Department for Transport

RTFO statutory review and the future of the scheme: summary of responses and policy update

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Ministerial Foreword

From its introduction in 2008, the Renewable Transport Fuel Obligation (RTFO) has been a pillar in the UK's effort to decarbonise the vehicles driving on our roads. Recently, it has been joined by the Zero Emission Vehicle Mandate and the Sustainable Aviation Fuel Mandate. Together, these schemes are accelerating progress towards net zero.

While the goal is to see zero emission technology across all transport modes, that transition will not happen overnight. It is therefore clear that low carbon fuels will continue to play an important role in decarbonising transport, providing cost effective emissions reductions on our journey to net zero and delivering greener transport.

Since the last major changes to the RTFO in 2018, the low carbon fuel sector has continued to develop, with new technology unlocking opportunities for innovation and investment. This progress can help drive investment and economic growth.

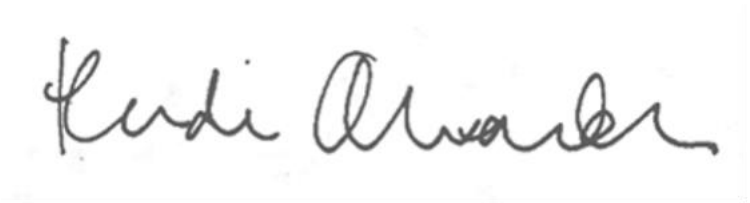
As the main lever for encouraging the use of low carbon fuel in surface transport, the RTFO was responsible for two thirds of transport's carbon savings between 2008 and 2022. But, like all policies, it must evolve to best meet the challenges of today. We have sought industry's views on how best to do this via our call for evidence on the future of the scheme and will continue to work closely with the sector. I am pleased to publish our summary of those responses today and set out the vital next steps in the policy development process.

This work will include:

- A consultation on the broader RTFO scheme containing proposals for the future target trajectory. This will include options for increased targets and improving the development fuel obligation.
- A call for evidence, to be published later in 2025, on the eligibility of different types of crops in the Sustainable Aviation Fuel (SAF) Mandate.
- Convening an expert working group to explore whether ethanol blending in petrol can be increased beyond E10 (10%) in the UK.
- As set out in the Maritime Decarbonisation Strategy, implementing International Maritime Organization regulations and, subject to consultation, introducing complementary domestic fuel regulations.

I'd like to thank all those who responded to our call for evidence and for the valuable information shared. This has already informed the actions above, and we will continue to engage with stakeholders throughout the rest of the year as we develop these policies.

The groundwork for the RTFO was laid two decades ago in the 2004 Energy Act, and we will do everything we can to deliver another two decades of progress in this vital green economy sector.



Rt Hon Heidi Alexander MP
Secretary of State for Transport

Executive summary

Context

1.1 In 2023, the transport sector remained the UK's largest emitting sector, responsible for 29% of domestic UK greenhouse gas emissions.[1] The government is committed to delivering greener transport, which will support the missions to kickstart economic growth and make Britain a clean energy superpower.

1.2 The majority of transport's emissions are currently from road transport, where fossil fuels like petrol and diesel are the main forms of energy. Low carbon fuels are already delivering significant emissions savings by replacing fossil-derived fuels. Supported by the Renewable Transport Fuel Obligation (RTFO), these fuels, which deliver carbon savings over their lifecycle when compared to traditional fossil-derived fuels, constituted 7.5% of surface transport fuel in 2023.[2] Low carbon fuels have delivered 55 MtCO2e of emissions savings since the RTFO's inception in 2008.[3]

1.3 The UK has an established low carbon fuel industry, producing fuels to help meet RTFO targets, as well as developing and deploying the advanced technologies needed to meet future needs.

1.4 Government is committed to transitioning to zero emission technologies for all road transport modes, and the Zero Emission Vehicle (ZEV) Mandate is today driving this transition in the car and van market, supported by over £4.5bn of Government investment to help industry and drivers make the switch.

1.5 While the accelerating shift to zero emission vehicles is evident on UK roads today, we are realistic that clean technologies for some parts of the sector will take longer to mature. For these heavier applications, low carbon fuels will continue to play an important role as an interim solution for reducing transport emissions

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[1] Department for Energy Security and Net Zero, 2025. 2023 UK greenhouse gas emissions: final figures.

[2] Department for Transport, 2024. Renewable fuel statistics 2023: final report.

[3] Department for Energy Security and Net Zero, 2024. Energy and emissions projections: 2023 to 2050. *GHG savings from the energy emissions projections are relative to a 2009 counterfactual forecast of no additional decarbonisation policy beyond that date.*

during this period. Aviation and maritime, in particular, are likely to continue to use combustion engines and alternatives to fossil fuels will be vital on their journeys towards net zero. Government will continue to use regulation and other policy levers to support and enable this.

1.6 As our transition to net zero progresses, it is important that we review and update schemes like the RTFO. This is to make sure that they are operating as intended and remain cost-effective alongside other key policies like the ZEV Mandate and SAF Mandate, in line with the key principle of maximising GHG savings without compromising on wider environmental priorities.

The role of the Renewable Transport Fuel Obligation

1.7 Since 2008, the RTFO has supported the decarbonisation of fuels used in surface transport by placing an annual obligation on fuel suppliers which requires a certain percentage of their fuel to be sustainable low carbon fuel rather than fossil fuel.

1.8 Examples of these fuels include biofuels such as biodiesel and bioethanol, typically blended into diesel and petrol respectively, while more recently we have seen increasing use of hydrotreated vegetable oil (HVO, also known as renewable diesel) and biomethane. Other low carbon fuels such as renewable hydrogen are also eligible but not currently supplied in large quantities under the scheme.

1.9 The scheme has two obligations (or targets) which apply to fuel suppliers:

- the main obligation - which supports the supply of traditional biofuels
- the development fuel obligation - which supports the development of novel strategic fuels of the future

1.10 Since it was introduced in 2008, the operation of the RTFO has been reviewed and adapted to ensure the policy has continued to achieve significant GHG emissions savings. This has included:

- increasing the level of the obligation;
- widening the scope of eligible fuels and end uses (non-road mobile machinery (NRMM), maritime and aviation);
- updating sustainability criteria to provide increased protections for the environment;
- introducing additional incentives for waste-derived fuels; and
- introducing a crop cap.

1.11 The RTFO implemented a series of policy changes in 2018. It is a statutory requirement to scrutinise the impact of these changes and publish a review summarising their impact. As part of this review, we gathered stakeholder feedback on how the scheme was performing.

1.12 A call for evidence on the RTFO was published on 25 November 2024, and closed on 28 January 2025. This call for evidence was published in the context of the wider statutory review of the RTFO, and asked a range of broad questions on:

- future RTFO targets (or obligation levels);
- how low carbon fuels are rewarded under the RTFO;
- the treatment of crops and wastes;
- the development fuel sub-target; and
- the administration of the RTFO.

1.13 The call for evidence received 128 responses, from a wide range of organisations.

1.14 This Statutory Review concludes that the RTFO continues to meet its overarching objective to deliver significant and growing GHG savings across surface transport. On average, the RTFO main obligation has delivered value-for-money carbon abatement over the review period relative to the DESNZ carbon values. The scheme was relatively less cost-effective during times of high fuel prices (2021-2022) following Covid-19 and the Russia-Ukraine war. The development fuel obligation has been more challenging, due to low volumes of fuel supply resulting in a high level of buy-out. We have identified key areas for further consideration and recognise industry requests for further clarity.

1.15 We can therefore confirm that we will consult on:

- proposals for the future target trajectory – this will include options for increased targets
- support for development fuels
- how low carbon fuels are rewarded under the RTFO
- broadening the RTFO to include fuels produced from nuclear energy
- broadening the list of eligible non-road transports to include hydrogen fuel cell mobile generators.

1.16 Through this process, we are committed to continue our active engagement with industry. We will organise a series of workshops with stakeholders following publication of this document, allowing us to further develop our evidence base on these areas ahead of consultation.

1.17 The government is committed to creating an RTFO fit for the future. We will work closely with the low carbon fuels sector and other stakeholders to ensure that low carbon fuels continue to decarbonise transport and deliver net zero.

Future RTFO targets

1.18 The RTFO's targets have a current trajectory which increases until 2032 and then remains at that level into the future.

1.19 The call for evidence asked stakeholders for their views regarding the current trajectory of the RTFO targets, the anticipated availability of feedstock (resources needed to create fuels), and the current scope of the RTFO with regards to transport modes, fuels and feedstocks.

1.20 We received a range of responses; however, the consensus from industry stakeholders was that the RTFO targets should be increased and extended into the future to provide a clear market signal. Respondents expressed confidence

around the global availability of feedstock to meet any target increases. There were mixed views on the current eligibility requirements of fuels, feedstocks and transport modes supported by the RTFO.

1.21 The government is committed to consulting on the future target trajectory including the option to increase future RTFO targets. We are working to update our evidence base to model potential future scenarios.

1.22 When taking decisions about future targets it will be important to consider various factors including: (1) delivery of UK carbon budgets and net zero by 2050; (2) the increased demand and competition for feedstocks globally across sectors including road transport, off-road machinery, maritime and aviation globally; (3) the low carbon fuel supply capacity in the UK; (4) value for money and affordability for drivers; (5) the increase in zero emission vehicles which will reduce liquid fuel demand on UK roads over time.

How low carbon fuels are rewarded under the RTFO - crops and wastes

1.23 The RTFO currently provides certificates to low carbon fuels in proportion to the volume of fuel supplied, provided they meet the sustainability criteria set out in the RTFO. These certificates are used by suppliers to provide evidence of meeting the RTFO obligations (or targets). Individual businesses can trade these in a market, offering a more flexible way for the fuel industry to comply with their obligations.

1.24 Within that mechanism, the scheme then further incentivises the supply of waste and residue-derived fuels over fuels produced from crops given they have the potential to offer higher GHG savings through helping to avoid wider sustainability risks, such as indirect land-use change and also avoid impacts on food security. This is achieved by double counting waste and residue-derived fuels towards a supplier's obligation and a cap on the use of crop-derived fuels. These policies were introduced in 2011 and 2018 respectively. For the purposes of this document, 'waste and residues' will be written as 'wastes'.

1.25 An alternative model for schemes like the RTFO is to operate on a greenhouse gas (GHG) basis. This would mean that fuels are rewarded based on the emissions savings they achieve compared to fossil fuels, with better performing fuels receiving more certificates per litre or per unit of energy, and no additional incentive for waste-derived fuels. The SAF Mandate, which began in 2025, operates on this basis.

1.26 The call for evidence asked questions on:

- how the RTFO should reward fuels
- whether the current minimum GHG emission savings thresholds remain appropriate
- the crop cap trajectory, and the types of crops covered by the cap
- the effectiveness of double-counting waste-derived feedstocks under the RTFO.

1.27 We received a range of responses. The majority of stakeholders considered that the RTFO should transition to a GHG-based scheme. Views were raised in this section of the call for evidence about whether the double-counting of waste-derived fuels is appropriate in cases where these fuels do not achieve double the carbon savings. It was also raised that indirect land use change (ILUC) values currently have a high level of uncertainty, [4] and there would be a risk that fuels with high ILUC risk could be supplied under a GHG scheme, potentially leading to adverse environmental impacts and reducing the RTFO's overall GHG savings.

1.28 **The government commits to consult on how low carbon fuels are rewarded under the RTFO to further consider the balance of the evidence already received.**

The development fuel sub-target

1.29 In 2018, the RTFO introduced a new development fuel obligation, intended to encourage the supply of novel emerging technologies for fuel production, including those suitable for harder to decarbonise sectors and modes such as trucks and planes. This was implemented on the 1st January 2019.

1.30 Like the main obligation, the development fuel trajectory is set to increase each year until 2032, after which it continues at that level indefinitely. The RTFO has not seen the uptake of development fuels expected, with high levels of buy-out each year since the obligation was introduced.

1.31 The call for evidence asked stakeholders a series of questions on the development fuel obligation, including why the supply had been lower than anticipated; whether this level had potential to increase; and how policy changes or external factors could stimulate the increased supply of development fuels going forward.

1.32 Responses focusing on the development fuel sub-target were mixed. Stakeholders provided a wide range of evidence as to why supply had been lower than anticipated and how that could be addressed. There was also positivity around the design of the policy, including that increased supply is expected to come online in the coming months and years as a result of the target. Stakeholders also highlighted the importance of a stable regulatory environment and higher targets to support the case for further investment.

1.33 **We commit to consulting on how the development fuel sub-obligation can best deliver on its objectives.**

1.34 We will continue to explore in detail whether the production of development fuels is getting the support it needs, and whether eligibility criteria remain correct. We also understand that investments have been made based on the existing mechanism, and so will be careful to balance any changes with the need for regulatory stability.

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[4] International Energy Agency, 2024. Carbon Accounting for Sustainable Biofuels.

The role of the RTFO administrator and administration of the scheme

1.35 Finally, the call for evidence took the opportunity to seek input on how the RTFO is administered, asking for feedback on the day to day running of the scheme.

1.36 This feedback was broadly positive, and, where appropriate, suggestions from stakeholders have been taken on board by the Administrator. Stakeholders were positive about the administration of the scheme, production of guidance and the engagement between industry and both policy officials and the administrative team. They valued the statistical releases, guidance documents and regular stakeholder workshops. We remain open to receiving further feedback on the operation and administration of the scheme.

Next steps

1.37 The government will continue to engage with stakeholders on changes to the RTFO, building our evidence base through workshops before consulting on any potential changes. Subject to that consultation, and parliamentary time, we aim to introduce any necessary legislation in 2026 and implement any changes to the RTFO in time for the start of the 2027 reporting year.

Introduction

Purpose of this document

This document represents the culmination of the statutory review process required for the Renewable Transport Fuel Obligations Order (2008). Following a call for evidence which closed on 27 January 2025, this document provides a summary of responses as well as our proposed next steps.

We are taking this opportunity to provide a broader policy update, setting out the important role we see for low carbon fuels across the transport modes, including surface transport, in meeting Net Zero. We also outline some of the key considerations and principles that we will need to balance in setting the future framework for the RTFO.

The strategic importance of low carbon fuels

Low carbon fuels' role in decarbonising transport

Delivering greener transport is one of the five key priorities for the Secretary of State for Transport. Low carbon fuels have an important role to play in delivering this priority as well as the government's missions, helping to **Kickstart Economic Growth**, and **Make Britain a Clean Energy Superpower**.

To achieve this, we are committed to deploying low carbon fuels to deliver cost-effective greenhouse gas (GHG) emission reductions while protecting the wider environment, delivering socio-economic benefits, and promoting the sustainable supply and use of low carbon fuels globally.

Low carbon fuels are already delivering significant emissions savings in transport. These fuels, which deliver carbon savings over their lifetime when compared to traditional fossil-derived fuels, constituted 7.5% of surface transport fuel in 2023[5] and have delivered 55

[5] Department for Transport, 2024. Renewable fuel statistics 2023: final report.

MtCO2e of GHG savings since its inception in 2008, that's about two thirds of the transport's GHG savings between 2008 and 2022.[6]

Over the coming years and decades, zero emission solutions, principally electrification, will play a central role in decarbonising transport. Our vision is that all road vehicles will be zero emission in the future. However, this transition will take time, and there are some modes and applications where zero emission technologies will take longer to mature. As such, low carbon fuels will continue to play an important role in decarbonising those vehicles, vessels, machinery, and aircraft that are powered by combustion engines and fuel cell technology as the UK continues its journey towards net zero 2050.

This government has already signalled its support for the vital role of these fuels and their use in maritime and aviation. The Maritime Decarbonisation Strategy (MDS) commits to consulting on the introduction of regulations to drive uptake of low carbon fuels in maritime. In aviation, the Sustainable Aviation Fuel (SAF) Mandate came into force on 1 January 2025 and we are developing a Revenue Certainty Mechanism (RCM) to help de-risk domestic SAF production projects, thus creating both demand and supply side regulatory support from government for these fuels.[7]

As part of this statutory review, we are taking the opportunity to more clearly articulate the important role we see for low carbon fuels in decarbonising surface transport, now and in the future. We aim to build a RTFO policy which is fit for the future, supporting the use of low carbon fuels in zero emission applications and where combustion engines remain on our roads, rails and off-road settings.

A continuing role for low carbon fuels in surface transport

Biodiesel and bioethanol have been a crucial part of UK fuel supply since the RTFO's inception in 2008, with these fuels being blended into the regular petrol and diesel supply, seamlessly delivering GHG savings across surface transport applications. Increasingly, fuel suppliers and vehicle operators are also deploying fuels such as hydrotreated vegetable oil (HVO) and biomethane as options to achieve higher blends of low carbon fuel and therefore higher GHG savings. HVO supply almost doubled between 2022 to 2023 to over 500 million litres,[8] and there were over 400 more gas-using HGVs on UK roads in Q2 of 2024 compared to Q2 2023.[9]

Although combustible low carbon fuels can achieve high GHG savings today, they still have limitations compared with zero emission (ZE) technologies such as battery-electric and hydrogen fuel-cell. For example, low carbon fuels used in combustion engines still produce local air pollution from their exhausts. This has impacts both on the environment and on human health. Additionally, while some respondents to the call for evidence argued that there is plentiful availability to meet future targets, the supply of sustainable biofuels is

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[6] Department for Energy Security and Net Zero, 2024. Energy and emissions projections: 2023 to 2050. *GHG savings from the energy emissions projections are relative to a 2009 counterfactual forecast of no additional decarbonisation policy beyond that date.*

[7] Department for Transport, 2025. Sustainable Aviation Fuel (SAF) Mandate

[8] Department for Transport, 2024. Renewable fuel statistics 2023: final report.

[9] Driver and Vehicle Licensing Agency, 2024. Vehicle licensing statistics data tables (VEH1103).

finite and will be subject to growing competition from other modes and sectors, both domestically and internationally. Ensuring that low carbon fuels are deployed in a way that maximises GHG savings without compromising on wider environmental priorities is a key principle of government's support for these fuels.

The limitations noted above are, alongside greater energy efficiency in general, key reasons why government is committed to transitioning to ZE technologies wherever possible, supported by policies such as the Zero Emission Vehicle Mandate (ZEV mandate). Alongside this, low carbon fuels have an important role to play delivering transport decarbonisation across the modes, but we need to be strategic in their deployment and ensure that they are utilised in sectors and use cases where alternative decarbonisation options are either operationally or economically unfeasible.

All road transport is expected to be ZE in future, with ZE options already available in every weight class. This includes Heavy Duty Vehicles (HDVs), where new vehicles with increased ranges are coming to market each year. While ZE technology options for the HDV sector are already being deployed, parts of this sector, including coaches and heavy goods vehicles (HGVs), are still at an earlier stage of deployment compared with cars and vans, where battery electric vehicles are becoming increasingly prominent on UK roads. These sections of the HDV market are therefore likely to take longer to transition. Older vehicles will also remain in use throughout the coming decades, and so there will be a need for combustible fuels. During this transition, the RTFO will continue to support utilisation of low carbon fuel options such as higher biocontent fuels (HBFs) and biomethane, enabling operators to achieve further GHG emission reductions. The RTFO's development fuel target also supports the utilisation of hydrogen, both in fuel-cells and engines of vehicles, vessels, and machinery which have already made the transition and are covered by the RTFO order.

This transition will also be challenging for non-road surface transport such as NRMM[10] and agricultural vehicles, examples of which include forklift trucks, tractors, and mobile generators. These are particularly diverse sectors, and decisions on fuel switching will ultimately depend on various factors including machine type, use case, deployment site characteristics, and fleet availability. In rail, although the priority should be to electrify wherever possible, low carbon fuels may have some longer-term, limited applications.

Wherever low carbon fuels are used in UK transport, industry, governments and other actors must work together to ensure that these fuels are sourced sustainably. Schemes like the RTFO have strict sustainability criteria supported by a robust compliance framework including third-party verification of every consignment of fuel and the widespread use of voluntary certification schemes to provide assurance throughout the supply chain. In the UK, we augment this by undertaking additional investigations and we work closely with other renewable fuel regulators, voluntary schemes, verifiers and auditors to share information and promote compliance.

We are clear that while vehicles and machinery with internal combustion engines remain in the UK surface transport fleet, we will continue to support and facilitate the use of low

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[10] Non-road mobile machinery (NRMM) broadly refers to any mobile machine, transportable equipment or vehicle not intended for the transport of goods or passengers on the road, and which has a combustion engine. The legislative definition is contained within the RTFO Order.

carbon fuels which can deliver effective GHG emissions reductions. As such, this review seeks to take this long-standing and highly successful policy and build an RTFO fit for the future, working effectively alongside policies like the ZEV Mandate to collectively deliver rapid and cost-effective decarbonisation of surface transport.

The critical role of industry

Businesses across the value chain have played a crucial role to date in scaling up the production, supply, and use of low carbon fuels in the UK, from domestic producers of biofuel to refineries, importers, blenders, distributers, and operators. We have also seen a raft of innovations in low carbon fuel production being developed and deployed by UK industry, from turning fatbergs into fuel,[11] to the first commercial scale SAF production in the UK at Humber refinery.[12] Policies like the RTFO have helped to bring these actors together around the common goal and challenge of decarbonising transport through the use of low carbon fuels.

In the coming years and decades, as the role of low carbon fuels across the transport modes grows, there are opportunities for the growth of new businesses and technologies, as well as for our existing fossil fuel-based industries to transition towards more sustainable technologies. Alongside the supply-side support for the deployment of novel production technologies such as through the Advanced Fuels Fund[13], schemes like the RTFO can help to provide long-term demand side certainty to fuel suppliers and producers.

We are committed to ongoing engagement with UK industry as we move forward, building on the UK's technological and engineering expertise to continue to position the UK as a world leader in developing new solutions to the challenges of climate change.

The Renewable Transport Fuel Obligation

What is the RTFO?

The Renewable Transport Fuel Obligation (RTFO) is the Government's main policy for reducing greenhouse gas emissions from fuel supplied for use in: (i) road vehicles, and (ii) non-road mobile machinery (NRMM). The RTFO commenced on 15 April 2008 and is intended to deliver reductions in greenhouse gas emissions from fuel used for transport purposes by encouraging the supply of sustainable low carbon fuels. The Renewable Transport Fuel Obligations Order (2007) has been amended multiple times since its introduction. This review focuses on the changes made in 2018.

The RTFO works by setting annual obligations on fuel suppliers to require a certain percentage of their fuel supply to comprise low carbon fuels. This obligation can be met in three ways (or using a combination of these):

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[11] BBC, 2017. 'Fatbergs', faeces and other waste we flush could be a fuel

[12] Phillips 66 Limited. Renewable Fuels

[13] Department for Transport, 2025. Advanced Fuels Fund (AFF) competition winners

- by supplying low carbon fuel and claiming renewable transport fuel certificates (RTFCs)
- by purchasing RTFCs from other suppliers, and/or
- by "buying out" of any proportion of their obligation

The costs associated with the RTFO are borne by fuel suppliers, with those costs likely passed on to fuel users, such as motorists, via increased fuel costs. In order for low carbon fuel to qualify for RTFCs it must meet minimum greenhouse gas (GHG) emissions saving thresholds compared to fossil fuels and comply with wider sustainability criteria.

