Department for Transport

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Targeting net zero - Next steps for the Renewable Transport Fuels Obligation

March 2021

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Ministerial foreword: Secretary of State for Transport, Rt Hon Grant Shapps MP

In December 2020 this Government committed the UK to reducing economy-wide greenhouse gas emissions by at least 68% by 2030, setting a new target on our pathway to net zero by 2050. Low carbon fuels have been central to greening UK transport for more than a decade, supported through the Renewable Transport Fuel Obligation (RTFO) scheme. In 2019, the use of low carbon fuel supplied under the RTFO saved almost 5.5 million tonnes of carbon dioxide emissions – the equivalent of taking 2.5 million combustion engine-powered cars off the road.

The next 15 years will be crucial for slashing greenhouse gas emissions from our roads. Until electric cars become the norm, we need to act to reduce emissions today, and the RTFO will continue to play a central role. Most fuel supplied so far under the RTFO has been used in road vehicles, and this will be reinforced by the mandated introduction of E10 petrol (containing up to 10% bioethanol) from September this year. Then, as cars are increasingly electrified, we will need to consider the best use of low carbon fuels in the decades to come. This is likely to mean a transition so that in the longer term these fuels are primarily used in sectors with limited alternatives - especially aviation and maritime.

This consultation proposes faster and higher ambition on the contribution of sustainable low carbon fuels. It would increase the RTFO main obligation by an extra 1% in 2022 (to 11.9%) and then gradually by a further 1.5% in 2032 above the currently legislated target (to 14.9%). Altogether the proposed amendments to the RTFO are estimated to produce an additional 16.9-21.0 MtCO2 in greenhouse gas savings over the period 2022-2032. The annual figures increase over time and are equivalent to the removal of around an additional 1.2 million cars from the road by 2032. These increases will enable us to maximise the carbon savings gained from introducing E10 in the short term, but critically ensure we can remain confident that the volume of biomass used in biofuel will continue to be sustainable in the longer term.

The consultation also proposes ways of supporting a more diverse range of fuels in transport for the longer term, especially to support the uptake of renewable hydrogen and recycled carbon fuels (RCFs) – which turn household rubbish into fuel. Alongside grant schemes to support new plants, such as the Green Fuel, Green Skies competition, the inclusion of RCFs in the RTFO would transform the commercial viability of that technology, supporting UK companies to pioneer technologies to convert non-recyclable waste streams to aviation fuel and potentially delivering new green industrial jobs throughout the supply chain.

This will ensure the UK is well placed to benefit from these expanding markets for advanced fuels.

As we extend the RTFO eligibility to support a wider range of fuels, it remains vital that we are confident in the carbon savings such fuels deliver, reinforcing the UK's commitment to ensuring high environmental standards and leading the world by example. The consultation therefore proposes to update sustainability requirements for renewable fuels.

We are seeking your views now so that we have the option to make changes in time for the start of 2022, and we look forward to receiving responses. I believe that this package of measures will help us provide a regulatory framework which delivers for the environment, supports green jobs and growth, and builds on the phenomenal achievements to date of the UK's low carbon fuel sector.

Executive summary

Introduction

1. Climate change is the most pressing environmental challenge of our time. Global leaders have agreed the need to limit global warming to well below 2°C and we have legislated to end the UK's contribution to climate change by 2050. In December 2020 we committed the UK to reducing economy-wide greenhouse gas emissions by at least 68% by 2030, setting a new target on our pathway to net zero by 2050.
2. The UK government has also made world-leading progress in cutting greenhouse gas (GHG) emissions by setting UK carbon budgets. Carbon budgets are made under the Climate Change Act 2008 and limit the amount of carbon emissions permitted across the economy. Every tonne of GHG emitted between now and 2050 will count[1].
3. Achieving net zero will require rapid and unprecedented action across the UK economy and wider society supported by technology innovation and robust policy frameworks.
4. The transport sector is particularly challenging to decarbonise, with factors including its current reliance on carbon intensive liquid fuels as well as an increasing demand for transport services. The transport sector now accounts for the greatest share of UK GHG emissions, contributing 27% of UK domestic emissions in 2019[2].
5. Recognising the need to accelerate emissions reductions in the transport industry, in March 2020 the DfT published the policy paper 'Decarbonising transport: setting the challenge'. This paper is the precursor to a full Transport Decarbonisation plan which will be published in the spring.
6. As part of the plan, the government is considering a wide range of policies to increase the proportion of zero emission vehicles on the road. These policies will help to secure a sustainable future fleet; but given the need to meet immediate carbon budgets, we will also need measures to reduce emissions from conventional vehicles. Cleaner fuels will play an important role in meeting our climate change commitments and achieving our aim of greener and more prosperous economy.
7. Low carbon fuels can deliver emissions reductions quickly and help meet interim

[1] International maritime and aviation are excluded from the UK's carbon budgets.
[2] 2019 UK Greenhouse Gas Emissions https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957687/2019_Final_emissions_statistics_one_page_summary.pdf

carbon budgets on the path to net zero. They will play a key role in reducing emissions from the existing fleet, and in transport sectors which cannot currently be easily electrified. such as the aviation and heavy goods sectors.

8. Biofuels have been supported in the UK for over a decade, principally by the Renewable Transport Fuel Obligation (RTFO). The RTFO commenced on 15 April 2008 and delivers reductions in GHG emissions from fuel used for transport purposes by mandating the supply of renewable fuels.

9. The scheme works by setting an annual obligation on suppliers to supply renewable fuels - increasing from 9.75% of total transport fuel in 2020 to 12.4% in 2032. In subsequent years suppliers' obligation levels will remain at the 2032 level. This obligation can be met by supplying renewable fuel or purchasing renewable transport fuel certificates (RTFCs) from other suppliers[3]. RTFCs are issued to suppliers of sustainable renewable transport fuel and this trading mechanism enables obligated suppliers to meet their obligation in a cost-effective manner.

10. Since its introduction, the RTFO has been amended several times to improve its effectiveness, deliver increased carbon savings, reinforce sustainability standards, and align with wider international standards - facilitating trade in what is now a global market. In 2019, a new 'development fuel' obligation was introduced to drive investment in novel waste-derived renewable fuels for use in harder to decarbonise transport modes or as drop-in replacements for petrol and diesel. These fuels are completely interchangeable substitutes for conventional petrol or diesel, meaning they do not require adaptation of the engine, fuel system or the fuel distribution network. These also include renewable fuels of non-biological origin (RFNBOs), such as, hydrogen produced using renewable power.

11. In 2019, renewable fuels supplied under the RTFO saved almost five and a half million tonnes of carbon dioxide emissions, or the equivalent of taking two and a half million combustion engine-powered cars off the road. Renewable fuels supplied under the RTFO currently contribute around a third of the savings required for the UK's transport carbon budget as seen in our most recently published statistics report.

Summary of proposals

12. In line with our wider decarbonisation ambitions and net zero commitments, the Department for Transport is now seeking views on potential policy measures to accelerate transport decarbonisation. This consultation seeks to propose options to further enhance the RTFO and increase the carbon savings it achieves. The consultation proposals are summarised below.

Renewable fuel supply trajectory

13. We propose to increase the RTFO main obligation to supply renewable fuel by 2.5%: 1.5% in 2022 followed by an additional 1% spread over the period 2023 to 2032. The target will remain at the 2032 level in subsequent years but will be kept under review going forwards.

14. This complements the introduction of the requirement to increase the ethanol blend

[3] Suppliers can also buy out of their obligation by paying the 'buy-out price' for every RTFC or litre they are short of their obligation. This is set at £0.50 per litre for the main obligation and £0.80 for the development fuel obligation (or sub-target).

in petrol as well as allowing the growth of other renewable fuels and feedstocks.

15. Increasing targets will provide long term certainty to industry, whilst ensuring an ongoing and more ambitious contribution to net zero.

16. The proposed target rise is projected to deliver an additional GHG emission savings of 14.6 MtCO2e over the period 2022-2032[4] and increase fuel costs by 0.5-0.8 pence per litre (including VAT).

Inclusion of support for recycled carbon fuels

17. Recycled carbon fuels (RCFs) are fuels produced from fossil wastes that cannot be avoided, reused or recycled. Examples of feedstocks include industrial waste gases and the fossil fraction of municipal solid waste (MSW) such as non-recyclable plastic.

18. These feedstocks are being proposed as eligible for RTFO support as there is evidence that GHG emission savings can be achieved by diverting wastes from their current disposal routes if the RCF route can offer a greater energy recovery from the waste. RCFs may also help bring more renewable transport fuels to market, as many of these waste streams are mixed with biogenic material, which would together alternatively be landfilled or incinerated.

19. It is anticipated that supporting RCFs will strengthen the business case for developing advanced conversion technologies, such as gasification and pyrolysis, meaning the UK could become a global leader in development of advanced technology.

Hydrogen and renewable fuels of non-biological origin

20. Since 2018, renewable fuels of non-biological origin (RFNBO) such as hydrogen have been eligible for support under the development fuel obligation. The market for RFNBOs, including hydrogen, continues to expand and has potential for decarbonisation of several modes of transport. We are therefore proposing to:

- Expand the scope of the RTFO to make RFNBOs used in maritime, rail and non-road vehicles eligible for support.
- Introduce more clarity and flexibility for RFNBOs eligible for support; and
- Amend the support conditions for biohydrogen.

Sustainability criteria

21. The RTFO already includes significant safeguards to ensure the sustainability of biofuels supported under the RTFO. These include incentives (in the form of double RTFCs) to supply waste-derived fuels, minimum GHG emission savings criteria, a cap on the use of crop-derived biofuels, and protection for lands such as forest and peatland. As part of this consultation, we are seeking views on proposals to further refine these criteria to promote further improvements in the sustainability profile of fuels supported under the RTFO.

[4] See the cost-benefit analysis at Annex B for more detail

The proposed changes include:

- Increased minimum GHG emission savings thresholds for newer biofuel production installations;
- The introduction of specific minimum GHG emission thresholds for RCFs;
- Protection for additional high carbon stock land types; and
- Specific sustainability requirements for fuels produced from forest biomass.

Civil penalties

22. Suppliers who fail to comply with the RTFO may be liable to civil penalties. The amount of the penalty charge, in certain scenarios, has historically been linked to the price suppliers must pay to buy out of their obligations to supply renewable fuel. We propose that the calculation used to determine the relevant civil penalty amounts is updated to reflect recent changes to the buy-out price.

Changes to ensure renewable fuels and chemical precursors do not receive multiple incentives

23. Currently, renewable fuels or chemical precursors are not eligible for reward under the RTFO if they count towards an EEA state or UK renewable energy target other than the RTFO.
24. In addition to this, we propose to remove eligibility for RTFO support where the renewable fuel or chemical precursor has received, or is expected to receive, other incentives in the UK or any other countries.
25. We propose to create an exception to this for incentives in the form of financial support to develop fuels and technologies e.g. laboratory-scale testing or support for construction of demonstration scale production. This means that fuels produced in a plant that has received funding from the Future Fuels for Flight and Freight Competition, for example, would remain eligible for reward under the RTFO.

How to respond

The consultation period began on 25th of March 2021 and will run until 23rd of April 2021. Please ensure that your response reaches us before the closing date. If you would like further copies of this consultation document, it can be found at https://www.gov.uk/dft#consultations or you can contact LowCarbonFuel.Consultation@dft.gov.uk if you need alternative formats (Braille, audio CD, etc.).

Please send consultation responses to the email address: LowCarbonFuel.Consultation@dft.gov.uk

Due to remote working for the foreseeable future and health and safety issues with handling physical mail, we strongly encourage responses by the online form or by email. If you are unable to respond by the online form or by email, we would invite you to please let us know by asking someone to email on your behalf. If none of the above is possible, then we invite you to provide responses to:

Low Carbon Fuels Team
Department for Transport
Zone 1/32 Great Minster House
London SW1P 4DR

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 stakeholders who may wish to be involved in this process please contact us.

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.

1. Renewable fuel supply trajectory to 2032 and subsequent years

We propose to deliver further GHG emission savings under the RTFO by increasing the main obligation to supply renewable fuel by 1.5% in 2022, followed by an additional 1% spread over the period 2023 to 2032. The target will remain at the 2032 level in subsequent years. The level of the target to 2032 and beyond will be kept under review.

This complements the recently announced increase in the ethanol content of petrol as well as allowing the growth of other renewable fuels and feedstocks.

Increasing targets will provide long term certainty to industry, whilst ensuring an ongoing and more ambitious contribution to UK Carbon Budgets and our commitment to meet net zero.

The potential to increase the supply of renewable transport fuel

Renewable fuels already play an important role in reducing carbon emissions and the UK has led the way in developing policies to support their production and use. Currently, the main RTFO renewable fuel obligation is set at 9.6% with an additional 0.5% coming from development fuels, increasing to 2.8% in 2032 and beyond. There is an opportunity and potential for renewable fuels to have a larger impact on carbon budgets through increasing targets under the RTFO.

Suppliers have a number of routes to delivering additional renewable fuel in order to meet higher targets, including by:

- Increasing the volume of biofuels blended into petrol and diesel up to the maximum blend wall, including through the supply of E10 petrol;
- Increasing the supply of renewable fuels capable of being supplied at high blends; and
- Increasing the proportion of waste-derived biofuels.

Potential for increased supply under the blend wall

Most biofuel supplied under the RTFO is supplied as biodiesel or bioethanol which can be blended directly with diesel or petrol, respectively. In the UK, diesel can contain up to 7% biodiesel (known as B7) and petrol currently contains up to 5% ethanol (known as E5). These blends can be sold directly by fuel retailers on garage forecourts as these fuel blends do not require any vehicle modifications. These maximum amounts of biofuel permitted to be sold on garage forecourts are known as the blend wall.

In order to supply a biofuel at higher blends some adaptations to vehicles or infrastructure may be required. Alternatively a type of renewable known as a drop-in fuel can be used - these fuels are completely interchangeable substitutes for conventional petrol or diesel, meaning they do not require adaptation of the engine, fuel system or the fuel distribution network.

As seen in Table 1, in 2019, the average renewable fuel content of diesel was 5.9%. This means there is the potential to increase biodiesel content of diesel without exceeding the 7% blend wall, as defined by the standard (BS EN 590). However, we do recognise that there are challenges in blending which may impose a practical limit on how much biodiesel can be blended with diesel.

	2019		**2020**	
Fuel	**Volume (million litres)**	**% renewable**	**Volume (million litres)**	**% renewable**
Diesel	28,451	5.9	13,829	7.1
Biodiesel	1,778		1,059	
Petrol	16,008	4.5	4,295	4.6
Bioethanol	756		208	
Total fossil fuel	44,459	5.4	18,124	5.9
Total renewable fuel	2,535		1,268	

Table 1 Biodiesel and bioethanol supplied in 2019 and 2020 (first half) through the RTFO as a proportion of diesel and petrol, respectively

In 2019, the bioethanol content of petrol was 4.5% - close to the blend wall of 5%. On 25 February, we announced that we will introduce E10 (petrol with up to 10% ethanol) by requiring standard, 'premium' petrol to contain at least 5.5% from September 2021 in order to increase GHG emission savings in petrol. The roll out of E10 will enable bioethanol supply to increase up to twice its current volume. Our modelling indicates that whilst the introduction of E10 can deliver greater GHG emission savings in petrol compared to E5, if we do not increase targets any increased supply of bioethanol would likely displace biodiesel.

There is limited data available for 2020 to help us identify what room there is under the blend walls. Due to the global pandemic the demand for fuels decreased, particularly in the second quarter of 2020, affecting the fuel mix and resulting in higher than expected proportions of biofuel. For example, during the first half of 2020 the biodiesel proportion was approximately 7.1% of total diesel fuel supply. Of this, fatty acid methyl esters (FAME) made up 6.6% with the remaining 0.5% coming from hydrotreated vegetable oil (HVO) and non-road biodiesel.

Potential for increased supply of renewable fuels as "high blends"

To help meet future carbon budgets, and to continue progress towards net zero, higher blends of biofuels are likely to be needed to increase the GHG emission savings from vehicles using fossil fuels. 'High blends' refers to biofuels at a higher percentage than contained in standard blends (i.e. B7 and E5/E10) i.e. above the blend wall. At, or below, the current blend wall, standard passenger vehicles do not need to be adapted to accommodate the biofuel; however, to use high blends some adaptions or more frequent vehicle checks may be needed. Typical high blends are petrol with up to 20% (E20) or 65%-85% ethanol (E85) and diesel with up to 30% (B30) or up to 100% biodiesel (B100).

A recent Zemo report on *Market opportunities to decarbonise heavy duty vehicles using high blend renewable fuels)* sets out that biodiesel blended up to 100% (B100) could deliver up to 92% GHG emission savings compared to fossil diesel. Initial research suggests that commercial fleets i.e. freight and public transport have the most potential to use higher blends because the way infrastructure and supply chains are laid out in the UK means that it would be difficult and costly to add additional fuel grades at filling stations, as have been introduced in other European countries. For this reason, high blends are well suited for smaller markets, such as fleet operators with their own back-to-base refuelling infrastructure (a storage tank and a dispensing pump). These fleets often have commercial vehicles with larger engines which means they can withstand exposure to higher blend biodiesel. These operators could include bus companies, coach companies, some heavy goods vehicle (HGV) companies and council operator fleets. These groups usually purchase diesel for delivery directly to their sites.

Another reason that there is a more of a focus on using high blends in HGVs, in particular, is that they are expected to continue to use liquid fuels for a longer period compared to smaller vehicles such as cars as they are more challenging to electrify, especially for vehicles travelling long distances or with heavy loads. Increasing the blend of renewable fuel offers a way of cutting GHG emissions in the transition to zero-emission HGVs. Deployment of higher blends of biodiesel (typically above B30) could be achieved through engine modifications alongside more frequent vehicle checks or by using 'drop-in'

renewable fuels such as hydrotreated vegetable oil (HVO) which do not require vehicle modifications.

However, transitioning to higher blends could result in additional costs include installing new refuelling infrastructure, converting existing fleets to operate on higher blends, or even the purchase of new vehicles if higher blends such as B100 are used. Other challenges include the impact on air quality and vehicle warranties vary in their cover for use of biodiesel at higher concentration levels compared to the standard biodiesel blend (B7).

High blends are likely to play an important role in decarbonising heavy goods vehicles. Indeed, gas vehicles running on biomethane are already successful in this area. However, there are barriers to be overcome in delivering significant levels of high blends and further work is needed to determine the best measures to overcome these, building on the recommendations of the Zemo report on *Market opportunities to decarbonise heavy duty vehicles using high blend renewable fuels high blends*.

Other renewable fuels which are not constrained by limits on blending include gaseous fuels: biopropane and biobutane (together known as bio-LPG) and biomethane can fully displace fossil gases (LPG and fossil methane, respectively) without the need for vehicle modification. However, to be able to expand the use of gas trucks, either gas vehicles would need to be purchased or the current fleet be upgraded. Industry tell us that there is scope for growth of biomethane. However, the rate of growth and therefore overall contribution of biomethane is constrained by the rate at which fleets are upgraded to compatible vehicles.

Increasing the proportion of waste-derived renewable fuels

Suppliers could also meet increased targets by switching from crop-derived biofuels to waste-derived biofuels, which double count towards supplier's obligations (targets). In 2019, 69% of all renewable fuel supplied was waste-derived. Further details and breakdowns of feedstocks can be found in our most recently published statistics report.

Sustainability

While renewable fuels, can achieve carbon savings of 90% and above, they may perform worse than fossil fuels should their production divert resources or lead – directly or indirectly – to land use change (such as deforestation). We need to ensure we do not incentivise fuels beyond sustainable levels.

Sustainability criteria already in place

Sustainability criteria already in place ensure biofuels deliver at least 50% GHG savings (60% for processing facilities built after 15 October 2015), and there are protections for biodiversity and land use change such as deforestation.

The RTFO focuses on wastes by:

- Providing double the level of reward for waste-derived biofuels;

- Providing additional incentives for advanced biofuels from wastes through the development fuel target; and
- Limiting biofuels from crops by having a crop cap in place. Our crop cap is one of the tightest in Europe and is currently set at 4%, decreasing to 2% by 2032 (see Figure 1).

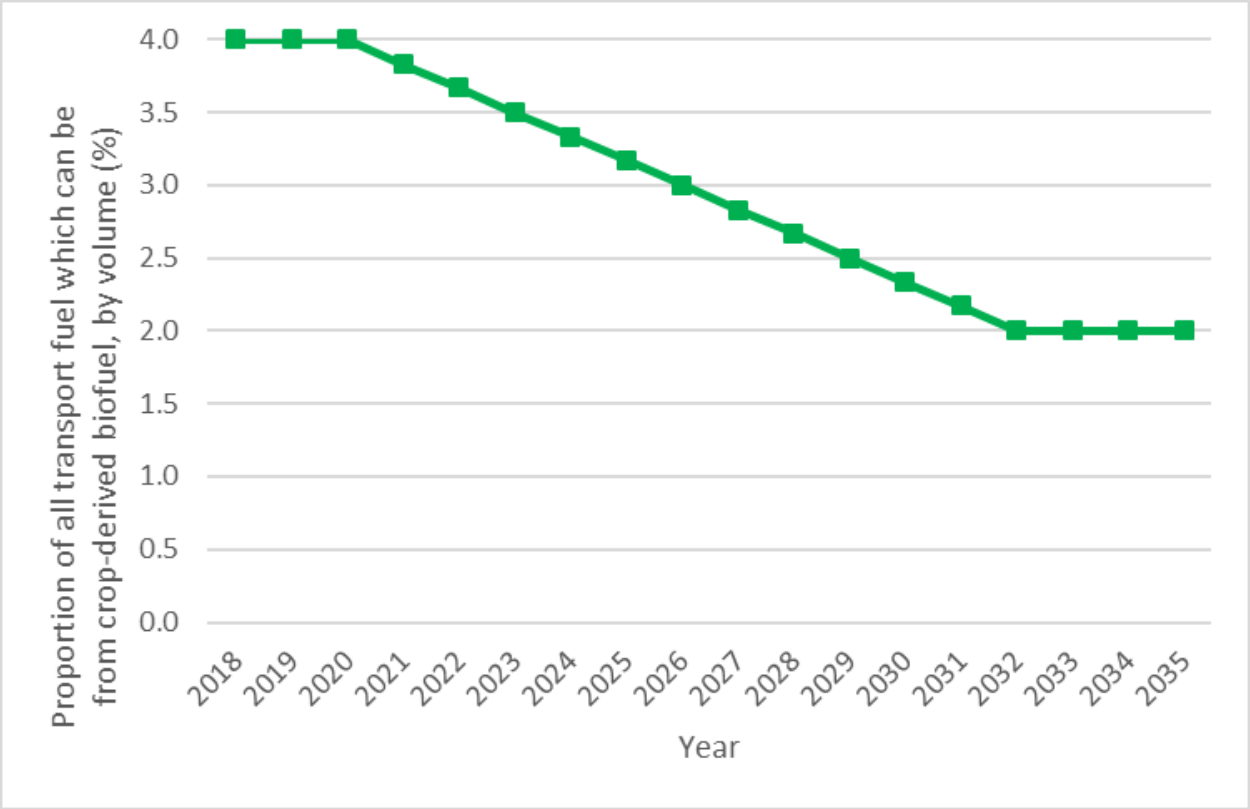

Figure 1 UK crop cap from 2018 to 2035

Future sustainability considerations

When considering increasing targets, we must take into account factors which could have a detrimental impact on the environment. Some of the factors that could limit how much we can increase targets by include:

- Biomass availability. There is demand for the same raw materials from multiple other sectors both in the UK and internationally (e.g. food/feed production, electricity, heat as well as industrial production).
- Life cycle GHG emissions can vary significantly by feedstock. We want to ensure supply is increased without adverse environmental impacts.

