central	0.01	0.8	0
A High	0.29	16.0	0
B Low	0	0	0
B Central	0.01	0.8	0.24
B High	0.29	16.0	12.9

2.3 Required changes to legislation

- Amend RTFO to so that RTFCs are awarded for synthetic fuels. Synthetic fuels would be defined as fuels produced using hydrogen. The amendment would specify that recycled Co2 can be from natural occurring or waste sources (ie industrial plants).
- Include the same minimum GHG savings criteria to that used for biofuels (35% raising to 50% in 2017). Specify that if grid electricity is used in the electrolysis of water, only the proportion which is renewable will be eligible for RTFCs.
- Synthetic fuels would be awarded two RTFCs per litre in recognition of their higher degree of GHG savings and the fact that they do not present land use sustainability issues.

2.4 Practical implementation issues

- A.69** This legislative change implies changes in the RTFO guidance and also change to the IT system used to operate the RTFO. In particular, there would need to be a new category of double-counting material.
- A.70** Synthetic fuels from electricity do not meet the definition of biofuels under the RED and so do not require the same sustainability verification. However, we are proposing that these fuels should meet equivalent lifecycle carbon savings as biofuels. Consideration will need to be given in guidance as to how the RTFO's existing greenhouse gas calculation methodology will need to be adapted for suppliers to provide that they have met these minimum standards.

3 Harmonisation of support for biodiesel

3.1 Rationale for intervention

- A.71** Nearly all biodiesel in the UK is a substance known as Fatty Acid Methyl Ester or FAME. It is produced using around 90% organic inputs (such as vegetable oil) and using around 10% fossil methanol. However, in the UK FAME has always received one RTFC per litre of fuel. FAME is an exception in this regard, other fuels are awarded RTFCs in proportion to the level of renewable inputs involved in their production (their renewability). HVO is a relatively new diesel substitute produced from vegetable oil which is made with around 98% renewable inputs, and some fossil fuel inputs.
- A.72** HVO is made using a different production process than most biodiesel. Unlike most biodiesel, which cannot be blended into standard diesel at more than 7%, HVO can be blended at much higher rates, which makes it a “drop-in fuel”. The RTFO currently treats HVO as ‘partially renewable’ because the RTFO classifies all biofuels in proportion to their proportion of renewable feedstock. Most EU member states treat HVO in the same way as FAME.

3.2 Policy options

- **Do Nothing:** HVO is assessed as partially renewable fuel: if fossil hydrogen is used it would be classified around 98% renewable (if renewable hydrogen were used, HVO would be 100% renewable). Under a ‘do nothing’ scenario, a fuel supplier supplying 100 litres of HVO would also have to supply 2 litres of another biofuel in order to receive 100 RTFCs or would have to buy two RTFCs in the market.
- **Option A and B:** To remove the differential treatment of FAME/HVO and ensure level playing field among suppliers and deem HVO 100% renewable in the RTFO Order.

Monetised Benefits & Cost

A.73 To date, HVO biodiesel has not been supplied in significant volumes in the UK. Changing its treatment under the RTFO will make supplying HVO biodiesel marginally more attractive, since each litre of HVO supplied will then be awarded one full RTFC instead of 0.98 RTFCs under the do nothing scenario.

A.74 It is possible that this change will improve the commercial viability of HVO as a biofuel. However, it is thought most likely that this amendment will not change the economics of supplying HVO (relative to other biofuels) significantly enough to change supply patterns. Based on a historic average value of £0.15 per RTFC, this change is worth £0.003 per litre of HVO, a relatively small change in the level of incentives. The main drivers for the uptake of HVO are probably unrelated to this particular change to the RTFO. Therefore this change is not expected to result in any significant change to RTFO costs or GHG savings.

3.3 Required changes to legislation

A.75 The RTFO Order 2007 would need to be amended so that HVO is deemed as 100% renewable .

3.4 Practical implementation issues

A.76 This legislative change requires amending the RTFO guidance. The IT system will also be updated to indicate the revised percentage of renewability for HVO, though this is not expected to be a significant change.

4 Clarification on the powers to request information from suppliers

4.1 Rationale for intervention

A.77 In 2011 the Government's Red tape Challenge (RTC) commitment around the RTFO concerned removing any unnecessary reporting powers. Article 13 provides the administrator with powers to request information from any transport fuel supplier as defined by article 132 Energy Act 2004. The RTC commitment would be achieved by making clearer how the general power in article 13 would be used by the Administrator to request information and removing in particular those parts in article 13 which duplicate powers now provided in articles 12 and 16

4.2 Policy options cost benefit analysis:

- **Do nothing:** no change made to Article 13 – retain generic power to require information.
- **Option A and B:** amend Article 13 to clarify powers. It is not envisaged that the generic power in Article 13 will be used to require information relating to the wider environmental standards of fuel supplied by non-obligated suppliers in the future, therefore there are unlikely to be any significant costs or benefits arising from removing Article 13(4).