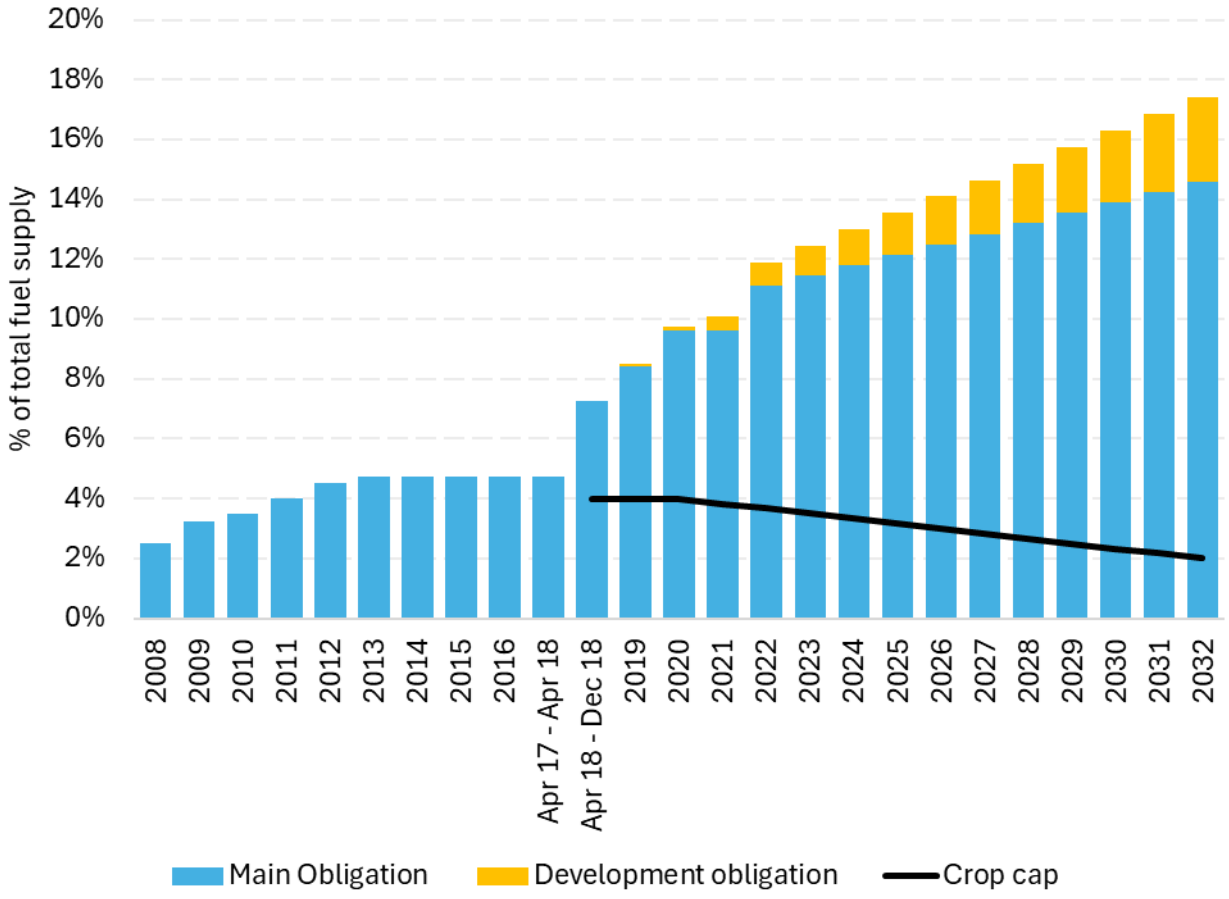

Figure 1 RTFO obligations and crop cap currently set in legislation. In 2018, the scheme moved to operate on a calendar year basis.

Notes: the crop cap is set as a % volume of crop-derived fuel of total fuel supply. Crops receive 1 certificate for each 1 litre.

Figure 1 shows the main obligation, the development fuel obligation, the combined obligation, and the level of the crop cap. From 2032, the RTFO's obligation will continue at a constant trajectory unless it is reviewed and adapted. Note that the obligation determines the amount of RTFCs fuel suppliers are required by the RTFO to redeem. The crop cap determines the maximum number of RTFCs derived from crop-derived fuel that can be used to meet suppliers' obligations.

Key changes made to the RTFO between 2008 and 2016

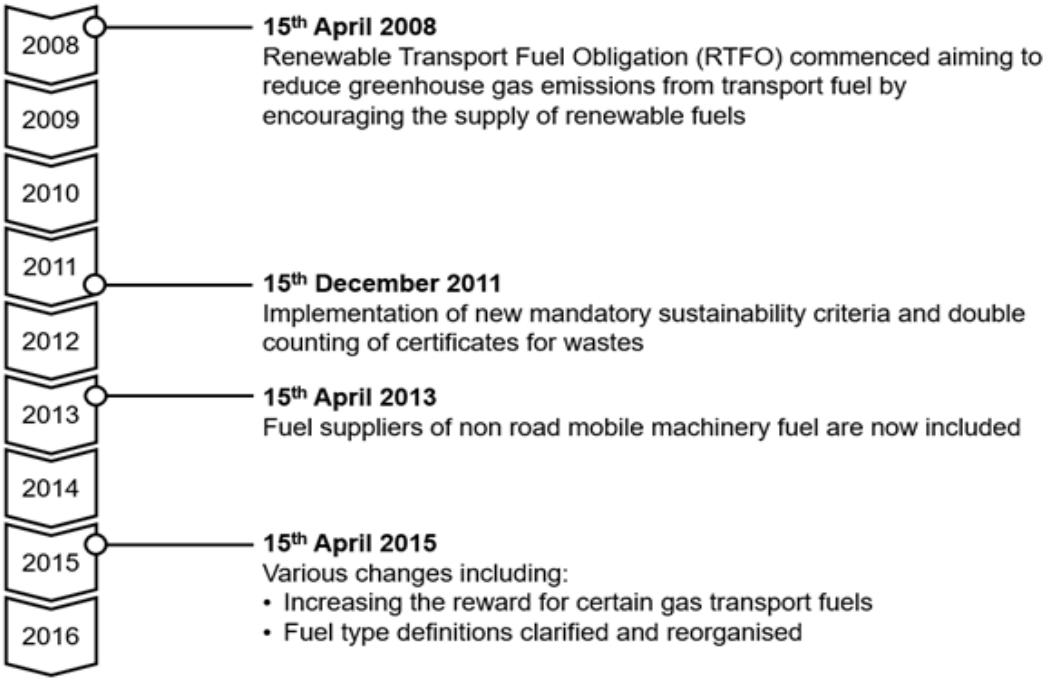

Figure 2 Timeline of changes made to the RTFO from 2008-2016

Changes made to the RTFO in 2018

Increase in the main obligation

The changes to the RTFO in 2018 included increasing the main obligation for 2019 and 2020. The main obligation was then set to remain flat for the following years. The previous target level was 4.75%, and the obligation was changed to increase up to 9.60% in 2020 and subsequent years.

The crop cap and changes to sustainability requirements

Measures to limit the use of crop biofuels were introduced via a "crop cap" in April 2018. This defined the maximum contribution that biofuels made from agricultural crops can make towards meeting suppliers' obligations. This change was made to encourage the use of sustainable waste-derived fuels due to their lower lifecycle emissions and reduced pressure on land use.

The maximum level for crop-derived fuels was set at 4.00% of total fuel in 2018 and from 2021 reduces linearly each year to reach 3.00% in 2026 and 2.00% in 2032. It is set to remain at the 2.00% level in subsequent years.

A new definition for 'waste' and further measures to allow waste-derived biofuels to be awarded a single certificate (instead of double certificates) in instances when an alternative disposal or use of the feedstock would deliver a better environmental outcome than using the waste as a biofuel feedstock were also introduced.

The development fuels sub-target

A ‘development fuel’ obligation was introduced on 1 January 2019, in order to incentivise novel fuels which could target harder to decarbonise sectors such as aviation and maritime, making them strategically important to the UK’s decarbonisation goals. The obligation level was set at 0.10% in 2019, rising to 2.80% for 2032 and beyond.

The development fuel obligation required a new development fuel RTFC (dRTFC) with a buy-out price of 80 pence per certificate. For a fuel to qualify as a development fuel it must be made from:

- sustainable wastes or residues which the Administrator considers are eligible for double certificates, apart from segregated oils and fats such as used cooking oil and tallow

or classified as:

- a renewable fuel of non-biological origin (RFNBO)
- a recycled carbon fuel (RCF)

It must also be one of the below:

- a fuel that can be blended at rates of at least 25% whilst meeting either the fuel standard for diesel (EN590) or petrol (EN228)
- substitute natural gas
- hydrogen

These fuels and feedstocks are considered development fuels as they require advanced fuel technologies and demand more significant levels of investment to produce than traditional biofuels.

Changes made to the RTFO since 2018

This statutory review uses the pre-2018 legislation targets as a baseline for the analysis undertaken; however, it is worth nothing that the RTFO has changed multiple times since 2018.[14] These changes are important to set out, as they have had a significant impact on the RTFO, and the GHG savings and fuels it has delivered. The changes made since 2018 are set out below:

Increase in main obligation

A further increase in main obligation targets was implemented in 2022. This increased the trajectory from 9.60% in 2021, up to 14.60% in 2032, where it was set to continue indefinitely. This increase in targets was introduced due to:

- evidence of an increased supply of fuels capable of being supplied at high blends
- the introduction of E10 increasing the volume of bioethanol supplied into the RTFO

[14] More details on analytical approach can be found in Annex A.

- an increased proportion of waste-derived biofuels

Increase in buy-out price

The level of the buy-out price of the main obligation was increased in 2021 from 30p/litre to 50p/litre in response to the cost of biofuels relative to petrol and diesel. The increase mitigated the risk of suppliers buying out of their obligation, maintaining GHG savings and providing greater certainty of support to the UK low carbon fuels industry.

Introduction of E10 regulations

E10 petrol, which contains between 5.5% and 10% bioethanol, was introduced in UK forecourts from September 2021, replacing E5 (up to 5% ethanol) as the standard blend of petrol. This change enabled greater quantities of bioethanol to be used in transport helping suppliers to meet increased obligations and increasing overall GHG savings. While the bioethanol within E10 petrol is supported through the RTFO scheme, separate legislation relating to fuel quality[15] was used to ensure its introduction.

Changes to sustainability criteria

In 2022 multiple updates were made to the sustainability criteria including strengthening the land, soil carbon and forest biomass criteria. Additionally, a new definition of sustainable feedstocks was introduced, encompassing the updated forest, soil carbon and land criteria to align with the EU framework at the time.

Expansion of RTFO to other transport modes

From January 2022 renewable fuels of non-biological origin used in maritime as well as in fuel cell powered trains and other alternatively powered non-road vehicles became eligible for support under the RTFO in the form of RTFCs.

Recycled carbon fuels

The scope of the RTFO was extended in 2024 so suppliers of sustainable recycled carbon fuels (RCFs) can claim development fuel RTFCs. RCFs are fuels made from a designated fossil waste which cannot be recycled, reused or prevented, and which has been designated as a relevant feedstock.

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[15] The Motor Fuel (Composition and Content) and the Biofuel (Labelling) (Amendment) (No. 2) Regulations 2021

RTFO Statutory Review and next steps

What is a statutory review?

A statutory review (SR) is a retrospective examination of regulations to understand the extent to which they address the original problem under consideration. The review should consider whether the policy objectives were achieved and identify if they could be achieved in a more efficient and effective way in the future. The review should also seek to identify if government intervention is still required. The purpose of a statutory review is not to propose new policies, but to gather evidence on the efficacy of a policy to help inform future policy development.

The statutory review includes analysis that compares the impacts estimated prior to implementation to those that have been measured since, as well as stakeholder feedback from the RTFO call for evidence, published in November 2024. This review forms part of the monitoring and feedback mechanisms within the policy development cycle.

More details on the analytical approach can be found in Annex A.

Call for evidence

To help inform the statutory review, the Government published a call for evidence on the RTFO on the 25th November 2024. This document set out a variety of key policies within the RTFO and sought feedback on these areas. These included:

- future RTFO targets
- how low carbon fuels are rewarded under the RTFO
- the treatment of crops and wastes
- the development fuel sub-target
- the administration of the RTFO

The call for evidence received 128 responses, from the following range of organisations:

Organisation type	**Number of respondents**
Agricultural Vehicle Manufacturer	1
Airport operator	1
Automative electric vehicle transport operator	1
Civil society organisation	1
Consultancies	2

Electric vehicle charge point operators	3
Energy trading company	1
Fossil/low carbon fuel producers/suppliers	45
Gas network operator	1
Public partnership	1
Individuals	34
Laboratory	1
Low carbon energy developers	2
Low carbon energy supplier	1
Think tank	1
Trade associations	30
Waste management company	1
Maritime leisure association	1
Total	128

It is worth noting that there is significant crossover between low carbon fuel producers and suppliers, and fossil fuel producers and suppliers, with many organisations being involved in more than one of these markets. Therefore, for the purpose of this document we have grouped these organisations into the category 'fossil/low carbon fuel producers/suppliers'

We are grateful to all stakeholders for their input.

What are we publishing in this document?

This publication contains:

- the final element of the Statutory review, including updated analysis
- a summary of responses to the call for evidence
- a government response to key issues
- commitments to consult on certain policy areas in future.

Next steps

The responses to this call for evidence and our work reviewing the operation of the scheme will now feed into further detailed policy development. The broader strategic

context of the role of low carbon fuels in surface transport, which is set out earlier in this document, will be used to help guide this policy development and ensure future changes to the RTFO scheme align with the economy wide transition to net zero.

We can therefore confirm that we will develop a consultation which will, at a minimum, include the following topics:

- proposals for the future target trajectory – this will include options for increased targets
- support for development fuels
- how low carbon fuels are rewarded under the RTFO
- broadening the RTFO to include fuels produced from nuclear energy, better aligning with the SAF Mandate
- broadening the list of eligible non-road transports to include hydrogen fuel cell mobile generators

Ahead of formal consultation, we are committed to continue our active engagement with stakeholders and will organise a series of workshops, allowing us to further develop our evidence base on these areas.

Any policy changes to the RTFO will be subject to public consultation and, development of a statutory instrument to amend the Renewable Transport Fuel Obligations Order (2007). Subject to that consultation, and parliamentary approvals, we aim to implement any changes to the RTFO in time for the start of the 2027 reporting year.

RTFO main obligation

Original objectives of the 2018 changes

In 2018, the main obligation level of the RTFO was increased to ensure low carbon fuels provided increased carbon savings helping us to meet carbon budgets and to ensure we met the EU Renewable Energy Directive (RED) target that 10% of all transport energy was delivered from renewable sources by 2020.

Year	Main obligation as % of total fuel		
	2013 amendments[16]	2018 amendments[17]	2021 amendments[18]
2015	4.75%	4.75%	4.75%
2016	4.75%	4.75%	4.75%
Apr 17 - Apr 18	4.75%	4.75%	4.75%
Apr 18 - Dec 18	4.75%	7.25%	7.25%
2019	4.75%	8.40%	8.40%
2020	4.75%	9.60%	9.60%
2021	4.75%	9.60%	9.60%
2022	4.75%	9.60%	11.10%
2023	4.75%	9.60%	11.45%
2024	4.75%	9.60%	11.80%
2025	4.75%	9.60%	12.15%
2026	4.75%	9.60%	12.50%
2027	4.75%	9.60%	12.85%
2028	4.75%	9.60%	13.20%
2029	4.75%	9.60%	13.55%
2030	4.75%	9.60%	13.90%
2031	4.75%	9.60%	14.25%
2032 onwards	4.75%	9.60%	14.60%

[16] RTFO 2013 amendments

[17] RTFO 2018 amendments

[18] RTFO 2021 amendments

Table 1 RTFO Main Obligation changes from legislative amendments

Table 1 presents the main obligation target trajectory from 2008 to 2032, and subsequent future years. In 2018, the main obligation was increased from 4.75% to reach 9.60% in 2020 after which it remained at that level. This included a "short year" in 2018 as the scheme moved to operate on a calendar year basis. From 2019, each RTFO year runs from 1 January through to 31 December.

Figure 3 shows the volume of low carbon fuel supplied into the RTFO each year between 2018 and 2023. This analysis has been recreated for two scenarios from the published 2018 cost-benefit analysis[19] and the RTFO outturn statistics[20]. It shows 3 different volumes:

- baseline: the baseline volumes expected from the 2018 cost benefit analysis (CBA)
- expected: the expected volumes in the 2018 CBA forecast following the 2018 amendments.
- outturn: the outturn volumes in the RTFO statistics 2018 – 2023

More details on the analytical approach can be found in the Annex A.

The total volume of low carbon fuel delivered across the period was equivalent to 16,745 million litres. The volume of low carbon fuel supplied has increased over the review period as the main obligation has increased, delivering GHG reductions.

[19] Department for Transport, 2018. Cost Benefit Analysis Amendments to the Renewable Transport Fuel Obligations Order (Table 29 and Table 30).

[20] Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables (Table RF_0111).

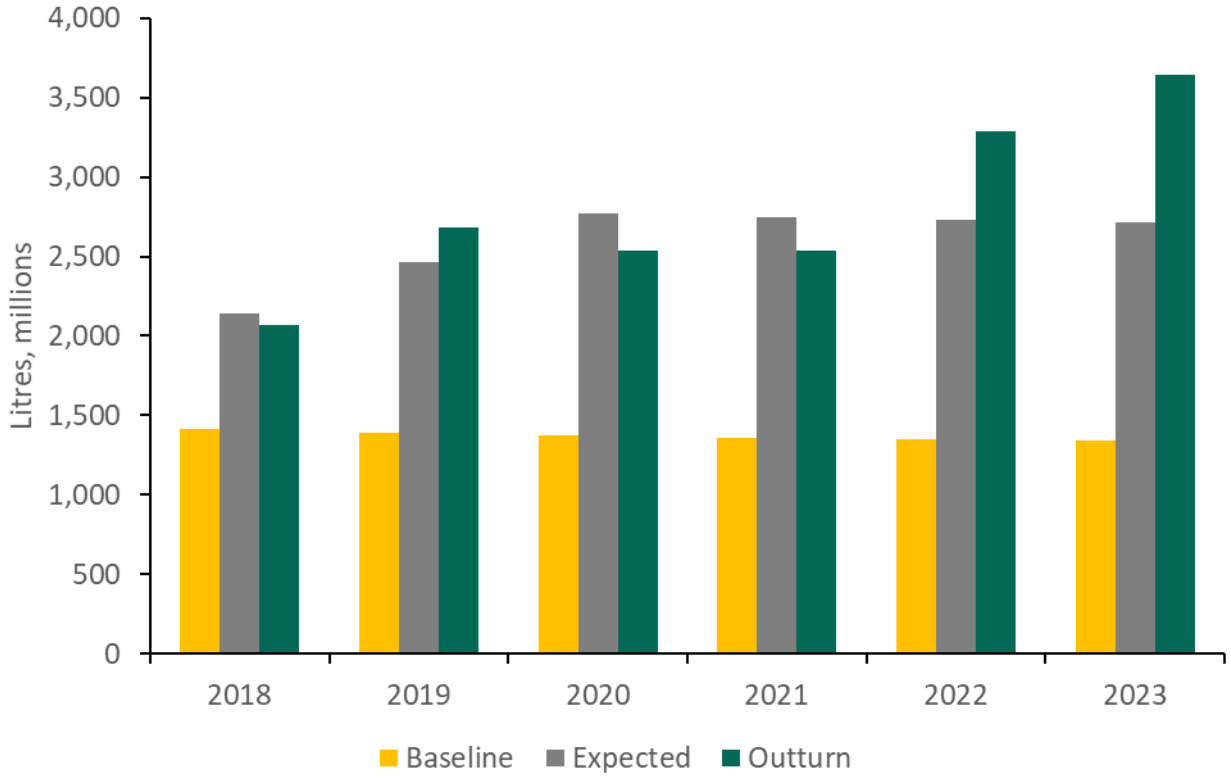

Figure 3 Supply of low carbon fuel under the main obligation of the RTFO from 2018-2023

Source(s): (1) Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables. (2) Volumes in the Baseline and Expected can be found in the RTFO 2018 Cost-benefit analysis.

Figure 4 presents the volumes delivered under the main and development obligation and the overall fossil fuel supplied into the UK. Fossil fuel supply decreased by 13.5% (litres) between 2018 and 2023, and low carbon fuel supply has increased by 78.4% (litres) over the same period. Notably, total (fossil and renewable) liquid fuel supply fell significantly in 2020 - 2021, during the COVID-19 pandemic, and is still below the levels in 2019.