As part of this consultation we are proposing changes to our sustainability criteria, which can be found in Chapter 4.

What is the potential for growth in development fuels?

The UK is fully committed to supporting development fuels and we are encouraged by the level of interest in investment in technologies to produce these fuels. We are pleased to have issued our first development fuels renewable transport fuel certificates (dRTFCs). We will keep under review the scope for increases in the development fuel target, but we are not proposing to revise it at this time given the target was only recently introduced. The development fuel target is set to rapidly increase in the coming years as can be seen below in Figure 2.

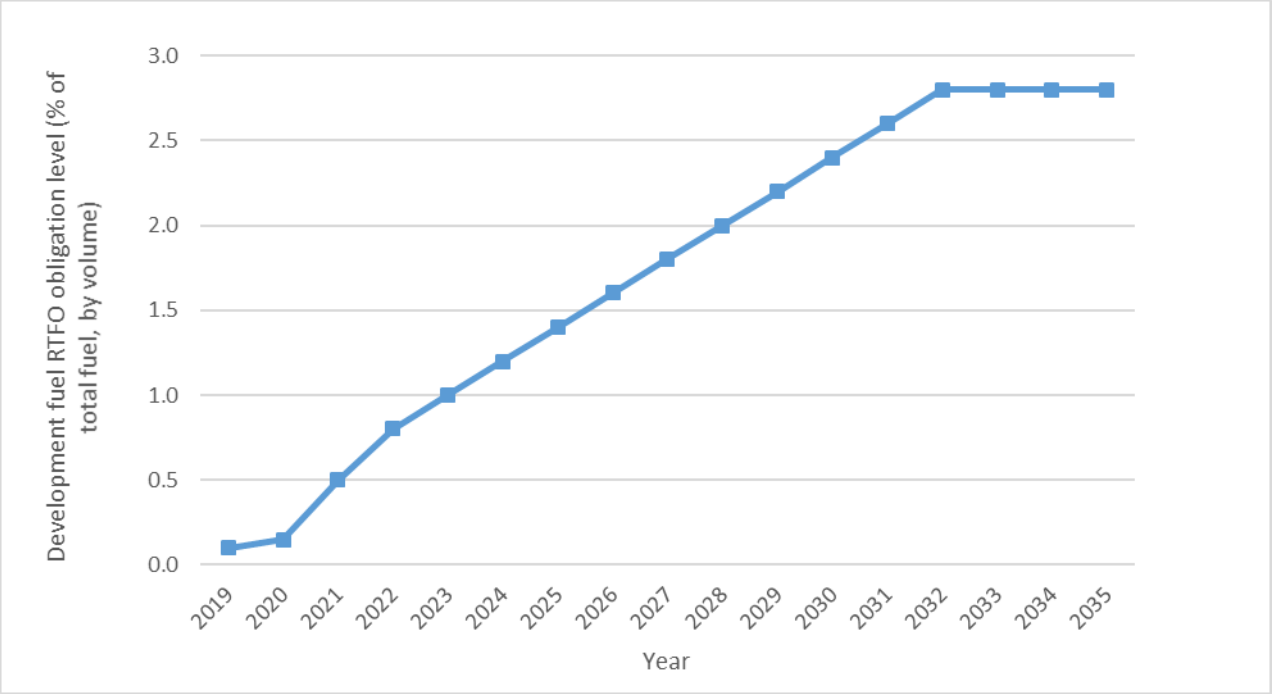

Figure 2 Development fuel obligation 2019 to 2035

Proposal to increase RTFO targets

Overview

As set out above there is scope for increasing the level of the RTFO main obligation, but this needs to be carefully considered against constraints on the levels of sustainability feedstock available.

We are therefore consulting on the following options:

- **Option 0 - no change.** The main obligation would remain at 9.6%.
- **Option 1 - 1.5% increase to the main obligation.** This would apply from 2022. The target would increase from 9.6% in 2021 to 11.1% in 2022 and continue at the same level thereafter.
- **Option 2 - 2.5% increase to the main obligation.** This would apply as a 1.5% increase in 2022 (as per option 1) with an additional 1% increase spread over the period 2023 to 2032. The target would increase from 9.6% in 2021 to 12.1% in 2032 and continue at the same level thereafter. **This is our preferred option.**

- **Option 3 - 5% increase to the main obligation.** This would apply as a 1.5% increase in 2022 with an additional 3.5% spread over the period 2023 to 2032. The target would increase from 9.6% in 2021 to 14.6% in 2032 and continue at the same level thereafter.

The options described above are set out in Table 2[5] and Figure 3 below.

Please note that the RTFO remains in place after 2032; with the target levels remaining at 2032 levels unless further legislation is brought in to change them.

Obligation period or periods	**Main obligation target as a share of total fuel by volume (current/ option 0)**	**Option 1** **1.5%**	**Option 2** **2.5% (1.5%+1%)**	**Option 3** **5% (1.5%+2.5%)**
2021	9.60%	9.60%	9.60%	9.60%
2022	9.60%	11.10%	11.10%	11.10%
2023	9.60%	11.10%	11.20%	11.45%
2024	9.60%	11.10%	11.30%	11.80%
2025	9.60%	11.10%	11.40%	12.15%
2026	9.60%	11.10%	11.50%	12.50%
2027	9.60%	11.10%	11.60%	12.85%
2028	9.60%	11.10%	11.70%	13.20%
2029	9.60%	11.10%	11.80%	13.55%
2030	9.60%	11.10%	11.90%	13.90%
2031	9.60%	11.10%	12. 00%	14.25%
2032 and subsequent years	9.60%	11.10%	12.10%	14.60%

Table 2 Target increases for the different options from 2021 to 2032 and subsequent years

[5] Please note in the RTFO Order obligations are given as % which, when applied to the obligated amount gives the main obligation

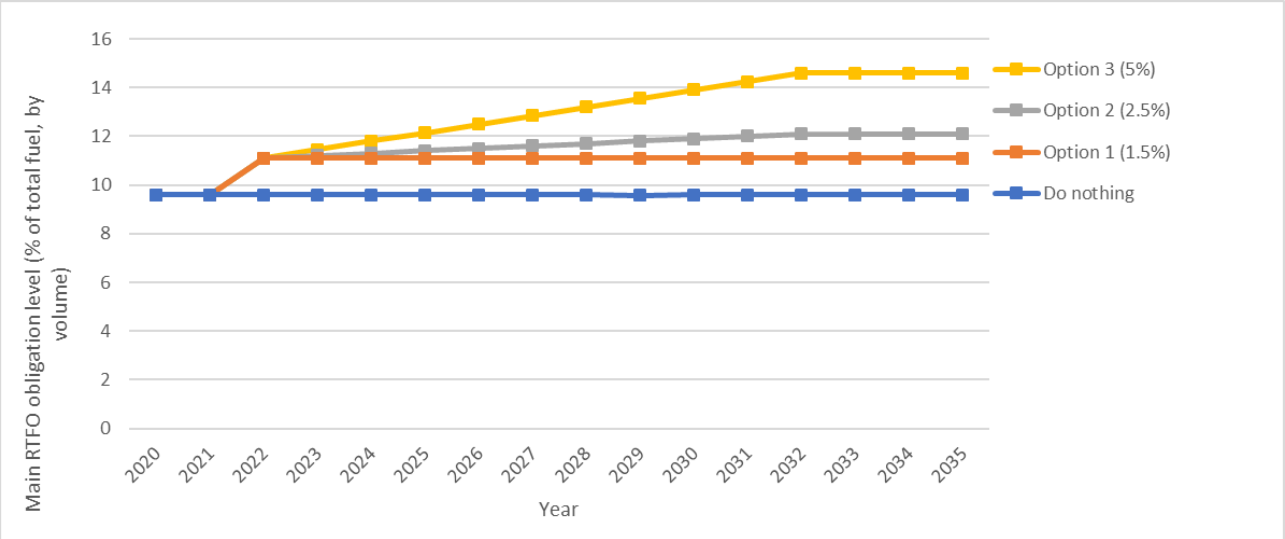

Figure 3 Target increases for the different options from 2020 to 2032 and subsequent years

The following sections describe the options for increasing targets in more detail.

Option 0 - no change

Increasing the ethanol content of petrol could help reduce GHG emissions from petrol vehicles, helping to meet UK climate change targets. However, if targets are held as they are now, we anticipate that the introduction of E10 could displace approximately 500 million litres of biodiesel because it is assumed to be cheaper to supply bioethanol than biodiesel. This is shown in Figure 4 which illustrates fuel projections over time should E10 be rolled out, but RTFO targets remain the same. This would result in a reduction in GHG emissions of around 2.2 MtCO2e, giving a negative monetised benefit of -£148 million.

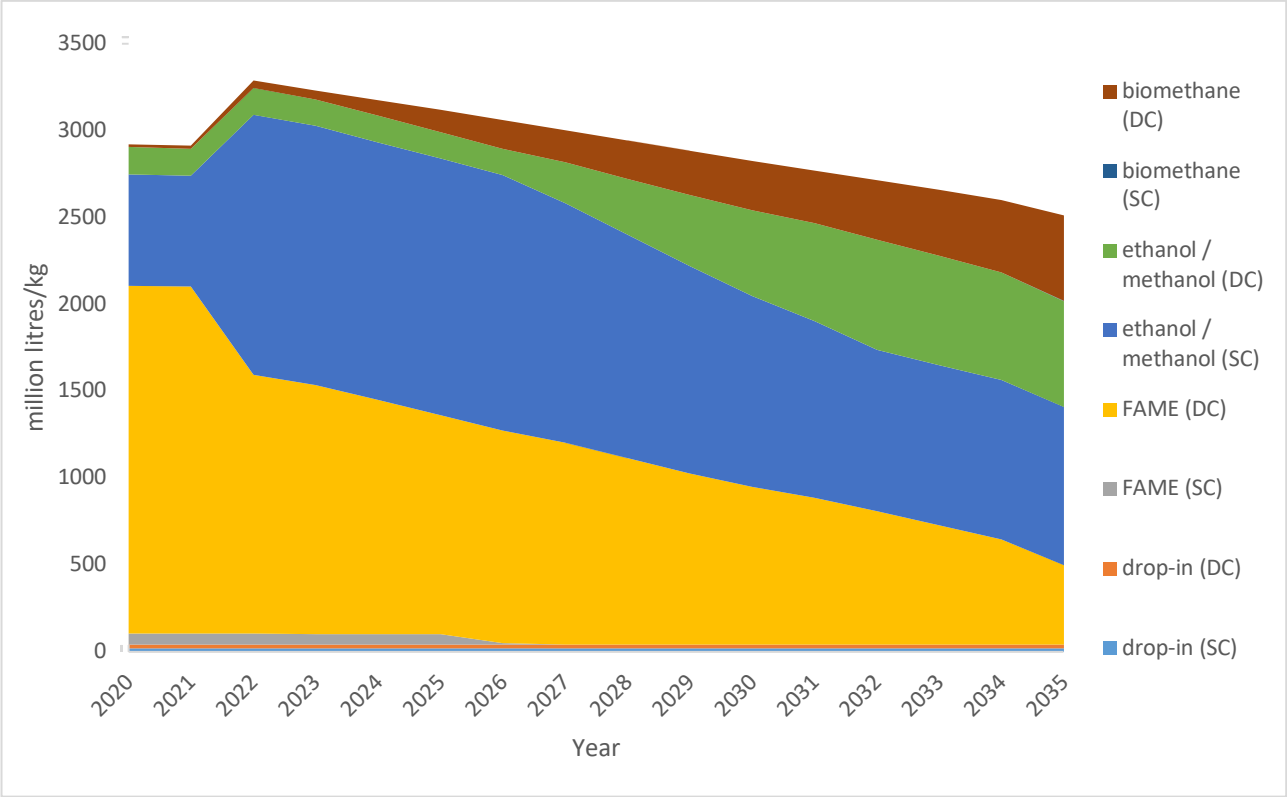

Figure 4 Fuel projections from 2020 to 2035 for the main RTFO obligation (baseline). SC = biofuel from feedstocks which single count towards suppliers' obligations (typically crop-derived biofuels) and DC = biofuel from waste feedstocks which double count towards suppliers' obligations.

In addition, if we do not increase RTFO targets (which are set as a proportion of supplier's total fuel supply), we anticipate that over time the volume of biofuel delivered under the RTFO will decrease - see Figure 4. This is due to the decrease in total fuel supply driven primarily by the projected increase in electrification. If the decrease drops too quickly this may deter long-term investments in fuels. Such investments are needed, especially for the modes which are more difficult to electrify such as aviation.

Note that from the mid-2020s we have modelled an increase in waste-derived bioethanol as we anticipate this will replace crop-derived bioethanol which will become constrained by the crop cap.

We have also assumed that biomethane will have a 16% share of energy demand for HGVs by 2035.

Further details of the assumptions can be found in the accompanying cost-benefit analysis at Annex B.

Option 1 - increase the main obligation by 1.5% in 2022

If we increase the RTFO obligation by 1.5% in 2022 this will allow space for E10 whilst maintaining existing biofuel supply and avoid the risk of bioethanol displacing biodiesel. This is based on increasing the maximum possible bioethanol content of petrol from E5 (currently supplied at an average of 4.7%) to E10 (assuming an average supply of 9.8%).

Whilst suppliers have multiple routes to meet their obligation - including through increasing supply of biomethane or switching from crop-derived biofuels to using more waste-derived biofuels - a 1.5% increase in targets is likely to be met most cost effectively through the introduction of E10.

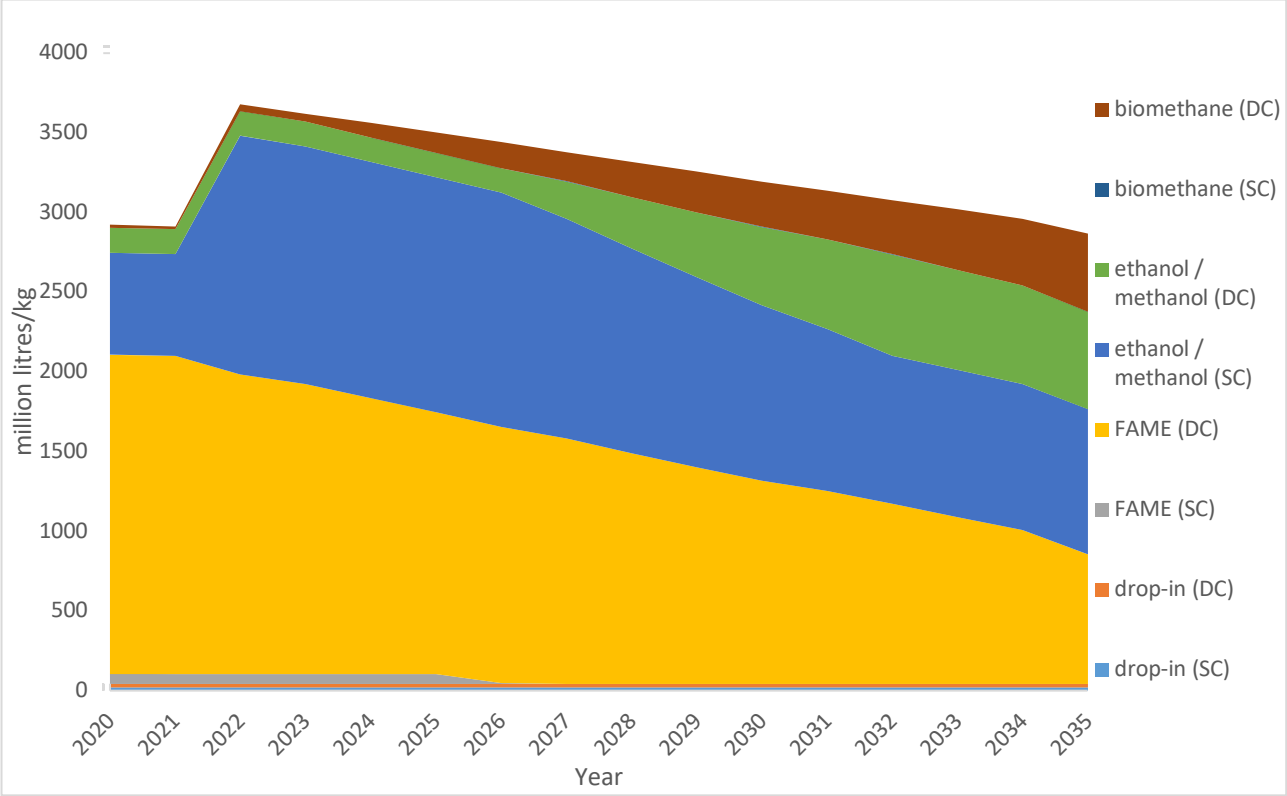

Figure 5 Fuel projections from 2020 to 2035 for the main RTFO obligation with a 1.5% increase to the RTFO obligation in 2022. SC = biofuel from feedstocks which single count towards suppliers' obligations (typically crop-derived biofuels) and DC = biofuel from waste feedstocks which double count towards suppliers' obligations.

It is anticipated that once E10 is rolled out in the autumn, after an initial transition period, the amount of ethanol in UK petrol will fairly rapidly reach close to 10% given bioethanol has historically been cheaper to supply than the next most common biofuel type – waste derived biodiesel. The analysis underpinning this consultation is based on this assumption. However, there is uncertainty about future market conditions, and prices are difficult to predict. If bioethanol is no longer the most cost-effective biofuel to supply, there is a small risk that supply could be closer to 5.5% (the minimum proportion of ethanol in petrol mandated by E10). In this scenario, additional biofuel – must likely biodiesel - would be required to meet the increased targets.

Using bioethanol in place of fossil petrol can reduce GHG emissions by around 65% per megajoule of fuel displaced. As a result, increasing the proportion of bioethanol in petrol from 5 to 10% could reduce GHG emissions of a vehicle by around 2%[6]. By increasing the main obligation by 1.5% there could be additional savings of 1.0 MtCO2e per year. This is estimated to cost £139 to £210 million per year, which is equivalent to an additional 0.5 pence per litre of fuel (VAT included).

[6] The 2% GHG reduction figure takes into account GHG emissions from indirect land use change as a result of using crops and also takes into account the energy difference between fossil petrol and ethanol.

Options 2 and 3 - increasing targets beyond 1.5%

Here we consider the scope to be more ambitious and increase targets beyond that which is necessary to support the introduction of E10. A further increase would send a positive signal to investors, and further encourage suppliers to consider additional, alternative types of renewable fuels and fuel blends.

As set out above, there is scope for increasing targets through actions such as increasing the supply of biodiesel up to the 7% blend wall; using higher blends; or increasing the supply of fuels not limited by blend walls, such as, biomethane.

It is important to ensure the renewable fuels used to meet the RTFO deliver genuine GHG emission savings and do not generate unintended environmental consequences. To help mitigate this, the UK's renewable fuels strategy focuses on incentivising waste-derived biofuels (through double counting of wastes, the crop cap and the development fuels target) as these offer high GHG emission savings and have lower risks of indirect impacts.

Another challenge is biomass availability. To increase targets to higher levels, without adverse sustainability impacts, then it is likely we would need more waste-based biomass, but the level of untapped biomass is uncertain.

Option 2 - 2.5% increase to the main obligation (preferred option)

As with Option 1, we propose an initial increase to the main obligation of 1.5% in 2022 to complement the E10 rollout. This would facilitate the RTFO gaining the additional GHG emission savings offered by E10. A further increase of 1% to the targets which is distributed from 2023 to 2032 allows growth in other biofuels and feedstocks and gives a positive signal to industry to help support investment.

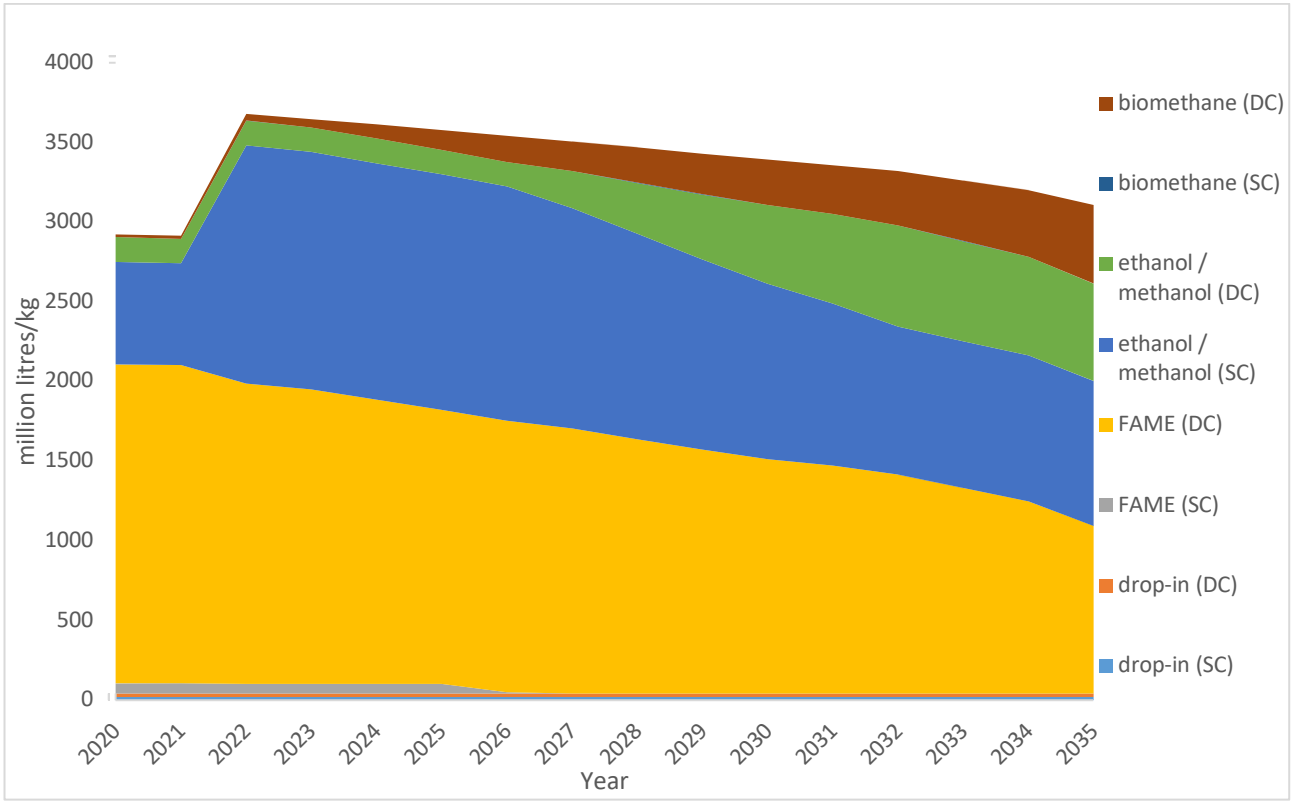

Figure 6 Fuel projections from 2020 to 2035 for the main RTFO obligation with a 2.5% increase between 2022 and 2032. Fuel demand is based in Energy Emission Projections by BEIS. SC = biofuel from feedstocks which single count towards suppliers' obligations (typically crop-derived biofuels) and DC = biofuel from waste feedstocks which double count towards suppliers' obligations.