Monetised Benefits & Costs

A.78 In particular, there is not expected to be any impact on the quantity or type of biofuel that is supplied, or on the cost of producing road transport fuels. Therefore the clarification of the intended use of the power of the RTFO Administrator to require information from transport fuel suppliers will not have any impact on petrol or diesel pump prices.

A.79 Clarifying the intended future use of the power of the RTFO Administrator to require information from transport fuel suppliers may provide some benefits to suppliers in that potentially less information may be required from them. However, as the Administrator is not expected to use the full

extent of the power if it remained unchanged, it is assumed that transport fuel suppliers operating outside of the RTFO scheme would not incur any costs preparing to provide this information. Therefore the monetised costs and benefits are assumed to be zero.

5 Summary of policy benefits

Policy Option	BENEFIT				COST		Central estimate, sum of costs and benefits (£m)
	Range of Carbon Savings in 2015-21 (Mt Co2)	Central estimate carbon savings (Mt Co2)	Range of Monetised Carbon Savings in 2015-21 (£m), discounted	Central estimate monetised carbon savings (£m), discounted	Cost of double counting (- £m), discounted	Central estimate cost (-£m), discounted	
A							
(1) Biomethane	-0.003 – 0.9	0.04	-0.2 – 49	2.2	0	0	2.2
(2) Synthetic Fuel	0 – 0.29	0.01	0 – 16	0.8	0	0	0.8
Total	-0.003 – 1.2	0.05	-0.2 – 65	3	0	0	3
B							
(1) Biomethane	-0.003 – 0.9	0.04	-0.2 – 49	2.2	0	0	2.2
(2) Synthetic Fuel	0-0.29	0.01	0 – 16	0.8	0-12.9	0.24	0.56
Total	-0.003 – 1.2	0.05	-0.2 – 65	3	0-12.9	0.24	2.76

Table 5.1 Summary of policy costs and benefits, 2014 prices

6 Regulatory status

- A.80** The RTFO is considered a “tax and spend measure” and not a regulation. It has been classified as such by the Office for National Statistics.
- A.81** There is no precise definition of a tax and spend measure. Obligations such as the RTFO be considered tax and spend measures, since they impose a cost on industry, like a tax, even though no money is collected by any government body.

7 Sensitivities

- A.82** The estimates presented in this Cost Benefit Analysis are sensitive to the assumptions that have been used. One of the most influential assumptions is over marginal fuels (ie the biofuel that would be replaced by an increase in the other fuels incentivised). Going forward there is uncertainty over exactly which biofuel, or combination of biofuels, will play the role of the marginal fuel. For the scenarios above we have made the specific assumption that the marginal fuel will be a combination of 50% UCO and 50% crop biodiesel. However, to explore the impact of this assumption we have undertaken some sensitivity analysis using alternative assumptions on the marginal fuel as set out below.

Greater UCO displacement

- A.83** The central scenario for gaseous fuels assumes that displacement will consist of 50% UCO and 50% crop biodiesel. Carbon saving benefits are crucially underpinned by this displacement assumption. However, there is a risk that more than 50% of the displaced fuel will be UCO, which would lead to lower carbon savings. In light of this, a sensitivity analysis was carried out to analyse the impact if only UCO was displaced in the central scenario.
- A.84** Based on central gas-powered HGV uptake and an average fuel use of 264 MWh/year per HGV, a total of 0.9 TWh would be supplied from biomethane in the RTFO in the period 2015-2020.
- A.85** Given UCO’s lower carbon intensity (11g Co₂/MJ) compared to biomethane’s (17g Co₂/MJ), the sensitivity test suggest there will be additional GHG emission of 0.076 Mt Co₂.

A.86 Under the current RTFO target level, more UCO displacement leads to greater increase in GHG emissions.

A.87 However, if the RTFO target level is increased to meet the 10% energy transport sub-target, additional biofuel will be required. This is more likely to be sourced from crop biodiesel rather than from UCO which we assume is in limited supply. Given this, the marginal fuel is more likely to be crop biodiesel and therefore in the long run gaseous fuel amendment can deliver some carbon savings.

A.88 This scenario estimates:

Table 7.1 Central Scenario – Greater UCO displacement comparison

	2015	2016	2017	2018	2019	2020	Total	Total PV
Mt Co2 Saved	-0.005	-0.008	-0.011	-0.014	-0.017	-0.021	-0.076	
£m, based on DECC's non-traded carbon prices (2014)	-0.29	-0.49	-0.70	-0.92	-1.15	-1.38	-0.29	-4.3
Central estimate for comparison								
Mt Co2 Saved	0.002	0.004	0.006	0.007	0.009	0.011	0.002	
£m, based on DECC's non-traded carbon prices (2014)	0.15	0.26	0.37	0.48	0.60	0.72	2.56	2.2

Question 6a) Do you have any comments on the analysis of costs and benefits in Annex A? Please provide supporting evidence where possible.

Annex B: Consultation principles

The consultation is being conducted in line with the Government's key consultation principles which are listed below. Further information is available at <https://www.gov.uk/government/publications/consultation-principles-guidance>

If you have any comments about the consultation process please contact:

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