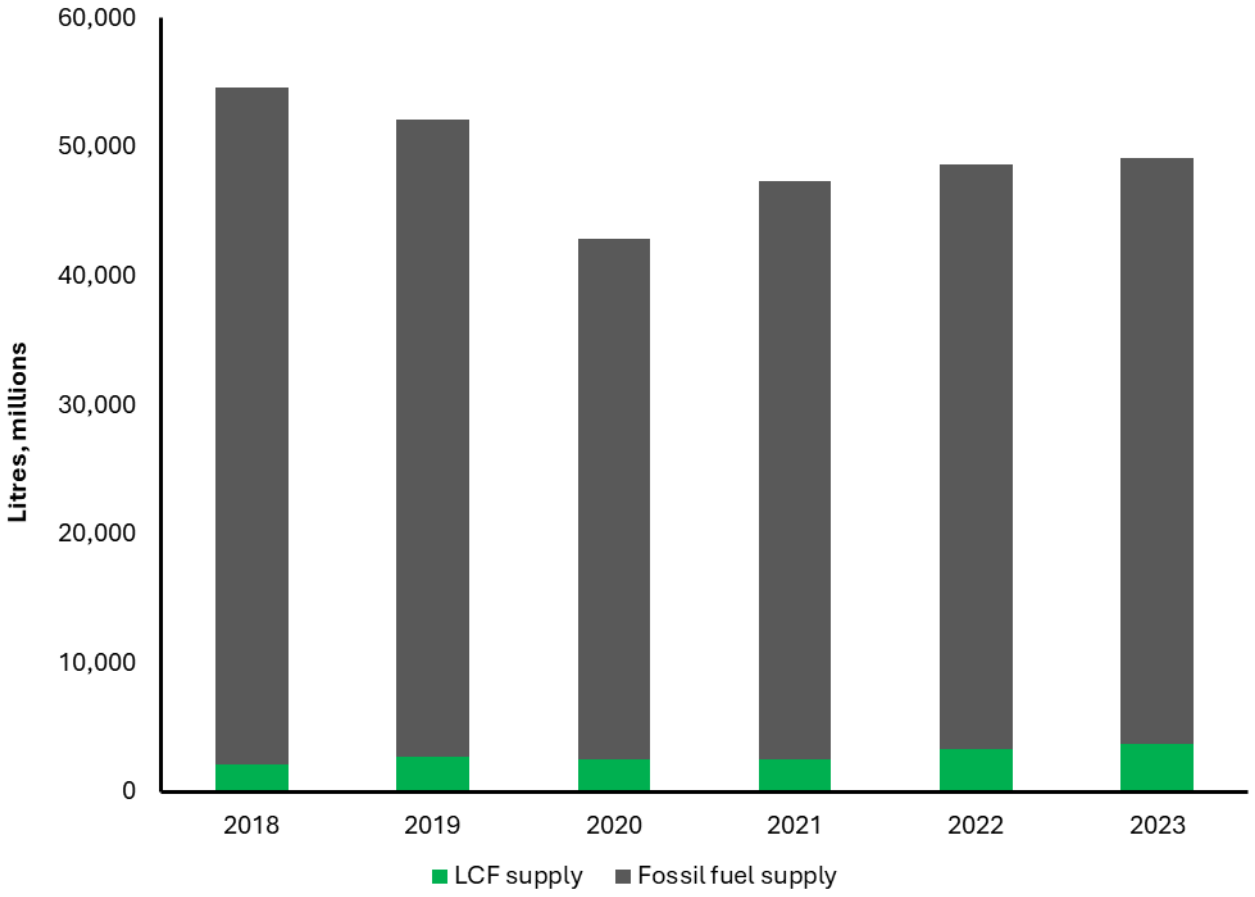

Figure 4 Total low carbon fuel supply (main and development obligation) and fossil fuel supply.

Source: Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables

Has the policy met the objectives of 2018 changes?

Figure 5 presents the GHG emissions savings achieved by the fuels supplied under the RTFO, from 2018-2023. This analysis has been recreated for two scenarios from the published 2018 cost-benefit analysis[21] and the RTFO outturn statistics[22]. More details of the scenarios can be found in Annex A.

Overall, the outturn GHG savings have been close to the expected GHG savings during the years where fuel supply was also at the expected levels. However, in 2020 and 2021, fuel supply was lower during the COVID-19 pandemic, therefore the RTFO achieved lower GHG savings than expected.

[21] Department for Transport, 2018. Cost Benefit Analysis Amendments to the Renewable Transport Fuel Obligations Order (Table 29 and Table 30).

[22] Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables (Table RF_0111).

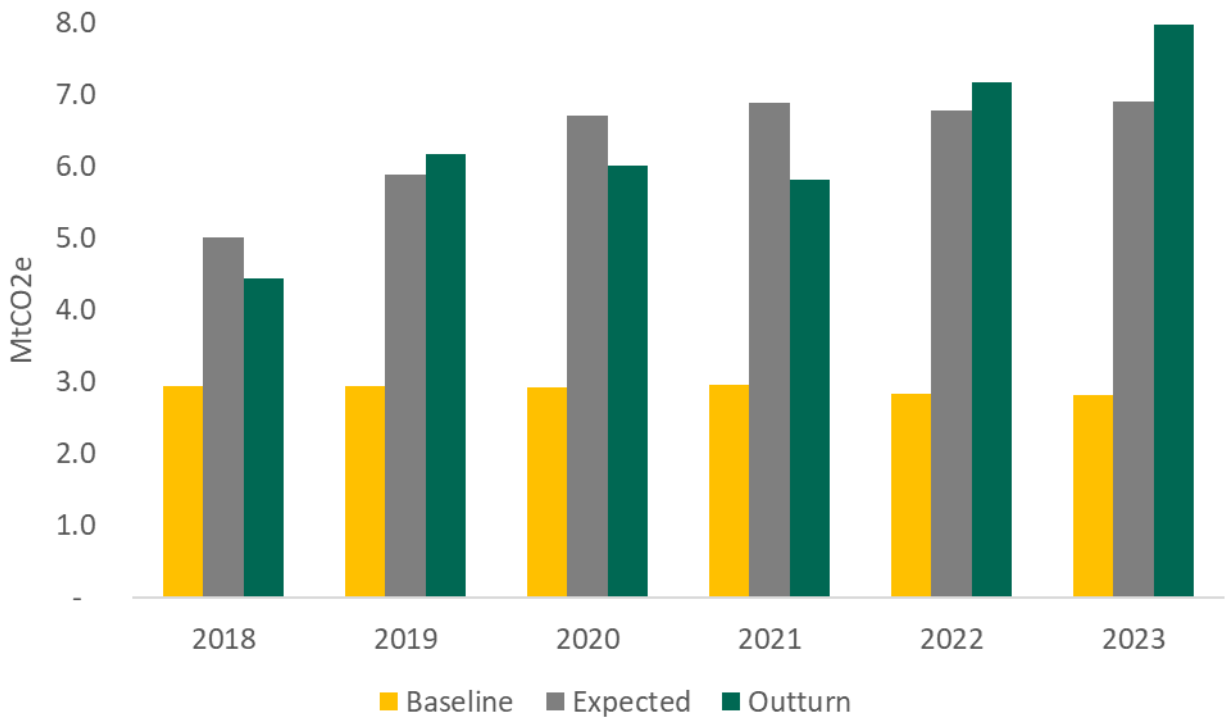

Figure 5 The 2018 baseline and expected GHG savings of the RTFO, as well as the actual GHG savings achieved.

Source(s): (1) Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables (2) Department for Transport, 2018. Cost Benefit Analysis Amendments to the Renewable Transport Fuel Obligations Order
Notes: estimates of GHG savings in this chart reflect savings over the fuel lifecycle and if the low carbon fuels displaced fossil fuels. More details in Annex A.

The carbon savings delivered under the RTFO outturn from 2018-2023 total 37.6 MtCO2e.[23] The additional carbon savings above the baseline totals 20.1 MtCO2e. This is a significant proportion of transport's contribution to overall carbon budgets and highlights the importance of the RTFO and low carbon fuels both historically and moving forward as the UK makes the transition to net zero.

The RTFO is also focused on delivering carbon emission reductions in a cost-effective way. GHG savings, monetised benefits, and monetised costs are estimated relative to the original baseline. The 2018 analysis is re-estimated using actual fuel prices; carbon values; and carbon intensity factors to allow better comparability to the outturn versus what

[23] More details on carbon accounting can be found in Annex A.

was expected in 2018. Furthermore, the benefits and costs are discounted in 2015 prices for comparability.[24,25]

More details of the scenarios and methodology can be found in Annex A. More details on the costs, benefits and overall value of the scheme per year can be found in Annex B.

Figure 6 presents the monetised GHG benefits of the RTFO and the costs of the scheme.[26] The blue bars represent the monetised benefits under the central carbon value, with the error bars reflecting the range under low and high carbon values. Over the 2018–2023 period, the net impact of the scheme was -£49m with a low range of -£1,717m and high range of £1,753m). Under the central carbon values, the NPV of the scheme was only negative in 2021 and 2022.

Whilst the benefits of the scheme have generally increased over the past five years, the costs have also gone up. A key driver of this is the increased costs since 2018, peaking in 2022. This was due to external events such as (1) Covid-19 and (2) the Russia-Ukraine war which both impacted fuel supply and prices. More recently, in 2023 the cost of the scheme did decrease, in line with overall fuel costs.

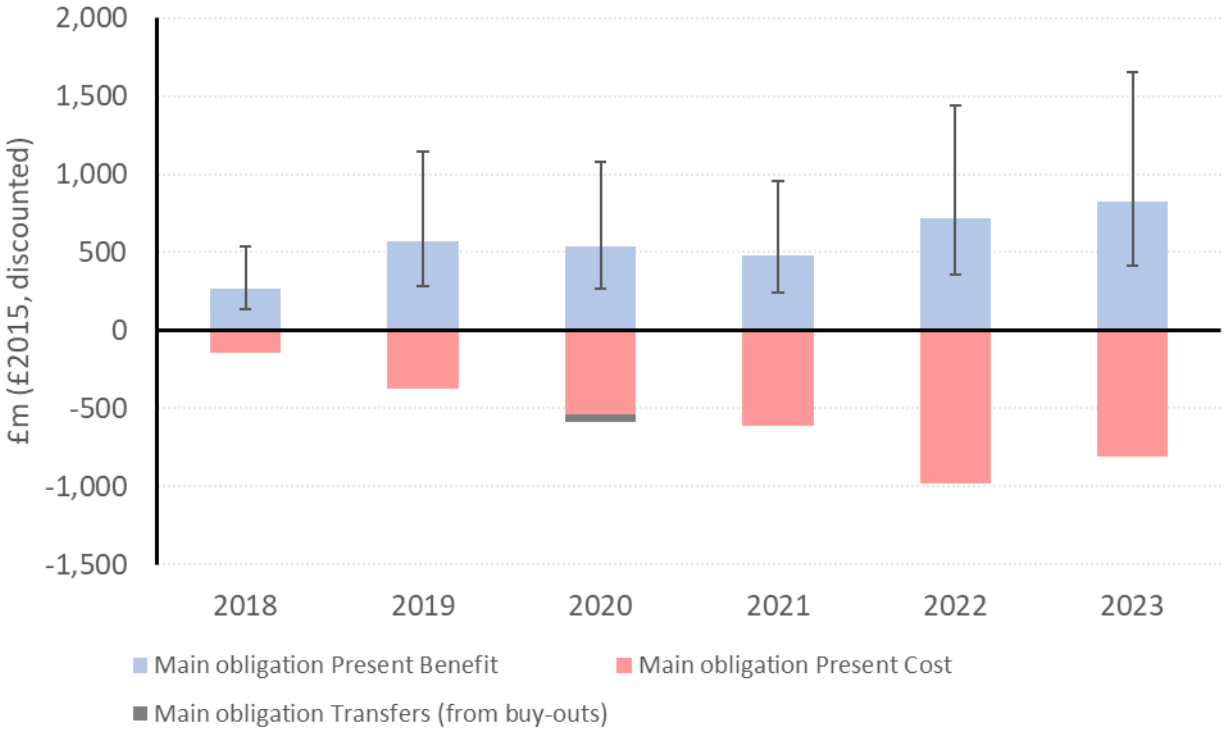

Figure 6 Costs, benefits and overall value of the RTFO main obligation.

[24] Discounting is a process of devaluing future values to a "present value" to account for society's preference for value now rather than later, and to account for expected growth in per capita incomes.

[25] Values are presented in constant 2015 prices to remove the inflationary effect of prices and allow comparability to the previous analysis originally conducted in the 2018 Cost Benefit Analysis.

[26] More detail of the cost benefit analysis approach is summarised in Annex A.

Source(s): (1) Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables (2) Department for Transport, 2018. Cost Benefit Analysis Amendments to the Renewable Transport Fuel Obligations Order (3) Argus Media

Note: The blue bar reflects the monetised GHG benefits under the central DESNZ carbon values. The error bars around this reflect what the benefits would be using the upper and lower carbon values. The cost-effectiveness of decarbonisation schemes is measured using the average cost of saving each tonne of carbon dioxide (equivalent).[27]

Figure 7 shows the RTFO performance (both the main and development obligation together) in delivering cost-effective decarbonisation when compared to the Government's published carbon abatement benchmarks. The abatement costs are grouped up here for comparability to what was expected in 2018 because the original CBA grouped these together.

In times of high fuel prices (2020-2022), due to external factors such as COVID-19 and the war in Ukraine, the scheme was less cost-effective than anticipated in the original 2018 CBA. The cost-effectiveness of the RTFO has since improved as the cost difference between biofuels and fossil fuels has come down in 2023.

Overall, the RTFO (the average of the main and development obligation) has been cost-effective on average over the whole review period when compared to the high carbon value. The break-down of abatement costs for the main and development obligation in isolation can be found in Annex B. Over this period, the RTFO main obligation cost £173/tCO2e to offset a tonne of carbon dioxide equivalent versus the central £174/tCO2e comparator.[28] The average abatement cost for the development obligation is estimated to be relatively expensive at £450/tCO2e. However, due to limited fuel cost data for novel fuels, this is largely driven by the assumption that the fuel costs are equal to the buy-out price.[29]

Furthermore, there have been buy-outs seen as part of the development fuel obligation (see Development fuel obligation section for more details). When the buyout costs are included, adding scheme costs but without the GHG benefits, the scheme is also relatively less cost-effective.[30] However, even when factoring all of this in, the RTFO on average is still a cost-effective carbon abatement measure relative to the DESNZ high carbon values over the whole 2018-2023 period.

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[27] Green Book supplementary guidance: valuation of energy use and greenhouse gas emissions for appraisal

[28] When using the Weighted Average Carbon Comparator (WACC).

[29] More details on methodology can be found in Annex A.

[30] According to the Green Book government analysis guidance these buyouts should be counted as "transfers" and omitted from net present value calculations. However, this is presented with and without to illustrate the real-world cost effectiveness of the scheme given the level of compliance.

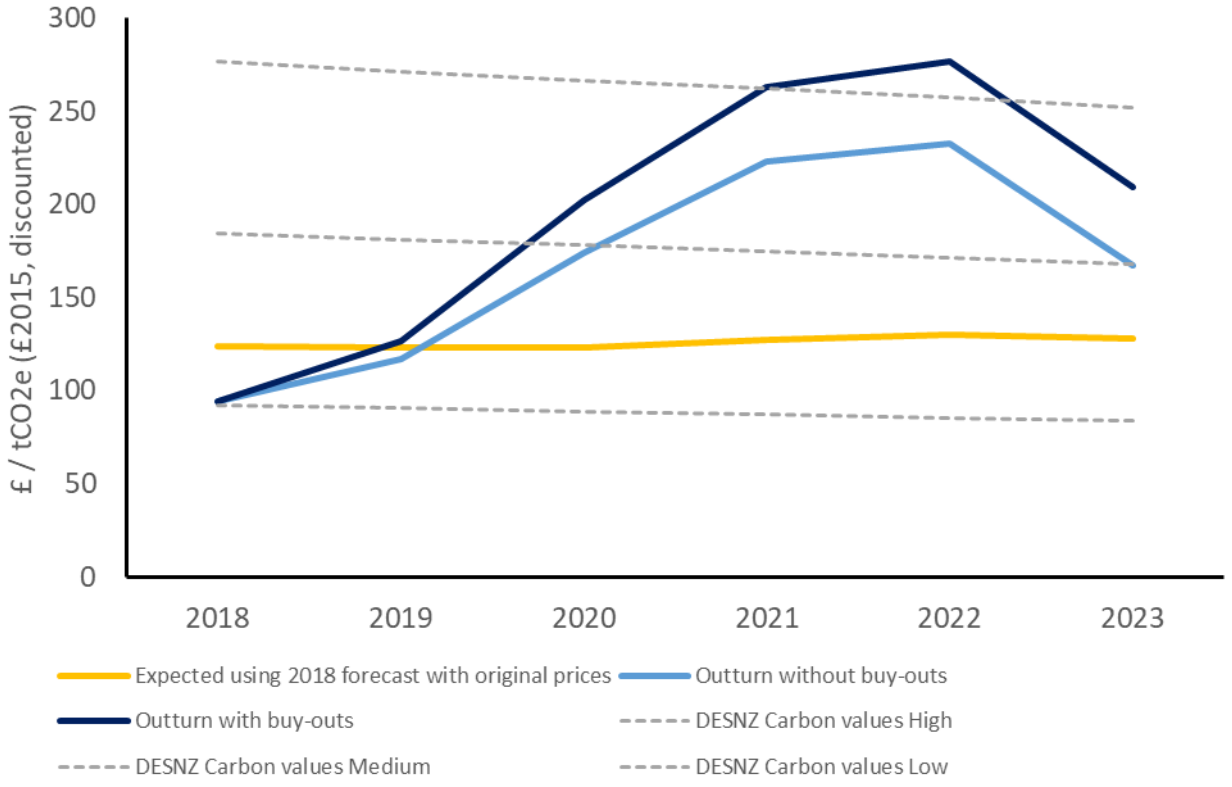

Figure 7 The cost to offset a tonne of greenhouse gas from the RTFO from 2018-2023

Source(s): (1) Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables (2) Department for Transport, 2018. Cost Benefit Analysis Amendments to the Renewable Transport Fuel Obligations Order (3) Department for Energy Security and Net Zero, 2021. Valuation of greenhouse gas emissions: for policy appraisal and evaluation

Note: This presents the total abatement cost of the scheme including both the main and development fuel obligation to provide comparability with the abatement cost published in the 2018 CBA which grouped these together. The abatement costs here refer to the cost of the additional GHG savings as a result of the obligation target increase beyond the 2018 baseline.

Future Targets

Background

Historically, most of the main obligation has been met via the supply of low carbon fuels, with negligible levels of buy-out. This means the RTFO targets have been achievable and realised carbon savings.

The RTFO will need to adapt to ensure the use of low carbon fuels compliment wider policies and changes to the sector. SAF mandates (both in the UK and overseas) and any future specific support for maritime fuels will create additional competition for feedstocks and fuels, while the roll out of electric vehicles will result in lower demand for liquid fuels in road transport. To maximise GHG savings, a key principle for the support and use of low carbon fuels, it is necessary that their use is prioritised in harder to decarbonise sectors such as aviation and maritime, given road transport can be electrified. All of this must be considered in setting future targets.

Call for evidence questions

Question 1

- **Are the current RTFO main obligation targets set at the right level? Consider both the current trajectory between now and 2032 and how they could be adjusted after 2032.**

Yes	9
No	90

Summary of responses

Stakeholders provided a broad range of opinions on how targets should evolve in the near term (until 2032) and longer term (towards 2050). The different approaches advocated for and against are presented via grouped summaries below.

Increase before and after 2032

Seventy of the 99 stakeholders who responded to this question, expressed that the main obligation targets should be increased both now and in the future. Respondents included fossil/low carbon fuel producers/suppliers, individuals, low carbon energy suppliers, low carbon energy developers, energy trading companies, a public partnership, trade associations, a gas network operator, a consultancy, a waste management company and a transport operator.

These stakeholders advocated for a more ambitious increase in obligation levels to account for technological advancements and the growing maturity of renewable fuel markets. One stakeholder noted that low targets combined with the double counting of the majority of supplied fuels, results in low physical volumes of renewable fuel supplied to the market and that targets should therefore be increased. Additionally, some respondents noted that the post-2032 target is currently set too low. There was concern that it is insufficient to meet future carbon budgets and does not support net zero.

Additionally, stakeholders noted that increasing targets would send a clear signal to markets, encouraging more investment in renewable fuel technologies and fostering a diverse energy mix. A few respondents called for a more structured and clear strategy, focusing on a long-term perspective to provide a decisive signal to industry, strengthening investor confidence in low-carbon fuel infrastructure and accelerating the deployment of advanced technologies.

Finally, a few stakeholders suggested an automatic mechanism to increase targets, both for the main and development fuel obligations. This would increase targets depending on whether the previous target level had been met. One respondent detailed a specific mechanism involving a 15% increase when the requirement is met by 70% or more. The respondents noted this would provide necessary stability to the sector and ensure the value of certificate prices.

Some respondents highlighted the significance of electrification of road transport, and emphasised the need for a greater encouragement of EV technology adoption. While a detailed summary of responses relating to views on adding electricity used in electric vehicles to the RTFO scheme is provided in question 4, respondents in favour of such an approach all supported accompanying this with a rise in overall RTFO targets.

Maintain up to 2032 and then increase

Seven stakeholders responded that the target trajectory up to 2032 should be maintained and then be increased after 2032. These included fossil/low carbon fuel producers/suppliers and trade associations. To note a few respondents responded to this question with views on the development fuel obligation – these have been summarised in question 14.

A few respondents highlighted that there is currently an excess of Renewable Transport Fuel Certificates (RTFCs), indicating that the main obligation target is being met with more certificates than necessary and that a change in the main obligation alone is unlikely to change this. They suggest that the RTFO could more effectively incentivise a switch from fossil fuels to renewable fuels to achieve maximum GHG reductions.

Maintain both trajectories

Ten stakeholders considered that we should maintain current RTFO targets with no changes at this time. Respondents included a consultancy, fossil/low carbon fuel producers/suppliers, a low carbon energy developer, trade associations, and an individual. Their responses are summarised below.

Some respondents considered that the current trajectories should be maintained as they are realistic and have been effective in delivering GHG reductions to date. The majority of respondents expressed concern with regards to overly ambitious targets and the need to recognise evolving capabilities of obligated fuel suppliers. One respondent suggested focusing on the development fuel obligation instead and leave the main obligation as it is in order to encourage more advanced low carbon fuels into the market.

One respondent highlighted that any move to increase targets will require both high blend and ‘drop-in’ fuels, including waste-derived HVO and these fuels will play a vital role in the transport fuel mix.

A trade body, however, suggested that it is too early to set obligations levels for post-2032 due to uncertainty in the low carbon fuel market. While increased targets after 2032 could signal long-term regulatory support for the renewable sector, they cautioned that targets need to be achievable with existing technologies and that overly ambitious targets could increase costs. They warned that a scenario with high buy-out levels would pass on significant costs to consumers without achieving significant GHG savings.

One respondent used the opportunity to request that biomethane-fuelled HGVs are not phased out as part of broader plans to ban the sale of non-zero emission HGVs.

Decrease trajectories

Nine stakeholders responded that the current main obligation targets are not set at the right level and that the current trajectory between now and 2032 should be decreased or initially decreased and then maintained. Respondents included individuals, trade associations and a civil society organisation.

A civil society organisation is calling for a decrease in targets if renewable electricity for vehicle charging is not being introduced to the RTFO scheme. If electric vehicle charging was to be introduced, they would support targets which encourage uptake of EVs. See summary for question 4 to see the main points raised on supporting renewable electricity and/or chargepoints in the RTFO.

Some stakeholders responded that the target trajectory up to 2032 should be decreased and then targets should be set for after 2032 based upon updated data, these included trade associations.

A number of individuals responded with their reasoning for a decrease in targets varying, from scepticism around the science of climate change to highlighting the tension between using crops for food rather than for fuel.

Question 2

- **Do you have any evidence on the anticipated availability and cost of eligible fuels and feedstocks given likely increases in competition across modes and internationally?**

Summary of responses

Fifty-one respondents provided evidence on the anticipated availability and costs of eligible fuels and feedstocks or the likely increase in competition across modes and internationally. These respondents included: a consultancy, an energy trading company, fossil/low carbon fuel producer/suppliers, an individual, low carbon energy developers, a public partnership, and trade associations. Many stakeholders sent in various pieces of evidence covering these topics and we thank those respondents for this. We will review this information to assist our policy development and will engage specifically where clarification or further information may be helpful.