A 2.5% increase to targets would deliver further GHG emission savings of 14.6 MtCO2e from 2022 to 2032 and provide a greater contribution to future Carbon Budgets. The cost of this is estimated to be £210 to 231 million per year which is equivalent to an additional 0.5 to 0.8 pence per litre of fuel (including VAT). Fuel prices are volatile and difficult to forecast. The modelled possible increase of 0.8 pence per litre in 2030 is likely to be small in the context of wider fuel price volatility.

As set out in the cost-benefit analysis, we forecast that demand for liquid fuels will decrease over time due to an increased uptake of electric vehicles (EVs). Consequently, a sensitivity analysis has been undertaken to compare the baseline model used in this consultation with a higher electrification ambition (see Figure 6 and Figure 7, respectively). This sensitivity has been applied to the government's preferred option which is to increase targets by 2.5%.

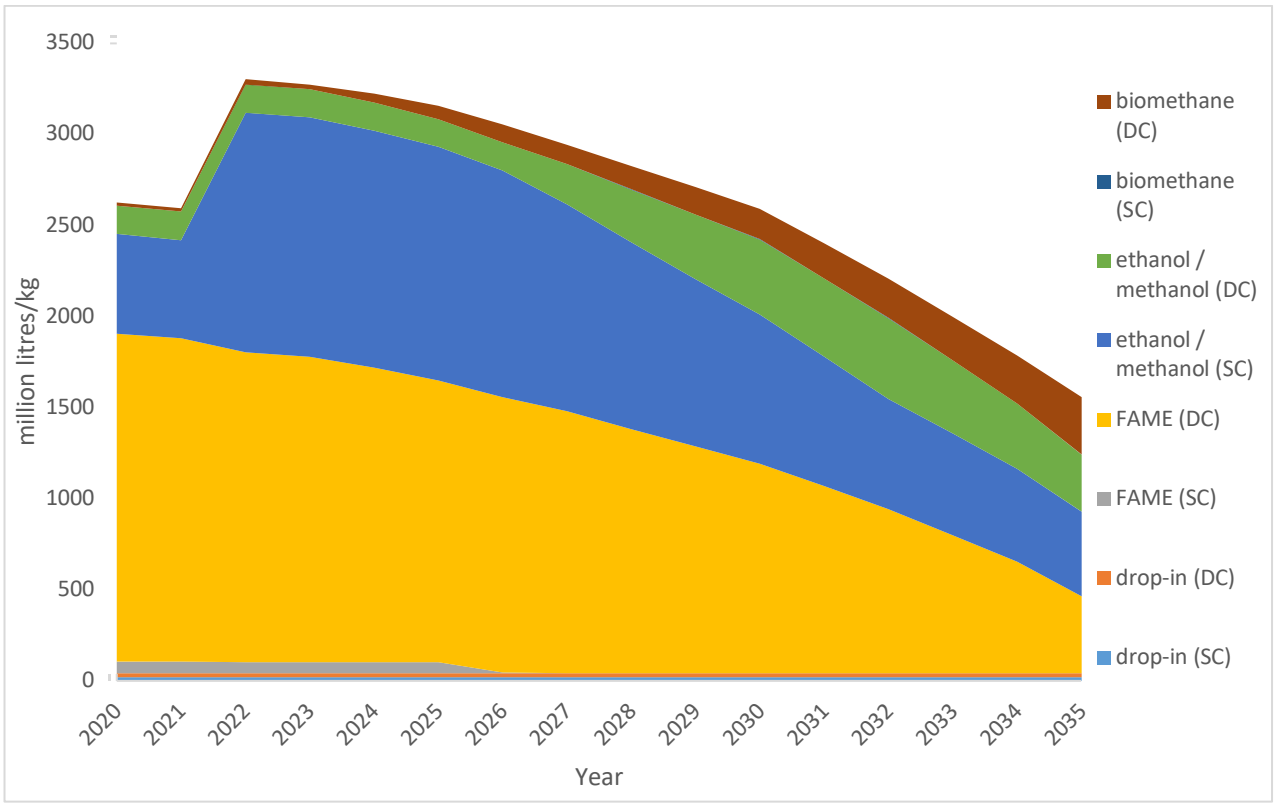

Figure 7 Fuel projections based on high EV uptake from 2020 to 2035 for the main RTFO obligation with a 2.5% increase between 2022 and 2032. SC = biofuel from feedstocks which single count towards suppliers' obligations (typically crop-derived biofuels) and DC = biofuel from waste feedstocks which double count towards suppliers' obligations.

The high ambition EV scenario results in a steeper decline of volume of renewable fuel. However, proportions of the individual biofuels are similar to those in the baseline energy demand scenario illustrated in Figure 6.

Option 3 - 5% increase to the main obligation.

In Option 3, we would increase the main target by 5% by 2032. This would be through an initial increase of 1.5% in 2022 (in line with Options 1 and 2) followed by a further 3.5% split across the period 2023 to 2032. The target would then remain at the 2032 level in subsequent years.

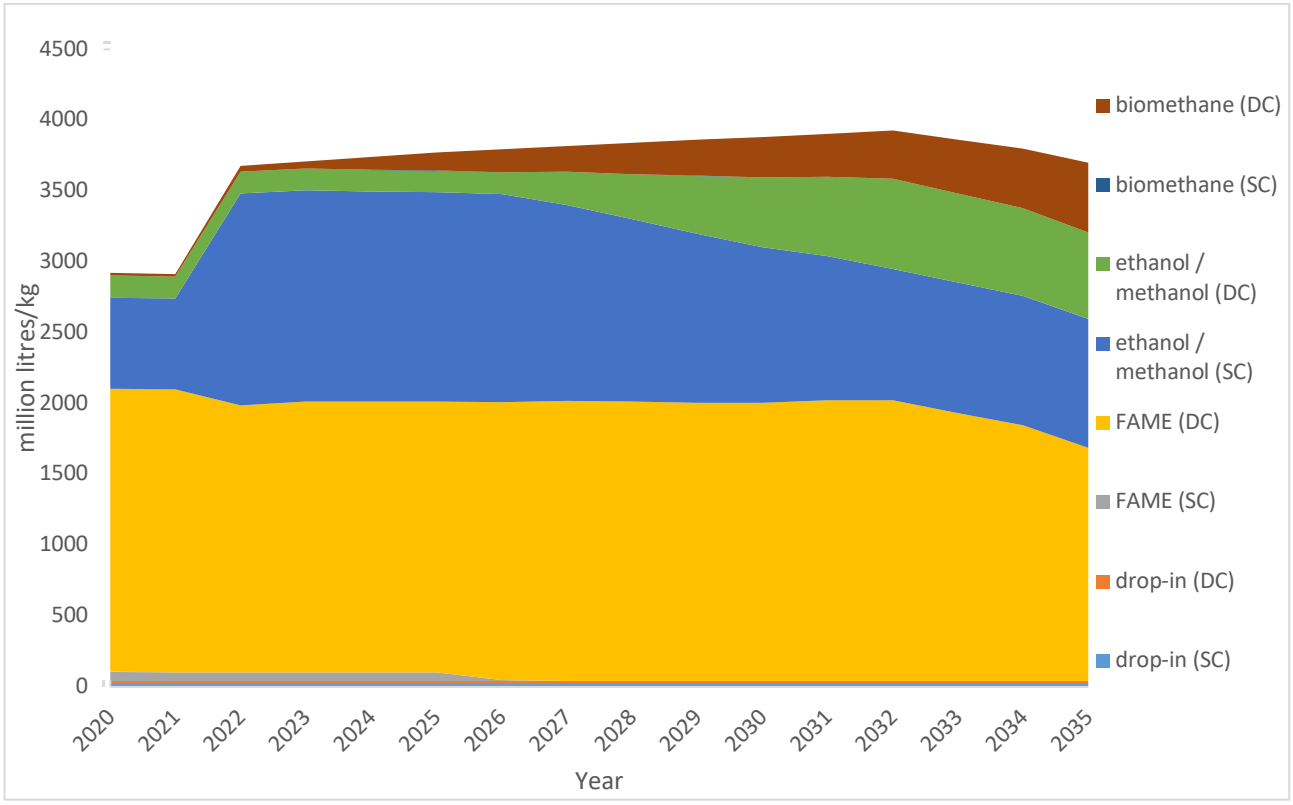

Figure 8 Fuel projections from 2020 to 2035 for the main RTFO obligation with a 5% increase between 2022 to 2032. SC = biofuel from feedstocks which single count towards suppliers' obligations (typically crop-derived biofuels) and DC = biofuel from waste feedstocks which double count towards suppliers' obligations.

By increasing targets by 5% there is a sustained increase in the total amount of renewable fuel supplied compared to current supply until 2032. This would deliver further GHG emission savings of 23.6 MtCO2e from 2022 to 2032 and provide a greater contribution to future Carbon Budgets. The cost of this is estimated to be £210 to £463 million per year which is equivalent of 0.5 to 1.6 pence per litre at the fuel pump (including VAT).

As with the 2.5% increase (Option 2), we have assumed that the increased targets would be met by an increase in supply of waste-derived FAME biodiesel, due to this being the marginal fuel, as explained in the cost-benefit analysis. Although there are multiple routes for suppliers to meet their obligation, with a significantly higher target there are higher levels of uncertainty as to how this might be delivered.

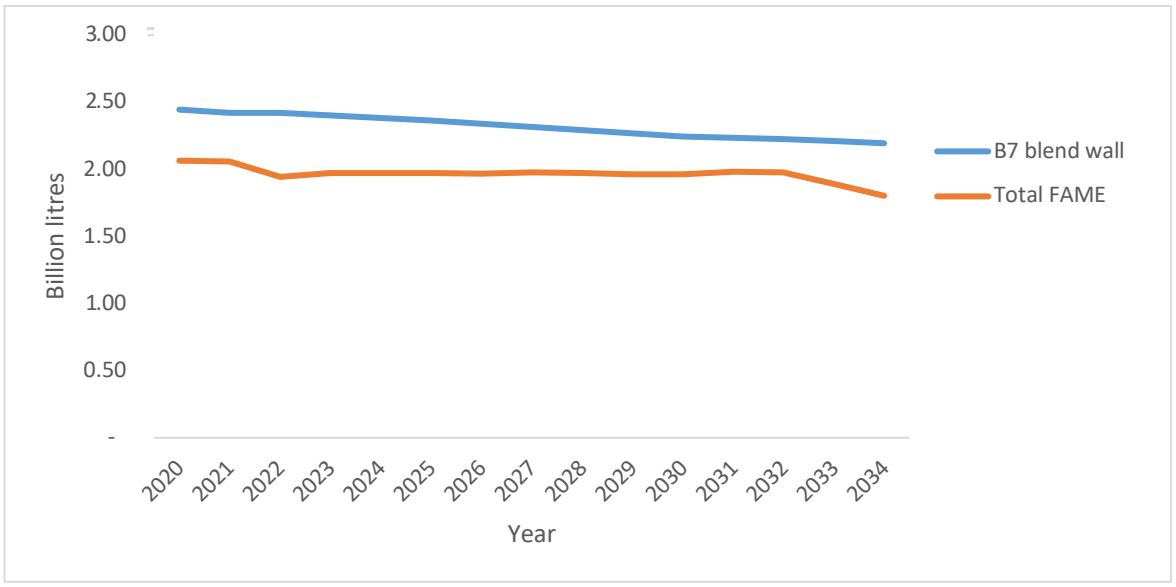

Figure 9 FAME supply vs blend wall for 5% target increase between 2020 and 2034

By increasing the target by 5% the biodiesel blend wall is close to being maximised as seen in Figure 9. The closer we get to this blend wall, the more suppliers will need to look to other renewable fuels and feedstocks to meet their targets, in particular, waste-derived bioethanol. As the crop cap decreases we assume that there is a decrease in crop-derived bioethanol and an increase in waste-derived bioethanol. Evidence is limited as to whether there is sufficient availability of waste derived bioethanol feedstock. If there is not, then this could, in turn, put pressure on other fuels to be supplied to meet supplier's obligations.

In the coming years we expect to see demand increases in the global biofuel market with more countries committing to lowering their GHG emissions. Member States in Europe will be implementing the EU's new Renewable Energy Directive by June 2021 which may also increase demand for low carbon fuels.

Any additional biomass required to meet increased targets must not have adverse sustainability impacts. There is already strong competition in the UK and internationally for sustainable biomass. This target is significantly more ambitious and would further increase the competition for sustainable biomass. Given uncertainties about the amount of sustainable biomass available, further evidence is required to ensure this ambitious target can be met sustainably.

Conclusions

The UK is committed to reaching net zero by 2050. To achieve this, all sectors need to act to deliver carbon reductions.

Transport fuels must continue to be displaced by electrification where possible, but low carbon fuels will play a critical role during the transition, and for decades to come in sectors where electrification is more challenging. The RTFO is the UK's key scheme for delivering these low carbon fuels and the GHG emission savings they provide in transport.

Given the opportunity that E10 presents to further decarbonise petrol we have ruled out maintaining targets (Option 0). Keeping the main obligation at the current level of 9.6%

would most likely result in less waste biodiesel being supplied and therefore would not enable us to realise the GHG emission savings available with the rollout of E10.

Option 1 which delivers additional GHG savings by increasing targets to allow space for both existing volumes of biodiesel and other biofuels, as well as for the additional ethanol supplied in E10 petrol is therefore desirable as a minimum level of target increase.

But there is potential to go further. As explained above, there is the ambition from industry to increase renewable fuel supply and deliver additional GHG emission savings beyond those that can be delivered through the rollout of E10. Opportunities include increasing the use of high blends and drop in fuels as well as delivering more biodiesel under the B7 blend wall.

We also need to ensure that this ambition to deliver higher targets can be met by sustainable fuels to ensure that we deliver genuine GHG emission savings. We must be mindful of future needs for sustainable fuels including through the development fuel target, or other mandates. There is a particular growing need for the use of sustainable fuels in aviation and maritime. There is also uncertainty regarding the extent of additional demand across other sectors and countries which can be met sustainably.

Therefore, whilst we think it right to propose an increase in RTFO targets beyond the minimum required to allow space for E10, given the various uncertainties, we consider that increasing targets by 2.5% (option 2) is the most appropriate level at this time. This would allow suppliers some flexibility in how they deliver the target. We consider this strikes the right balance in allowing some sustainable growth in renewable fuels without introducing significant delivery and sustainability risks.

With the government's commitment to net zero and drive to continue to save more GHG emissions the RTFO is continuously under review and as more evidence and data regarding biomass availability becomes available, targets will be reviewed and adjusted accordingly. For example, we will monitor the impacts of E10 rollout and whether bioethanol penetration is close to 10%, as expected, as this will impact demand for other renewable fuels and feedstocks. As we identify levers or other policy measures that can be deployed to further facilitate high blends that may also enable further action on targets to be taken. Consideration of how further carbon savings may be achieved through low carbon fuels will be set out in the forthcoming Transport Decarbonisation Plan.

We anticipate that any target increases resulting from this consultation would be introduced in January 2022, which is the earliest opportunity as the RTFO operates on a calendar year basis.

Questions

Question 1: Should we increase, decrease or keep the main obligation at the same level? Please provide evidence and reasoning for your answer.

Question 2: If you agree that we should increase the RTFO obligation, what level should it be increased by; 1.5%, 2.5%, 5%? Please provide evidence and reasoning for your answer.

2. Introducing support for recycled carbon fuels

We propose to extend the scope of the RTFO to make fuels made from certain waste fossil materials - known as recycled carbon fuels (RCFs) - eligible for support in the future. Suppliers of sustainable RCFs will not be obligated.

This would unlock new feedstocks and increase the number of options available for decarbonising transport fuels.

The proposed fuel types eligible for support will be limited to those listed in the development fuel sub-target.

We propose that eligible feedstocks should include the fossil content of refuse derived fuel and waste process gases from industry that are only suitable for incineration for energy recovery.

A GHG assessment methodology is proposed, which takes account of emissions from diverting the waste feedstock from incineration. We propose that RCFs will need to meet a GHG emission saving threshold of 50% initially, and that minimum GHG saving threshold will increase over time.

We propose that RCFs from solid feedstocks are awarded 0.5 dRTFCs per litre, and RCFs produced from gaseous feedstocks are awarded 1 dRTFC per litre.

To introduce support for RCFs into the RTFO we will need to amend the Energy Act 2004 or find alternative primary powers. Given that this will take additional time, we will not be able to introduce support for RCFs as part of this package of amendments to the RTFO. However, we will gather views from this consultation so that we can set out the Government position with a view to making any changes as soon as possible.

What are recycled carbon fuels?

RCFs are fuels produced from fossil wastes that cannot be avoided, reused or recycled and have the potential to reduce GHG emissions relative to petrol or diesel. Examples of

feedstocks include the fossil fraction of municipal solid waste (MSW) (e.g. non-recyclable plastic) and industrial waste gases.

RCF feedstocks may be mixed with biogenic material (e.g. food contaminated packaging, sanitary waste, polycotton) and the resulting fuel will be part RCF and part renewable - therefore supporting the whole fuel could lead to greater use of biomass wastes in future.

Benefits of supporting recycled carbon fuels under the RTFO

Support for fuels under the RTFO is currently limited to renewable fuels (i.e. biofuels and renewable fuels of non-biological origin (RFNBOs) e.g. renewable power to liquid). RCF feedstocks are not currently supported as they are of fossil origin and cannot therefore be defined as 'renewable'. We have identified some potential RCFs that could present an opportunity to reduce GHG emissions from transport fuels and are proposing to bring these fuels into the RTFO.

There are environmental benefits to producing fuels from some fossil wastes if they can be more efficiently processed into a fuel employing advanced facilities, instead of disposing of them via conventional means, such as landfill or incineration. RCFs can encourage a more effective use of our waste by offering a greater energy recovery. They deliver GHG emission savings, as the resulting fuel can be used to displace conventional transport fuel.

The potential to save GHG emissions is large: approximately 25 million tonnes of non-recyclable residual waste are produced in the UK each year, of which an estimated 55-70% is waste biomass (including food waste, contaminated paper etc.), and approximately 15-30% is of fossil origin[7]. Currently this waste is sent to landfill, incinerated in the UK or sent overseas for incineration.

While biogenic waste for transport fuel production is currently supported under the RTFO, a proportion of this is difficult and costly to separate from residual waste. There is evidence that additional support for RCFs would therefore encourage investment in the advanced waste processing technologies that are required to bring greater quantities of renewable fuel to market, while converting the non-bio elements into fuel, instead of disposing of the whole waste stream via conventional means.

By providing this support, the UK has the opportunity to become a global leader in development of RCF technology. It is anticipated that supporting RCFs will strengthen the business case for developing advanced conversion technologies, such as gasification and pyrolysis. These technologies have the potential to deliver a much wider range of energy products and may therefore facilitate the advancement of other technologies, for example, for plastic recycling. We wish to harness interest shown by industry in UK investments in such advanced facilities. These have the potential to make an important contribution on our path to net zero as they are suitable for producing aviation fuel and 'drop-in' road fuel suitable for heavy goods vehicles – sectors with fewer decarbonisation options.

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[7] Includes categories of waste that are mixed plastic and biological material (e.g. textiles, hygiene products), approx. 15% is other non-combustibles including glass, metals and electronic items. https://www.gov.uk/government/publications/greenhouse-gas-emissions-created-by-producing-fuels-from-fossil-wastes-and-residues.

Over time, the nature and composition of waste may change in line with cross-Government policies on waste prevention and recycling; however, it is likely that a proportion (and significant volume) of the most complex and mixed wastes (such as contaminated residual waste) will continue to be produced and require disposal in some way. Therefore, supporting RCFs may provide a route to recover the most energy and some benefit from our problematic residual waste, and support tightening targets to reduce landfill and increase recycling.

In summary, supporting RCFs under the RTFO will provide more options for suppliers to use to meet their RTFO obligations and unlock more biomass. This support will encourage investment in strategically important fuels such as sustainable aviation fuel as well as contribute towards diversifying the energy sector and decarbonising the UK while making more effective uses of our waste.

Given these potential benefits of RCFs, we propose to support these under the RTFO. In doing so, it will be important that support is only afforded to those RCFs which are sustainable and deliver genuine and significant GHG savings (in line with the approach for supporting renewable fuels) – see section below *on Ensuring recycled carbon fuels are sustainable* for our proposed approach.

Existing evidence base

In our RTFO Consultation in 2016 we welcomed suggestions on how RCFs (then termed 'low carbon fossil fuels') could be supported. We asked which fuels, feedstocks and/or technologies should be encouraged; and whether the RTFO would be the right mechanism to support them. Respondents in favour suggested that a technology neutral approach would be appropriate and recognised that these fuels are still at an early point in their technology development. Some respondents suggested that support should be in proportion to their GHG emission saving potential.

The consultation also noted that the European Commission had proposed to include RCFs in RED II and that there was no methodology in place to calculate their GHG emissions savings compared to conventional fossil fuels. Since then we have developed a draft GHG accounting methodology to ensure that GHG emission reductions can be quantified and verified so the UK is in a position to support RCFs.

To support the development of the GHG assessment methodology, two research reports were commissioned, led by E4Tech, to understand the sustainability risks of RCFs[8] and provide detailed GHG emission calculations examining the impacts of diverting residual waste away from current disposal routes and into fuels[9]. The studies show that the alternative (or counterfactual) use of the waste will determine the net GHG emission savings.

In April 2017, DfT launched the Future Fuels for Flight and Freight Competition (F4C) to provide matched capital funding to support the construction of low carbon aviation and HGV fuel production facilities. In 2019, four successful projects were selected as

[8] http://www.e4tech.com/wp-content/uploads/2018/02/LCFF_Sustainability-FinalReport.pdf
[9] https://www.gov.uk/government/publications/greenhouse-gas-emissions-created-by-producing-fuels-from-fossil-wastes-and-residues

competition finalists, able to receive a share of the remaining £20m of available funding following completion of certain, project-specific, eligibility criteria. Three of these four project finalists intend to use RCF feedstocks within their feedstock mix.

Question 3: Do you agree or disagree that recycled carbon fuels should be eligible for support under the RTFO given their potential to deliver GHG savings?

Eligible feedstocks

We have identified two types of RCF feedstocks that we propose to support under the RTFO – see Table 3.

Solid fossil wastes are problematic wastes that are currently produced in high volumes and have the potential to save GHG emissions if displaced from conventional disposal routes. These wastes are also expected to be mixed with organic waste and can therefore support an additional supply of renewable fuels. Therefore, it is the intention that support will only be provided where solid wastes are mixed with organic waste to help unlock more biomass for transport use. It is proposed that solid feedstocks should have at least a 25% content, by energy, of biogenic waste. This is considered realistic based on the relative composition and energy content of residual waste streams and is also in line with the requirements of drop in fuels, except for an RCF the whole fuel would be supported.

In line with the principles of the Waste Hierarchy, we propose that RCFs should not be produced from recyclable material. For solid RCFs to be eligible for support, suppliers must demonstrate that the feedstocks are derived from facilities that have adequate separation processes to remove recyclable dense plastics, and that the resulting feedstock is categorised as refuse derived fuel (e.g. EWC 19 12 10).

Gaseous wastes are considered because there is evidence from industry that conversion to RCF can be done at a high conversion efficiency and therefore this feedstock has the potential to save a high amount of GHG emissions if used instead of flaring or generation of electricity. An example may be incompletely oxidised carbon (carbon monoxide) from a steel processing plant. Unlike waste carbon dioxide (which is currently supported under the RTFO if used to produce a RFNBO), carbon monoxide contains energy that could be harnessed into a recycled carbon fuel. It is proposed that these gases will only be supported if they occur as a result of an industrial process, and if they cannot be avoided.