Increased competition

Evidence was provided around growing international competition for feedstocks, as aviation, maritime and road transport all aim to decarbonise through the use of liquid low carbon fuels. Stakeholders noted that SAF mandates could absorb and put pressure on availability of certain feedstocks such as used cooking oil (UCO) and tallow, potentially increasing RTFO costs and causing supply bottlenecks. However, one respondent suggested mitigating this risk though policy mechanisms such as a cap on UCO-derived biofuels within the RTFO.

Evidence was also provided regarding increased competition within the main RTFO obligation, referencing the UK's crop cap and double counting for wastes. This is summarised in more detail in questions 8 and 11.

Multiple incentives

A stakeholder also flagged that restrictions on multiple incentives[31] are likely to increase the costs of eligible fuels and feedstocks.

Feedstocks utilisation

A reoccurring theme throughout the responses was that feedstocks are not being fully utilised and additional supply pathways are being overlooked.

Stakeholders considered that there is potential to stimulate increased biomethane production by increasing the RTFO targets. They also considered aligning scheme guidance and the feedstock list with EU legislation and sustainability standards set by EU-approved voluntary schemes.

Some stakeholders provided links to reports and studies investigating future feedstock availability and the measures that may need to be taken to ensure this is utilised. This included reference to the UK's own Biomass Strategy and work by academic institutions. These were generally positive around future availability, however noted that further research and development was needed to overcome technical barrier to utilisation as well as improving resource management practices and supply chain development.

The use of municipal solid waste was raised, with multiple stakeholders highlighting its abundance in the UK, and its potential use as a low carbon fuel feedstock, to address both waste management and climate objectives.

Evidence was also provided that the UK produces large amounts of slurry but only a small percentage is used for biofuels. It was suggested that utilising this feedstock would help decarbonise heavy-duty vehicles and reduce methane emissions.

Previous work across government

Finally, stakeholders acknowledged that significant work has already been undertaken by the department and across government regarding feedstocks, during the development of a strategic approach to low carbon fuels and the Biomass Strategy. Respondents noted that this work should be utilised when policy is developed to address this question.

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[31] Multiple incentives refer to the situation where renewable fuels and chemical precursors receive financial support from more than one scheme, either domestically or internationally. This has the potential to lead to market distortions and can negatively impact domestic suppliers. To address this, the RTFO includes specific rules to prevent renewable fuels from receiving multiple incentives.

Question 3

- **Does the main RTFO obligation cover all transport modes, fuel types and feedstocks that it needs to? If not, how should it be amended?**

	Transport modes	Fuel types	Feedstocks
Yes	20	20	28
No	46	28	43

Summary of responses

The majority of respondents think that the RTFO obligation does not cover all the transport modes, fuel types and feedstocks that it needs to. These respondents are calling for an expansion of coverage across transport modes, inclusion of charging for electric vehicles (EVs), and alignment with the SAF mandate on inclusion of fuels derived from nuclear power.

Recommendations for expanding eligible transport modes

Forty-six stakeholders responded that the RTFO does not encompass all transport modes that it should. Those stakeholders included trade associations, individuals, fossil/low carbon fuel producers/suppliers and an energy solutions company. The recommendations they provided have been summarised below.

There have been a number of responses from individuals and trade associations that would like to see the inclusion of leisure vessels in the RTFO beyond those already supported under the definition of non-road mobile machinery (NRMM).

There is a recurring theme from some respondents that more support is needed for low carbon fuels used in the maritime sector. It was expressed that maritime should either have its own obligation or the RTFO should be extended to cover maritime fuel use more generally. Many of these respondents were focused on the leisure boating sector, rather than commercial maritime operations. However, a respondent noted that the design must avoid diluting the core focus of the RTFO and/or creating multiple incentives or double counting.

Finally, there is a call to improve clarity of the NRMM definition to utilise hydrogen fuel cell generators and improve clarity of the eligible end uses.

Recommendations for expanding eligible fuel types

Twenty-eight stakeholders responded that the RTFO main obligation does not encompass all fuel types that it should. Those stakeholders included fossil/low carbon fuel producers/suppliers, energy solutions company, an EV transport operator, a civil society organisation, trade associations, and an individual. However, many of the fuel types

quoted in the responses are either already supported by the RTFO main obligation or are supported by the development fuel obligation. Some of responses noted below were also advocating support for new fuel types relevant to the development fuel obligation. These are all explored in more detail in the summary of question 16.

A number of stakeholders used this opportunity to call for support of blue hydrogen and derivative fuels through the RTFO scheme. They cited alignment with the government's Low Carbon Hydrogen Standard and suggested such a move would encourage development of advanced fuel production and reduce costs. Some respondents used this opportunity to ask that nuclear energy be permitted for the production of e-fuels like hydrogen and derivatives, in line with the SAF Mandate. Both of these requests are examined in more detail in question 16.

There were also calls for the RTFO to move further towards a low carbon fuel scheme not based around the need for fuels to be renewable or from specific feedstocks. Differentiated natural gas[32] was suggested as an option, provided it could meet minimum carbon reduction thresholds.

Support for adding electricity used to charge electric vehicles was also raised. These points are summarised in question 4.

Recommendations for expanding eligible feedstocks

Forty-three stakeholders responded that the RTFO does not encompass all feedstocks that it should. Those stakeholders included fossil/low carbon fuel producers/suppliers, a civil society organisation and a trade association. The recommendations they provided have been summarised briefly below; however, most of the responses considered fuels that would be supported under the development fuel obligation and have been picked up in responses to question 16.

Some respondents suggested that specific biogenic feedstocks should be considered as eligible feedstocks.

A few stakeholders raised the use of different forms of crops in the RTFO, these responses have not been summarised here but in question 10.

Question 4

- **Should the RTFO be adapted to support wider transport decarbonisation objectives such as support for renewable electricity used by road vehicles?**

Yes	44
No	43

[32] Differentiated natural gas (DNG), also referred to as certified gas, is natural gas that is marketed and sold based on verifiable properties.

Potentially	2

Summary of responses

Support for EV charging

Of the 44 respondents that answered yes to this question, around half expressed support for extending the RTFO scheme to support the use of renewable electricity by road vehicles. These included charge-point operators, trade associations, fuel producers / suppliers, a civil society organisation and individuals. Respondents pointed to the fact that a credit system, such as could be provided by the RTFO would improve the business case for deploying charge points and therefore support the shift to EVs required to meet the targets for vehicle sales driven by the Zero Emission Vehicle (ZEV) Mandate and phase out dates. It was also highlighted that many European countries have implemented credit schemes to help meet Renewable Energy Directive targets in the EU, and failure to offer similar support in the UK could result in investment being focused elsewhere.

Stakeholders also highlighted that, alongside a move to a GHG-based scheme, support for electric vehicle charging would level the playing field and ensure GHG emissions savings were rewarded regardless of the energy vector used.

Some respondents suggested the longer-term certainty that support from the RTFO could offer is preferable over short-term direct funding for charge points, which could be more easily removed or not renewed. It would also shift the burden from direct government spending and instead see costs borne by fossil fuel users, in line with the polluter pays principle.

There was particular attention drawn to the need for further investment in HGV charging infrastructure if internal combustion vehicles are to be phased out. It was suggested that including EV charging in the RTFO would support the business case for this type of infrastructure.

A few respondents highlighted that as the scheme supports hydrogen produced from renewable energy, it would be appropriate for renewable energy used for vehicle charging to also be supported, ensuring a technology neutral approach. Concern was raised by some stakeholders that current rules governing the eligibility of renewable energy for hydrogen production within the RTFO would be too restrictive if applied to any extension of support for EV charging and that this would need to be revisited to ensure such a change actually supported increased EV charging.

However, some respondents who were broadly supportive of including EV charging caveated their position that it should not directly compete with the low carbon fuels already supported by the scheme. There was a danger that introducing EV charging credits could out compete traditional blending of biofuels thereby limiting the emissions savings during the transition. It was suggested that by broadening the scope of the scheme, it needed to deliver additional carbon savings, rather than displace current activities. As such, an increase in targets, or a separate sub target, were proposed to ensure existing RTFO

measures were not eroded. Some highlighted that it was not clear that support through the RTFO would be more effective than direct grants, and that any decision to alter the overall framework of charge-point support would need to be carefully considered.

Finally, it was also raised that the use of low carbon fuels such as biodiesel and biomethane should be permitted to power generators connected to new or temporary recharging facilities. This was seen as different to the broader question of direct support for EV charging as this still relates to the use of low carbon fuel in internal combustion engines.

Support for expanding the RTFO to support broader decarbonisation objectives

The remaining respondents who answered yes to this question offered broader observations on how the RTFO could support additional decarbonisation objectives beyond electric vehicle charging. A recurring theme was that the RTFO should be extended to cover more maritime vessels such as leisure boating on tidal waters, particularly with a view to incentivising HVO supply for this sector. Other reiterated the importance of decarbonisation across the economy, and the need for incentives to encourage the use of low carbon fuels across a variety of use cases.

Disagreement with expanding the RTFO to support broader decarbonisation objectives

The majority of those responding no to this question were opposing the addition of EV charging within the RTFO. Respondents included fossil fuel/low carbon fuel producers/suppliers, fuel distributors, trade associations and a public partnership organisation.

Many raised the differing markets which low carbon fuels and EV charging operate, and the mechanics behind those markets. It was contended that the RTFO currently addresses a market failure, in that there would be little financial incentive to supply any low carbon fuel in place of fossil fuels without the scheme. Conversely, the supply of renewable energy to EVs is already occurring in the absence of specific support. It was also raised that renewable energy generation has and continues to receive significant specific support to ensure it drives decarbonising of the electricity grid to which most EVs draw their charge.

Respondents were also concerned that adding EV charging could impact the existing fuels supplied under the RTFO, and undermine the clear requirement for the supply of renewable fuels in place of fossil alternatives. They were clear that support for EV charging should be separate from schemes aimed at mitigating the impact of the ongoing use of fuels in internal combustion engines, which will endure throughout the transition to net zero. They suggested support for increasing EV uptake should be specific and tailored to that sector, rather than added to an already complex scheme with different aims.

There were also concerns raised about how additionality rules that currently apply to the production of RFNBO fuels could be applied to charging facilities. If EV charging did not need to meet such strict requirements, it was unclear how they could be maintained for fuel production pathways.

Clarifications to responses concerning the main obligation

When reviewing and summarising responses to the call for evidence, a number of statements made would benefit from the department clarifying the current approach to ensure existing policy is not misrepresented. We will do this at the end of each summary section.

In relation to feedstock eligibility under the RTFO, we can confirm that, where a low carbon fuel feedstock is not on the feedstock list, fuel suppliers should contact the low carbon fuel Delivery Unit who can undertake a feedstock assessment to determine how the feedstock should be classified under the RTFO scheme

Government response to main obligation question summaries

We thank stakeholders for the detailed responses and further evidence provided in support of these questions. We will be using this information, alongside further internal analysis to develop our policy around the next steps for the RTFO main obligation.

Given the important role traditional biofuels play in decarbonising the internal combustion vehicles on the road today, we can commit to consulting on options for the future RTFO target trajectory, up to, and beyond 2032. This will include the option of increased targets. We will be working to develop a range of options for consideration that will need to take into account increasing demand for feedstocks, changes to the vehicle fleet as EV sales grow and the costs to fuel consumers.

While it is clear that stakeholders have confidence in global feedstock availability, previous modelling carried out in support of the DESNZ Biomass Strategy; the SAF Mandate; and the CCC's CB7 advice suggest that the sustainable supply of feedstocks may become constrained in future. Given the additional evidence provided in response to this question, we will continue to work to understand supply characteristics in developing future target options.

We also thank respondents for the information and evidence provided in relation to expanding the RTFO to cover electricity used in charging electric vehicles. We acknowledge that any change to the existing RTFO would be highly complex and require significant additional policy development to fully understand the implications of such an expansion, particularly given the range of policy and design options any expansion could take. The Government keeps all options under review in how best to support the continued rollout of public EV chargepoints as the UK transitions to EVs.

How low carbon fuels are rewarded under the RTFO

How the scheme currently rewards fuels

Since its inception, the RTFO has operated as a volume-based scheme. This means, provided the fuel meets sustainability and minimum GHG emissions savings criteria, certificates are awarded based on a given unit of volume of low carbon fuel supplied. In order to incentivise higher-GHG saving fuels, the RTFO rewards the majority of waste-derived fuels with two RTFCs/litre.

An alternative model for schemes like the RTFO is to operate on a greenhouse gas (GHG) basis. This would mean that fuels are rewarded based on the emissions savings they achieve compared to fossil fuels, with better performing fuels receiving more certificates per litre or per unit of energy. The SAF Mandate, which began in 2025, operates on this basis.

The call for evidence set out some potential pros and cons of switching to a GHG based reward scheme, and asked stakeholders for their views on the direction the RTFO should take.

Range of GHG savings from fuels under the RTFO

Figure 8 shows a range of low carbon fuels have been supplied under the RTFO with different % GHG savings per unit of energy associated with them relative to fossil fuels.[33] Across the fuels supplied, the GHG savings range from the current minimum GHG threshold of 55%, up to 241% in 2022. The average and median GHG savings delivered by the RTFO, has stayed relatively steady since 2018. This average fell marginally in 2022 due to the increase in the obligation target, and the introduction of E10, which led to an increase in absolute volumes supplied and single-counted bioethanol being used.

In 2023, the middle 50% of the fuels supplied delivered between 78% to 88% GHG savings relative to fossil fuels. The RTFO has consistently seen some distribution of fuels

[33] In the context of the sustainability threshold, the GHG savings reflect the percentage gCO2e/MJ fuel lifecycle (excluding ILUC) reduction relative to a 94 gCO2e/MJ fossil fuel comparator.

delivering close to the minimum GHG threshold of 55% (for grandfathered[34] plants) and 65% (for non-grandfathered plants). We asked stakeholders whether we should raise this threshold given this has the potential to deliver higher overall GHG savings under the scheme.

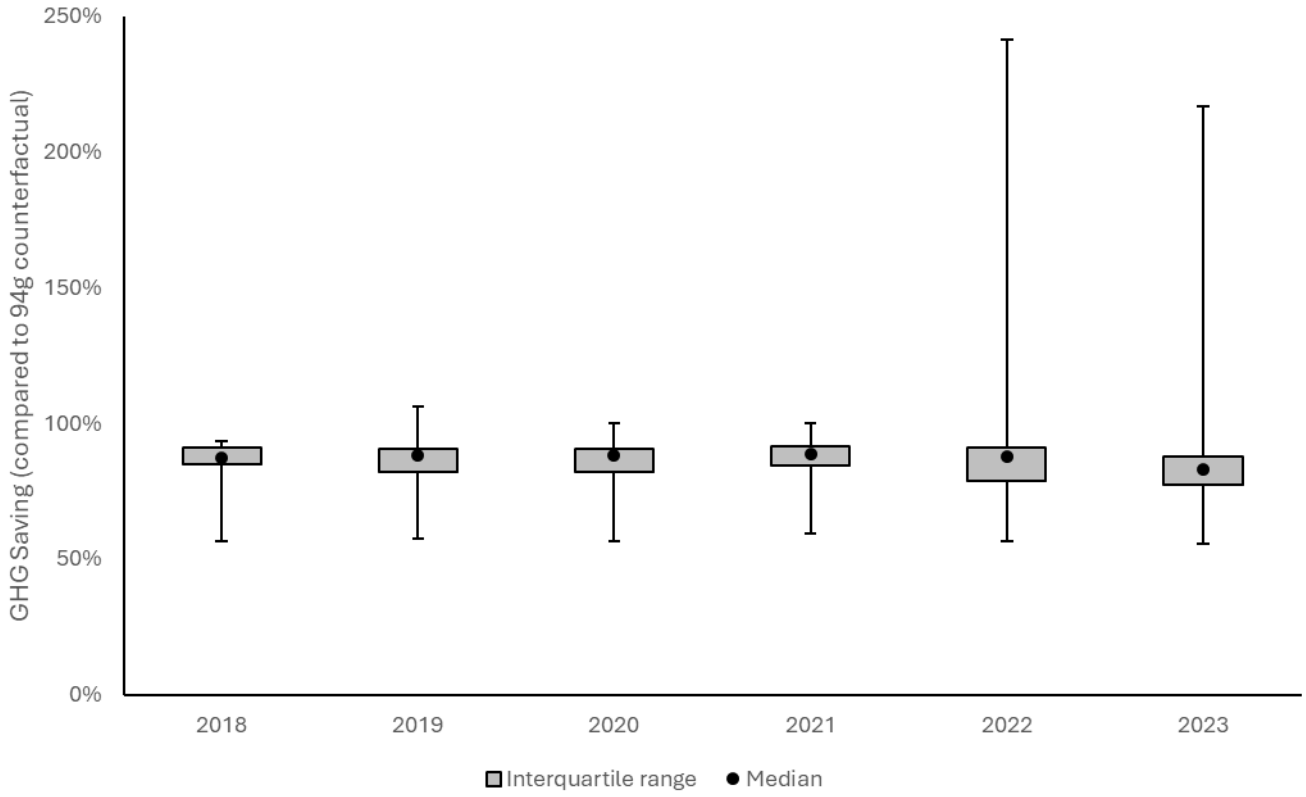

Figure 8 The maximum, minimum and average GHG savings achieved by low carbon fuels supplied under the RTFO. Excludes indirect land-use change. GHG savings compare low carbon fuels to 94g fossil fuel alternative.

Source: Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables

Note: GHG savings data comes from the *RTFO Statistics Table RF_0105b*. These values reflect the lifecycle % GHG reduction of low carbon fuels relative to a 94g fossil fuel comparator excluding ILUC (indirect land use change). GHGs from low carbon fuels are uncertain and can vary by: the feedstock; process used; origin of feedstock; distance of transporting feedstock and fuel; etc. The grey box (interquartile range) represents the middle 50% of the fuels and their sustainability. The error bars reflect the upper and lower 25% of the fuels and their sustainability.

[34] Grandfathering refers to biofuels produced in installations before certain dates and affects the GHG savings requirements. Fuel produced in an 'old' chain of installations has a minimum GHG threshold of 55%, whilst fuel produced in a 'new' chain of installations has a threshold of 65%

Call for evidence questions

Question 5

- **Should the RTFO continue to reward fuels on the volume supplied, or on a different basis, such as the GHG savings delivered by a fuel, in line with the SAF mandate?**

Yes, continue	16
No, different	65

Summary of responses

Support for continuing to reward low carbon fuel in proportion to volume supplied

Eighteen stakeholders responded that the RTFO should continue rewarding fuels based on the volume supplied. Those stakeholders included a consultancy, fossil/low carbon fuel producers/suppliers, a low carbon fuel energy developer, an EV transport operator, a civil society organisation, individuals, a trade association, and a waste management company. The reasoning provided for these responses is summarised below.

The majority of respondents who supported continuing to reward low carbon fuels on the basis of volume supplied noted that a volume-based system is the most effective and straightforward way to achieve the objectives of the RTFO and reflects the practicalities of real-world fuel delivery. One respondent highlighted that while the SAF mandate focuses on GHG savings, the current RTFO system effectively incentivises all market participants and rewards them appropriately.

A few respondents highlighted risks associated with switching to a GHG savings-based system. These risks include the potential for encouraging fraudulent activity given difficulties in verifying GHG savings assessments; significant changes to the biofuel supply chain; and increased administrative costs.

Additionally, a stakeholder identified that certain fuels, such as biodiesel derived from animal fats (tallow), might be disadvantaged depending on the GHG methodology used and emphasised the importance of maintaining the incentives for supplying waste-derived fuels. They highlighted that some of these feedstocks may be ideal for fuel production, but greater processing requirements could result in lower GHG savings per litre.

Finally, some stakeholders called for greater clarity and understanding before they can fully endorse a GHG based system. Particularly, there was a request for analysis focusing on impacts relating to the indirect land use change (ILUC) factors associated with different feedstocks.

Support for changing the way that low carbon fuels are supported

Sixty-five stakeholders responded that the RTFO should reward fuels on a different basis. These included fossil/low carbon fuel producers/suppliers, an airport operator, a think tank, a public partnership, a trade association, individuals, an energy trading company, a consultancy, trade associations and an energy solutions company. The reasoning behind these responses is summarised below.

Where comments were made about the double-counting policy for waste-derived fuels these have been summarised in question 12.

The majority of responses called for alignment with the SAF mandate and EU regulations, reasoning that standardising approaches could enhance scheme delivery efficiency and ensure a more accurate measurement of the actual renewable share of energy. However, one respondent noted that the effectiveness of this alignment would depend on the methodology and the complexity it introduces to the scheme.

A number of fossil/low carbon fuel producers/suppliers mentioned that moving to a GHG-based reward system would best drive decarbonisation and promote the adoption of fuels most likely to deliver carbon savings.

Some respondents believed that awarding RTFCs based on actual GHG savings would more closely achieve the intent of the RTFO, as the current volume-based scheme with double counting means actual emissions savings are not directly linked to target levels. It was noted that overall targets would need to be re-evaluated to account for any change in approach.

A stakeholder suggested that rewarding crop based on their existing (non-ILUC) values would still benefit fuels produced from wastes as waste-derived fuels often have higher GHG savings anyway. This approach would also encourage improvements in efficiency across the fuel spectrum, both for crop-based fuels and wastes. Another stakeholder recommended adopting a 50% GHG savings thresholds, with the methodology accounting for ILUC factors to ensure unsustainable feedstocks were excluded.

Question 6

- **Do you think increasing the RTFO GHG emissions savings thresholds would be appropriate and why. Would you have any concerns?**

Yes	29
No	32

Summary of responses

Support for increasing the GHG emissions savings thresholds

Twenty-nine stakeholders considered that the RTFO GHG emissions savings thresholds should be increased. Those stakeholders included fossil/low carbon fuel producers/suppliers, trade associations, a public partnership, a trade association, low carbon fuel energy developers, a civil society organisation and an energy trading company.

The majority of respondents supported aligning the GHG emissions savings threshold with the EU's renewable energy directive (RED II) and the UK's decarbonisation goals. They considered this alignment essential for ensuring consistency and maintaining competitiveness for UK producers in global markets. Additionally, this would create a level playing field with the minimum GHG savings required for RFNBOs and low-carbon fuels. There is agreement that the GHG threshold should be raised, a few respondents advocated for an increase between 65-70%.

Some respondents recommend a gradual increase in thresholds over time, with clear communication and sufficient lead times to minimise industry disruption.