It is proposed that the fossil-derived component of waste rubber, which would primarily take the form of end-of-life tyres, will not be supported. This is because the level of support available to the renewable component of end-of-life tyres under the RTFO is considered sufficient to bring that fuel technology to market. There are also additional valuable products that can be produced from tyres, such as recycled steel and carbon black. Any fuel produced from waste rubber will continue to be treated as a partially renewable fuel.

In making applications for RTFCs, where relevant, it is important that a distinction is made between the RCF content and the renewable content of the resultant fuels, as they are likely to have different GHG emissions and may be rewarded differently. A similar approach to the existing assessment of partially renewable fuels is proposed whereby the composition of the fuel product(s) is determined based upon the percentage (by energy) of

all the feedstocks to the production process, whether they are of RCF, renewable or conventional fossil origin. Suppliers of fuel made will need to have a Fuel Measurement and Sampling (FMS) regime in place to help achieve this.

To summarise, feedstocks proposed as eligible are:

- The fossil component of refuse derived fuel from the mechanical treatment of municipal solid waste streams, which would be inherently mixed with biological material.
- Industrial waste process gases containing carbon monoxide, that are only suitable for incineration for energy recovery.

Feedstock	**Fuel eligible for reward under RTFO[10]**	
	Renewable component if present (current)	RCF component (proposed)
Refuse derived fuel	✓	✓
Industrial waste gases	✓	✓
Tyres	✓	✗

Table 3 Proposed RTFO support for fuels produced from RCF and partial RCF feedstocks.

Question 4: Do you agree or disagree that only RCFs derived from refuse derived fuel and industrial wastes gases should be eligible for RTFO support? If not, please provide an alternative approach and set out why.

Question 5: Do you agree or disagree that RCFs produced from solid feedstocks should contain at least 25% biogenic content, by energy? If not, please set out an alternative approach with evidence as to why.

Eligible fuel types

Many fuels could potentially be produced from RCF feedstocks; however, it is proposed that those RCFs that are eligible for support under the RTFO should be those fuel pathways which need greater support and fit the UK's long term strategic needs to encourage investment in these particular fuels. Therefore, we propose that only those fuels that are categorised as ‘development fuels’ under the current RTFO are eligible for support[11]. This will direct support to fuels suitable for sectors which have fewer alternative

[10] Fuel eligible for support if the sustainability and eligible fuel criteria are met.
[11] Development fuels are fuels of a strategic importance to the UK transport sector and are described in Chapter 2 of the RTFO Process Guidance.

decarbonisation options such as electrification, in particular, aviation and heavy goods vehicles.

Therefore, in line with renewable fuels eligible for development fuels support, the proposed fuel types eligible for support are:

- Aviation fuel (avtur or avgas).
- A fuel that can be blended such that the final blend has a total content by volume of renewable and RCF content of at least 25% whilst still meeting BS EN: 228 (for petrol, as revised or reissued from time to time) or BS EN: 590 (for diesel, as revised or reissued from time to time). It is possible for the blend to be made entirely of RCF fuel.
- Substitute natural gas produced from the product of gasification or pyrolysis.
- Hydrogen when produced using carbon capture and sequestration (CCS).

Question 6: Do you agree or disagree that support for RCFs should focus on those RCFs which can meet the UK's future strategic needs? That is, that only RCF types which are equivalent to current development fuels should be eligible for support. As such they would be eligible for development fuel certificates and to count towards the development fuel sub-target under the RTFO.

Ensuring recycled carbon fuels are sustainable

Greenhouse gas saving criteria

In line with renewable fuels, we propose that RCFs must meet a minimum GHG emission saving threshold to receive support under the RTFO.

The GHG benefits of RCFs have the potential to increase as UK grid electricity GHG emissions decrease, as incinerating fossil waste will increasingly become a less attractive option for electricity generation. It is therefore proposed that the GHG emission saving threshold for RCFs increases over time as follows:

- 55% from when the policy is introduced
- 60% from 2025
- 65% from 2030

It is proposed that these GHG emission saving criteria will not be grandfathered (i.e. according to whenever a production facility comes online) because it is forecast that the grid will decarbonise over time and this will deliver the additional required GHG savings. If the grid decarbonises faster or slower than projected these GHG thresholds may be revised; however, any changes would be subject to consultation.

The GHG emission saving threshold could increase step-wise (Figure 10a) or gradually (Figure 10b). We propose that a step-wise increase (Figure 10a) is followed to allow suppliers time to prepare for increasing thresholds.

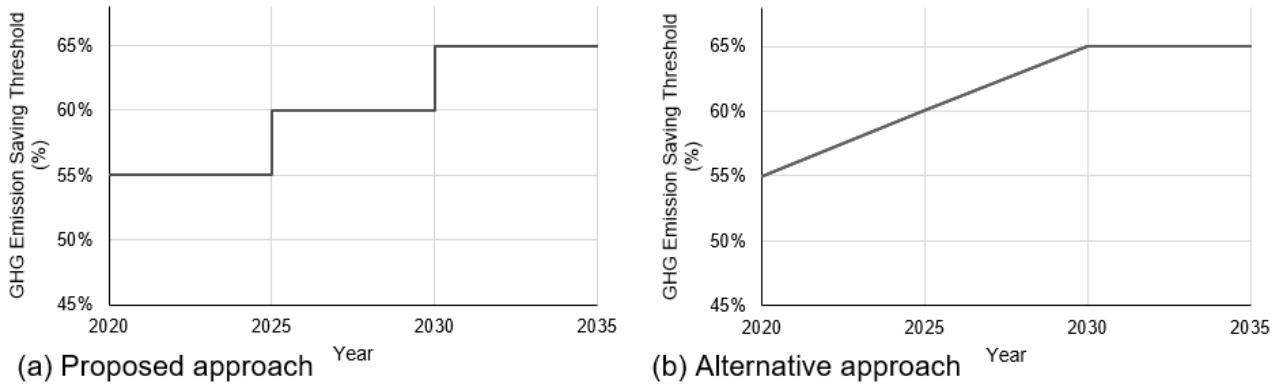

Figure 10 How the GHG emission saving threshold may increase over time.

Question 7 - Do you agree or disagree with the proposed GHG minimum thresholds and the timeline for increasing GHG emission saving criteria for RCFs? Please provide an explanation as to why.

Assessing GHG emission savings from recycled carbon fuels

At present, there is no framework for assessing the GHG emission savings from RCFs, we have therefore developed our own GHG assessment methodology.

As RCFs are produced from fossil wastes, and therefore release fossil-derived carbon dioxide when combusted, they should be assessed differently to the biogenic carbon dioxide that is released when renewable materials are combusted[12]. For the same reason, where wastes are mixed with biogenic material, the GHG emissions arising from RCF and biogenic contents should be assessed separately.

It is proposed that the GHG emissions from RCFs will be compared against an alternative option (the counterfactual) where the fossil waste would otherwise be disposed of via another means. It is proposed that all fossil wastes will be assessed against the same counterfactual. This approach has been taken because it acknowledges that residual waste is currently produced in large quantities and it may be difficult to determine what would have otherwise occurred to a single batch of RCF feedstock, and how this may change over time.

The counterfactual scenario represents what would occur to the RCF feedstocks if not used to produce fuel. Several different counterfactuals were considered and these are illustrated in Figure 11 alongside the volumes produced in the UK:

- **Landfill** was not considered to be a relevant counterfactual for RCFs, as there are targets to reduce this significantly over the next decade, which may lead to the diversion of around 5 Mt of RCF feedstocks from landfill. Diverting fossil waste from landfill and into incineration may appear to increase GHG emissions if only the fossil element of the waste was considered. However, fossil waste is typically mixed with a biogenic content, therefore avoiding landfill can lead to net GHG benefits from

[12] The combustion of renewable fuels has a GHG intensity of zero according to the RTFO Carbon and Sustainability Guidance.

avoided emissions of methane that result from the decay of biogenic material, even after accounting for GHG emissions from fossil waste combustion[13]. As mentioned, there are other policy mechanisms and targets in place that will reduce the landfilling of waste. Therefore, landfill as a comparison system will become invalid over time.

- The **incineration of waste without energy recovery** is regarded as "waste disposal". This is not considered as a suitable counterfactual as the GHG emission savings relative to RCF use would automatically be high, as it would be compared against a baseline that poorly utilises waste.
- The most common fate of the UK's municipal and residual waste, representing around one third (29%) of fossil waste disposed or recovered, is **incineration with electricity generation** in an energy from waste (EfW) plant.
- Around 7% of fossil waste is incinerated in EfW plants that generate both **combined heat and power (CHP)**, which can recover more energy from the waste than a power only plant. Recent research shows[14] that only a small proportion of EfW plants in the UK exported heat alongside power, despite most EfW plants having the capacity to export heat. This is because there is currently a small demand for exported heat. The UK exports a further 12% of fossil waste overseas where it is used for CHP. The impact of supporting RCFs on exported waste is uncertain.
- There are also some examples where RCF feedstocks may be used to directly generate **heat**, and if this is a counterfactual then there is a risk that GHG emissions will increase as the heat may be replaced by fossil fuels. However, as mentioned, the demand for heat is limited and the projected volumes of waste, means it is likely that the future supply will satisfy the demand of both RCFs and heat demands.

After considering these potential counterfactual scenarios, it is proposed that the counterfactual should be based on a 'next likely' outcome, which means that we would compare producing RCFs with the method in which they are most commonly disposed of. This approach is in line with the principles of the Waste Hierarchy, and the policy would therefore support GHG emission savings that can be gained by improving the efficiency of energy recovery from waste.

[13] Providing the incinerator achieves a minimum electrical conversion efficiency: http://randd.defra.gov.uk/Document.aspx?Document=11918_WR1910Energyrecoveryforresidualwaste-Acarbonbasedmodellingapporach.pdf The minimum electrical generation efficiency depends on a range of factors.

[14] https://www.gov.uk/government/publications/greenhouse-gas-emissions-created-by-producing-fuels-from-fossil-wastes-and-residues

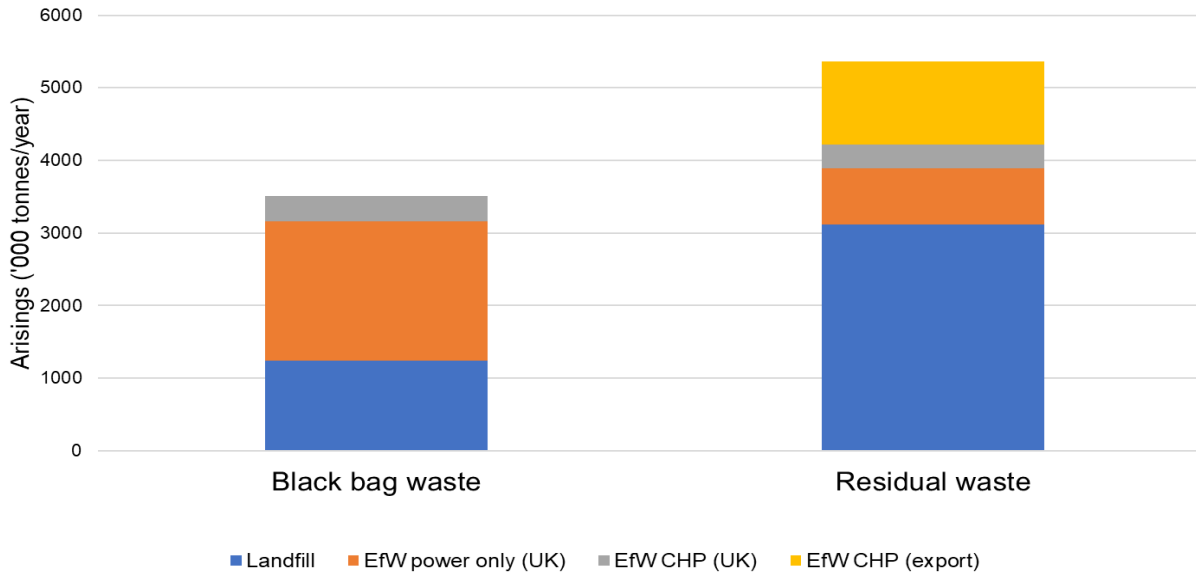

Figure 11 Arisings of non-recyclable fossil waste in the UK.[15].

Proposed greenhouse gas calculation methodology

The following proposed GHG calculation methodology has been developed for the calculation of the carbon intensity of RCFs and is proposed to be included in the RTFO. A simplified description of the GHG assessment methodology using an example RCF is shown in Figure 12. It shows that when fossil waste is diverted to aviation fuel then the GHG emissions from one disposal route to RCF production, then the disposal emissions are avoided; however, the displaced energy must be accounted for. Therefore, the embodied carbon emissions from the fossil waste are considered; however, they cancel out between the current and RCF situation.

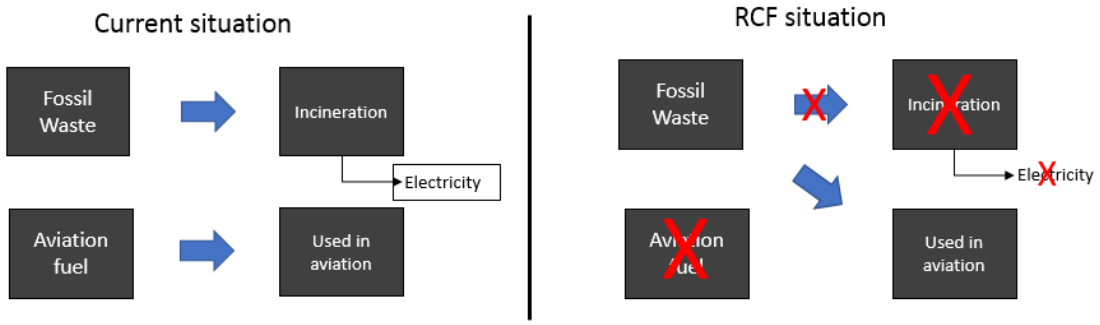

Figure 12 Simplified description of the GHG assessment methodology used to assess RCFs.

The proposed GHG calculation methodology aims to quantify the GHG emission savings from making more effective use of waste by increasing the rate of energy recovery, and

[15] An additional quantity of waste biomass is not shown but this is estimated to compose 55-70% of the total waste arisings https://www.gov.uk/government/publications/greenhouse-gas-emissions-created-by-producing-fuels-from-fossil-wastes-and-residues

rewarding the development of carbon capture technology. Therefore, although fossil CO2 is still emitted, GHG emissions are saved because more energy can be derived from the waste. RCFs can, therefore, offer a short to medium term solution for decreasing GHG emissions from transport. However, in the future, as we approach the Net Zero target then they may require a greater amount of CO2 offsetting than renewable transport fuels.

The relative GHG emissions savings achievable by RCFs will depend on the efficiency of the RCF plant, the efficiency of the counterfactual use, and the GHG emissions from the replacement of any utility provided by combustion of the waste in the counterfactual (e.g. generation of electricity or heat). There may also be opportunities for carbon capture and storage (CCS).

We propose that the GHG emissions from the production and use of RCFs shall be calculated as:

$$\mathbf{E = E_{prod} + E_{td} + E_{disp} – E_{CCS}}$$

where

E = total emissions from the use of the fuel (g CO2e/MJ);

E_{prod}= emissions from processing (g CO2e/MJ);

E_{td}= emissions from transport and distribution (g CO2e/MJ);

E_{disp}= emissions from displaced energy use (g CO2e/MJ);

E_{CCS}= emission saving from carbon capture and geological storage (g CO2e/MJ);

And

$$\mathbf{E_{disp} = (E_{fe} * E_e) / Ef_{RCF}}$$

E_{fe}= Efficiency of conversion in counterfactual use (%);

E_e= Emission factor of the displaced energy in counterfactual (g CO2e/MJ);

Ef_{RCF}= Efficiency of conversion to RCF (%)

The final result (E) would then be compared with the fossil fuel comparator to calculate the overall RCF GHG emission savings.

The total GHG emissions from combustion of the input material is assumed to be the same as the GHG emissions from the counterfactual system although, in practice, in the RCF system, GHG emissions will occur during both production and combustion of the fuel. Therefore, if CCS is deployed some of these GHG emissions can be mitigated.

The counterfactual use is incineration with energy (electricity) recovery[16]. This is selected because it is the most common energy recovery route in the UK currently. The same counterfactual use will be applied to all RCF feedstocks; however, for industrial gases (see following section) alternative counterfactuals could be considered if sufficient evidence is provided. Suppliers of RCFs produced from industrial gases would be required to demonstrate that heat generation is not displaced by the production of RCFs. If there is evidence that increased heating requirements arise due to the production of RCFs then the RTFO Administrator would consider that heat generation would be the counterfactual use. This is proposed to be assessed on a plant-by-plant basis by the RTFO Administrator.

We propose that the efficiency of conversion in the counterfactual use should be 26%. This is based on engagement with stakeholders and independent research. It is consistent with the Waste Framework Directive energy efficiency standard (the R1 standard), which was established to differentiate between EfW plants which are classified as 'recovery' under the waste hierarchy and those which are classified as 'disposal'[17].

We propose that the emission factor of displaced energy in the counterfactual should be the latest published figures for a full reporting year for the average generation of that energy in the country where the feedstock and fuel is produced (i.e. year preceding).

Question 8 - Do you agree or disagree with the proposed GHG emissions methodology to assess the GHG savings for recycled carbon fuels? Please provide an explanation to why.

Level of reward

It is proposed that suppliers of sustainable RCFs will be eligible for reward.

Note that a consequence of bringing RCFs into scope of the RTFO is that suppliers of unsustainable RCFs (i.e. RCFs which do not meet the minimum GHG savings) would incur an RTFO obligation. This is consistent with the treatment of unsustainable biofuels and RFNBOs.

Given that the fuels that we are proposing are eligible for reward are development fuels we propose that they receive development fuel RTFCs and can count towards the development fuel sub-target. In line with other development fuels, we propose that RCFs will be eligible for double reward, as they are from waste feedstocks. As RCFs are produced from non-renewable material, and the GHG emission saving threshold for RCFs is lower than for renewable transport fuels, we propose that the level of support for RCFs

[16] The counterfactual assumes that the incinerator has an R1 energy efficiency rating.
[17] European Commission (2011) Guidelines on the interpretation of the R1 energy efficiency formula for incineration facilities dedicated to the processing of municipal solid waste according to Annex II of directive 2008/98/EC on waste, Available from: http://ec.europa.eu/environment/waste/framework/pdf/guidance.pdf

will be lower. The proposed level or reward is two x 0.25 development fuel RTFCs per litre[18].

RCFs from industrial waste gases are proposed to be eligible for two x 0.5 development RTFCs per litre, but they must demonstrate that the avoided GHG emissions from the industrial gases are not already counted elsewhere (e.g. under the Emission Trading Scheme), and that they have not been attributed to the final fuel. We welcome evidence on how this can be demonstrated.

In either case, it is proposed that the RCF component of fuels will be eligible for reward providing that the sustainability criteria (Proposed greenhouse gas calculation methodology) are met for the RCF component of the fuel.

Verification

Applications for development fuel RTFCs for RCFs will require independent assurance (verification) which would be as similar as possible to the verification of sustainability information already required under the RTFO. This would cover verification of the feedstock, GHG emission values, and claims of partial RCFs. In line with renewable fuels we propose that verification would be carried out using the standards set out in the International Standard on Assurance Engagements (ISAE) 3000[19].

Question 9: Do you agree or disagree with our proposal that RCFs from solid feedstocks are eligible for two x 0.25 dRTFCs per litre, and RCFs produced from gaseous feedstocks are eligible for two x 0.5 dRTFCs per litre?

Question 10: RCFs from industrial waste gases have the benefit of avoiding release of the industrial gases to the atmosphere. Do you have evidence as to how it can be demonstrated that avoided GHG emissions have not been claimed elsewhere (e.g. under the Emission Trading Scheme), and that they have been attributed to the final fuel?

[18] Gaseous fuels will receive the same multiplier as other development fuels, for example hydrogen will receive 2 x 0.25 x 4.58 = 2.29 dRTFCs per kg.

[19] https://www.iaasb.org/publications/international-standard-assurance-engagements-isae-3000-revised-assurance-engagements-other-audits-or-0

3. Hydrogen and renewable fuels of non-biological origin

Introduction

RFNBOs are renewable transport fuels that do not have any biological content. These fuels are considered renewable where the energy content of the fuel comes from non-biomass derived renewable energy sources including wind, solar, aerothermal, geothermal, hydrothermal and ocean energy, or hydropower.

RFNBOs such as hydrogen and renewable power-to-liquid fuels are potentially significant components of a future low carbon transport fuels mix. Hydrogen can be produced from biomass and be classed as a biofuel or by utilising renewable power to separate hydrogen from water, in which case it is classed as a RFNBO. RFNBOs can also include synthetic hydrocarbon fuels produced using renewable energy and combining a hydrogen and carbon source.

Hydrogen is attractive for its high energy to mass ratio and its zero-carbon tailpipe emissions. RFNBOs in general are attractive for their low land use impact and potential for carbon neutrality or negativity under certain circumstances. Hydrogen and RFNBOs offer significant potential for hard to decarbonise sectors.

In 2018, a new category of fuels called ‘development fuels’ was introduced into the RTFO. Development fuel certificates provides additional support to fuels of high strategic importance, to address the difficulty and cost of delivering the technological advances needed to produce fuels for hard to decarbonise sectors, such as aviation and freight. Currently all renewable hydrogen is considered a development fuel, as long as it complies with the RTFO sustainability requirements.

All development fuels double count towards fuel suppliers’ obligations, receiving twice as many RTFCs as a standard crop based-biofuel. The development fuel obligation has a higher buy-out price than the main RTFO obligation which is intended to deliver the increased incentive required for these fuels which cost more to produce than traditional biofuels given the need for advanced technologies.

Eligibility of grid supplied renewable power for RFNBO production and additionality requirements

It is an important principle of the RTFO that the renewable energy used for producing RFNBOs must be additional i.e. the RFNBO production must not divert renewable energy from existing applications. This is to ensure that the RTFO is only incentivising actions which lead to an increase in GHG savings.

In the UK, RFNBOs produced at locations that do not have a direct connection to a renewable energy source i.e. they draw their energy from the grid are not currently able to meet the minimum GHG savings required to be eligible for RTFO support. The resultant fuel is also partially renewable as the grid energy supply is not wholly renewable.

We have identified some circumstances where a RFNBO can be counted as wholly renewable and deliver the required minimum GHG savings without the need for the renewable energy facility to be directly connected to the production facility. We therefore are proposing that the Administrator can take these into account when determining eligibility for reward under the RTFO.

Underpinning these new circumstances is a need to demonstrate that the renewable power is additional to current demand to ensure the RFNBO delivers genuine GHG savings.

We propose to define additionality and place a requirement on the Administrator to be satisfied that the RFNBO has been produced from additional renewable electricity in cases where the grid is not sufficiently decarbonised. In this context, additional would mean power that would not have been available to the grid in the absence of power demand from the RFNBO plant in question. The same principle would apply if an alternative energy source such as heat was used to produce the RFNBO i.e. the Administrator must be satisfied that the RFNBO production has not diverted the renewable energy sources from existing uses.