One respondent noted that increasing thresholds would phase out lower-performing fuels while incentivising high-impact solutions like hydrogen fuel cells. However, another respondent expressed concerns that high thresholds might disadvantage certain feedstocks or production pathways, particularly those that are widely used but less efficient in terms of GHG reductions.

A fossil/low carbon fuel producer/supplier suggested that increasing thresholds is a more effective way to incorporate additional GHG-based factors than switching to a GHG-based reward system, potentially leading to the development of new fuels.

A trade association agreed that an increase in thresholds would be appropriate but emphasised the need to use the latest life-cycle assessment standards and data to gauge real-world emissions accurately.

Support for maintaining the GHG savings thresholds

Thirty-two stakeholders did not support increasing the RTFO's GHG emissions savings thresholds. These included fossil/low carbon fuel producers/suppliers, consultancies, individuals, a transport operator, a waste management company, an energy trading company and an energy solutions company.

It is worth noting that a large proportion of these responses were made with the caveat that the government acts upon the proposals and evidence provided in other questions – specifically, switching to a GHG-based reward system. The majority of respondents noted that increasing GHG emissions savings thresholds would create an unnecessary double regulation. A few respondents expressed that raising thresholds would be a poor substitute for moving to a proportional GHG rewards basis and would not address the disadvantages that the current system experiences. On the other hand, a few respondents think that the

current threshold is realistic and is an appropriate baseline for fuel reward. One respondent suggested a compromise solution, where-by a supplemental RTFC mechanism provided an additional certificate for fuels that meet an established and enhanced GHG savings target.

There were also calls from some stakeholders to align the threshold with the SAF mandate to ensure consistency of approach and to support investment in low carbon fuels.

Some respondents think that increasing the threshold would have little impact on overall GHG emissions and should not be a priority. This was on the basis that the current market has not yet brought forward substantial qualities of fuel that exceed the current threshold. However, other stakeholders suggested that given average GHG savings were already well above the existing thresholds, changing the threshold may have a limited impact.

Question 7

- **Did the GHG Reporting scheme that ran alongside the RTFO encourage a greater supply of low carbon fuels in the UK with higher GHG savings? If so, which fuels?**

Yes	16
No	10

Summary of responses

Yes, the GHG reporting scheme encouraged a greater low carbon fuel supply

Sixteen stakeholders considered that the GHG Reporting scheme that ran alongside the RTFO did encourage a greater supply of low carbon fuels in the UK with higher GHG savings. Those stakeholders included a low carbon energy supplier, fossil/low carbon fuel producers/suppliers, a transport operator, an individual, a trade association, and a laboratory. The reasoning provided for these responses is summarised below.

Some respondents would like the GHG reporting scheme to be reinstated, or at least for DfT to explore reinstating. As a complementary measure it encouraged producers to strive for and achieve some additional GHG savings.

One respondent noted that it had a moderate impact and suggested adopting a broader performance-based approach that rewards all fuels that meet stringent low carbon intensity and sustainability criteria.

No, the GHG reporting scheme did not encourage a greater low carbon fuel supply

Ten stakeholders considered that the GHG Reporting scheme that ran alongside the RTFO did not encourage a greater supply of low carbon fuels in the UK with higher GHG

savings. Those stakeholders included fossil/low carbon fuel producers/suppliers, individuals, a trade association, and a consultancy.

The majority of respondents provided minimal/no extra evidence to support their responses to this question.

One respondent reported that the reporting scheme added unnecessary complexity to the process for obligated suppliers.

Another respondent used the opportunity to express that the double counting for waste-derived fuels provided a greater incentive for these fuels in the UK compared to other EU member states.

Government response to how low carbon fuels are rewarded

We thank stakeholders for their considered responses to these questions. We acknowledge the support for a shift to a GHG scheme and the arguments made as to the benefits of such an approach. We can commit to including how low carbon fuels are rewarded in a forthcoming broad consultation on the RTFO.

The primary objective of the RTFO is to reduce GHG emissions in order to deliver greener transport. In this respect, rewarding fuels based on the emissions reductions they achieve would seem to better align with overall policy objective. However, understanding the GHG emissions associated with different fuels is not straightforward, as other responses raised. There remains a risk that a GHG scheme could inadvertently incentivise fuels which have higher ILUC risk associated with them. This concern ties in with the key principles of Government's approach towards low carbon fuels, considering wider environmental impacts as well as aiming to achieve the maximum GHG savings possible under the RTFO.

The double counting of waste-derived low carbon fuels has mitigated this issue to date; however, we acknowledge concerns from some stakeholders that this has driven competition between waste-derived fuels and those crop-derived fuels associated with lower ILUC impacts.

We will work to further develop our understanding of the GHG performance of fuels, their ILUC impacts and the role of minimum GHG savings thresholds and how those factors may interact under different RTFO market conditions. We are committed to continue our active engagement with stakeholders as our understanding develops and will set up a series of workshops, to further our evidence base. Any proposed changes to the RTFO will be informed by this work and guided by the strategic context in which low carbon fuels sit, which was set out in the introduction to this document.

Treatment of biofuels derived from crops

Original objectives of the 2018 changes

In 2018, measures to limit the use of crop-derived biofuels were introduced into the RTFO via a "crop cap". This defined the maximum contribution that biofuels made from agricultural crops can make towards meeting suppliers' obligations.

The cap was introduced as one of a range of measures to lower risk of unintended consequences, in particular, on land use change and food security.

The maximum level for crop derived fuels was set as a % of total fuel (fossil and renewable) supplied. This was set at 4.00% in 2018. From 2021, this level reduces linearly year on year to reach 3.00% in 2026 and 2.00% in 2032. It is currently set to remain at the 2.00% level in subsequent years. The crop cap applies to ‘relevant crop’ feedstocks which are defined in the RTFO order. The crop cap does not apply to dedicated energy crops.

More details on the level of the crop cap and the types of crop it covers can be found in the call for evidence.

Has the policy met the objectives of 2018 changes?

Figure 9 shows that the crop cap has not been breached and is therefore being complied with when considering the supply of crop-derived biofuels. To date, fuel suppliers' decisions on whether to supply crop-derived biofuel or waste derived-biofuel have therefore been primarily driven by factors other than the crop cap. Suppliers will generally look to meet their obligations in the most cost-effective way, and this has been driven by the double counting of waste-derived fuels and to a lesser extent the requirement for standard petrol to be classed as E10 (containing over 5.5% ethanol). However, the crop cap has been an important part of setting a UK market signal for the biofuel industry, shifting investment towards waste-derived fuels, and reducing the risk of unintended consequences from the RTFO as a whole.

Figure 9 shows that the most commonly supplied crop-derived feedstock is corn (maize), accounting for around 41.04% of all crop-derived supply in 2018, 30.25% in 2020, 68.89% in 2021, 54.34% in 2022 and 45.73% in 2023. The proportion of other crop feedstocks has varied year on year. However, wheat continually represents a sizeable proportion of

overall crop feedstocks, ranging from 8.67% to 21.02% across 2018 and 2023. The introduction of E10[35] in 2022 caused a significant increase in the volume of crop-derived fuel supplied both in absolute volumes and terms of the percentage of total fuel supplied.

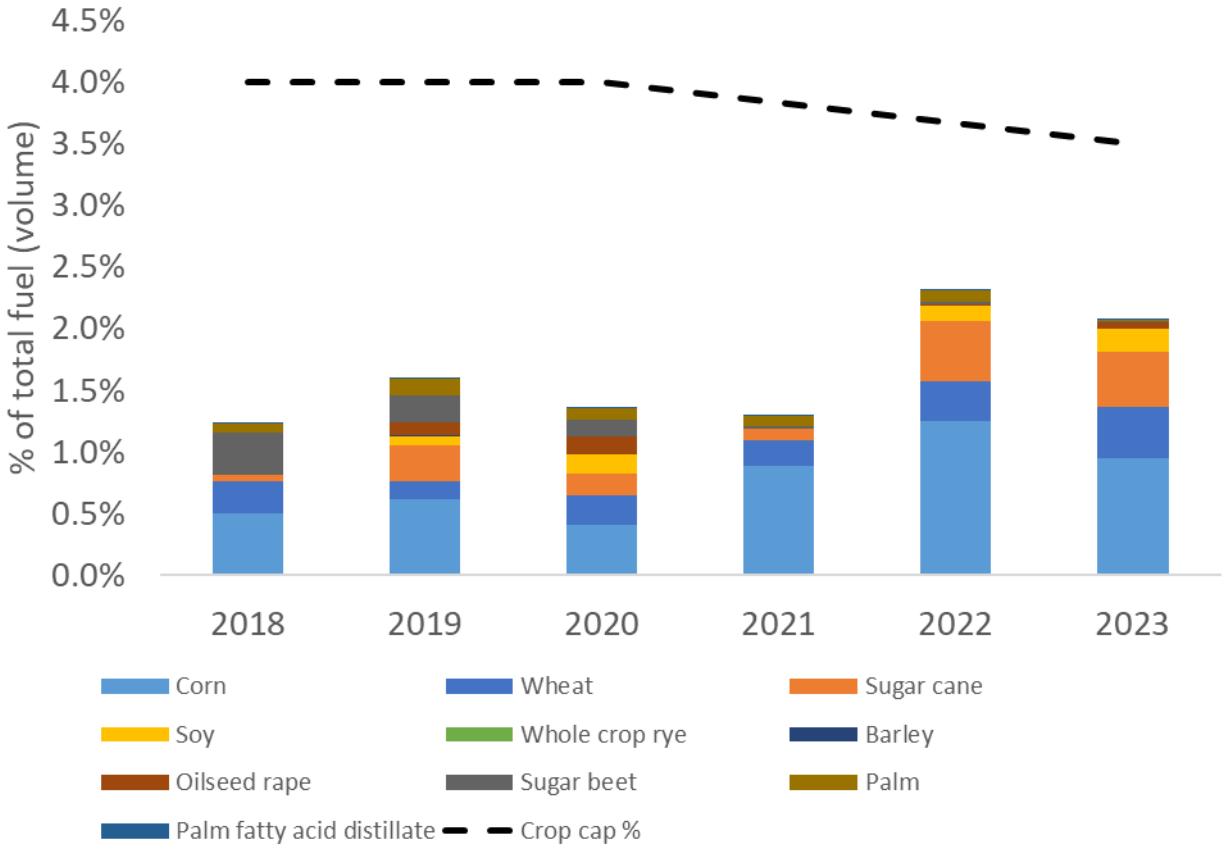

Figure 9. Volume of crop-derived biofuel, broken down by crop type, relative to the crop cap.

Source: Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables (Table RF_0105b)

Call for evidence questions

Question 8

- **Is the RTFO crop cap trajectory set at the right level?**

Yes	12
No	27

[35] E10 petrol contains up to 10% renewable ethanol, and was introduced into petrol forecourts in 2022.

Summary of responses

Twenty-seven respondents did not agree that the crop cap trajectory is set at the right level. Respondents included an agricultural vehicle manufacturer, a civil society organisation, a consultancy, an energy trading company, fossil/low carbon fuel producers/suppliers, individuals, a low carbon energy supplier, a think tank and trade associations.

Twelve respondents think that the crop cap is set at the right level. These included fossil/low carbon fuel producers/suppliers, a low carbon energy developer and a waste management company.

Support for the current crop cap trajectory

Those in support of the trajectory thought that the crop cap had been successful in meeting its objectives, namely the prioritisation of crops for food and feed purposes and encouraging the supply of renewable fuels from alternative energy sources addressing challenges posed by direct and indirect land use change; and mitigating risk against global shocks to crop supply chains such as that experienced in Ukraine.

On the trajectory specifically, one respondent noted that it aligns with the growing availability of waste-derived alternatives and the development timeline for scaling up advanced fuel technologies. The gradual reduction gives industry time to adapt the supply chain while still continuing to supply renewable fuel.

Other points raised by stakeholders who broadly agreed with the trajectory did note potential changes may be required including:

- If crop-based feedstocks negatively impact crop-based food supplies or pricing, stronger crop-based feedstock disincentives should be considered.
- The crop cap should continue towards zero.
- The crop cap trajectory would be set at the right level if the GHG savings of imported double counted ethanol are accurately assessed alongside domestic single counted ethanol. Moving to a GHG basis and ensuring indirect land use change (ILUC) assessments are accurate should negate the need for a crop cap.
- It is still important for some fuels, such as biomethane, that a contribution can be made from crop feedstocks going forward beyond 2032 provided the resulting fuel meets the minimum GHG saving requirements.
- The crop cap should not apply to biofuels with low GHG emissions. Exempting such fuels from the crop cap would incentivise their production and use, driving more significant reductions in carbon emissions while ensuring that the most sustainable options are prioritised.

Against the current crop cap trajectory

Most of the respondents who disagreed with the trajectory felt that the crop cap was too stringent; disagreed with the crop cap in principle; or disagreed with the feedstocks in scope. However, a few respondents urged government to introduce a more stringent crop cap.

Concerns over the crop cap being too restrictive

Several stakeholders argued that the crop cap is too restrictive leading to negative impacts on the bioethanol industry and limiting the GHG savings that could be delivered by the scheme. It was emphasised that the bioethanol industry is of economic importance to the UK, and the current crop cap poses a threat to the industry.

These respondents felt that a crop cap which was less stringent, or removing the crop cap entirely, would allow the UK to capitalise on the significant GHG savings crop-derived biofuels, such as biomethane and bioethanol, can deliver. Some respondents argued that it would be less resource-intensive than pursuing novel fuel technologies which remain economically and energetically unviable at scale. A further benefit highlighted of a less stringent crop cap was support for UK production, contributing towards energy independence.

Those that argued for the crop cap to be removed underlined that the UK government should take a technology neutral approach, which would allow different technology options to emerge at the lowest cost to consumers. The alternative approach of directing support for preferential technologies (‘picking winners’) creates a substantial risk of reducing support for the development and deployment of lower cost opportunities to provide earlier and more significant actual emissions reductions.

A couple of respondents stated that, although the crop cap is not being reached, it will start to limit the volumes of crop-derived biofuel soon which could have a lasting negative impact on the UK’s bioethanol supply and may prevent the development of complementary food/energy crop cultivation. One respondent noted that the significant increase in double counting ethanol means that meeting the crop cap is less likely.

One respondent noted that there has been a significant improvement in crop yields and suggested that the crop cap should be revised to take this into account.

Disagreement with feedstocks in scope of the crop cap

Several stakeholders raised concerns that a blanket cap on all crops is not appropriate, in particular, where there have been technological advances or certain agricultural practices are adopted which mitigate against some sustainability concerns and risk of competition with food and feed. These arguments overlap with points made in response to question 10, so have been summarised in that section.

Disagreement with the crop cap in general

A few respondents stated that the crop cap is ineffective. In particular due to the widespread use of double counting waste-derived biofuels which has reduced the reliance on crop-based fuel, rather than the cap itself.

Several stakeholders highlighted that, should a GHG scheme be introduced in the RTFO, there would be no need for a crop cap. This would allow crops to be used but only if they have significant GHG savings and low land use impact. It would therefore encourage suppliers to employ best practice in the cultivation of crops.

Crop cap should be tightened

Several stakeholders recommended the crop cap should be more stringent to ensure the UK moves away from using crops as soon as possible, with a couple of respondents suggesting the crop cap should be reduced to zero by 2030. This is because many crops have modest GHG savings, particular when taking into account ILUC. Respondents also raised concerns about negative biodiversity impacts, competition with food, and whether this is the best use of our land.

One respondent noted that there have been several important developments since the crop cap was first introduced in 2018. Namely, net zero commitments, a ban on new petrol and diesel vehicles by 2030 and the war in Ukraine. As such, the government should be more ambitious than initially set out in 2018.

It was recognised, however, that phasing out crops would have an impact on the UK's bioethanol producers. It was suggested that this transition would need to be managed carefully, by supporting their conversion to use waste feedstocks, either for bioethanol or for newer uses such as SAF. Alternatively, there may well be export opportunities for crop-based bioethanol. Finally, the UK should continue to work internationally, in particular with the EU and US, to find a common consensus on winding down crop-based biofuels, as this will make a meaningful difference to global food prices.

Other factors to consider

Some stakeholders had specific suggestions of what to consider if revising the crop cap trajectory. These were:

- balance food security concerns with the need for high-GHG-saving biofuels
- improved crop cultivation
- new definitions and appropriate sustainability requirements

It was stressed that the RTFO should employ robust certification methods to ensure there is no deforestation, and that marginal or existing farmland is used, thereby reducing land use impacts. This would be a better approach to manage best practices in the cultivation of crops than a crop cap. One stakeholder suggested removing low ILUC crops from the crop cap by using ILUC factors as an initial eligibility threshold or tightening the requirements regarding land-use change and/or biodiversity loss.

Question 9

- **Has the RTFO crop cap impacted UK biofuel producers, suppliers, or other operators and if so, how?**

Yes	22
No	5

Summary of responses

Twenty-two respondents stated that the crop cap has had an impact on UK biofuel producers, suppliers or other operators, Including an agricultural vehicle manufacturer, fossil/low carbon fuel producers/suppliers, individuals, a low carbon energy supplier and trade associations.

Five respondents that stated that the crop cap has no impact. This included an individual, a trade association, fossil/low carbon fuel producers/suppliers and a civil society organisation.

Of those that responded no to this question, two respondents highlighted that the double counting of waste feedstocks is more effective in reducing the supply of crop-derived fuels to the RTFO, rather than the crop cap itself. One of these noted that the crop cap is not being reached, so it is difficult to claim that it is having an impact.

The crop cap has had a positive impact

In terms of positive impacts, some stakeholders noted that the crop cap provided a market signal which influenced their strategic planning and investment decisions from the outset. It was stressed in the responses that this market signal had shifted the UK market towards waste-derived fuels.

The crop cap has had a negative impact

Stifling investment and technological advancements

A respondent argued that the crop cap discourages investment in biofuel infrastructure and research, as the limited quota reduces the potential return on investment in crop-based biofuels. In contrast, another respondent argued that the use of crop-based fuels has delayed investment and deployment of zero emission fuels such as hydrogen.

Competitive disadvantage and increased costs

It was also raised that the crop cap has reduced the competitiveness of UK produced crop-derived biofuels. It was suggested that this has made some crop-derived biofuel production economically unviable, hindering innovation, technology investment, and increasing operational costs for producers transitioning to waste-derived feedstocks.

It was also claimed that limiting the volume of crop-based biofuels has inadvertently inflated the prices of alternative feedstocks. Furthermore, waste-derived production has added complexity relative to crop-based processes. Responses suggested these factors have led to limited investment in waste-derived processes and that the UK is now suffering a shortage of waste-derived fuel production.

Increased pressure on feedstocks

Another point raised was that the crop cap has limited the feedstock availability pool, which in turn has placed increased competition for waste feedstocks and increasing operational costs. Respondents suggested that these limited options resulted in a series of temporary closures of UK bioethanol producers which rely on first generation production. Furthermore, it creates challenges in meeting the obligation, which limits the GHG savings achieved through the RTFO. One respondent noted that the decision to allow new waste feedstock approvals has seen a very quick increase in waste-derived fuel and therefore obligated parties are less reliant on using crop-derived fuels to meet their obligation.

Negative messaging

A couple of respondents noted that the crop cap has a significant impact on the perception of crop-derived fuels. Namely, the binary view that crops are bad, and wastes are good. This removes the nuance that is required in the conversation surrounding feedstocks. For example, bioethanol producers are creating fuel and feed together. It was also flagged that the double counting of waste-derived fuels can increase the profitability of cattle farming, through the processing of animal waste into fuel. The stakeholder argued that cattle farming is a more GHG-intense use of land than growing biofuel crops, and that double rewarding fuels resulting from these activities further supports them.

Question 10

- **Is how “relevant crops” and “dedicated energy crops” are defined still appropriate?**

Yes	9
No	1**9**

Summary of responses

Nineteen respondents said no to either one, or both, of the definitions, whereas nine respondents said that the definitions are still relevant.

The definitions are still appropriate

Those that stated the current definitions remain appropriate included: individuals, fossil/low carbon fuel producers/suppliers, a low carbon energy developer and a low carbon energy supplier. These respondents considered that the definitions clearly differentiate between food/feed crops and non-food crops grown specifically for fuel. This distinction provides clear guidance for producers when sourcing feedstock, aligns with market expectations and facilitates verification by auditors. One respondent noted that excluding energy crops from the crop cap acknowledges their lower indirect land use risk, mitigates competition with food for human or animal consumption and highlights their role in a sustainable fuel supply.

The definitions are not appropriate

Stakeholders who responded that the one, or both of the definitions are no longer relevant included: fossil/low carbon fuel producers/suppliers, individuals, trade associations and a civil society organisation The most common response to this question was that the simple definitions are outdated as they only consider the type of feedstock rather than assessing a broader set of environmental impacts.

Suggestions for factors which the definition should consider included:

- lifecycle carbon intensity
- direct and indirect-land use change
- agricultural practices
- impacts on soil, water and air

By considering these factors, respondents felt that government should have technology-neutral and performance-based definitions, which would allow reward based on the sustainability merits rather than broad categorisations that do not account for the complexities of modern biofuel technologies. As such, it would provide a more accurate and effective framework for evaluating and incentivising sustainable biofuels.

It was argued that adopting such an approach would encourage industry to invest in, and adopt, diverse and innovative biofuel technologies which could lead to greater GHG savings and lower costs. For example, feedstocks such as miscanthus and algae offer significant potential for low-carbon fuel production due to their high yield and lower environmental footprints.

There were several comments requesting that, should the crop cap be retained, intermediate or cover crops are adequately defined to include feedstocks such as camelina. Respondents raised the benefits of cover crops including:

- protecting and improving soil health

- reducing erosion
- managing nutrients
- not competing with food crops
- not driving land use change
- making use of land in the off season

Stakeholders claimed that by allowing cover crops to be supported and providing a clear definition, investment into these feedstocks would be encouraged and could reduce the cost to consumers while delivering GHG emissions savings. One respondent suggested that the definition of such crops may be similar to dedicated energy crops i.e. a non-food material, specifically grown as an energy crop and with a vegetation period allowing harvest in-between two main food crop cycles and therefore not creating additional land demand.

It was also suggested that underutilised crops which are grown on surplus land or non-arable land, or where countries produce an excess of crops leading to waste should be encouraged under the RTFO.

In addition, there were the following specific amendments suggested to either relevant crop or dedicated energy crop definitions:

- the term "relevant" is not well suited as relevancy changes over time and implies conflict with those that do not fall under this definition
- an additional definition may be worth considering for 'dedicated energy crops', such as certain types of cellulosic or ligno-cellulosic materials that are specifically not suitable for food use, as opposed to those that are
- the definition of dedicated energy crops does not include additional safeguards to ensure these are not used as feed or food and that there are no impacts on land use

Related to the final point, one stakeholder queried why energy crops were not subject to the crop cap and are instead double counted as this seems to contradict the UK policy to incentivise waste feedstocks. Another respondent went further to propose that energy crops should be included in the crop cap and ultimately phased out as rewilding could bring more climate and biodiversity benefits.