We propose that the Administrator may take into account the use of power purchase agreements (PPAs) as evidence that suppliers have purchased renewable energy. This will allow renewable energy generation and fuel production to be located in the most optimal locations i.e. they do not need to be co-located.

In permitting transmission of renewable energy across the grid for RFNBO production it will be important to take into account transmission losses and ensure there is temporal correlation between renewable energy supply and the RFNBO production.

Background

The RTFO incentivises a wide range of fuels, which are used in a growing number of transport applications. The development fuel obligation was created to provide additional

incentives for fuels which are of strategic future importance and which currently cost significantly more to produce than standard biofuels such as biodiesel or bioethanol. Renewable hydrogen and some other RFNBOs are eligible for support as a development fuel.

It is also a key principle of the RTFO that the fuels it incentivises must deliver genuine GHG emissions. This means that investment in additional renewable energy should be required to avoid diversion of that energy from existing power applications. Replacing this diverted energy can lead to increased GHG emissions as it is assumed that it would be replaced with a mix of both renewable and fossil energy sources. This requirement also ensures that the RTFO contributes additional GHG emissions savings and does not incentivise their diversion away from other sectors.

In line with biofuels, RFNBOs must meet a minimum GHG savings threshold to qualify for support under the RTFO. This is currently set at 60% for RFNBOs. Whether or not a RFNBO meets the minimum GHG saving threshold is dependent on the source of the power to produce the fuel as this is the main energy input and therefore the main factor in determining GHG emissions.

Current requirements

Where a RFNBO production facility (e.g. electrolyser in the case of renewable hydrogen) has dedicated renewable power then very high GHG emission savings can be achieved. Where the production plant is sourcing power from the grid, this (in most countries) will be a mix of renewable and fossil inputs. The method for determining how much fuel from a RFNBO plant can be counted as renewable is set out in Article 5 (4B)(e)(i) of the RTFO. Where the process energy used to produce a RFNBO is electricity taken entirely from a national electricity grid, the renewability of the fuel will be equal to the proportion of non-biomass renewables in the grid in the country of production as measured two years before the year in question. The resultant fuel will therefore be partially a RFNBO which could be eligible for RTFCs and part fossil/non-RFNBO which would not be eligible for RTFCs. The GHG emissions of the RFNBO will reflect the GHG intensity of the grid.

In addition, if the electricity is sourced through the grid, then the production facility will have diverted renewable power away from power applications which will need to be replaced. This will likely come from a combination of sources, including fossil fuels, resulting in a net increase in GHG emissions. For this reason, the RTFO Guidance sets out that the supplier must account for any GHG emissions that arise from the displacement of renewable energy from the wider grid.

In these instances, it is assumed that the grid average emissions intensity should apply to the amount of displaced renewable energy used by the fuel production plant. In the UK, any RFNBO which has been produced using grid power is unlikely to meet the minimum GHG emission savings required by the RTFO, until the grid sufficiently decarbonises.

However, we recognise that there are some circumstances in which the required GHG savings may be achieved. There are therefore specific derogations both for determining renewability and for determining the GHG emissions which should be applied.

Articles 4(8)(f) and 5(4B)(e)(ii) of the RTFO set out that if the Administrator considers it is not appropriate to use the grid average, they may apply an alternative methodology to determine the proportion of renewable fuel.

With respect to GHG emissions calculations, the RTFO Guidance sets out some specific circumstances in which the Administrator considers an alternative methodology may be used. These are:

a. when the electricity production site is not connected to the electricity grid and is connected to the fuel production plant; or

b. when the electricity production site is connected directly to the fuel production plant and the electricity grid, and can evidence that the annual electricity generation that would have been lost due to local grid capacity constraints has been consumed by the fuel production plant instead; or

c. when the electricity production site is connected directly to the fuel production plant and the electricity grid, and the fuel production plant can evidence that their consumption has been provided by the electricity production site without importing electricity from the wider grid.

Under these rules, unless a UK RFNBO production plant is directly connected to a renewable energy source, it is very difficult for the resultant fuel to meet the RTFO GHG emissions saving requirements. This is because, in these circumstances, the GHG intensity of that RFNBO production will be determined by the GHG intensity of the national grid and the UK grid is not yet sufficiently decarbonised for the resultant fuel to meet the RTFO GHG saving threshold.

However, we recognise the significant limitation that the effective requirement for the RFNBO plant to be co-located imposes. We are therefore proposing some options to allow the purchase of additional renewable energy across the grid, and some circumstances in which an average grid GHG intensity other than the national average can be used. Where additional renewable energy is purchased and supplied across the grid, we are proposing some further requirements to ensure that GHG emissions are accounted for.

Demonstrating renewable energy has been supplied across the grid for RFNBO production

Use of existing documentation or methods to demonstrate the supply of renewable energy across the grid for RFNBO production is preferable since this would minimise the requirement for further administration by the fuel supplier. Two possible options for this have been considered – power purchase agreements (PPAs) and Renewable Energy Guarantees of Origin (REGOs).

Using power purchase agreements to demonstrate renewable energy has been supplied across the grid

PPAs are a method of demonstrating that energy generated from a specific source is delivered to a particular customer. As legally enforceable agreements, PPAs also reduce

financial risks for generators by ensuring that a minimum amount of renewable energy is supplied and paid for, regardless of wider demand.

We consider that allowing RFNBO production plants which are not co-located with renewable energy sources, to use PPAs to demonstrate that renewable energy had been purchased will allow greater flexibility for production plants to be built where they are needed – in particular, at a place where there is demand such as a bus station. We also anticipate that this will allow for improved utilisation of newly installed renewable generation assets, this utilisation means more renewable energy can be captured and reduce the overall UK GHG emissions.

We therefore propose that the Administrator of the RTFO can take into account the use of PPAs as evidence of renewable energy supply across the grid to produce RFNBOs such as hydrogen. This means that the renewable energy generation can take place in a different location from the RFNBO production, providing flexibility for suppliers. The use of PPAs will therefore be taken into consideration when determining whether it is appropriate to depart from using the national grid average GHG emissions value. Further details will be provided in guidance and consulted on separately**.**

A consequence of allowing the use of PPAs to demonstrate renewability, in combination with also permitting other suppliers to use a grid average renewability, is that the same renewable energy could be accounted for more than once. We consider this to be low risk when hydrogen energy and other RFNBO demand is small compared to the total renewable energy available on the grid. We are seeking views on whether this risk is acceptable. We expect to keep this under review as the hydrogen and renewable power to liquid industry develops.

Note that the supplier must also demonstrate that other relevant requirements are met including for that renewable energy to be additional and that the generation of that renewable energy correlates over time with the RFNBO production. Further details of these are set out below.

Why REGOs cannot adequately demonstrate additionality

The main recognised method of accounting for energy renewability within the UK is the REGO. These are issued by the energy regulator and provide transferable verification for the source of any given MWh of energy. Each certificate is generated dependent upon the output of a given facility over time. For example, a 1MW wind turbine would need to operate for one hour in order to generate a REGO, however that hour could be spread over multiple days if the wind is intermittent, meaning that although the final time is recorded the period of time covered by the generation may not be closely related to the time recorded by the REGO. Therefore, REGOs do not represent a consistent or standard period of time and are unsuitable for use in attributing energy to a specific period that can be accurately correlated with RFNBO production.

Accounting for power that has been transmitted across a grid

When transmitting electricity across a distribution grid there are losses caused by heating as a result of resistance in conductors and energy conversion processes. This means that,

relative to a direct connection, the conversion efficiency of energy generation to fuel production will be lower for a grid supplied RFNBO producer.

UK Power Networks terms these as "Technical Losses" and identifies that there is a loss of between 6% and 9%[20] depending on the nature of the network, with rural areas (where renewable energy is often located) being in the 9% range.

Consistent with this we propose that where energy is supplied over the grid via a PPA to a RFNBO plant, that the eligible fuel quantity be subject to a suitable correction in order to account for the transmission losses. The details of this will be laid out in guidance and consulted on separately.

Matching additional energy supply and demand (temporal correlation)

When renewable energy is purchased and transmitted across the grid, we must ensure that production of the renewable electricity and the production of the fuel are happening at the same time, otherwise the fuel is not (wholly) renewable. This is called temporal correlation. If we did not ensure this temporal correlation, it would be possible for RTFCs to be claimed for fuels that had been produced during times of high electricity demand, and that therefore the renewable energy is not additional resulting in a net increase to the GHG intensity of the grid.

It is important to select a time period for this correlation that is sufficiently small to minimise any GHG emission increases, and yet large enough to be of practical use. Direct metering and energy supply trading systems are capable of determining power production and usage levels over 30-minute intervals.

We propose that renewable energy and RFNBO production must have happened within the same time period of 30 minutes or less in order for the fuel to be eligible for RTFCs.

The need to apply temporal correlation does not apply where the RFNBO production facility has a direct renewable energy connection and is not sourcing energy from the grid for the production facility. It also does not apply where the production facility is connected to the grid but the supplier is applying the grid average renewable energy proportion to determine the renewability of their fuel.

Constrained and sub-national grids

As previously explained, current rules mean that for RFNBO production where renewable energy is sourced from the grid, the GHG emissions intensity of the fuel is determined by the average GHG intensity of the national grid in the country in which it is produced. Using PPAs to demonstrate that renewable power has been purchased will help to increase the circumstances in which RFNBO plants can claim RTFCs, but there are other opportunities too as set out below.

[20] https://www.ukpowernetworks.co.uk/losses/static/pdfs/ukpn-business-plan-2015-2023.ded5a34.pdf

Excess renewable energy and grid constraints

Grid constraints are limitations on the ability of an electricity transmission network to move electricity from an area of generation to one of demand. For example, in parts of Scotland with high numbers of wind turbines, the grid does not have sufficient capacity to distribute this energy at times of peak generation, so some of this energy is lost. We consider renewable electricity that would otherwise be lost or curtailed to be additional.

Currently, some specific curtailment circumstances would fall within current derogation b which allows the Administrator to take into account evidence of curtailment and therefore whether the supplier can account for their fuel as wholly renewable and also apply the GHG emissions from the renewable element only (rather than grid average GHG emissions). Derogation b only allows for circumstances where the electricity production site is connected directly to the fuel production plant and the electricity grid. Our proposals to allow evidence of renewable energy sourced from the grid through PPAs also introduces flexibility to allow the use of curtailed power where the electricity production site is not directly connected to the fuel production site.

Enabling the use of GHG emission factors from regional or local electricity grids

There are areas of the world where electricity grids are not national in scale, and therefore the existing definition of 'national grid average' GHG emissions intensity is inappropriate. These locations include the USA and Canada, which have regional or state-level grids that function more like a national level grid as seen in Europe, and where the GHG emissions intensity can vary significantly depending on the power sources on each grid.

We propose that the Administrator may allow the use of the GHG intensity of regional or local grids in RFNBO GHG emission calculations where it can be demonstrated that these grids are highly renewable and sufficiently separate from the national grid. The details of this will be laid out in guidance and consulted on separately.

A risk of this is that GHG savings may be claimed by a production facility on a low GHG emission regional/local grid which have also been accounted for in the average national grid GHG intensity. We are seeking views on whether this risk is acceptable. We expect to keep this under review as the hydrogen and renewable power to liquid industry develops.

Amendment to the GHG emissions threshold for RFNBOs

Details of the proposed change to the GHG emissions thresholds in the RTFO, including for RFNBOs, can be found in the Greenhouse gas saving thresholds section in chapter 4.

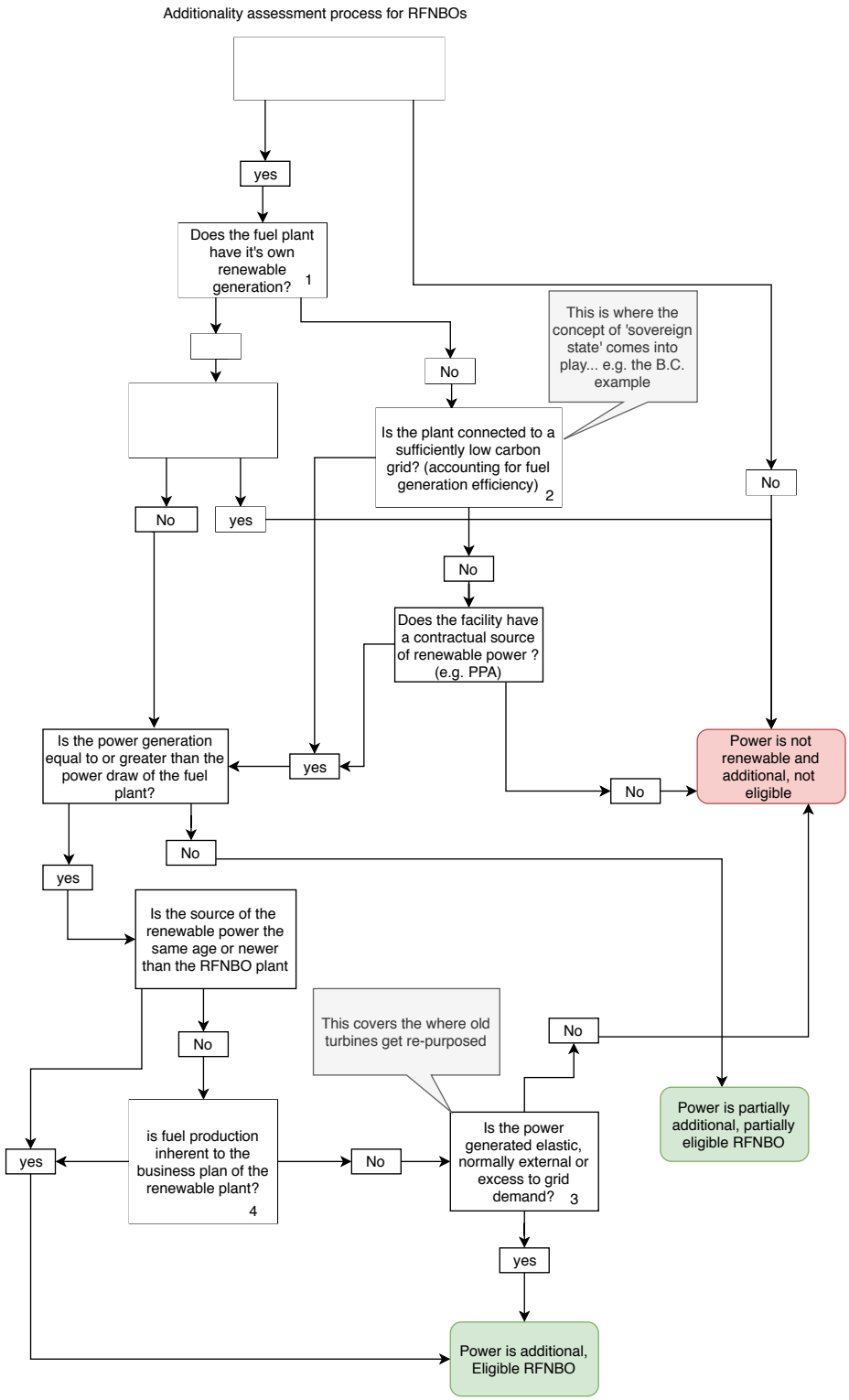

Figure 13 Flow chart explaining the proposed additionality decision tree

Questions

Question 11: Is "*renewable energy that would not have been available to the grid in the absence of power demand from the RFNBO plant in question"* an appropriate definition of additional renewable energy?

Question 12: Should the Administrator be able to take into account the use of power purchase agreements (PPAs) as evidence that suppliers have purchased additional renewable energy in order to allow the renewable power generation to be located in a separate location from the RFNBO production facility?

Question 13: A consequence of allowing the use of PPAs to demonstrate renewability, in combination with also permitting other suppliers to use a grid average renewability, is that the same renewable energy could be accounted for more than once. We consider this to be low risk when hydrogen energy and other RFNBO demand is small compared to the total renewable energy available on the grid. We are seeking views on whether this risk is acceptable. Is this risk acceptable?

Question 14: Should appropriate adjustments be made to the amount of renewable energy supplied to a RFNBO production facility to account for transmission losses where renewable energy is transferred over the electricity grid?

Question 15: Do you have any comments on the proposal to use a 30-minute time period for temporal correlation of renewable energy production and use, in cases where renewable energy has been purchased and transmitted across the grid?

Question 16: Should the Administrator be able to permit fuel suppliers to use local grid GHG emissions factors in RFNBO GHG emission calculations? Circumstances in which this might be appropriate include where there are local grid constraints or other local conditions which mean that the local grid GHG intensity differs substantially from that of the national grid.

Question 17: A consequence of allowing local grid GHG emissions to be used in calculating the GHG intensity for a RFNBO is that GHG savings may be claimed by a production facility on a low GHG emission regional/local grid which have also been accounted for in the average national grid GHG intensity. Is this risk acceptable?

Question 18: Have we captured all the additionality scenarios as set out in the proposals in the chapter and in the decision tree (Figure 13)? Please suggest alternatives with evidence

Changes to the level of reward for biohydrogen

Development fuels and biohydrogen

Given that biohydrogen produced from biomethane reformation is an established technology, we propose that it will only be eligible for development fuel certificates where it has been produced from an advanced technology such as processes which make use of carbon capture and storage (CCS). Biohydrogen produced from biomethane reformation without advanced technologies will instead be eligible for normal RTFCs.

The development fuel target is intended to drive the development of strategically important renewable fuels using advanced technologies.

Subsequent to its creation, proposals for projects to produce biohydrogen have emerged that do not meet the intended purpose of development fuels. The most basic of these is steam methane reformation (SMR) of biomethane. Ninety-six per cent of global hydrogen production comes from SMR: it is the cheapest, most widely used method for industrial hydrogen production and is most often used in large-scale applications. There is also a more advanced and efficient reformation alternative called autothermal reformation (ATR) which has advantages for certain applications. SMR and ATR are normally applied to the reformation of fossil methane to hydrogen, but the same process can be undertaken using biomethane as the feedstock.

Biomethane can be produced in a number of ways including anaerobic digestion and by capturing landfill gas. Biomethane created in this way can then be easily supplied to a producer of biohydrogen by injecting into the gas grid and extracted elsewhere, where it is needed.[21] This means that in order to produce biohydrogen from an SMR process, there is no increased investment in new biomethane production facilities because all the required biomethane can be supplied through the grid using existing technologies.

Biomethane can be used directly as a fuel in vehicles and for other applications, such as, heat production. Using biomethane for hydrogen production is therefore likely to divert it away from existing applications. Additionally, converting the biomethane to usable hydrogen consumes energy, which results in lower overall GHG emissions savings than using the biomethane directly. Consequently, producing biohydrogen from biomethane via SMR or ATR does not optimise the GHG efficiency of fuel production. An exception to this is if the reformation process uses CCS as this avoids the release of GHG emissions.

In addition, SMR of biomethane is not an advanced process for hydrogen production, having been used commercially for decades and requiring no extra investment over purchasing biomethane to act as a feedstock for an existing SMR plant. Consequently, we do not consider supporting biohydrogen produced in this way as a development fuel leads to greater investment in advanced technologies.

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[21] In doing so, the principles of mass balance must be adhered to i.e. the amount extracted must match the amount injected (minus any losses) and the consignment of biomethane must be transferred between owners with appropriate sustainability data.

Given that SMR and ATR of biomethane for biohydrogen production does not fit our development fuel objectives we propose that these production routes should no longer be eligible for development fuel certificates, but instead be eligible for normal RTFCs which can be counted towards suppliers' main RTFO obligation.

CCS and other strategic routes to biohydrogen

CCS is a method by which carbon dioxide emitted from a process is captured and permanently diverted away from the atmosphere. The Climate Change Committee (CCC) has recommended that in order to reach net zero in the UK economy there is a need to have certain net carbon absorbing energy systems. CCS is proposed as one such critical advanced technology and it is a system that can be applied to industrial facilities to reduce their carbon intensity. However, there are very few global deployments of CCS in operational scale environments and none in the UK. This is an advanced, strategic technology that therefore needs development in the UK.

It is possible to couple CCS to gas reformation thereby significantly reducing the GHG emissions of the process. Using CCS on gas reformation to produce biohydrogen is a possible route to negative GHG emissions, delivering an improved biohydrogen pathway.

Given that biohydrogen production with CCS is an advanced technology (i.e. it is an early stage development with low commercial deployment) which fits wider strategic needs for decarbonisation we propose that this pathway is eligible for development fuel certificates

There are other possible ways to produce hydrogen from biomass - the most notable of these is direct biomass gasification, converting biomass directly into gases through heating in an oxygen poor environment. This is a technology also flagged by the CCC as strategically important to reach net zero GHG emissions. There are also possible routes to hydrogen production directly from biological action, for example, through engineered organisms or managed environments. Whilst these alternative methods are not yet practical, we see no reason to exclude them from being eligible for development fuel certificates given their technical challenges and potential to deliver low carbon renewable hydrogen. Examples of production methods for renewable hydrogen and their current and proposed eligibility for dRTFCs can be seen in Table 4.

Method of production	Current eligibility	Proposed future eligibility
Biomethane+SMR	Development	Regular
Biomethane+SMR+CCS	Development	Development
Biomethane+ATR	Development	Regular
Biomethane+ATR+CCS	Development	Development
Biomass gasification	Development	Development
Direct to hydrogen biological processes (e.g. fermentation)	Development	Development
RFNBO hydrogen	Development	Development

Table 4 Examples of current and proposed future levels of reward for renewable hydrogen supply under the RTFO

Questions

Question 19: Do you agree or disagree that biohydrogen produced from biomethane reformation should be eligible for standard RTFCs rather than development fuel RTFCs?

Question 20: Certain advanced production methods for biohydrogen are likely to be of strategic future importance and require new investments, such as addition of CCS. Do you agree or disagree that when these methods are used, biohydrogen produced from biomethane reformation should remain eligible for development fuel RTFCs?

Given the need to decarbonise maritime fuels, we propose to introduce support for all RFNBOs for use in maritime under the RTFO. We do not propose introducing an obligation on fossil maritime fuels.

To provide additional decarbonisation options for non-road vehicles we propose to make renewable fuel used in trains and construction vehicles powered by fuel cells eligible for support under the RTFO. Note that renewable fuels used in such vehicles powered by internal combustion engines are already eligible for support.

Hydrogen supplied to retail customers is already eligible for RTFCs. We propose to amend the assessment time for hydrogen so that it is clear that fuel supplied to commercial customers can also qualify for RTFCs.

Expansion of RTFO support to other transport modes

Current scope of the RTFO

The RTFO currently supports renewable fuel for use in road vehicles and non-road mobile machinery (NRMM). The definition of NRMM covers vehicles and engines that are not used for driving on the road, including farm and construction machinery and rail vehicles. However, the definition only includes machinery powered by an internal combustion engine – this means that whilst biofuels can be supported, renewable hydrogen, when used in a fuel cell, is not currently eligible for support.

The RTFO currently provides support for renewable fuels used in inland waterway vessels but not ships operating at sea.

Introducing support for renewable fuels used in maritime

Analysis supporting the Clean Maritime Plan[22] shows that alternative liquid fuels will be needed to decarbonise shipping. This information, together with consultation proposals and questions, is presented in detail in "The role of the Renewable Transport Fuel Obligations in UK maritime" (Annex A[23]). The volumes of fuel needed for maritime use means that there is unlikely to be sufficient sustainable biomass to meet the total demand, especially giving competing needs in other sectors. An alternative is to use RFNBOs, which are not affected by the same land use and sustainability concerns as biofuels. We therefore propose to make RFNBOs used in shipping eligible for development fuel RTFCs.

We do not propose to implement an obligation for fossil maritime fuel: at this stage the industry is not suitable for a full-scale obligation but would benefit from support in the deployment of the first stages of renewable fuels. Note that any unsustainable RFNBOs used in maritime (i.e. fuel that does not meet the minimum GHG emissions savings threshold) would incur an obligation, in line with the treatment of other unsustainable fuels in the RTFO.

We propose to use a broad definition for the vessels in which RFNBOs used will be eligible for RTFO support. Specifically, the definition of ship found in Section 313(1) of the Merchant Shipping Act (1995): "includes every description of vessel used in navigation". This definition will act as an extension to the existing coverage for vessels, not a replacement.

The maritime consultation at Annex A sets out more details of our proposals including eligible fuel types and the proposed levels of reward[23].

Introducing support for renewable fuels used in fuel cell powered trains

The UK rail network is already substantially electrified. However, there are routes, currently being considered under the Traction Decarbonisation Network Strategy (TDNS)[24], that will need on board power to either bridge the gap between electrified areas or as the prime motive power. Hydrogen fuel cell technology is one option under consideration and is currently being tested in the UK.

Fuels used in internal combustion engines on trains are already obligated by the RTFO and renewable fuels are eligible for support. We propose to make all renewable fuels used to power rail vehicles eligible for support regardless of the power system used. This would mean that renewable hydrogen used in a fuel cell powered train becomes eligible for support.

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[22] Clean maritime plan: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815664/clean-maritime-plan.pdf

[23] Annex A: *The role of the Renewable Transport Fuel Obligations in UK maritime*

[24] Traction Decarbonisation Network Strategy: https://www.networkrail.co.uk/wp-content/uploads/2020/09/Traction-Decarbonisation-Network-Strategy-Executive-Summary.pdf

Introducing support for renewable fuels used in alternatively powered non-road vehicles

Hydrogen fuel cells also have the potential to be an important decarbonisation option for other non-road vehicles such as farm, construction and loading equipment.

We propose to make all renewable fuels used to power non-road vehicles eligible for support regardless of the power system used. This would mean that hydrogen used in fuel cell powered equipment such as tractors, diggers and forklifts become eligible for support.

Vehicle	Characteristics
forklift	Self powered, wheeled or tracked, driver rides on
Digger/multi use	Tracked or wheeled, self powered, driver rides on
bulldozer	Tracked, self powered, driver rides on
Mobile crane	Wheeled or tracked, self powered, driver rides on
Demolishing ball	Wheeled or tracked, self powered, driver rides on
Tipper truck	Wheeled, self powered, driver rides on.

Table 5 Examples of potential vehicles covered in expansion of non-road vehicles with alternative drive trains

Differing assessment times

The key reporting point for the RTFO is the assessment time, which is when the fuel is supplied for use in transport. It is key to ensuring the fuel is only counted once – both with regards to determining suppliers obligations, but also in determining volumes of fuel eligible for support. The assessment time is set at the duty point for road fuels. Using the duty point is coordinated with the recording of fuel volumes so is consistent and verifiable against other data held by HMRC.

Hydrogen assessment time for rail, road transport and other non-road transport

In the case of renewable hydrogen, the assessment time currently used in the RTFO applies to the purchase point by a retail customer.

However, to support renewable hydrogen for the full range of transport modes including rail, a change is needed to the renewable hydrogen assessment time to account more clearly for commercial uses. We propose to amend the assessment time for renewable hydrogen from the duty point to the purchase point, to remove any apparent distinction in purchase by retail and commercial customers to qualify for RTFCs. This will have no practical impact on the existing support for renewable hydrogen under the RTFO.

Maritime assessment time

As a result of the international nature of the industry, maritime fuels are not subject to duty (see Maritime consultation for more details and questions[23]).

We propose that the assessment time for qualifying maritime fuels would be at the point where the fuel is dispensed for use (into a vessel). Please see Chapter 2 and Question 7 In Annex A (The role of the RTFO in domestic maritime[23]) for further information.

Questions

Please see Annex A for questions relating to the extension of the RTFO to maritime applications.

Question 21: Hydrogen is likely to be an important power source for parts of the railway that are not possible to electrify. Do you agree or disagree that renewable fuel used in trains powered by fuel cells should eligible for RTFCs?

Question 22: Hydrogen also has the potential to be an important power source for construction and other non-road vehicles. Do you agree or disagree that renewable fuel used in these vehicles powered by fuel cells should eligible for RTFCs?

Question 23: Hydrogen supplied to retail customers is already eligible for RTFCs. Do you agree or disagree that the assessment time for hydrogen should be amended to make clear that fuel supplied to commercial customers can also qualify for RTFCs?

4. Changes to sustainability criteria

Overview

The RTFO includes sustainability criteria for renewable fuels. These are intended to ensure that the RTFO supports fuels which deliver significant GHG savings. The criteria are also designed to prevent negative environmental consequences such as the loss of biodiversity, deforestation and clearance of land with high carbon stock (e.g. peatland) for the cultivation of raw materials use in biofuel production.

These criteria are currently aligned with the sustainability criteria set out in the EU Renewable Energy Directive (RED) as amended by the Indirect Land Use Change Directive. Alongside the sustainability criteria, the RTFO includes a number of further measures which are intended to improve the sustainability of renewable fuels supported by the RTFO, primarily by driving a shift towards waste-derived biofuels. These measures include the issue of additional RTFCs for eligible waste-derived fuels and a cap on the level of crop-derived fuel that can be supplied[25].

In assessing whether a material is eligible for double reward as a waste we consider the wider sustainability implications of the use of waste products to make fuel including any impact on sustainable development and wider environmental impacts such as air quality considerations.

As part of this consultation we wish to seek views on a number of proposals to further refine and strengthen the sustainability safeguards applied to renewable fuel. These include:

- Updates to default GHG values;
- Updates to the GHG emission calculation methodology;
- Updates to the fossil fuel comparator and revised minimum GHG thresholds;
- Inclusion of new protected land types in the sustainability criteria;
- Updates to the highly biodiverse grassland definition;
- Requirements to protect soil carbon when agricultural residues are utilised;
- Specific sustainability criteria for renewable fuels produced from forest biomass; and

[25] The maximum permitted level of crop derived biofuels does not apply to dedicated energy crops, these are grassy crops such as *Miscanthus*, and woody crops such as short rotation coppiced trees.

- Changes to the crop cap definition.

In addition, we are also proposing some amendments which update the sustainability criteria and will facilitate the continued use of international voluntary schemes. Industry is heavily reliant on the use of such voluntary schemes to track sustainability information of globally traded feedstocks and fuels and demonstrate that the biofuels they have supplied are sustainable – 99% of biofuel supplied under the RTFO is certified under such schemes. These voluntary schemes are currently updating their criteria to reflect changes that will apply in the EU from July onwards as part of the new Renewable Energy Directive (RED II) implementation. The UK is no longer required to implement RED II but the changes we propose are mainly technical changes that reflect updated data sources and will allow the continued use of voluntary schemes. This will simplify trade and as such it makes sense to reflect the new evidence in the RTFO's sustainability criteria.

Changes to the greenhouse gas saving criteria

Introduction

To be eligible for RTFCs all fuels must meet minimum GHG saving criteria. These are intended to ensure that renewable fuels achieve meaningful GHG savings when compared to fossil fuels and consequently contribute towards the decarbonisation of transport fuels.

The GHG saving that a fuel achieves is calculated by comparing the carbon intensity (CI) of the renewable fuel to the carbon intensity of a standard fossil fuel comparator. A fuels carbon intensity is a measure of the GHG emissions generated per unit of energy contained in the fuel – gCO2eq/MJ. Under the RTFO, suppliers can provide a CI or GHG emission value for the supplied renewable fuel by submitting either a 'default value' or a calculated 'actual value'.

We propose to update the renewable fuel default and disaggregated default GHG emission values which can be used when reporting or calculating fuel GHG values.

The new values better represent the real world GHG emissions resulting from common fuel production process. They also cover more fuel pathways and feedstocks than the current values. Their adoption would facilitate trade of feedstocks, intermediate products and renewable fuel.

Default and disaggregated default values

Updates to default values

Default values provide accepted estimated GHG emission saving values for a number of renewable fuel production pathways. Currently suppliers that wish to report default values are required to use the default values set out in Annex V to the RED. These values were

established via an extensive study completed by the EU Joint Research Centre (JRC) and utilised the best available science at the time.

RED II introduces new default values based on updated reports from the EU Joint Research Council. These better reflect the real world GHG emissions resulting from common renewable fuel pathways[26]. They also cover significantly more fuel pathways and feedstocks than the default values provided in the original RED. The new values are set out in Annexes V and VI to RED II and will supersede the old values across the EU in July 2021.

We therefore propose to use these updated default values in the RTFO. By requiring suppliers to use the updated values we will maintain compatibility with the wider market place, which will help facilitate the trade of feedstocks, intermediate products and renewable fuel including through the use of voluntary schemes which are anticipated to adopt these values.

Updates to disaggregated default values and reference values

When an appropriate 'default value' does not exist or when a supplier has a preference to supply an actual value to demonstrate better GHG savings, they must calculate the actual value using an approved standard methodology.

To help reduce the administrative burden of calculating actual values, the RTFO allows suppliers to utilise standard disaggregated GHG values for some elements of the fuel production pathway when calculating the actual value. Examples of variables for which disaggregated default GHG values exist include the cultivation of crops and the transport of fuels. Examples of reference values include GHG equivalence values.

As with the default values discussed above, the new JRC report [26] and annexes to RED II introduce new and updated disaggregated default values, and new reference values to be used in the actual calculation process. We propose to reference these updated values in the RTFO.

By allowing suppliers to utilise relevant updated values when calculating actual values, we will maintain compatibility with the wider market place including the EU, which will facilitate the trade of feedstocks, intermediate products and renewable fuel.

Question 24: Do you agree or disagree that the default and disaggregated default values for calculating renewable fuel CI values under the RTFO should be updated in line with those published in the RED II Annexes?

[26] https://op.europa.eu/en/publication-detail/-/publication/7d6dd4ba-720a-11e9-9f05-01aa75ed71a1/language-en

Updates to the GHG emission calculation methodology

We propose to amend the actual GHG value calculation methodology to remove the allowable emissions credit for cogeneration of excess electricity (relevant to fuel production facilities utilising combined heat and power (CHP)). This will prevent overstating the GHG emissions savings achieved by the finished fuel.

We propose to amend the biomethane actual value calculation methodology to allow suppliers utilising slurry or manure as a feedstock to apply an emissions credit equivalent to the emissions avoided as a result of improved manure management. We consider that this better represents the lifecycle GHG emissions.

RED II introduces new rules related to the production of biomethane from codigestion of multiple feedstocks. These allow the aggregation of the GHG saving based on the feedstock proportions. We do not propose to introduce these rules into the RTFO. To do so would be inconsistent with the treatment of other fuels under the RTFO.

When a supplier wishes to submit an actual value, they must calculate this using the methodology stipulated in the RTFO and detailed in the RTFO Carbon and Sustainability guidance[27]. This methodology matches the methodology set out in the RED.

We wish to amend the actual value calculation methodology to improve its accuracy in light of new evidence. We propose to remove the option to include an emission credit from co-generation of excess electricity in the calculation. We also propose to introduce an emission saving value related to improved agricultural management of manure when it is utilised as a feedstock in the production of biomethane. These changes are also being implemented across the EU as part of RED II.

Allowance for emission saving from cogeneration of excess electricity

The current GHG methodology rules allow suppliers to apply a GHG emissions credit when calculating actual values where there is cogeneration of excess electricity in the fuel production process. This credit is equal to the emissions avoided by the production of any excess electricity as it displaces electricity production that would otherwise have been required. This is relevant to fuel production pathways which require a significant amount of heat in the production process and utilise combined heat and power (CHP) units.

We are concerned that this methodology could potentially lead to an overstating of the GHG emission savings achieved. The methodology allows the value of the saving to be calculated on the basis that that any excess electricity produced in the fuel production process has displaced electricity that would have other wide been generated using the same fuel that powers the CHP rather than applying a grid average.

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[27] https://www.gov.uk/government/publications/renewable-transport-fuel-obligation-rtfo-guidance-2021

To provide an example, this means that if a fuel production facility that utilises a CHP unit fuelled by fossil gas produces excess electricity, the fuel suppler can apply a GHG emissions saving credit equivalent to the GHG emissions that would have been created by the displaced electricity, on the assumption that this electricity would have also been generated using fossil gas.

As a result of this methodology there is a significant risk of overstating the GHG emissions saving resulting from the excess electricity generation. This risk is likely to increase as electricity grids continue to decarbonise.

We propose to update the actual value calculation methodology to remove the allowance of a credit for electricity produced as a result of cogeneration of excess electricity in the fuel production process. This will protect against an overstating of the final fuels GHG emission saving due to the application of an excessive credit.

Allowance for emissions saving for improved agricultural management of slurry and manure

When raw manure or slurry is stored, waiting to be spread, it releases gases in the atmosphere as result of bacterial activity. Methane is the main gas released by manure decomposition, but other compounds such as nitrogen oxides and ammonia are also released. Methane and nitrogen oxides are potent greenhouse gases, and ammonia emissions contribute to air pollution because they convert to particulate matter, which is harmful to human health. Ammonia emissions also damage the environment, reducing biodiversity in sensitive habitats. When manure or slurry is treated in an anaerobic digester, the methane produced through decomposition is captured and collected as biogas, and as such is not released to the atmosphere[28].

RED II allows biomethane suppliers that utilise manure or slurry as a feedstock to apply an emission credit for improved agricultural management of manure when calculating the carbon intensity of biomethane.

This GHG emissions saving credit is intended to reflect the emissions that would have occurred if the manure had been left untreated and free to emit methane to the atmosphere, rather than being treated via anaerobic digestion. The credit that can be applied is -45 gCO2eq/MJ of manure used in anaerobic digestion. The methodology supporting this value is set out in the JRC report on 'Solid and gaseous bioenergy pathways: input values and GHG emissions'.[29]

We wish to encourage better treatment of manure and slurry and recognise that this can achieve significant emissions reductions. As such, we propose to allow biomethane suppliers to utilise an emission saving credit in the actual value calculation, when manure or slurry is utilised as a feedstock for biomethane production. We propose that the value of

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[28] A volume of ammonia is still released during the digestion process and also from the resulting digestate during storage and when spread to land as a fertiliser. Additionally, if not applied carefully and in line with soil and crop need, digestate can cause pollution to water courses through run-off and leaching of nutrients in the digestate, potentially damaging local ecosystems and habitats.

[29] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/solid-and-gaseous-bioenergy-pathways-input-values-and-ghg-emissions-calculated-according-0

this credit should be informed by the JRC report and RED II and as such should be 45 gCO2eq/MJ.

GHG calculations for biomethane produced via co-digestion of multiple feedstocks

Under the RTFO, biofuel suppliers must calculate and provide a separate GHG saving for each feedstock consignment. This ensures that all the feedstock consignments used in the production of the final fuel can independently demonstrate that they meet the minimum GHG criteria and land criteria.

RED II introduces a new methodology which fuel suppliers should use to calculate the carbon intensity of biomethane produced via the co-digestion of a combination of different feedstocks in a biogas plant. Under this methodology biomethane suppliers are permitted to aggregate together feedstock consignments into a digester, and to assign an average GHG saving to the final fuel based on the ratio of the feedstocks and their associated GHG savings.

We expect voluntary schemes to offer fuel suppliers the option to report the GHG saving of biomethane using this methodology, (i.e. one aggregated GHG saving based on the ratio of feedstocks) once the new rules apply across the EU.

This methodology potentially provides an undesirable opportunity for suppliers to utilise feedstocks in biomethane which would not otherwise hit the required GHG saving threshold, and through careful combination with higher performing feedstocks create a final fuel which via aggregation of values meets the minimum GHG threshold. This is demonstrated in Table 6 below.

		GHG emission saving	Feedstock proportion	Aggregated saving	Eligible for reward
RED II	Feedstock 1	75%	50%	60%	Y
	Feedstock 2	45%	50%	60%	Y
RTFO	Feedstock 1	75%	50%	Not permitted	Y
	Feedstock 2	45%	50%	Not permitted	N

Table 6 Hypothetical biomethane example - required GHG emission saving 60%

In this example two feedstocks are added to a digester in equal quantities. One feedstock has a GHG emission saving value of 75% whilst the second has a GHG emission saving value of 45%. Under RED II the individual savings can be aggregated across both feedstocks, with all the produced fuel eligible for reward.

The RTFO does not currently allow the aggregation of GHG savings across different feedstocks when producing biomethane from co-digestion. Therefore, as shown in the table, feedstock 2 would not be eligible for reward as it does not deliver the required minimum GHG savings.

To allow averaging of GHG savings across feedstocks would potentially provide biomethane with a competitive advantage over other renewable fuels, by creating a unique case for biomethane under which biomethane can utilise feedstocks which would not meet the GHG saving requirement independently.

For these reasons, we do not intend to amend the RTFO to allow biomethane suppliers to use a single aggregated value for all feedstocks and submit a single GHG saving value for the finished fuel. Instead we propose to continue to require biomethane suppliers to follow rules consistent with other renewable fuels, and to continue to require that CI values are provided for each feedstock consignment.

Questions

Question 25: Do you agree or disagree with our proposal to remove the GHG emissions credit for cogeneration of electricity from the greenhouse gas saving methodology to prevent overstating the GHG emissions savings achieved by the finished fuel

Question 26: Do you agree or disagree that biomethane suppliers should be able to apply a GHG emissions saving credit for avoided emissions when calculating the carbon intensity of biomethane produced from manure?

Question 27: Do you agree or disagree that when biomethane is created via the codigestion of multiple feedstocks, the supplier should continue to be required to report the CI of each individual consignment? That is, the supplier should not be permitted to average the CIs across feedstocks, in line with the mass balance rules which apply to other biofuels.

Fossil fuel comparator

We propose to update the fossil fuel comparator from 83.8 gCO2eq/MJ, to 94 gCO2eq/MJ, to better represent the current emissions profile of fossil fuel and relative savings achieved by renewable fuels.

To allow the effective and consistent calculation of GHG savings, renewable fuel savings are calculated by comparing the CI of a renewable fuel (either a calculated actual value or a default value) to a fixed fossil fuel comparator. The fossil fuel comparator has been set at 83.8 gCO2eq/MJ since 2011. This value is based on the historic average carbon intensity of fossil petrol and diesel supplied in the EU and set out in RED. In RED II the fossil fuel comparator has been revised to 94 gCO2eq/MJ: this new value better represents the carbon intensity of transport fuel as supplied across Europe.

We propose to update the RTFO to reference the updated fossil fuel comparator of 94 gCO2eq/MJ. This better represents the GHG intensity of fossil fuel used in road transport.

We recognise that updating the fossil fuel comparator to a higher value could enable some renewable fuels which historically did not meet the minimum GHG savings to meet the existing GHG thresholds by virtue of a higher fossil fuel baseline value. In the next section we will introduce proposals to mitigate this.

Question 28: Do you agree or disagree with our proposal to update the fossil fuel comparator from 83.8 gCO2e/MJ to 94 gCO2e/MJ to better reflect the real world GHG emissions associated with fossil fuels used in road transport?

Greenhouse gas saving thresholds

We propose to update the minimum GHG emission savings thresholds which renewable fuels must meet to be eligible for RTFCs. This will offset the impact of the proposal to increase the fossil fuel comparator and maintain existing GHG savings.

To be eligible for RTFCs, renewable fuels need to meet minimum GHG saving thresholds. These are intended to ensure that renewable fuels achieve meaningful GHG savings when compared to fossil fuels and consequently contribute towards the decarbonisation of transport fuels.

The GHG saving attributed to a renewable fuel is calculated by comparing the CI of the renewable fuel to the fixed fossil fuel comparator CI (currently 83.8 gCO2eq/MJ) using the formula below:

Calculation of direct renewable fuel GHG saving

GHG saving = (CI of FF displaced - CI of biofuel)/CI of FF displaced x 100%

FF is the fossil fuel

CI is the carbon intensity of the fuel

Note that a negative result denotes an increase in GHG emissions.

Currently in the RTFO, the level of GHG saving a biofuel must achieve to be eligible for RTFCs is dependent on the date at which the fuel production plant producing the fuel began (or will begin) operation. The required GHG emission saving threshold has increased with time - this encourages producers to build increasingly efficient plants, source lower carbon feedstocks and reflects improvements in production processes.

Minimum GHG savings threshold for biofuels

The RTFO currently includes two minimum GHG saving thresholds for biofuels. The thresholds are as follows:

- Plants in operation on or before 5th of October 2015 (referred to in the RTFO as "old chain installations") are required to achieve a saving of at least 50%; and
- plants that entered operation on or after 6th of October 2015 (referred to in the RTFO as "new chain installations") are required to achieve a saving of at least 60%.

These thresholds match the thresholds set out in the RED.

In the fossil fuel comparator section, we noted that the change in the fossil fuel comparator has an impact on the minimum carbon intensity a renewable fuel must achieve to meet the relevant required GHG saving threshold (50 or 60% depending on the date that the production plant began operations).

In the fossil fuel comparator section, we proposed to update the fossil fuel comparator in the RTFO from 83.8 gCO2eq/MJ to 94 gCO2eq/MJ to better reflect the real-world emissions resulting from fossil fuel use in transport. This 11.2g increase in gCO2eq/MJ represents a 12% increase in the fossil fuel comparator. We recognise that if the existing thresholds are not amended the knock-on impact of a 12% increase in the fossil fuel comparator is that the maximum permitted CI for fuels will also effectively increase by 12%.

We consider this undesirable because it means that some fuels which are currently ineligible for RTFCs due to an insufficient GHG saving could become eligible for RTFCs at the current threshold levels as a result of the proposed change (increase) to the fossil fuel comparator value. This change risks undermining our desired policy intent which is to incentivise fuels which deliver increasingly stringent GHG savings.

To address this risk, we propose to adjust the minimum GHG saving thresholds to offset the impact of increasing the fossil fuel comparator to 94 gCO2eq/MJ. To achieve this, we propose to revise the existing thresholds allowable under the existing RTFO. The proposed new threshold values are set out in Table 7.

Date biofuel plant became operational	Current FF comparator (gCO2eq/MJ)	Current RTFO GHG saving threshold	Current permitted maximum CI (gCO2eq/MJ)	Proposed FF comparator (gCO2eq/MJ)	Proposed GHG saving threshold	Proposed permitted maximum CI (gCO2eq/MJ)
On or before 05/10/15	83.8	50%	41.9	94	55%	42.3
On or after 06/10/15	83.8	60%	33.5	94	65%	32.9

Table 7 Proposed threshold values

We propose to increase the existing threshold for fuels produced in installations which began operation on or before 5th October 2015 (termed old chain installations) from 50% to 55%. After factoring in the impact of the revised fossil fuel comparator this change results in a maximum permissible CI value of 42.3 (compared to the existing 41.9). This equates to a 0.4 gCO2eq/MJ increase in the maximum permissible CI.

We propose to increase the existing threshold for fuels produced in facilities which began (or will begin operation) after 6th October 2015 (termed new chain installations) to 65%. The proposed value of 65% results in a maximum permissible CI value of 32.9 (compared to the existing 33.5). This is a 0.6 gCO2eq/MJ reduction relative to the current maximum CI new chain installations. We recognise that this proposed threshold results in a marginally reduced maximum permitted CI for fuels compared to the maximum permitted CI allowable under the current RTFO.