Finally, it was suggested that palm and soy biofuels should be immediately phased out from counting towards the RTFO targets due to the negative environmental impacts and human rights violations.

Government response

We thank stakeholders for the detailed responses to the questions on the treatment of crops in the RTFO. Responses covered a broad range of opinions, both from those keen to encourage further use of sustainable crops and those keen to encourage further use of wastes, residues and non-biological feedstocks. We also recognise that efficient use of available feedstocks will be important given wider feedstock supply may become constrained. This must not be at the expense of overall sustainability standards.

Accounting for ILUC directly in support schemes like the RTFO is not straight forward and we will continue to work with industry and across government to build our understanding of

options. We can confirm that the double counting of waste-derived fuels has been taken into account when setting obligation targets and will be considered as part of future target options. The role that sustainable crops can play alongside wastes in decarbonising transport fuels will therefore be an important part of our considerations as we develop future RTFO policy.

Treatment of fuels derived from wastes

Original objectives of the 2018 changes

In 2011, amendments to the RTFO introduced double counting of RTFCs towards suppliers' obligations for fuels produced from biological wastes and residues. This means that biofuel attributable to sustainable wastes is issued with double certificates relative to crop-derived biofuels. These are therefore known as double and single counting feedstocks, respectively.

In 2018, this was built on via further changes to waste categorisation within the scheme. These changes aligned the policy with the waste hierarchy (Figure 10), which requires waste holders to reduce or treat waste in accordance with the following principles:

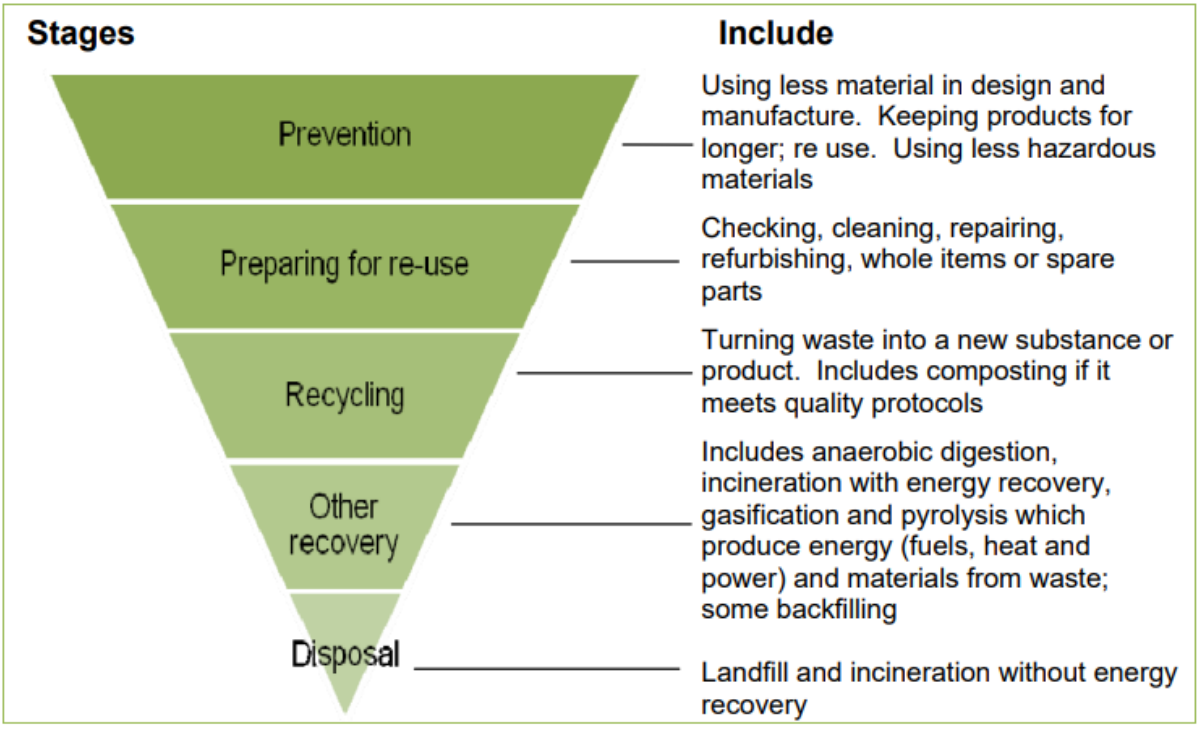

Figure 10 The waste hierarchy. Fuel production sits in the 'other recovery line'

More details on the RTFO waste requirements can be found in the call for evidence, as well as the RTFO compliance guidance.

Has the policy met the objectives of 2018 changes?

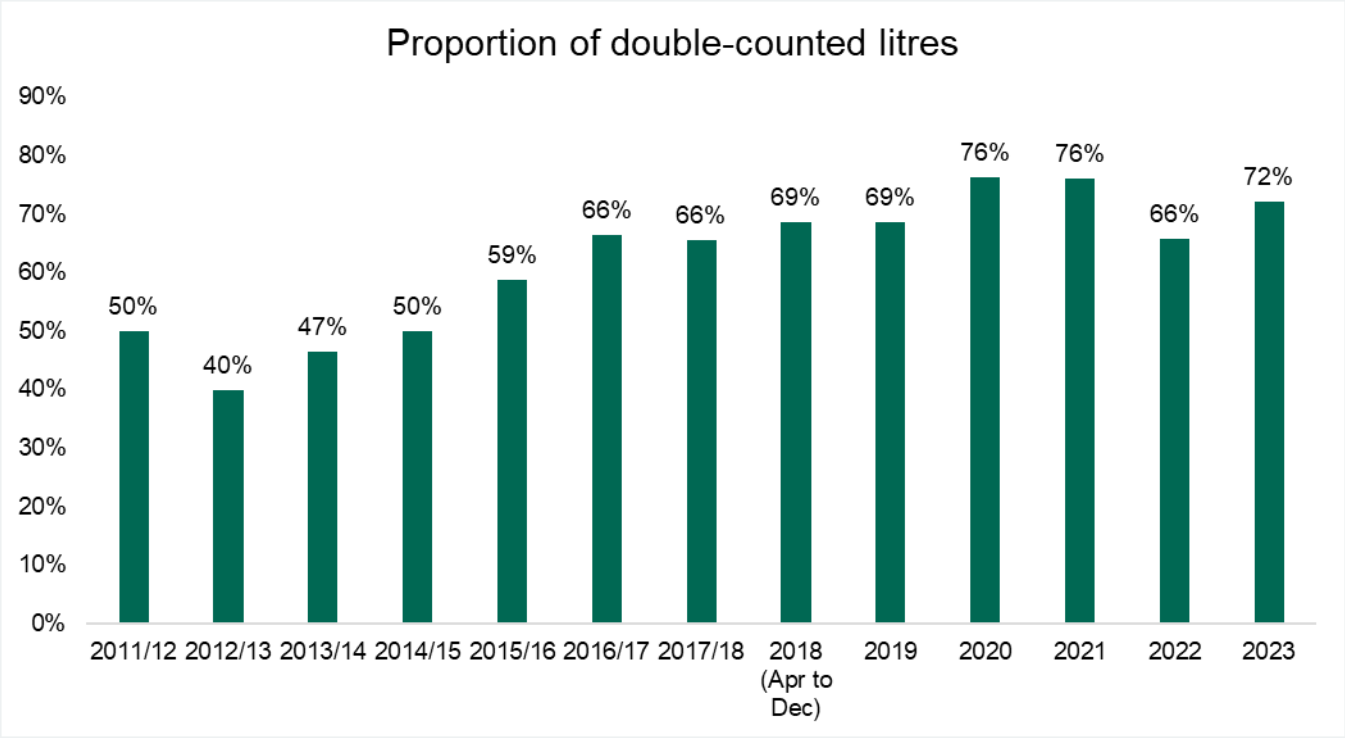

Figure 11 Proportion of double-counting biofuels supplied under the RTFO.

Source: Department for Transport, 2024. Renewable Transport Fuel Obligation statistics: data tables. Table RF_0105a indicates if fuel comes from double-counted feedstock. RF_0105b provides volumes over time.

Note: The reporting period in 2018 is 9 months rather than the conventional 12 months as the scheme moved from a financial to a calendar year for each obligation period.

Figure 11 shows that, since the policy was introduced in 2011, the proportion of waste-derived fuels has increased. With regards to the last 5 years, there was a drop in 2022 of waste-derived fuel to 65.80% from 75.98% in 2021, due to the introduction of the E10 regulation, meaning more ethanol was required in the UK fuel market, which has historically been produced from single-counting feedstocks.

The increase in 2023 of waste-derived fuels compared to 2022 could be partly due to the increased supply of double-counting ethanol into the RTFO, which had previously not been abundant. Whilst the policy does incentivise this, there are fewer ILUC concerns over sugar and cereal crop-derived fuels, when compared to the oil-rich crops which are used to make biodiesel. One of the key principles of the RTFO is to ensure that the low carbon fuels supplied into the UK promote a sustainable supply and use of fuels globally and this therefore adds another element to consider when developing the waste policy of the RTFO going forwards.

Whilst Figure 11 suggests that the incentivisation of waste-derived fuels is effective in driving the supply of those fuels, we wanted to understand stakeholder's views on the policy and whether it has delivered cost-effective GHG savings.

Call for evidence question

Question 11

Has the double rewarding of waste-derived fuels relative to single rewarding for crop-based fuels been effective in achieving maximum carbon savings?

Yes	29
No	25

Summary of responses

Yes, the double rewarding of waste-derived fuels has been effective

Around half of respondents responded that the double rewarding of waste-derived fuels has been effective in achieving maximum carbon savings. These included: a consultancy, trade associations, a public partnership, energy trading companies, a waste management company, fossil/low carbon fuel producers/suppliers, a maritime leisure association and a low carbon energy developer.

Comments were also provided about the future of the double-counting policy in the RTFO, and these have been summarised in question 12.

The majority of respondents, including those who responded "no" to this question, acknowledged that double counting had boosted the supply of waste-derived fuels. Specifically referenced were the increased supply of waste cooking oils, and tyre pyrolysis oil. It was noted that whilst biodiesel is now composed largely from waste-derived feedstocks, bioethanol remains largely crop-based.

In terms of the benefits of an increased supply of waste-derived fuel, it was highlighted that these fuels generally have greater GHG savings than crop-based fuels, with reduced ILUC concern, and better outcomes in terms of food security. There were further environmental benefits flagged due to improved waste management processes. Stakeholders also noted that the policy can drive innovation in waste-to-fuel technologies, especially in the early stages of project development, which can help with the decarbonisation of harder-to-abate sectors. Finally, the policy has allowed producers of fuels that use harder to utilise feedstocks, due to increased processing and logistical costs, to be more economically competitive.

There were stakeholders, who despite suggesting that the policy had been effective in achieving GHG savings, raised some issues with the policy. It was highlighted that a number of EU member states were transitioning towards GHG-based schemes and that

this could result in better performing fuel being drawn away from the UK. This was complimented by a call to align the RTFO feedstocks list with the EU, specifically with regards to the double-counting of 'dedicated energy crops'. Finally, it was flagged that the RTFO has become overly reliant on specific waste streams, and the policy must continue to encourage innovation and diversification.

No, the double rewarding of waste-derived fuels has not been effective

Those who did not think that the double-counting policy had been effective in achieving maximum carbon savings included a civil society organisation, a fossil/low carbon fuel producers/suppliers, individuals, and trade associations.

Where stakeholders responded with alternative ways to incentivise the supply of waste-derived fuels going forward, these have been summarised in more detail in question 12.

Various stakeholders argued that the double-counting of waste-derived fuels had not increased the overall carbon savings through the RTFO due to the lower supply of fuel needed to meet the obligation, whilst the GHG savings of waste-derived fuels are not double those of non-waste-derived fuels. It was also suggested that the policy has resulted in the large supply of cheap RTFCs, lowering the market value and thereby undermining the supply of single counting biofuels.

There were also claims made that the policy had increased the risk of fraud. It was also stressed that if the double counting was to continue, the assessment process for approving waste feedstocks must be robust and transparent.

The use of waste in fuel production was also questioned by stakeholders. There were concerns that diverting this away from other uses could lead to higher overall emissions.

Treatment of wastes going forward

Call for evidence question

Question 12

Should double reward continue or is there an alternative way within the RTFO to incentivise the supply of waste-derived fuels?

Continue	46
Not continue	29
Other	4

Summary of responses

Support for continuing double rewards for waste-derived fuels

Forty-six stakeholders believed that the double counting of waste-derived biofuels should continue. These included an agricultural vehicle manufacturer, consultancies, an energy trading company, fossil/low carbon fuel producers/suppliers, a gas network operator, individuals, a low carbon energy developer, a public partnership, trade associations, and a waste management company.

The majority of explanations as to why respondents thought the policy should continue referenced their reasoning in question 11. These have not been expanded upon in the summary of this question.

It was noted that now double reward is well understood, changing the incentive could create uncertainty amongst suppliers and investors. It was highlighted that any changes must ensure that UK based fuel production remains viable and attractive for further investment. Biofuels produced from wastes need to continue receiving more support than crop-based fuel to maintain viability.

The main point of discussion in the responses to these questions was related to a potential transition to a GHG-based scheme. Some respondents clarified that despite their preference being a transition to a GHG-based RTFO, if the RTFO was to remain volume-based, the double counting of waste-derived fuels should remain. Those supporting the move to a GHG-based scheme did flag that this would favour waste-derived fuels anyway. Other stakeholders suggested that a move to a GHG scheme must still incentivise waste-derived fuels, as many of their benefits are not related solely to GHG savings. There was a suggestion that instead of a GHG scheme, multipliers could be applied to wastes for specific use-cases or GHG thresholds reached – for example a triple reward for any waste achieving over 70% carbon savings.

A stakeholder who argued that double counting should stay caveated this with the suggestion that targets must be increased, to not undermine the physical volume of fuel supplied. Another caveat of continuing with the policy was that careful scrutiny of wastes must occur to prevent fraud.

Support for an alternative way to incentivise waste-based fuels

Twenty-nine stakeholders did not believe that double reward should continue going forwards. These included an energy trading company, fossil/low carbon fuel producers/suppliers, individuals and trade associations. Their responses are summarised below.

As per the previous summary, there is crossover here with other summaries, such as arguments for transitioning to a GHG scheme and why the double-counting policy has not achieved maximum carbon savings to date. These have not been summarised in detail here.

In a similar fashion to the previous question, there were respondents who caveated the fact that although in a preferred GHG scheme there would be no need for the double counting of wastes, if the RTFO was to remain as a volume-based scheme then the policy should remain.

Transitioning to a GHG scheme was a popular suggestion for an alternative way to structure the scheme. The reasons for this included:

- Fuels should be categorised on their overall carbon intensity;
- The world is becoming more complex, so a more nuanced approach is required;
- There is only an incentive to reach the minimum GHG threshold with regards to producing waste-derived fuels;
- A GHG scheme would naturally incentivise the production of waste-derived fuels as they generally generate greater GHG savings; and
- Alignment with the SAF Mandate.

It was also flagged that any change to a GHG-based scheme should be undertaken alongside improved ILUC assessments, or a broadening of the development fuel obligation to include more waste-derived fuels.

These arguments were expanded upon by evidence provided that biomethane, which could displace the use of fossil diesel in heavier vehicles, is crowded out by the incentivisation of waste-derived fuels. The overreliance on certain types of wastes, such as used cooking oil, was also implied as being a barrier to the development of advanced fuels.

There was also a suggestion to have an ‘additionality’ requirement on wastes. This would mean that if the normal end use of the waste is already to produce low carbon fuel, it would need to meet an additionality test to be considered a double counting waste.

Finally, respondents argued that the policy has stimulated a large increase in imported fuels and that further incentives are therefore needed to ensure UK fuel producers continue to produce waste-derived fuels.

Other responses

Four other respondents provided evidence but did not specifically answer the question posed on the future of the policy. These were fossil/low carbon fuel producers/suppliers, a civil society organisation, and a think tank.

It was argued that more rigorous database tracking should be introduced to prevent fraud and ensure that wastes are genuine. An example of joining up with the EU database was proposed. This links to another concern raised about the dramatic increase of imports of double counting waste from Asia and sustainability concerns. It was suggested by one stakeholder to remove the double counting of UCO sourced from outside Europe to mitigate any risks.

Government response

We thank stakeholders for their responses to the questions relating to the treatment of waste-derived fuels under the RTFO. A future RTFO consultation will consider how different low carbon fuels are rewarded under the RTFO. With regards overall carbon savings, we can reiterate that during the setting of RTFO targets, the double counting of waste-derived fuels is taken into account.

Several stakeholders raised the potential risk of fraud in biofuel supply chains. Fuels supplied under the RTFO are subject to strict sustainability criteria and third-party verification.[36] We can, and do, investigate the sustainability claims of applications for reward of fuel under our schemes and have powers to take action if evidence of non-compliance or fraud is found.

We will consider the detailed views presented in response to these questions as we develop further focused policy proposals ahead of a wider consultation on the RTFO to be published in due course.

[36] More information on this is available in the RTFO guidance.

RTFO development fuel obligation

Original objectives of the 2018 changes

The 2018 amendment to the RTFO included the creation of a new sub-target to encourage the production and supply of low carbon fuel produced using novel emerging technologies, known as ‘development fuels’. These types of fuels were seen as key to driving decarbonisation in harder to decarbonise modes, such as aviation, without the need for vehicle adaption.

The intention of the development fuel obligation was to:

- Stimulate the production and supply of strategically important, advanced low carbon fuels, without the need for vehicle adaptation and driving decarbonisation in sectors where there are fewer alternatives.
- Reduce the reliance on ’traditional’ biofuels, where feedstocks are limited and may become more so as demand increases.
- Increase the supply of drop-in fuels (low carbon fuels that avoided the blend walls[37] that limit conventional biodiesel (FAME) and ethanol).
- Increase the use of feedstocks that do not have land use change risks or compete with existing fuel pathways.
- Encourage development of strategic fuel pathways by accessing feedstocks that are otherwise not used in the main obligation because the technology is new and expensive.

To qualify for development fuel certificates, a fuel must be made from one of the following:

- Sustainable wastes or residues that the administrator considers are eligible for double RTFCs, but exclude fuels produced from segregated oils and fats such as used cooking oil and tallow, as these feedstocks are already widely used.
- A renewable fuel of non-biological origin (RFNBO), for example hydrogen made from renewable energy.

[37] A ‘blend wall’ is maximum amount of biofuel which can be blended into a fossil fuel beyond which fuel supply infrastructure and vehicles would need to be modified to become compatible.

In addition, a development fuel must also be one of the following fuel types:

- hydrogen;
- aviation fuel (avtur or avgas) – note this fuel type will be removed as the SAF mandate comes into force in 2025;
- substitute natural gas – low carbon methane produced from the product of gasification or pyrolysis; or
- a fuel that can be blended so that the final blend has a low carbon fraction by volume of at least 25% whilst still meeting BS EN: 228 (for petrol) or BS EN: 590 (for diesel).

The development fuel obligation trajectory can be seen in Table 2. The obligation was implemented in 2019 and has been increasing up to its current level of 1.20% in 2024. The development fuel obligation has been set to increase each year until 2032 where it will reach 2.80%, after which it continues at that level indefinitely.

Year	Development obligation as % of total fuel	
	Before 2018	2018 amendments[38]
2015	N/A	0.00%
2016	N/A	0.00%
Apr 17 - Apr 18	N/A	0.00%
Apr 18 - Dec 18	N/A	0.00%
2019	N/A	0.10%
2020	N/A	0.15%
2021	N/A	0.50%
2022	N/A	0.80%
2023	N/A	1.00%
2024	N/A	1.20%
2025	N/A	1.40%
2026	N/A	1.60%
2027	N/A	1.80%
2028	N/A	2.00%
2029	N/A	2.20%
2030	N/A	2.40%
2031	N/A	2.60%
2032 onwards	N/A	2.80%

Table 2 The development fuel obligation targets

Findings of analysis

Development fuel supply

As referred to in the call for evidence, the development fuel obligation has seen a significant amount of buy-out since it began in 2019 due to insufficient fuel supply. Figure

[38] RTFO 2018 amendments

12 shows the amount of development RTFCs redeemed under the RTFO from 2018-2023 under the development obligation. The majority of the development fuel obligation has been bought out, accounting for around 6.41% of all RTFCs needed to meet the total (main and development) RTFO obligation in 2023.

In the first year of the development obligation, there was 100% buyout. By 2023, 105 million certificates had been redeemed with 52 million litres of development fuel supplied[39], and 413 million bought out. This means that the obligation was seeing 79.79% buyout in 2023. Overall, between 2018 and 2023, the RTFO has delivered about 12.82% of its targeted development fuel.

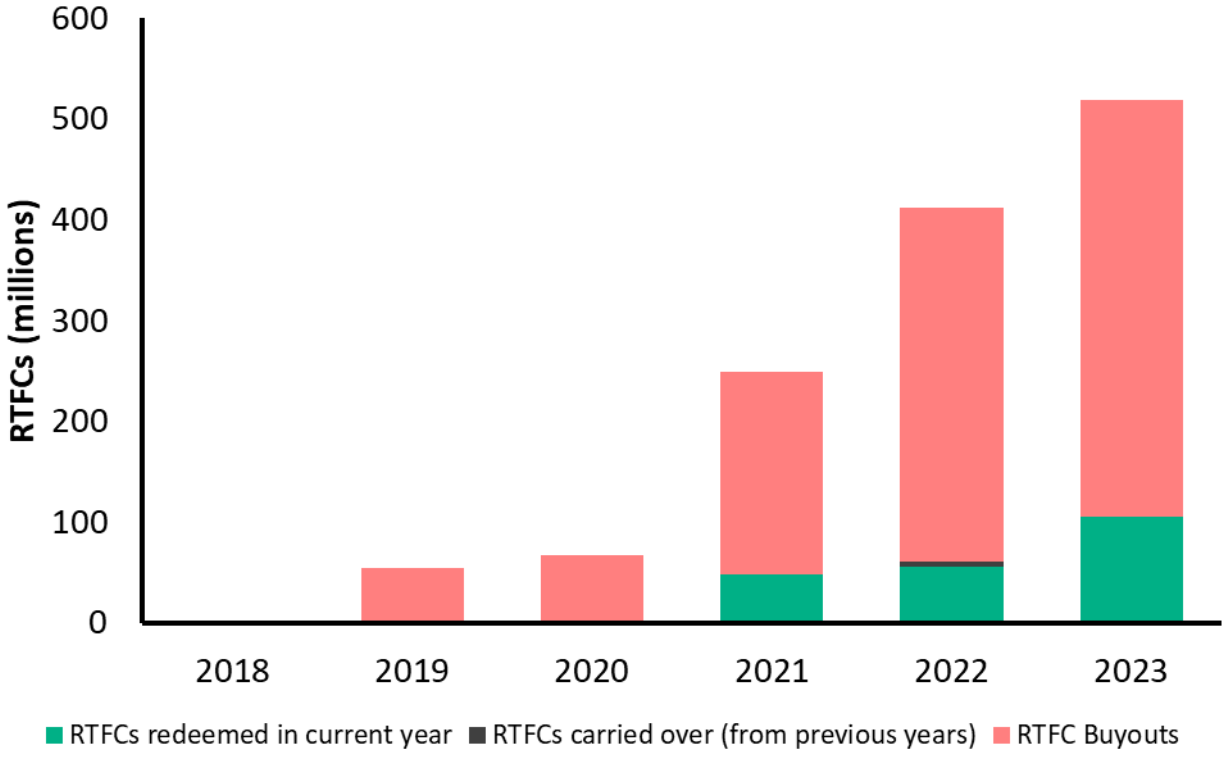

Figure 12. How the development fuel was met - dRTFCs bought out compared to redeemed as a proportion of the obligation

Source: This is taken directly from the RTFO Statistics ROS system.