The proposed GHG emission saving thresholds and a comparison with the existing RTFO thresholds are shown in Figure 14.

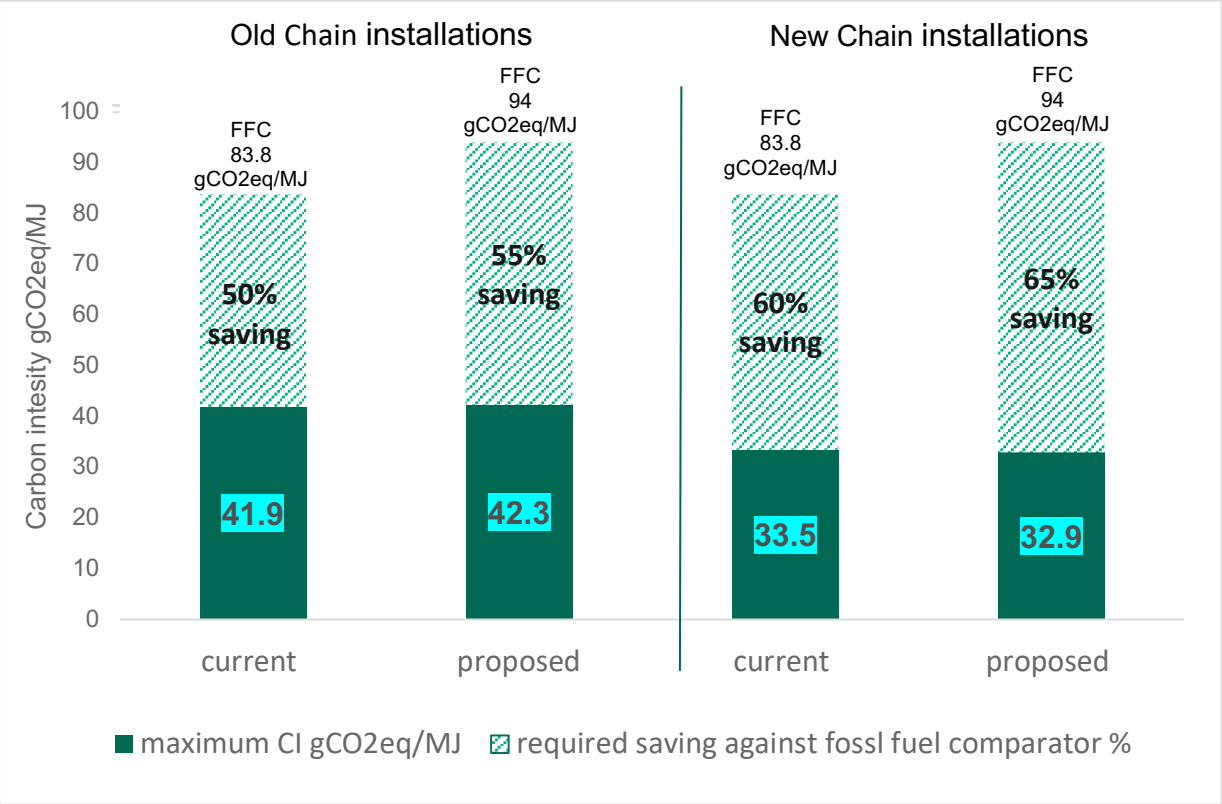

Figure 14 Proposed changes to minimum GHG savings thresholds (FFC = fossil fuel comparator)

Under RED II the EU is introducing a new minimum GHG saving threshold for fuels produced in production plants which began or will begin operation on or after 01/01/20. This is set at 65%.

At this time, we do not propose to introduce a third GHG savings threshold given that our proposal to change the second threshold to 65% is equivalent to the third threshold established under the RED II.

Figure 15 demonstrates how the maximum carbon intensity of fuels permitted under the new proposed thresholds compares to the values allowable under the current RTFO thresholds and the thresholds that will be applied across the EU under RED II.

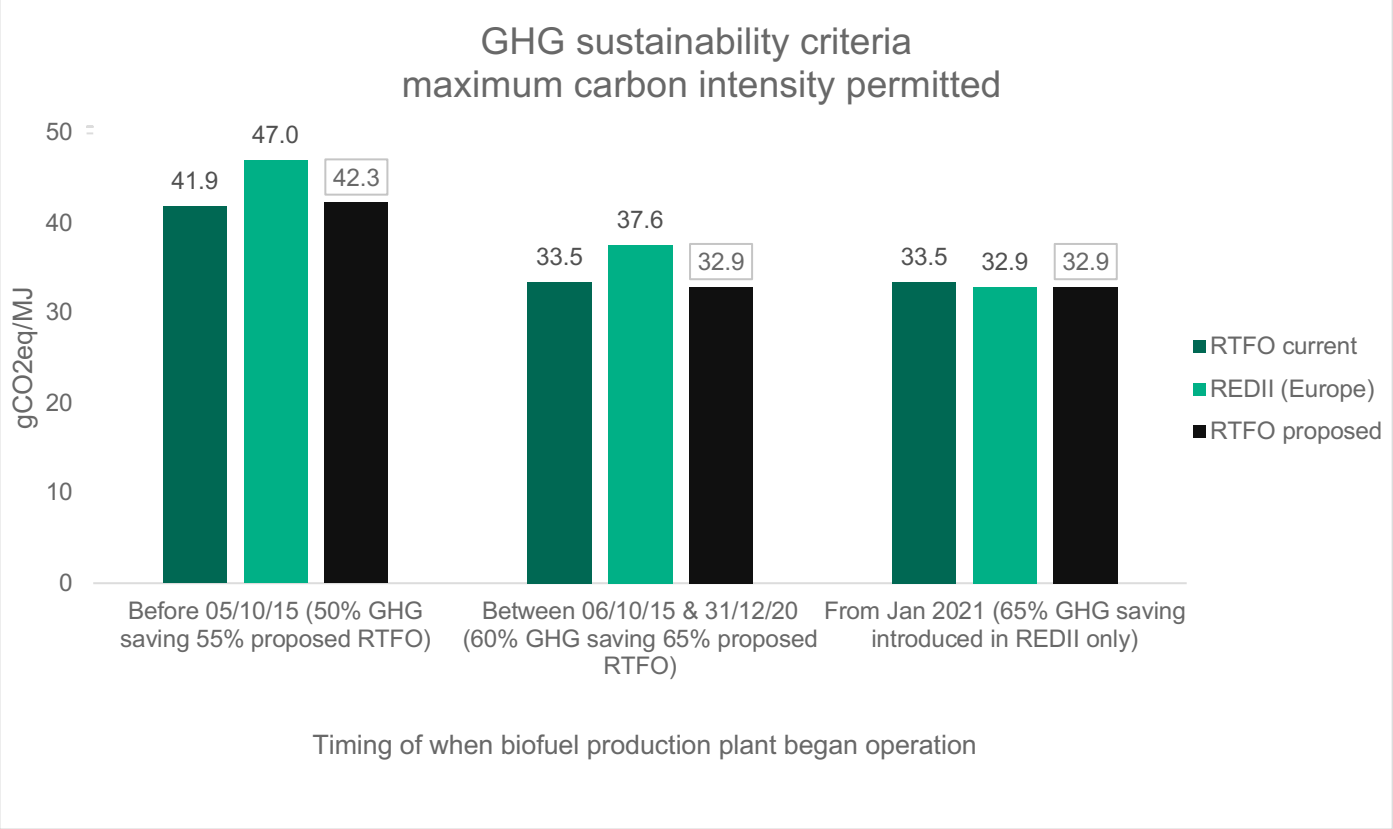

Figure 15 Minimum GHG savings thresholds according to when the production plant began operation under the current RTFO, RED II and the proposed changes to the RTFO.

As part of this consultation we would also welcome views on whether a third tighter GHG threshold should be introduced for new installations in the future. Whilst tighter GHG threshold for new installations may be consistent with our aims to increase the GHG savings of fuels supported under the RTFO, before introducing a new more stringent third threshold we would like to understand the potential impact this could have on our wider biofuel strategy.

Our wider strategy places an increased focus on the use of novel waste feedstocks, which due to their nature often require significantly more processing than traditional feedstocks such as crops and waste segregated oils and fats. This additional processing requirement means that fuels made from novel waste feedstocks, whilst offering significant GHG savings, may not deliver the very high GHG savings offered by more traditional feedstocks with more established technologies such as used cooking oil. Setting tighter GHG thresholds could impact the viability of producing biofuel from harder to process waste feedstocks and could be a potential barrier to innovative fuels that are not yet produced at sufficient scale to reach the highest GHG savings.

Minimum GHG savings threshold for renewable fuels for non-biological origin

Because of the extremely low GHG footprint of renewable power the use of this power to produce a RFNBO can in theory create an extremely low GHG intensity fuel.

RED II introduces a 70% GHG saving threshold for RFNBOs. Currently there is uncertainty as to whether the EU will use the same fossil fuel comparator for RFNBOs as conventional renewable fuels.

Our intention is to maintain consistency with our existing renewable fuels policies by using the same comparator for RFNBOs as for biofuels under the RTFO i.e. to determine the GHG savings of RFNBOs against average fossil fuel emissions which are being displaced.

We propose to change the GHG saving threshold for RFNBOs from 60% to 65% as this will offset the proposed new, higher fossil fuel comparator and maintain existing GHG savings. This means that the maximum CI permitted changes slightly from 33.5 g CO2e/MJ to 32.9 gCO2e/MJ. This is in line with the changes we are proposing for biofuels processed in facilities classed as new chain installations (i.e. those that began operation after 6 October 2015).

There is little justification for allowing RFNBOs from older production facilities a lower GHG savings threshold as the GHG savings that can be achieved are more commonly limited by the overall decarbonisation of the electricity system, rather than the technology employed in the production facility.

Questions

Question 29: Do you agree or disagree that we should update the minimum greenhouse gas saving thresholds to offset the impact of the revised fossil fuel comparator? This would prevent support for renewable fuels which have worse GHG emissions than those supported now.

If you agree - do you agree with the levels of the new proposed GHG savings thresholds?

If you disagree - please provide your reasoning.

Question 30: Do you think we should consider introducing a tighter GHG emission savings threshold for fuels produced in new production facilities in the future? This would be in addition to the existing thresholds that we are proposing and would only apply to installations not yet built.

If yes - what do you think the minimum GHG emission savings threshold should be and what should the start date be?

Question 31: Do you agree or disagree that we should increase the RFNBO GHG threshold to 65%? Please provide supporting evidence.

Measures to address the environmental impact of crop and forest based renewable biofuels

Introduction

Our strategy for incentivising renewable fuels through the RTFO is to focus on waste and advanced fuels. These offer some of the highest GHG savings and make use of feedstocks which would otherwise be discarded. This strategy is supported through measures such as the award of additional certificates to renewable fuels from waste-derived feedstocks and the development fuel sub-target. These measures have been successful in encouraging suppliers to utilise waste derived feedstocks. Since the introduction of the additional award for waste-based biofuels in 2011 the proportion of fuel that is created from waste feedstocks has continued to grow from around 30% in 2010 to 69% in 2019[30].

When crops or agricultural, forestry or fisheries residues are used to produce biofuels, in addition to meeting the prerequisite greenhouse gas savings described in the earlier sections of this chapter, the feedstock must also meet specific land sustainability criteria which apply globally. The land criteria provide protection for land with high carbon stock and or high biodiversity. The criteria set out land categories on which feedstocks for biofuels cannot be grown at all as well as categories where the harvesting of biomass feedstocks must not change the status of the land. Land with high carbon stocks are natural carbon stores and sinks - which if destroyed or damaged can release carbon and contribute to climate change.

The land criteria apply to areas of land on the basis of the status that the area had as of January 2008. This prevents vulnerable land which met this description on, or prior to, January 2008, but that has been relatively recently been converted to a different land category (i.e. between 2008 and now) from being utilised to produce biofuels eligible for reward under the RTFO.

In some circumstances, and for certain protected land types (e.g. designated nature protection areas and non-natural grassland), the application of good land management practices means that material can be harvested from protected areas without damaging the integrity of the land. In these instances, the RTFO includes exclusions which allow suppliers to utilise these land types in the production of feedstocks provided that can evidence that the pre-requisite good land management practices have been observed.

The RTFO land criteria are currently aligned with the land criteria in place under the RED i.e. the same land types are protected under UK and EU law.

[30] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932933/renewable-fuel-statistics-2019-final-report.pdf

Highly biodiverse forest and other wooded land

We propose updating the sustainability criteria in the RTFO to add 'highly biodiverse forest and other wooded land which is species rich and not degraded' to the list of restricted land categories.

We propose to extend the land criteria set out in the RTFO to protect 'highly biodiverse forest and other wooded land' from conversion to biofuel production. This will add increased protection to an important biodiverse land type.

We recognise that biofuels can be cultivated within areas of highly biodiverse forest and other wooded land without damaging the land and can be harvested sustainably if the correct measures are taken. As such, we propose to exclude biofuels produced from feedstocks grown on highly biodiverse forest and other wooded land from RTFO support **unless** the supplier can provide evidence that the production and harvest of feedstock from the land was completed without compromising the land type's nature protection purposes.

As with all the other existing land categories we propose to apply this to land based on its classification as of 2008.

The addition of this land type will increase existing environmental protections and keep pace with international protections. It will also help to facilitate the trade of feedstocks, intermediate products and renewable fuel, by enabling fuel suppliers to continue to utilise certificates issued by voluntary schemes to demonstrate compliance with the RTFO land criteria.

Question

Question 32: Do you agree or disagree with our proposal to add 'highly biodiverse forest and other wooded land which is species rich and not degraded' to the list of restricted land categories? This will increase existing environmental protections and keep pace with international protections.

Question 33: Do you agree or disagree that we should continue to allow the production and harvesting of biofuel feedstocks from 'highly biodiverse forest and other wooded land' when it can be demonstrated that the production and harvesting of the feedstock from the land was completed without compromising the land type's nature protection purposes?

Highly biodiverse grassland definition and size requirements

We propose to update the existing highly biodiverse grasslands definition to reflect changes in international definitions. This will help to facilitate the trade of feedstocks, intermediate products and renewable fuel, by enabling fuel suppliers to continue to utilise certificates issued by voluntary schemes to demonstrate compliance with the RTFO land criteria.

Highly biodiverse grassland (both natural and non-natural) has significant environmental value and as such is a protected land type under the RTFO. Currently the RTFO states:

“Natural highly biodiverse grassland” and “non-natural highly biodiverse grassland” have the meanings given in Commission Regulation (EU) No 1307/2014 of 8 December 2014 on defining the criteria and geographic ranges of highly biodiverse grassland for the purposes of Article 7b(3)(c) of Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels, etc. (also see article 17(3)(c) of the directive).

RED II includes an updated definition of highly biodiverse grassland - see Figure 16.

Figure 16 **Directive** REDII 2018/2001/EC: **Article** 29, paragraph 3 (d)

(d) highly biodiverse grassland spanning more than one hectare that is:

(i) natural, namely grassland that would remain grassland in the absence of human intervention and that maintains the natural species composition and ecological characteristics and processes; or

(ii) non-natural, namely grassland that would cease to be grassland in the absence of human intervention and that is species-rich and not degraded and has been identified as being highly biodiverse by the relevant competent authority, unless evidence is provided that the harvesting of the raw material is necessary to preserve its status as highly biodiverse grassland.

The new definition includes a requirement that non-natural highly biodiverse grassland has been identified as being highly diverse, and adds in a requirement that the non-natural highly biodiverse grass land exceeds over one hectare in size to be afforded protection. This minimum size requirement is consistent with the treatment of other land categories from which products can be harvested subject to certain criteria being met.

We propose to update the RTFO definition of natural grassland so that it matches the definition set out in RED II. This will maintain consistency with other land types and help to facilitate the trade of feedstocks, intermediate products and renewable fuel, by enabling

fuel suppliers to continue to utilise certificates issued by voluntary schemes to demonstrate compliance with the RTFO land criteria.

Question 34: Do you agree or disagree with our proposal to update the definition of highly biodiverse grasslands to maintain consistency with other land types, international definitions, and to facilitate the continued use of voluntary schemes?

Protection of soil carbon for agricultural residues

We propose to require that where biofuels are produced from agricultural wastes and residues feedstocks, suppliers must demonstrate that monitoring and management plans are in place. These plans should address soil quality and soil carbon impacts.

We recognise that agricultural residues - some of which would traditionally be left to decompose following a harvest - are now increasingly finding an alternative use in renewable fuel production.

Whilst we are supportive of the use of agricultural residues in biofuel production, we recognise that the decomposition of organic waste in-situ has the potential to deliver soil quality and carbon services. As such it is important that when agricultural residues are removed from land to produce biofuel, a monitoring and management plan is established to mitigate any detrimental impact on the site's soil quality and soil carbon content resulting from excessive removal of the waste product.

To address this, we propose to require that suppliers of biofuels produced from agricultural residues must demonstrate that the land from which the residue is sourced is subject to established monitoring and management plans to minimise the impact of the removal of the waste on the sites soil quality and soil carbon. These monitoring and management plans could be administered by either the supplier or the relevant national authority.

Question 35: Do you agree or disagree with our proposal to require that suppliers of biofuels produced from agricultural residues must demonstrate that monitoring and management plans are in place? These plans should address the impact of the removal and processing of the feedstock on the site's soil quality and soil carbon content.

Introduction of specific sustainability criteria for biofuels from forestry derived feedstocks

We propose to introduce new sustainability criteria specifically for feedstocks sourced from forest biomass.

These criteria address the specific environmental impacts associated with forestry. Under this proposal biofuels from forestry feedstocks would no longer be required to meet the existing land criteria, but instead would be required to meet new specific forest criteria.

Currently under the RTFO, the sustainability criteria which provide protections for land use change and biodiversity - known as 'land criteria' - are applied to all biofuels regardless of the feedstock utilised (with exemptions from the land criteria for processing residues and wastes). All biofuels must meet the land criteria and no distinction is made between biofuels made from feedstocks derived from forestry or agriculture.

However, the production and harvesting of forest biomass (biomass from forestry) has different environmental implications to the production and harvesting of agricultural biomass (biomass from agriculture). We therefore propose to introduce specific criteria for forest biomass into the RTFO.

RED II has introduced specific sustainability criteria for biofuels made from forestry feedstocks. From mid-2021, voluntary schemes are expected to require fuels from forest biomass to be certified against the specific forest criteria rather than the existing land criteria. Our proposed changes will establish appropriate, robust environmental protections and enable the continued use of voluntary schemes for biofuels from forest biomass.

We propose to amend the RTFO to require fuel suppliers that are utilising forest biomass in the biofuel they supply to be able to demonstrate the following:

- The material has not been harvested from protected land areas;
- The material has been legally harvested, and harvested in such a way that negative impacts on soil quality and forest biodiversity are minimised;
- That areas that have been harvested are then regenerated; and
- That management systems are in place at a national or forest sourcing area level to ensure that carbon stocks and sinks levels in the forest are maintained, or strengthened over the long term or that changes in carbon stock associated with forest biomass harvest are accounted for in submissions related to the country's commitment to reduce or limit greenhouse gas emissions under international agreements such as the 'Paris Agreement'.

Question 36: Do you agree or disagree with our proposal to introduce new sustainability criteria specifically for feedstocks sourced from forest biomass? Note that this would mean that biofuels from forestry feedstocks will no longer be required to meet the land criteria, but instead would be required to meet specific forest criteria.

Question 37: Do you agree or disagree that the proposed criteria better represent the specific environmental impacts associated with forestry?

If you disagree, please provide your reasoning.

Changes to the crop cap definition

We propose to update the crop cap definition. Note this has no impact on current policy which is to limit biofuels derived from crops except where the feedstock is a dedicated energy crop.

Background

The incentives available to crop-derived renewable fuels[31] are restricted by a 'crop cap' which was introduced to the RTFO in 2018. This acts as an additional safeguard to address potential indirect land use change (ILUC) risks posed by crop-derived biofuels and to encourage suppliers to increasingly move towards waste feedstocks.

ILUC occurs when non-agricultural land is bought into production due to displacement of existing food and feed crops by biofuels. The ILUC emissions resulting from the land clearance can outweigh the GHG savings achieved by the biofuels, especially when the conversion occurs on land with high carbon stock such as forests, wetlands and peatland.

When high carbon stock land is cleared for agricultural use, much of the carbon stored in the biomass is released into the atmosphere. In addition, the capacity of the land to absorb CO2 from the atmosphere may also be compromised or reduced.

The crop cap restricts the maximum amount of fuel from biofuels derived from crops (except for dedicated energy crops) that can be rewarded under the RTFO and counted towards a suppliers' obligation. The cap decreases incrementally from 4% in 2018 to 2% in 2032.

[31] The crop cap does not apply to biofuels made from waste materials, agricultural residues or dedicated energy crops.

Relevant crops covered by the crop cap

To determine which crops are limited under the crop cap the term "relevant crops" is used. Relevant crops include cereals, tubers and root crops, corm crops, but excludes wastes, processing residues, agricultural residues and dedicated energy crops (see Figure 17 for the wording in the legislation).

Figure 17 Article 2(1) RTFO Order relevant crops definition

"relevant crops" means starch-rich crops, sugars, oil crops and main crops, where "starch-rich crops" include—

(a) cereals (regardless of whether only the grains are used or the whole plant);

(b) tubers and root crops, including potatoes, Jerusalem artichokes, sweet potatoes, cassava and yams; and

(c) corm crops, including taro and cocoyam,

but feedstocks listed in Annex IX of the directive are not relevant crops;

Annex IX part A in RED includes other non-food cellulosic material and other ligno-cellulosic material, which includes crops such as miscanthus. These types of crops meet our definition of a 'dedicated energy crop'[32]. As they are included in Annex IX they are also not currently limited by the crop cap under the RTFO.

Proposal

We propose to update our crop cap definition, but note that this will not change what is captured by the crop cap.

We propose to remove the reference to Annex IX feedstocks of the RED. This term is not necessary because Annex IX feedstocks primarily consist of wastes and residues which are not crops and so are not caught by the definition of 'relevant crop'.

In removing Annex IX from the relevant crop definition we want to ensure that dedicated energy crops are not caught by the crop cap. We want to continue to exclude them from being limited by the crop cap because of the benefits they have over relevant crops, such as being neither a food or feed crop, and their potential to be grown on degraded land. Therefore, we propose to amend the definition of 'relevant crop' so that all the crops currently listed in that definition will be subject to the crop cap except for dedicated energy crops. It is anticipated this change will have no impact on current exclusions and inclusions of crops limited by the crop cap.

[32] As defined by Article 2(1) in the RTFO Order

Question 38: Do you agree or disagree that we should remove references to RED Annex IX Part A from this definition? Please provide reasoning and evidence for your answer.

Question 39: Are there any impacts that we have not foreseen? If yes, please explain your reasoning.

Continuing the use of voluntary schemes to demonstrate compliance with the sustainability criteria

Any supplier wishing to claim RTFCs under the RTFO must submit independent verification reports to the administrator to demonstrate that the consignment of fuel complies with the RTFO sustainability criteria.

In practice, suppliers typically choose to demonstrate to independent verifiers and the RTFO administrator that the renewable fuel they are supplying complies with the RTFO sustainability criteria by utilising voluntary scheme certification. In 2019, over 99% of all renewable fuel supplied under the RTFO was certified by voluntary schemes. They reduce the administrative burden, as they typically track sustainability information along the whole supply chain, and facilitate trade as they can be accepted across the EU.

Currently the RTFO sustainability criteria are aligned with the sustainability criteria set out in the RED. The EU Commission assesses and approves voluntary schemes which fuel suppliers can utilise to certify that the fuel they supply meets the RED sustainability criteria.

The RTFO administrator can also recognise voluntary schemes as demonstrating compliance with the sustainability criteria of the RTFO.

EU member states must accept biofuel certified under EU approved voluntary scheme as having met the RED sustainability criteria for the scope that they were recognised e.g. for all sustainability criteria and for the full chain of custody, or for a sub-set of these. This compatibility and guarantee of approval is desirable for fuel producers who often do not know the destination market for their fuel at the point of production.

As a result of our departure from the European Union, we are no longer compelled by law to accept biofuel has met the sustainability criteria where it has been certified under an EU recognised voluntary scheme. We do, however, recognise the useful role voluntary schemes make in certifying sustainable biofuels and their ubiquitous use across a global marketplace means continuing to use voluntary schemes is important to UK fuel suppliers.

We therefore propose to continue to allow the use of voluntary schemes where we are satisfied that they provide evidence of meeting the RTFO sustainability criteria. In most cases we expect that where a voluntary scheme has been recognised as meeting the REDII sustainability criteria by the European Commission then it will be acceptable for use under the RTFO. Further detail will be provided in the RTFO Guidance in due course.

Where we have proposed changes to the sustainability criteria we have done this with a view to facilitating the continued use of voluntary schemes.

5. Civil penalties – minor amendment to provision on civil penalties

Suppliers who fail to comply with the RTFO may be liable to civil penalties. The amount of penalty charge, in certain scenarios, has historically been linked to the price suppliers must pay to buy out of their obligations to supply renewable fuel. We propose that the calculation used to determine the relevant civil penalty amounts is updated to reflect recent changes to the buy-out price.

Overview

We propose to make a minor amendment to article 23 of the RTFO Order to change the specified amount which is relevant to calculating the potential maximum civil penalty which may be set out in a civil penalty notice issued by the Administrator of the RTFO scheme.

This change would apply where an account holder has gained or attempted to gain one or more Renewable Transport Fuel Certificates (RTFCs), which can be redeemed against the main obligation, and the account holder has done so in contravention of an applicable provision listed in article 23(1) of the RTFO Order.

The effect of the amendment would be that the specified amount will be equivalent to twice the value of the RTFCs which the account holder has gained or attempted to gain. The specified amount would, as a consequence, be determined by using a £0.50 multiplier per RTFC, as opposed to £0.30 per RTFC, as is the case now.

Background

The Administrator of the RTFO scheme can issue civil penalty notices (CPNs) in a range of circumstances. These include where an account holder:

- fails to supply a verifier's report in respect of renewable transport fuel supplied (Article 23(2A));
- fails to provide information and/or ensure the accuracy of information provided in respect of the volume, energy content, and sustainability of fuels supplied (Article 23(3) and 23(5));
- fails to ensure that information, and the declaration, are provided in support of an RTFC (Article 23(3) and 23(5)); and/or,
- fails to ensure the accuracy of the information provided to the Administrator in respect of a proposed revocation of an RTFC (Article 23(3) and 23(5)).

Nothing in this proposal changes the scope of the Administrator's powers to issue CPNs. It would continue to be the case that civil penalties are recoverable as civil debts. As is the case now, outstanding payments would have interest applied to that debt at a rate of 5 percentage points above the base rate of the Bank of England and interest will be calculated on a daily basis.

It would also continue to be the case that suppliers would have the right to lodge an objection with the Administrator and the right of appeal to the relevant court. The grounds for appeal would remain that the recipient of a civil penalty is not liable to pay or that the civil penalty amount is too high.

The process by which the Administrator determines a civil penalty amount is set out in article 23 of the RTFO Order 2007, and section 129 of the Energy Act 2004.

Section 129 of the Energy Act 2004 prescribes that the civil penalty amount must not exceed the lesser of "the specified amount", as set out in an RTFO Order, or 10% of the turnover of the defaulter's business (as calculated in accordance with article 23 of the RTFO Order). In circumstances where an account holder has gained, or attempted to gain one or more RTFCs, but has contravened the RTFO Order, the specified amount has been determined as twice the value of the buy-out price for most of the duration of the RTFO scheme - as set out in article 21(7) of the RTFO Order.

The exception to this, is for the current obligation year (2021), where further to amendments to increase the buy-out price from £0.30 to £0.50, the multiplier used to calculate the specified amount has remained at twice £0.30. This was the previous buy-out price for the main obligation under the RTFO scheme.

No changes are being proposed to the calculation of civil penalties with respect to development fuels, which remains at twice the buy-out price of £0.80 pence per litre.

Amendments to the RTFO buy-out price apply from 2021

The Renewable Transport Fuel Obligations (Amendment) Order 2020, which came into force for the start of the obligation year 2021, increased the buy-out price in article 21(7) of the RTFO Order from £0.30 per litre to £0.50 per litre.

The RTFO is a certificate trading scheme. Where a supplier cannot meet their obligation by acquiring RTFCs through the supply of renewable fuels, or purchasing RTFCs from other suppliers, they can discharge their obligation by making a buy-out payment which is calculated by multiplying the buy-out price with the volume of renewable fuel a supplier is short of their obligation.

The buy-out option applies in respect of both the main obligation for renewable fuels, and development fuels. The obligation, associated buy-out price, and specified amount for development fuels is unaffected by this proposal.

The increase in the buy-out price made in 2020 was necessary as recent increases in the cost of biofuels relative to petrol and diesel mean that there was a risk that suppliers will buy out of their obligations to supply renewable fuel. If we had not made this change this

might have meant that we could not deliver GHG emissions savings from these fuels which make an important contribution to UK carbon budgets and net zero.

In introducing the increase in buy-out price, the Department did not consult on making a corresponding change to the specified amount used to determine the civil penalty amount.

Why change how civil penalties are calculated?

The RTFO is underpinned by an enforcement regime based on civil penalties and it is important to ensure that these are effective, proportionate and dissuasive. In considering these principles applicable to civil penalties it is also necessary to consider whether these are internally consistent.

It is our view that leaving the multiplier for the specified amount for a civil penalty issued where an account holder has gained, or attempted to gain, one or more RTFCs and contravened the RTFO Order at £0.60 per RTFC, whilst the buy-out price has increased to £0.50 per litre, is not internally consistent.

Consider the following illustrative example. The cost of supplying biofuel reaches 50 pence per litre, and RTFCs for the main obligation trade at around that price. Supplier X applies for RTFCs for a consignment of 10,000 litres of renewable fuel and contravenes the RTFO Order by failing to ensure the accuracy of evidence provided in support of their application. Supplier Y looks to discharge their obligation in compliance with the RTFO Order by acquiring RTFCs or buying out at a similar cost of £0.50 per litre. The maximum civil penalty that could be applied to supplier X in contravening the RTFO Order would be £6,000, yet the cost to supplier Y who has acted in compliance with the RTFO Order would be only a little less at £5,000.

A key benefit of having an effective enforcement regime is to ensure a level playing field for those companies obligated under the RTFO certificate trading scheme. In this way the integrity of the scheme's achievements in reducing carbon reductions is preserved, as is faith in the fairness of the scheme as a whole. The potential difference in cost per litre or RTFC missed between a supplier who legitimately meets their obligation through buy-out and one that contravenes the RTFO Order could be as little as £0.10. The proposal to update and align the calculation of the civil penalty amount with the current buy-out price seeks to ensure that civil penalties will continue to be effective, dissuasive and proportionate.

This proposal is not expected to increase the costs associated with compliance with the Order.

Question 40: Do you agree that the specified amount used in determining civil penalty amounts related to the main obligation, should change to twice the buy-out price?

If yes, please explain the reasons you agree.

If you do not agree, please also explain why, and state what you think the multiplier should be if you have an alternate proposal.

6. Changes to ensure renewable fuels and chemical precursors do not receive multiple incentives

We propose to further limit the opportunity for multiple incentives for renewable fuel and chemical precursors. This means that the following conditions must be met in order to claim support under the RTFO:

The renewable fuel or chemical precursor:

- **Must not count towards any renewable fuel or renewable energy target other than the UK's RTFO Obligation; and**
- **Must not have received, or be going to receive, support in the UK or any other countries. Exceptions include financial support to develop fuels and technologies e.g. laboratory scale testing, support for construction of demonstration scale production. This means that fuels produced in a plant that has received funding from the Future Fuels for Flight and Freight Competition, for example, would remain eligible to claim support under the RTFO.**

Background

Renewable fuels and feedstocks originate from all over the world and are traded between countries. Renewable fuels and feedstocks are also used across multiple sectors including, transport, heat and electricity generation and in the biochemicals industry. Governments support the production of renewable fuels through different schemes such as issuing green certificates or providing tax exemptions. It is therefore possible that renewable fuels and feedstocks could be eligible to receive incentives in more than one country or sector.

As set out in the RTFO the transport fuel or chemical precursors cannot have been, or will not be, counted under a support scheme of another EEA state or in the UK. It also cannot be counted towards a UK renewable energy target other than the RTFO (see Figure 18). The RTFO guidance sets out that in order to claim RTFCs, suppliers are required to declare that the renewable fuel upon which they are claiming RTFCs, or any chemical precursor from which that fuel was produced has not been, and will not otherwise be,

counted towards the target referred to in RED (article 3(1)). This is to avoid the same unit of renewable energy being counted more than once towards Member State targets.

Figure 18 *Article 16(2)(a)(ii) - RTF*O requirements for a fuel not to be supported under another *support scheme*

the renewable transport fuel, or a chemical precursor to it, has not already been, and will not be, counted under the support scheme of another EEA state or the UK within the meaning of article 2(k) of the directive, or a UK renewable energy obligation other than the renewable transport fuel obligation of the supplier;

Biofuels and other renewable fuels are generally more expensive than fossil fuels and need measures in place to support their supply. The RTFO is the key driver for renewable fuel supply in the UK and works alongside other support such as the Advanced Fuels Demonstration Competition and the Future Fuels for Flight and Freight Competition, which support demonstration projects producing low carbon fuels of strategic importance.

The RTFO provides support only for renewable fuels which are supplied for use in the UK, but these fuels and their feedstocks are sourced from across the world. Some of those countries where the fuels are produced may have schemes which support the production of renewable fuel.

Currently, if a fuel or chemical precursor has benefited under a support scheme, whether in the UK or another European Economic Area (EEA) state, that does not necessarily mean it cannot be awarded RTFCs. It is only in cases where benefiting under such a support scheme means that the fuel or precursor in question is counted towards the RED target, that it will not be eligible for RTFCs. This means, for example, that a supplier must not apply for RTFCs if an application has been made or will be made to Ofgem under the Renewable Heat Incentive or Renewables Obligation in relation to that fuel or a chemical precursor to that fuel.

Given that the RED target no longer applies to the UK, but there remains a need to avoid multiple reward across different sectors or in different countries, there is a need to update this requirement.

As the need to address climate change becomes more important in countries around the world, it is likely that there will be an increase in demand for renewable fuels and energy in all sectors. Along with this, governments may decide to assist the production/supply through some type of support scheme. To help limit double or even multiple incentivising the production and supply of fuels we are proposing to make minor changes to the RTFO.

Proposal

We propose to further limit the potential for renewable fuel to have received multiple incentives outside the RTFO. A summary of the proposal compared to what is already in place can be seen below in Table 8.

Situation	Now	Proposed change
Counting towards targets	If a renewable fuel or chemical precursor counted towards the RED or a UK target other than the RTFO then they would not be eligible for support under the RTFO.	If a renewable fuel or chemical precursor counted towards any renewable energy obligation around the world other than the RTFO then they would not be eligible for support under the RTFO.
Multiple reward	If a renewable fuel or precursor has received support in another country or sector so long as it does not count towards a RED or UK target (other than the RTFO) then it is eligible for support under the RTFO.	Renewable fuel or the chemical precursor cannot be in receipt of support which benefits the end supply of fuel. Such schemes may include feed-in tariffs or premium payments. If the renewable fuel or precursor has been produced in a production plant that has benefited from, for example, investment aid anywhere in the world then the renewable fuel would be eligible to receive support under the RTFO.

Table 8 Proposed changes to ensure renewable fuels and chemical precursors do not receive multiple incentives, compared to what is already in place

If the end supply of fuel has benefitted from a renewable energy obligation support scheme, including those using green certificates, or a direct price support schemes including feed-in tariffs and sliding or fixed premium payments then it would not be eligible to claim RTFCs.

If the production facility[33] receives investment aid, including government grants or government loans and funding given through competitions such as Advanced Biofuel Demonstration Competition (ABDC) and the Fuels for Future Flight and Freight (F4C), then the end supply of fuel could be rewarded under the RTFO.

It is possible that suppliers are considering exporting their fuel to the UK so they could receive multiple incentives by claiming RTFCs and other support in the country or origin. This could mean that they decide to no longer export, which could lead to a shift in where the fuels are produced. We anticipate that any disruptions would be minor and temporary due to industry eventually filling the gap of the levels lost due to reduced importation.

These changes are relatively minor but could potentially encourage further development of UK produced fuel by eliminating any potential advantages that renewable fuel suppliers in other countries may have in being able to claim multiple incentives for a unit of energy.

[33] As defined by “chain of installation” in paragraph 1 of the RTFO

Questions

Question 41: We propose that RTFCs should not be awarded if the renewable fuel or chemical precursor benefits from other support schemes such as feed-in tariffs and premium payments. Do you agree that we should further limit multiple reward of renewable energy and chemical precursors? Please provide reasoning and evidence for your answer.

Question 42: We have set out some circumstances where support in addition to that offered by the RTFO might be appropriate. These include if the production facility receives investment aid, including government grants or government loans. Should there be other exceptions when limiting multiple reward of renewable energy and chemical precursors? If yes, please list them and provide reasoning and evidence for your answer.

Question 43: Do you anticipate any unintended consequences with this change? Please provide reasoning and evidence for your answer.

What will happen next

Immediate next steps

A summary of responses, including the next steps, will be published within three months of the consultation closing on 23nd April. Paper copies will be available on request.

If you have questions about this consultation please contact:

Low Carbon Fuels Team
Department for Transport
Zone 1/32 Great Minster House
London SW1P 4DR
Email LowCarbonFuel.Consultation@dft.gov.uk

Legislative timing

We anticipate that any target increases would be introduced in January 2022, which is the earliest opportunity as the RTFO operates on a calendar year basis.

To introduce support for RCFs into the RTFO we will need to amend the Energy Act 2004 or find alternative primary powers. Given that this will take additional time, we will not be able to introduce support for RCFs as part of this package of amendments to the RTFO. However, we will gather views from this consultation so that we can set out the Government position with a view to making any changes as soon as possible.

7. Full list of consultation questions

For each of the following questions, please set out the reasons for your answers, including the impacts of any alternative that you may propose and any anticipated implications. Please also provide any supporting evidence you may have.

Renewable fuel supply trajectory to 2032 and subsequent years

1. Should we increase, decrease or keep the main obligation at the same level? Please provide evidence and reasoning for your answer.

2. If you agree that we should increase the RTFO obligation, what level should it be increased by; 1.5%, 2.5% or 5%? Please provide evidence and reasoning for your answer.

Introducing support for recycled carbon fuels

3. Do you agree or disagree that recycled carbon fuels should be eligible for support under the RTFO given their potential to deliver GHG savings?

4. Do you agree or disagree that only RCFs derived from refuse derived fuel and industrial wastes gases should be eligible for RTFO support? If not, please provide an alternative approach and set out why.

5. Do you agree or disagree that RCFs produced from solid feedstocks should contain at least 25% biogenic content, by energy? If not, please set out an alternative approach with evidence as to why.

6. Do you agree or disagree that support for RCFs should focus on those RCFs which can meet the UK's future strategic needs? That is, that only RCF types which are equivalent to current development fuels should be eligible for support. As such they would be eligible for development fuel certificates and to count towards the development fuel sub-target under the RTFO.

7. Do you agree or disagree with the proposed GHG minimum thresholds and the timeline for increasing GHG emission saving criteria for RCFs? Please provide an explanation as to why.

8. Do you agree or disagree with the proposed GHG emissions methodology to assess the GHG savings for recycled carbon fuels? Please provide an explanation to why.

9. Do you agree or disagree with our proposal that RCFs from solid feedstocks are eligible for two x 0.25 dRTFCs per litre, and RCFs produced from gaseous feedstocks are eligible for two x 0.5 dRTFCs per litre?

10. RCFs from industrial waste gases have the benefit of avoiding release of the industrial gases to the atmosphere. Do you have evidence as to how it can be demonstrated that avoided GHG emissions have not been claimed elsewhere (e.g. under the Emission Trading Scheme), and that they have been attributed to the final fuel?

Hydrogen and renewable fuels of non-biological origin

11. Is "*renewable energy that would not have been available to the grid in the absence of power demand from the RFNBO plant in question"* an appropriate definition of additional renewable energy?

12. Should the Administrator be able to take into account the use of power purchase agreements (PPAs) as evidence that suppliers have purchased additional renewable energy in order to allow the renewable power generation to be located in a separate location from the RFNBO production facility?

13. A consequence of allowing the use of PPAs to demonstrate renewability, in combination with also permitting other suppliers to use a grid average renewability, is that the same renewable energy could be accounted for more than once. We consider this to be low risk when hydrogen energy and other RFNBO demand is small compared to the total renewable energy available on the grid. We are seeking views on whether this risk is acceptable. Is this risk acceptable?

14. Should appropriate adjustments be made to the amount of renewable energy supplied to a RFNBO production facility to account for transmission losses where renewable energy is transferred over the electricity grid?

15. Do you have any comments on the proposal to use a 30-minute time period for temporal correlation of renewable energy production and use, in cases where renewable energy has been purchased and transmitted across the grid?

16. Should the Administrator be able to permit fuel suppliers to use local grid GHG emissions factors in RFNBO GHG emission calculations? Circumstances in which this might be appropriate include where there are local grid constraints or other local conditions which mean that the local grid GHG intensity differs substantially from that of the national grid.

17. A consequence of allowing local grid GHG emissions to be used in calculating the GHG intensity for a RFNBO is that GHG savings may be claimed by a production facility on a low GHG emission regional/local grid which have also

been accounted for in the average national grid GHG intensity. Is this risk acceptable?

18. Have we captured all the additionality scenarios as set out in the proposals in the chapter and in the decision tree (Figure 13)? Please suggest alternatives with evidence

19. Do you agree or disagree that biohydrogen produced from biomethane reformation should be eligible for standard RTFCs rather than development fuel RTFCs?

20. Certain advanced production methods for biohydrogen are likely to be of strategic future importance and require new investments, such as addition of CCS. Do you agree or disagree that when these methods are used, biohydrogen produced from biomethane reformation should remain eligible for development fuel RTFCs?

21. Hydrogen is likely to be an important power source for parts of the railway that are not possible to electrify. Do you agree or disagree that renewable fuel used in trains powered by fuel cells should eligible for RTFCs?

22. Hydrogen also has the potential to be an important power source for construction and other non-road vehicles. Do you agree or disagree that renewable fuel used in these vehicles powered by fuel cells should eligible for RTFCs?

23. Hydrogen supplied to retail customers is already eligible for RTFCs. Do you agree or disagree that the assessment time for hydrogen should be amended to make clear that fuel supplied to commercial customers can also qualify for RTFCs?

Changes to sustainability criteria

24. Do you agree or disagree that the default and disaggregated default values for calculating renewable fuel CI values under the RTFO should be updated in line with those published in the RED II Annexes?

25. Do you agree or disagree with our proposal to remove the GHG emissions credit for cogeneration of electricity from the greenhouse gas saving methodology to prevent overstating the GHG emissions savings achieved by the finished fuel?

26. Do you agree or disagree that biomethane suppliers should be able to apply a GHG emissions saving credit for avoided emissions when calculating the carbon intensity of biomethane produced from manure?

27. Do you agree or disagree that when biomethane is created via the codigestion of multiple feedstocks, the supplier should continue to be required to report the CI of each individual consignment? That is, the supplier should not be permitted to average the CIs across feedstocks, in line with the mass balance rules which apply to other biofuels.

28. Do you agree or disagree with our proposal to update the fossil fuel comparator from 83.8 gCO2e/MJ to 94 gCO2e/MJ to better reflect the real world GHG emissions associated with fossil fuels?

29. Do you agree or disagree that we should update the minimum greenhouse gas saving thresholds to offset the impact of the revised fossil fuel comparator? This would prevent support for renewable fuels which have worse GHG emissions than those supported now.

If you agree - do you agree with the levels of the new proposed GHG savings thresholds?

If you disagree - please provide your reasoning.

30. Do you think we should consider introducing a tighter GHG emission savings threshold for fuels produced in new production facilities in the future? This would be in addition to the existing thresholds that we are proposing and would only apply to installations not yet built.

31. If yes - what do you think the minimum GHG emission savings threshold should be and what should the start date be? Do you agree or disagree that we should increase the RFNBO GHG threshold to 65%? Please provide supporting evidence.

32. Do you agree or disagree with our proposal to add 'highly biodiverse forest and other wooded land which is species rich and not degraded' to the list of restricted land categories? This will increase existing environmental protections and keep pace with international protections.

33. Do you agree or disagree that we should continue to allow the production and harvesting of biofuel feedstocks from ‘highly biodiverse forest and other wooded land’ when it can be demonstrated that the production and harvesting of the feedstock from the land was completed without compromising the land type’s nature protection purposes?

34. Do you agree or disagree with our proposal to update the definition of highly biodiverse grasslands to maintain consistency with other land types, international definitions, and to facilitate the continued use of voluntary schemes?

35. Do you agree or disagree with our proposal to require that suppliers of biofuels produced from agricultural residues must demonstrate that monitoring and management plans are in place which address the impact of the removal and processing of the feedstock on the site’s soil quality and soil carbon content?

36. Do you agree or disagree with our proposal to introduce new sustainability criteria specifically for feedstocks sourced from forest biomass? Note that this would mean that biofuels from forestry feedstocks will no longer be required to meet the land criteria, but instead would be required to meet specific forest criteria.

37. Do you agree or disagree that the proposed criteria better represent the specific environmental impacts associated with forestry?

If you disagree, please provide your reasoning.

38. Do you agree or disagree that we should remove references to RED II Annex IX Part A from this definition?

39. Are there any impacts that we have not foreseen? If yes, please explain your reasoning.

Civil penalties – minor amendment to provision on civil penalties

40. Do you agree that the specified amount used in determining civil penalty amounts related to the main obligation, should change to twice the buy-out price?

If yes, please explain the reasons you agree.

If you do not agree, please state what you think the multiplier should be, and also explain why, and state what you think the multiplier should be if you have an alternate proposal.

Changes to ensure renewable fuels and chemical precursors do not receive multiple incentives

41. We propose that RTFCs should not be awarded if the renewable fuel or chemical precursor benefits from other support schemes such as feed-in tariffs and premium payments. Do you agree that we should further limit multiple reward of renewable energy and chemical precursors? Please provide reasoning and evidence for your answer.

42. We have set out some circumstances where support in addition to that offered by the RTFO might be appropriate. These include if the production facility receives investment aid, including government grants or government loans. Should there be other exceptions when limiting multiple reward of renewable energy and chemical precursors? If yes, please list them and provide reasoning and evidence for your answer.

43. Do you anticipate any unintended consequences with this change? Please provide reasoning and evidence for your answer.

8. 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:

Consultation Co-ordinator
Department for Transport
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