Note: This can be recreated by taking the RTFO obligation targets and multiplying this by the fuel volume in RTFO Statistics Table RF_0101 to estimate RTFCs required for each obligation each year. RTFO Statistics Table RF_0103 shows the RTFCs redeemed over obligations over time. The difference between these two broadly shows buy-outs.

Despite an increase in development fuel supply over time, the RTFO is not seeing the anticipated pace of this developing, and we wanted to understand stakeholder's views on why.

[39] Renewable fuel statistics 2023: final report - GOV.UK

Has the policy met the objectives of 2018 changes?

Figure 13 presents the monetised policy impact of the development fuel obligation, including GHG savings, fuel costs, and buy-out costs.[40]

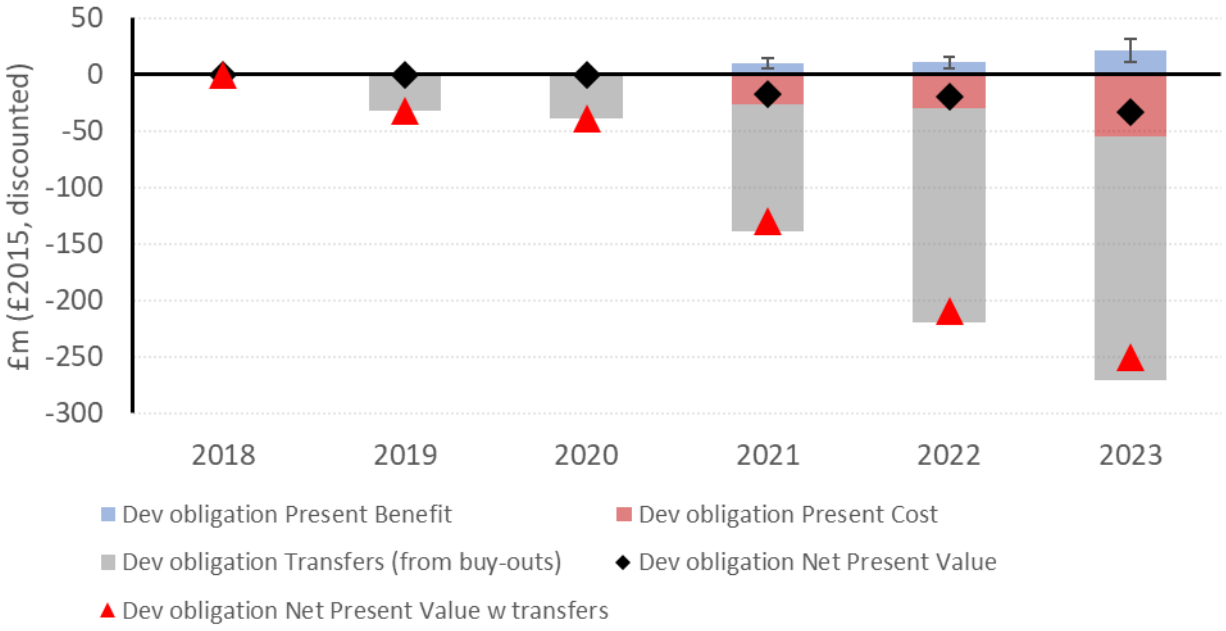

Figure 13 Benefits, costs, transfers and net present value of the development fuel obligation

Note: The blue bar reflects the monetised GHG benefits under the central DESNZ carbon values. The error bars around this reflect what the benefits would be using the upper and lower carbon values. Analytical approach of cost benefit analysis is discussed in Annex A.

Low fuel supply and high buyouts has meant there have been limited GHG savings achieved by the development fuel obligation. An estimated 0.25 MtCO2e of GHG savings have been achieved from 2018-2023, translating to a total monetised GHG benefit of £41m.

The cost-effectiveness of the development obligation, measured with the weighted average abatement cost, is estimated at 450 £/tCO2e over 2018-2023.[41] This is higher than the DESNZ 'High' carbon values, suggesting this scheme is a relatively expensive decarbonisation measure.

The abatement cost does not include the buyout as a cost as this is classed a "transfer" to the government under appraisal guidance. However, if included to reflect the higher cost without GHG savings, the cost goes up to 2,812 £/tCO2e.

Moving forward, it is important for the government to understand the reasons behind the shortfall of development fuel being supplied into the RTFO, from the perspective of industry and prospective development fuel producers. The call for evidence therefore

[40] More details of the CBA can be found in Annex B.

[41] Details of assumptions in Annex A.

requested evidence from stakeholders as to why this was the case, and if the supply of development fuels could be expected to increase.

Call for evidence question

Question 13

Do you have any evidence on why there has been a lack of supply of development fuels or how the obligation has stimulated the production of development fuels?

Summary of responses

Sixty-six respondents provided evidence as to the lack of supply of development fuels, or evidence of fuel production that has been stimulated by the obligation. These respondents included a consultancy, an energy trading company, fossil/low carbon fuel producer/suppliers, an individual, low carbon energy developers, a public partnership, and trade associations. The responses have been summarised below:

General development fuel project difficulties

Stakeholders raised various fundamental issues which have been barriers to production of development fuels. The following evidence was raised by: a consultancy, fossil/low carbon fuel producer/suppliers, low carbon energy developers, a public partnership, and trade associations:

The main barrier raised by respondents to the supply of eligible development fuels, was overcoming technology challenges related to producing novel fuels. This issue has knock on impacts to other issues brought up by stakeholders, as it underpins the business plans of prospective development fuel plants and can make securing investment challenging. These issues have contributed to extending the time taken to get development fuel projects up and running. In some cases, this was suggested to be in the 5-10 year range which is at odds with the original pace of the development obligation. This means a number of projects initiated since the policy was confirmed are still in their development phase and have not begun commercial production.

Stakeholders also flagged that the capital investment needed for many of the projects is high, with a long return on these investments anticipated. The lack of a guaranteed market price, alongside the points previously mentioned contributes to a high level of investor uncertainty.

Another theme raised in many responses was that for some development fuels, particularly hydrogen, the supply-chain is yet to be fully established, up to and including the end use of the fuel.

Finally, a stakeholder identified the fact that progress on some development fuel projects was delayed by both COVID-19, and the war in Ukraine.

RTFO definitions/requirements/eligibility difficulties

Stakeholders also raised a number of issues relating to the RTFO scheme itself. These respondents included: an industry trade association, energy trading companies, fossil/low carbon fuel producer/suppliers, a public partnership and trade associations. The responses have been summarised below:

One of the major points raised was that the definition and scope of eligible fuels and feedstocks is too narrow. This is summarised in more detail in question16, where we asked specifically about the range of eligible fuels and feedstocks.

Stakeholders also suggested that development fuel buy-out is too low to incentivise investment into development fuels, with the gap between the main obligation and development fuel obligation buy-outs being too small. Some respondents suggested an auto-ratchet mechanism to increase the buy-out or raising it in line with inflation.

In a similar vein, respondents mentioned that the development fuel targets are too low, and too short term. This, along with the lack of a price floor for dRTFCs means there is very little incentive to encourage investment in development fuel technologies. Furthermore, the lack of grandfathering technologies, alongside frequent legislative changes was raised as creating further uncertainty for investors.

Multiple arguments were made that the current requirement for eligible fuels to have a final low carbon fraction blend by volume of at least 25% is too high to stimulate investment in development fuel technologies. It was also suggested that it was BS EN 228/590 fuel standards, leading to unusual fuel additives being required to keep the fuel on specification. Furthermore, the sustainability criteria, end-molecule specifications and GHG emission thresholds of the development fuel obligation were flagged as being too strict. This, along with the fact that each development fuel needs to go through an individual approval process decreases investor confidence due to uncertainty over eligibility during production.

Multiple stakeholders also flagged that the ‘refinery route’, whereby refineries have mass balanced bio-hydrogen for hydro-processing of fossil gasoline and diesel, with no capital investment required, has diminished the ability to build new standalone development fuel plants.

Finally, new and prospective development fuel producers suggested that they have a lack of familiarity with the dRTFC trading process. It was proposed that a dedicated, robust, transparent platform for trading dRTFCs should be created.

Hydrogen/RFNBO specific difficulties

Numerous stakeholders responded with points relating to challenges with the production and supply of hydrogen. These included fossil/low carbon fuel producer/suppliers, and trade associations. These points have been summarised below:

It was raised that cost effective production of electrolytic hydrogen benefits from a consistent supply of electricity. The RTFO’s “additionality” requirements and sourcing rules

mean it can be challenging to ensure that consistent eligible hydrogen production can occur. This impacts the economics of any project development.

Some stakeholders fed back that the definition of eligible hydrogen is overly restrictive. More views on how the scope of hydrogen could be widened are outlined in question 16, however in a legislative sense it was raised that any hydrogen which is eligible under the Low Carbon Hydrogen Standard (LCHS), should be eligible under the RTFO. This, alongside competition with the hydrogen production business model (HPBM) and other government incentives means it is currently more attractive to supply hydrogen to industry off-takers rather than transport. It was suggested that a hydrogen sub-mandate separate to the development fuel obligation could incentivise increased production and supply and provide more certainty in relation to future demand.

Finally, the point was raised that the hydrogen market is still immature, with a lack of end use cases.

Other government policy barriers

There were further reasons given as to the lack of supply of development fuels which are due to government policy, but do not come under the scope of the RTFO. These points were raised by trade associations, a low carbon energy developer and a fossil/low carbon fuel producer/supplier. The evidence is summarised below:

A stakeholder argued that the obligation being at the duty point means that the development fuel market is controlled by the fuel supplier. Other respondents raised that there is no beneficial tax treatment for low carbon fuels supplied under the RTFO, which if implemented could further incentivise investment of development fuels.

Furthermore, it was suggested that the publication of the Biomass strategy has pushed biomass sites towards BECCs over fuel production. Stakeholders also argued that the 2035 ICE ban signals that road fuels will be in decline in the future. This acts to limit the market and payback time for road specific development fuel plants, increasing investor uncertainty. The focus of advanced fuel production has shifted to SAF, further reducing the likelihood of standalone road development fuel plants.

Finally, it was mentioned that the waste hierarchy (figure 11) does not currently discern between different types of energy recovery. The stakeholder suggested that waste-to-fuel should be prioritised over incineration of waste to create electricity in the hierarchy.

Evidence of stimulation of development fuel production

Finally, there were low carbon fuel producers who provided evidence that the obligation had stimulated some production. This included the fact that conversations with investors tend to centre around dRTFC eligibility - suggesting it has created an incentive. Likewise, contracts have been entered into by fossil fuel suppliers, suggesting that they are looking to achieve the obligation, and not just settle for buying out.

Development fuel obligation going forward

With increased competition for feedstocks, reducing the reliance on 'traditional' biofuels remains important, given increased competition for feedstocks.

We were keen to understand the part the RTFO should play in driving the growth of innovative, emerging technologies whilst delivering GHG reductions. As global demand for low carbon fuels increases, and different technologies are developed, we need to ensure the scheme supports its strategic aims of delivering sustainable advanced fuels while also diversifying the feedstocks and production processes required for their deployment.

SAF plants are in development, underpinned by the Advanced Fuels Fund, which could output road development fuels as byproducts/coproducts which could start to assist in the RTFO development targets.

We therefore asked industry various questions regarding their views on how the development fuel obligation can be adapted going forward. These questions, and the summary of responses are included below.

Call for evidence questions

Question 14

- **Do you expect development fuel supply to increase relative to the obligation in the short/medium term such that levels of buy-out are minimised?**

Yes	28
No	28

Summary of responses

Yes, expect an increase in development fuel supply

Twenty-eight respondents indicated that they expected development supply to increase in the short-medium term, such that levels of buyout are minimised. Those stakeholders included consultancies, fossil/low carbon fuel producer/suppliers, an energy trading company, individuals, and trade associations. The reasoning provided for these responses is summarised below.

It is worth noting that a proportion of these responses were made with the caveat that the government acts upon the proposals and evidence provided in other questions. Others stated that although they expect the supply to increase and buyout to decrease, they do not expect zero buyout to be achieved.

As the market matures, and the infrastructure and technology develop, there will be an increased capacity for production and utilisation of development fuels.

It was pointed out that the introduction of a SAF Mandate and revenue certainty mechanism will stimulate the production of RTFO eligible fuels, as co-products. The responses relating to this point are summarised in more detail after question 15.

A number of stakeholders gave a range of views as to how quickly the supply of eligible fuels may enter the market. It was suggested that development fuels would increasingly come online in the near future, leading to minimised buyout within around 24 months. Some evidence was provided that based on the current development fuel policy, buy-out levels could be minimal by 2029. There was particular acknowledgement that MSW plants developed following the introduction of support for recycled carbon fuels could be key to filling more of the development fuel obligation in the coming years, as the availability of feedstock is very high.

No, do not expect an increase in development fuel supply

Twenty-eight stakeholders also argued that buy-out would not be minimised in the short-medium term. These included a civil society organisation, fossil/low carbon fuel supplier/producers, low carbon energy developers, an individual, trade associations. The reasoning behind these responses is summarised below.

Again, it is worth noting that the majority of these responses were with the caveat of the RTFO not implementing any development fuel policy changes. Furthermore, most arguments referred back to the evidence provided in question 13, and they are not summarised here for the sake of brevity.

These stakeholders noted that the supply of development fuels has showed no signs of significant increase to date, and that there is little expectation for growth in the short to medium term. This was put down to investment costs and risks remaining high. The ability for suppliers to buy-out at the current price further limits appetite for investment.

Some stakeholders also raised the point that development fuels will not play a role in decarbonising cars or trucks, as electrification is the key pathway. This further inhibits new investment. They raised that other sectors, such as SAF and hydrogen production had specific support schemes tailored to securing and investments in new production facilities, such as the SAF revenue certainty mechanism and DESNZ's Hydrogen Production Business Model and Net Zero Hydrogen Fund.

Question 15

- **How important will SAF plants currently in development be in supporting deployment of drop-in low carbon road fuels under the RTFO?**

Very important/ important	44
Neither unimportant or important	9

Unimportant	7
Very unimportant	2
Other (non-survey)	3

Summary of responses

Very important/important

Forty-four respondents suggested that SAF plants in development would be either very important or important in supporting the deployment of drop-in low carbon road fuels under the RTFO. These included fossil/low carbon fuel producers/suppliers, individuals, a low carbon energy supplier, low carbon energy developers, a public partnership, trade associations, a waste management company. Their reasons are summarised below

Stakeholders provided evidence that, depending on the individual plant, it is expected that 10-50% of non-HEFA SAF plant output will be naphtha and diesel. This can then be sold into the road market as a road development fuel. SAF plants will not only be able to invest more capital than a standalone road development fuel plant would, but they will also encourage supply chain development and feed into economies of scale through technological advancements, stimulating further investment.

Respondents also raised that the RTFO can become an important revenue stream for SAF plant deployment, particularly if targets were further increased. This would also lower the cost of development fuels due to their increased supply. This point was built on by stakeholders who claimed that the price gap between SAF and road fuels will need to be narrowed to encourage the best practices and avoid re-processing of diesel and naphtha outputs back into SAF. While this could be inefficient in terms of low carbon fuel output, it may be commercially beneficial if SAF prices remain significantly higher than road development fuels.

It was also suggested that HEFA SAF processes can also produce paraffinic diesel, and therefore the HEFA cap under the SAF Mandate should be removed to ensure incentives for this remain strong.

It was also stressed that there will be enough feedstock to produce both SAF and road fuel at scale, however the SAF Mandate and RTFO policies must be as closely aligned as possible. This ties in with a suggestion to extend the SAF RCM to the co-products produced at SAF plants.

Neither important or unimportant

Nine stakeholders responded 'neither important or unimportant' to the question. Respondents included a consultancy, fossil/low carbon fuel producers/suppliers, and individuals. Their responses are summarised below.

These respondents were concerned that while SAF plants could produce road development fuels, the economics would need to shift to reward these fuels more substantially. The anticipated high demand for SAF meant these stakeholders were less positive about the economic pull for road fuels being sufficient.

It was also highlighted that co-products from SAF production could be directed away from the fuels sector into wider the chemicals sector.

Unimportant and very unimportant

Nine stakeholders answered 'unimportant' or ‘very unimportant’ to the question. These included fossil/low carbon fuel producers/suppliers, an individual, and a trade association. Their responses have been summarised below:

One stakeholder suggested that SAF investments remain risky, with a number of plants facing technical issues. They should therefore not be relied upon to stimulate the development fuel supply.

These respondents were more convinced that SAF plants would be likely to direct their entire output into meeting SAF mandates, through re-processing their co-products, due to the higher financial incentives associated with SAF supply. This is complemented by a point made that feedstock competition will increase once SAF plants come online. As SAF suppliers will have greater purchasing power, feedstock will be directed into SAF production.

Other evidence was focused around the difficulty in handling the two product streams. These included:

- technical barriers, such as managing two product streams, developing specific catalysts and ensuring feedstock compatibility.
- logistical barriers, including supply chain management of the feedstock supply, and dual product distribution.
- SAF and RTFO eligible fuels have different eligibility criteria making it difficult for plants to comply with both.
- the electrification of road transport was also highlighted as likely influencing SAF producers to focus on the SAF market.

Question 16

- **Are eligible fuels defined appropriately to meet the development fuel obligation goals? Should a broader or narrower range of fuels, feedstocks and production processes be considered?**

Yes	13
No	41

Summary of responses

Yes, eligible fuels are defined appropriately

Thirteen stakeholders responded that they thought the eligible fuels are defined appropriately to meet the development fuel obligation goals. These included a consultancy, fossil/low carbon fuel producers/suppliers, an individual, and trade associations. The reasoning for these responses was:

- The current list appropriately targets emerging technologies with significant decarbonisation potential, and any expansion must not compromise the sustainability of the fuels supported.
- The principle-based approach to assessing feedstock applications is valued.
- The production of development fuels via co-processing is an important production pathway.

Some respondents suggested that they were content with the current eligibility requirements and that DfT should avoid narrowing the scopeigible fuels and feedstocks.

A final concern was raised that if re-classifying any fuels, the development fuel obligation should be reserved for advanced fuels requiring additional support, being careful not to allow fuels which are easier to produce, in order to reduce buy-out

Support for a broader range of fuels, feedstocks or production processes

Forty-one respondents argued that a broader range of fuels, feedstocks or production processes should be considered as eligible for development fuel certificates. These included: an agricultural vehicle manufacturer, a civil society organisation, energy trading companies, fossil/low carbon fuel producers/suppliers, individuals, a laboratory, and trade associations. A number of updates to the fuels, feedstocks and production processes were suggested. These are summarised below. Where arguments overlapped with the points made in question 13, they are not summarised again in detail here.

Numerous stakeholders raised hydrogen related points regarding its eligibility under the development fuel obligation. It was argued that all RFNBO's and low carbon hydrogen should be eligible as a development fuel, and that this would provide the incentive needed to increase UK hydrogen production. Other responses were more specific, with arguments made to include thermal plasma pyrolysis hydrogen and nuclear derived hydrogen as eligible fuels. Aligning the RTFO with the LCHS, especially with regards to the inclusion of CCUS enabled “blue” (derived from natural gas) hydrogen as an eligible fuel was raised again in response to this question. It was also suggested that the RTFO should recognise the use of renewable and recycled RFNBO hydrogen as a substitute for fossil hydrogen as a process input in conventional oil refining. It was argued that this would encourage investment in low carbon hydrogen in a sector where fossil hydrogen is already used and that by decarbonising the hydrogen used in refineries, it would further contribute to overall GHG reductions in the road fuel market.

Regarding end-uses, it was recommended by multiple stakeholders that the NRMM definition should be updated to include hydrogen fuel cell technologies. Further arguments

were made that hydrogen could be set apart from other development fuels, with a separate hydrogen sub-target to specifically encourage the production and supply of hydrogen in transport. Conversely, it was suggested by a different stakeholder that the definition of development fuels should be stricter, limited only to green, electrolytic hydrogen.

Overall, stakeholders suggested a range of other fuels, feedstocks and production pathways which should be classed as eligible to receive development fuel certificates. These included:

- Biomass derived electricity for hydrogen production.
- RFNBO ammonia, methanol and methane.
- All forms of synthetic methane.
- Biomethane from AD plants with CCS.
- Biopropane – especially as it is currently used for process heat in SAF plants.

There were other arguments made as to how the development fuel obligation could improve regarding the eligible range of fuels, feedstocks and production processes. Some stakeholders suggested removing the eligible fuel type list and instead having a positive list of approved development fuel pathways.

It was also suggested that the development fuel obligation could be abolished entirely, and that relying on a GHG-based RTFO would be a better technology agnostic approach. Another approach suggested using different sub-mandates based on end fuel types to deliver the whole RTFO.

It was stressed by a couple of respondents that any changes to the eligibility of the fuels should be made in the spirit of the obligation - and that adding in an 'additionality' which factored in the counterfactual end use when assessing any development fuel would ensure sustainability. One respondent suggested certain fuels should be subject to routine biogenic testing to ensure sustainability.

Question 17

- **If the development fuel obligation was to switch to a GHG-based reward mechanism, how could this impact supply of development fuels including investment in production?**

Summary of responses

A total of 56 respondents provided evidence as how a switch to a GHG-based reward mechanism for the development fuel obligation could impact the supply of fuels. These included an: automative EV transport operator, a consultancy, an energy trading company, fossil/low carbon fuel producers/suppliers, individuals, low carbon energy developers, a public partnership, and trade associations. The evidence is summarised below.

Evidence supporting a move to a GHG based development fuel obligation

A key argument made by stakeholders for moving to a GHG based development fuel obligation was that this would channel investments into the fuels with commercial potential

and that also provide the highest GHG savings. This aligns with the primary principles of the scheme, providing an incentive to decarbonise above minimum thresholds. Furthermore, a GHG-based scheme would level the playing field for different technologies, allowing the market to identify the most cost-effective solutions.

From a hydrogen perspective, it was suggested that a GHG based- scheme would create a strong incentive for electrolytic hydrogen/e-fuel/RFNBO production and supply. Some stakeholders caveated that although hydrogen production would be favoured over synthetic hydrocarbons, the difference could be small.

A further benefit to switching to a GHG-based development fuel obligation was alignment with the SAF Mandate. This could further encourage SAF producers to supply development road fuels as a co-product. Consistent mechanisms across transport modes was generally flagged as important.

Stakeholders also raised the fact that a GHG-based approach could more accurately reflect the large variation in energy densities and practical applications of development fuels. This was built on with multiple respondents suggesting that the higher CCUS potential of development fuel projects lends itself to a GHG-based reward scheme - although this was caveated with the argument that legislative certainty is required due to the long-term nature of these projects. Concern was raised generally that frequent policy changes can put off investors and stability of policy is important.

Various responses supported a change to a GHG-based development fuel scheme, but caveated this with how the transition should be made. Many of these responses argued that the switch would only work if the broader barrier to development fuel supply were also addressed, as summarised in question 13. Other points raised were that the transition could not be done abruptly, and that it should be done alongside introducing a standardised LCA framework to increase investor certainty.

Evidence not supporting a move to a GHG based development fuel obligation

A key point raised by numerous stakeholders was regarding the carbon intensity of development fuels. Due to the complex nature of development fuels, many of the production processes require multiple processing steps, making them more carbon intense than lots of the fuels supplied under the main obligation. This is especially relevant regarding technologies which are in the early stages of development. There is therefore a risk that shifting to a GHG-scheme could undermine the purpose of the development fuel obligation; to stimulate investment, in novel, emerging fuel pathways. There was concern that such a move may favour the more established and lower risk fuel pathways.

Also highlighted was the complexity of predicting and calculating lifecycle GHG emissions. As these results would impact predicted return on investments, this approach could impact investor certainty as rather than needing a minimum threshold, the precise expected values could determine returns. This would create a significant additional risk for investors, with minimal upside when compared to a volume-based scheme.

These arguments were built upon with other stakeholders reinforcing that the current volume-based scheme is well understood, and that a stable framework can be more effective for investor confidence. The additional complexity being brought into the

approach was also flagged as potentially increasing the risk of incorrect claims of GHG reductions and possible over-reward.

On hydrogen, it was flagged that the current multiplier that hydrogen receives under the RTFO is enough to encourage its supply, whilst a change would be unlikely to cause a substantial impact on the supply of RFNBO's due to generally having similar carbon intensities to other low carbon fuels.

A stakeholder also pointed out the fact that a GHG mechanism would overlook the additional benefits provided by the obligation, such as economic development, air quality, and general reduced reliance on fossil fuels.

Finally numerous stakeholders referred back to arguments made in question 13, pointing out that switching the mechanism to a GHG scheme would do very little for the supply of development fuels due to the more significant barriers previously mentioned.

Other evidence provided

Some stakeholders made the argument to instead increase the GHG thresholds of development fuels to incentivise the adoption of the technologies which were the most sustainable or achieved the better carbon savings. This was built upon with a view that there should be higher reward factors or dedicated support mechanisms for fuels which met certain criteria, such as those which are carbon negative.

There were also logistical points raised by some stakeholders, regarding how a change would interact with other elements of the obligation. These were that the buyout would need to be translated to a GHG equivalent, and that targets would need to consider the double counting nature of the scheme.

Finally, various stakeholders did not indicate a preference regarding the scheme mechanism, but stressed that either way, the sub-target should remain in place as it encourages innovation and novel technologies.

Government response

We thank stakeholders for their detailed responses to the questions on the development fuel obligation. There was a broad range of opinions given for both why development fuel supply has been slow to materialise and the steps government could take to improve the outcomes for the sub target. We can commit to consulting on how the RTFO supports development fuels.

We were pleased to hear from a number of stakeholders that they think even if no further action was taken to amend the policy, the supply of development fuels is set to increase in the near future, as investments and new projects begin to deliver eligible fuel. We note however differing opinions on whether this will be sufficient to close the gap between the development fuel obligation target and the fuel supplied, given the increases to the sub-target between now and 2032. We understand development in new projects has been impacted by a number of factors since the policy was confirmed in 2018, and that part of

the slow increase in eligible fuels is simply due to how long it takes to get these projects to commercial commissioning.

We can confirm that the principles that were behind the introduction of the development fuel obligation still stand in that diversification of feedstocks and the supporting novel fuel production pathways to become commercially viable remain important. It is also clear that many of the projects being developed for SAF production will be capable of producing both SAF and road fuel. This presents an opportunity for the RTFO to be positioned to further support these investments through the development fuel obligation. This has the added benefit of driving efficient use of feedstocks.

We acknowledge that in terms of hydrogen production, there remains a difference between eligibility criteria for the RTFO and the Low Carbon Hydrogen Standard (LCHS). There are two major divergences between the schemes – the eligibility of CCUS-enabled hydrogen from natural gas, and the more stringent additionality requirements within the RTFO. It is important to note the different scopes of the RTFO compared to the LCHS. The LCHS was developed to support hydrogen production in the UK, where the electricity grid is rapidly decarbonising, driven by the Clean Power 2030 Mission, with significant additions of renewable capacity each year. Conversely, the RTFO eligibility criteria to cover RFNBO production globally, including, for example, where electricity grids may still have significant coal-powered generation and therefore additionality requirements are much more crucial for ensuring that low carbon fuels achieve genuine lifecycle GHG savings. We will continue to work internally and across government to understand whether and how this misalignment could be addressed and the potential the impacts of such a change. This work is relevant to both the RTFO and SAF Mandate schemes.

We will consult on including fuels produced from nuclear energy in the RTFO, utilising the powers provided in the Energy Act 2023 and aligning with the SAF Mandate.

With regards to broader aspects of the development fuel obligation, we are mindful that the current target trajectory runs to 2032 before plateauing in future years. We can commit to consulting on how the RTFO supports development fuels, with regards to future target levels and wider eligibility requirements.

The role of the RTFO administrator and administration of the scheme

Call for evidence summary

The call for evidence set out the role of the RTFO administrator, including their responsibilities, how fuel is assessed, and the fact that they publish end of year statistics. We sought feedback on the effectiveness of the administration of the scheme.

Call for evidence question

Question 18

- **Do you have any feedback on the effectiveness of the day to day running of the scheme and the provision of scheme guidance and statistics? Please provide suggestions for any improvements**

Summary of responses

Thirty-nine respondents provided feedback on the day to day running of the scheme. We will take all feedback onboard and consider both the policy and administrative elements raised. Below is a summary of the responses.

Many respondents were positive about the administration of the scheme, production of guidance and the engagement between industry and both policy officials and the administrative team. They valued the statistical releases, guidance documents and regular stakeholder workshops.

A number of stakeholders raised areas that could be improved. One theme was that issuing RTFCs could be delayed on occasion, and that this could lead to cash flow issues for some stakeholders. Some respondents suggested the RTFC application process was quite complex, and that this could create a barrier to newer or smaller entrants, particularly for RFNBO applications. It was suggested this additional burden can lead to administrative costs that erode the value of RTFCs. Respondents also suggested that the way RTFCs

are currently traded increases price volatility, and that changes to rules around trading RTFCs, including a marketplace within the ROS system would be beneficial.

There was a call for any new guidance to be issued in a timely manner ahead of any changes to the scheme coming into force to ensure stakeholders had time to prepare.

A number of respondents requested greater transparency in feedstock assessments and requested that consultation with industry was carried out before decisions were made. There was also a call for decisions to be made more quickly, with approval of new RCF feedstocks highlighted as taking more time.

Question 19

- **Do you have any further comments on the operation of the scheme to date?**

Summary of responses

Many stakeholders used this question to reiterate their key recommendations and to provide additional details to previous questions. These insights have been summarised within the relevant sections.

Government response

We thank stakeholders for their feedback on the operation and administration of the scheme. Whilst certificates are always issued within the timescales set out in the legislation, we recognise that prompt issuance of RTFCs is desirable for suppliers and that delays can have impacts on operators. However, it is also vital that approvals are accurate and that where further checks or evidence is required, time is taken to ensure these queries are resolved to the administrator's satisfaction. We would encourage suppliers to ensure they have processes in place to be able to respond quickly to checks or requests for additional information or evidence where required.

In making feedstock decisions, the administrator acts based on the facts available and makes decisions in line with the requirements of the regulatory framework. While we acknowledge the importance of transparent decision making, consulting industry on every feedstock decision would significantly increase administrative burden and the time required to make feedstock decisions, and for clear cases is unlikely to influence the outcome. We will remain in dialogue with stakeholders around how assessments and decisions can be best communicated.

We endeavour to make compliance process as simple as possible, however the scheme contains necessary complexities in order to ensure sustainability and robust GHG emissions savings. Where opportunities to simplify compliance arise we will look to implement them, but not at the detriment of the robustness of these processes or the scheme as a whole. Other than to provide the ROS platform for compliance, government has not played a role in the RTFC trading market and we have no plans for changes in that regard.

Where specific administrative or policy changes are requested, we are always open to discussing these and encourage stakeholders to contact us directly.

Annex A. Analytical approach

Modelling overview

1. This cost-benefit analysis (CBA) estimates the total fuel cost and greenhouse gas (GHG) savings (benefits) of the low carbon fuels supplied under the RTFO compared to fossil fuels. This analysis has been recreated for two scenarios taken from the 2018 RTFO CBA[42] and the outturn statistics. These are:
    a. Baseline: the baseline volumes expected from the 2018 CBA, e.g., the forecast of fossil fuels is multiplied by the baseline obligation targets;
    b. Expected: the expected volumes in the 2018 CBA forecast following the 2018 amendments, e.g., the forecast of fossil fuels is multiplied by the obligation target following the 2018 amendments which increased targets;
    c. Outturn: the outturn volumes in the RTFO statistics 2018 – 2023, e.g., the actual amount of low carbon fuels supplied into the UK is observed and published in the RTFO Statistics[43].
2. The baseline volumes are subtracted from both the Expected and Outturn volumes separately to estimate the expected and actual additional volumes as a result of the 2018 policy amendments. Comparing the expected and actual additional volumes allows us to understand how the original expected policy outcomes have differed from the outturn.
3. All volumes are converted into units of energy, using standard physical conversion factors from the RTFO Statistics.[44] This analysis is presented in 2015 prices and discounted to 2015 to improve comparability to the original 2018 CBA.

Costs

4. This analysis takes into account two main costs: the additional fuel costs as the difference between low carbon fuels and the fossil fuel equivalent, and the buyout costs if an obligation is not met. The increase in average fuel costs, and its second-order impact to reduce driving demand is not accounted for in this analysis.

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[42] See RTFO 2018 Cost-benefit analysis.

[43] See Table RF_0111 of the RTFO Statistics: it shows the mn litres (equivalent) and GJ for fuels over time.

[44] Default values can be found in the RTFO Compliance standard data 2023. Alternatively, RTFO Statistics Table RF_0111 can be used to estimate the L/MJ relationship for the list of fuels.

5. The cost of additional fuel supplied as a result of the RTFO is estimated through taking the wholesale price difference between a renewable fuel and its fossil equivalent and multiplying by the volume of fuel delivered. The lower energy density of renewable fuels is considered, increasing the fuel cost difference. This is because more volumes of renewable fuels are required to displace the same amount of energy as a fossil fuel. Energy density factors are provided in the RTFO Standard Data and used in the RTFO Statistics.[45]
6. Wholesale fuel prices are estimated using Argus Media Ltd[46], a market price and data provider, which includes traditional biofuels (bioethanol, biodiesels of different types, HVO, biomethanol, biomethane). Where a fuel price is not available on Argus, their closest proxy is used. Proxies have been chosen based on the process used to produce the fuel. If another fuel came out of the same process and a price exists for this fuel, then this price is chosen as a proxy .[47] If there is no fuel with a market price out of the same process, because it is a relatively niche process of low volumes, then a fuel price of another advanced process is used.[48] There is inevitably uncertainty around estimates when prices are not available. However, together these proxies reflect less than 0.5% of total fuel volumes in 2023.
7. Analysis within this review is based on average fuel prices each year and does not have the granularity of the RTFO Annual Reports which are conducted using monthly data which better reflects the fuel price volatility over each year. As a result, the estimated scheme costs in this analysis may vary from the annual reports by up to 1% - 4% per year in either direction.[49]
8. The market for RTFO development fuels has historically been limited, resulting in no clear market price being available to estimate the costs. Suppliers would generally be less willing to produce fuels unless it is cheaper than or equal to the buy-out cost. Since the volume of buyouts exceed the development fuels supplied, it implies production costs may be higher than the buy-out price. However, because fuels are unlikely to be supplied above this threshold, the average price of development fuels is assumed to match the buy-out cost. This is a simplification for modelling purposes and actual prices and production costs of development fuels can differ.
9. The amount of buyout required to meet the main and development fuel obligations are estimated from RTFO statistics.[50] To estimate the monetary impact, the amount

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[45] Default values can be found in the RTFO Compliance standard data 2023. Alternatively, RTFO Statistics Table RF_0111 can be used to estimate the L/MJ relationship for the list of fuels.

[46] Argus Media Ltd, accessed 20/11/2024. Argus Media is an independent provider of market intelligence for global energy and commodity markets. This includes daily price data assessments for over 40,000 energy and commodity prices using benchmarks in physical supply and derivative contracts.

[47] E.g. bioproprane is assumed to have the HVO price as this is a byproduct of the same process.

[48] E.g. for biobutane and MTBE (renewable), the HVO price is used as this reflects the biofuel price of another advanced process.

[49] See RTFO Annual Report 2022 which also estimates the cost of the scheme over 2022. Reports are available for each year.

[50] We take this directly from the RTFO Statistics ROS system. This can be recreated by taking the RTFO obligation targets and multiplying this by the fuel volume in RTFO Statistics Table RF_0101 to estimate RTFCs required for each obligation each year. RTFO Statistics Table RF_0103 shows the RTFCs redeemed over obligations over time. The difference between these two shows buy-outs.

of fuel bought out is multiplied by the buyout price. The buyout price was set in legislation at 30p per Renewable Transport Fuel Certificate (RTFC) for the main obligation before increasing to 50p from 2021; and 80p per Development Renewable Transport Fuel Certificate (dRTFC) for the development fuel obligation.[51, 52]

Benefits

10. The main benefits monetised in this analysis are the GHG savings from using low carbon fuels instead of their fossil fuel equivalent. To estimate the benefits, the GHG savings are calculated by taking the difference in carbon intensity (gCO2e/MJ) between low carbon fuels and their fossil fuel equivalent and multiplied this by the fuel supply. These differences are then monetised using DESNZ Carbon Values. Carbon values from the original 2018 CBA are superseded with the latest September 2021 carbon values.[53]
11. This analysis considers carbon intensities excluding indirect land-use change (ILUC). Indirect land-use change is extremely uncertain to quantify and depends on complex indirect global market responses. ILUC emissions are not counted in national carbon budgets, aligning with IPCC and UNFCCC guidelines.[54,55]
12. Data on Carbon Intensities (gCO2e/MJ) is taken from the RTFO statistics.[56] These carbon intensities reflect the emissions across the fuel lifecycle (well-to-wheel, or Scope 1, 2, 3).[57]
13. Biofuels are zero rated within internationally agreed carbon accounting, as biomass emissions are set as net '0' to account for the CO2 absorbed by fast-growing bioenergy sources during their growth.[58]

Caveats

14. The original baseline forecast from 2018 included a type of biomethane in the development fuel category. However, this was not included in legislation for the development fuel obligation. To account for this, the development fuel baseline was revised, starting at 0 in 2018 instead of 100 million litres.
15. There is substantial uncertainty around our assumptions on fuel costs and the proxies used. This is particularly true when it comes to the development fuels. We are continuously working to improve our evidence base and we will update this analysis if new and more accurate information becomes available.

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[51] RTFO 2018 legislation.

[52] Article 2 of the RTFO 2020 legislation.

[53] Department for Energy Security & Net Zero Carbon Values.

[54] Volume 4 of the 2006 IPCC guidance.

[55] UNFCCC guidance on 2006 IPCC guidelines for national greenhouse gas inventories.

[56] RF_0105b of the RTFO Statistics.

[57] This includes Scope 1 (the emissions of combustion), Scope 2 emissions from electricity, Scope 3 (emissions from feedstock cultivation, fuel production, transport and distribution, etc). More complete detail can be found on page 79 of the RTFO Compliance Guidance 2024.

[58] The emission and absorption of biomass is captured in the Agricultural, Forest and Other Land Use sector (AFOLU). Details can be found in Volume 2 of the 2006 IPCC Guidance.

16. Over the 2018-2023 period, there have been multiple policies which worked together as a package, making isolating impact of 2018 RTFO amendments difficult.
    a. EU GHG regulations target required suppliers to reduce the average GHG intensity of their fuels by at least 4% in 2019 and 6% in 2020, compared to the EU average 2010 baseline of 94.1 gCO2e/MJ.[59] The RTFO target was set at 8.5% in 2019 and 9.7% in 2020 as a percentage of total transport fuel volume. Furthermore, the RTFO sets a minimum sustainability threshold of an average 55% for a renewable fuel compared to a fossil fuel. Both factors can result in a range of outcomes for the % GHG reduction across all fuels. Whilst these two policies were targeting similar outcomes, the GHG regulations likely contributed to a certain level of minimum absolute sustainability. This analysis does not distinguish which GHG savings are attributed to each of these policies.
    b. In 2022, the E10 regulations were implemented, which set out that ethanol could be blended up to 5-10% on a volume basis, up from 5% previously. The impact of this is likely to cause higher amounts of bioethanol used in the RTFO. This is expected to affect the distribution of fuels and GHG savings under the RTFO. While bioethanol is cheaper per litre than double-counted biodiesel, it is relatively more expensive to deliver a single RTFC as more volumes of fuel are needed towards the obligation. Bioethanol also has slightly lower GHG savings compared to waste-based double-counted biodiesel. As a result, the E10 regulations were expected to increase the average cost of delivering the RTFO and lower GHG savings, except when the RTFO targets are increased, giving more headroom for additional biodiesel use and GHG reductions. [60] These higher RTFO targets were implemented in 2021 and the impact is not separated out as the schemes overlap.[61]
17. There have also been unexpected global events. Fuel prices and total fuel consumption decreased in March 2020 following the Covid-19 pandemic. Prices started to rise after June 2020.[62] The Russia-Ukraine war resulted in a global supply shock to fuels resulting in an increase in prices in 2022.[63] In both cases, the price of biofuels increased relatively more than fossil fuels, increasing the cost premium of biofuels over this period.

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[59] Transport fuel greenhouse gas reporting.

[60] 2021 E10 Impact Assessment.

[61] Article 7 of the RTFO 2021 legislation.

[62] 2020 consultation on increasing the RTFO buy-out price.

[63] RAC Foundation biodiesel and fossil fuel price comparison.

Annex B. Cost benefit analysis results

1.38 GHG savings, benefits, and costs are estimated for the expected forecast and outturn RTFO statistics relative to the original baseline. The 2018 analysis is re-estimated using updated fuel prices; carbon values; and carbon intensity factors to allow better comparability to the outturn versus what was expected in 2018.

1.39 The low, central, high DESNZ carbon values are used to monetise the GHG benefits in the tables below.

		2018	2019	2020	2021	2022	2023	Total
GHG savings (MtCO2e)	2018 CBA estimate (revalued in 2025)	1.72	2.57	3.37	3.42	3.28	3.25	17.62
	Actual outturn	1.49	3.22	3.08	2.79	4.28	5.02	19.88
Monetised GHG benefit (£m)	2018 CBA estimate (revalued in 2025)	311	456	588	587	550	536	3,028
	Actual outturn - low	137	291	273	243	366	422	1,732
	Actual outturn – central	269	570	537	479	717	827	3,400
	Actual outturn - high	412	873	821	732	1,100	1,265	5,202
Fuel cost (£m)	2018 CBA estimate (revalued in 2025)	144	297	583	678	670	396	2,768
	Actual outturn	141	376	536	610	980	807	3,448
Buy-outs (£m)	2018 CBA estimate (revalued in 2025)	0	0	0	0	0	0	0

	Actual outturn	0	0	48	0	0	0	48
Net Present Value (£m)	2018 CBA estimate (revalued in 2025)	167	159	5	-91	-119	139	260
	Actual outturn - low	-3	-85	-263	-366	-614	-385	-1,717
	Actual outturn – central	128	195	2	-131	-263	20	-49
	Actual outturn - high	271	497	285	122	120	458	1,753
Abatement Cost (£/tCO2e)	2018 CBA estimate (revalued in 2025)	84	116	173	198	204	122	157
	Actual outturn	94	117	174	218	229	161	173
DESNZ Carbon Values (£/tCO2e)	Low Benchmark	92	90	89	87	86	84	87
	Central Benchmark	184	181	178	175	171	168	174
	High Benchmark	277	271	267	262	257	252	262

Table 3 Annual breakdown of the variables affecting the overall value of the RTFO main obligation.

Notes: *estimates of GHG savings in this table reflect savings over the fuel lifecycle and if the low carbon fuels displaced fossil fuels. This table also reflects the additional GHG savings from additional low carbon fuels supplied above the baseline forecast, because of the increased RTFO target implemented from 2019. Abatement costs (the cost to offset one tonne of carbon dioxide or equivalent) and the DESNZ carbon values in the "Total" column reflect abatement cost weighted by the GHG emissions each year. For the DESNZ Carbon values this reflects the weighted average carbon comparator (WACC)*

		2018	**2019**	**2020**	**2021**	**2022**	**2023**	**Total**
GHG savings (MtCO2e)	2018 CBA estimate (revalued in 2025)	0.34	0.36	0.41	0.50	0.66	0.82	3.10
	Actual outturn	0.00	0.00	0.00	0.06	0.06	0.13	0.25
Monetised GHG benefit (£m)	2018 CBA estimate (revalued in 2025)	62	64	72	86	111	136	530
	Actual outturn - low	-	0	0	5	5	11	21

	Actual outturn – central	0	0	0	10	11	21	42
	Actual outturn – high	-	0	0	15	16	33	64
Fuel cost (£m)	2018 CBA estimate (revalued in 2025)	125	128	141	232	302	342	1,270
	Actual outturn	0	0	0	27	30	55	112
Buy-outs (£m)	2018 CBA estimate (revalued in 2025)	0	0	0	0	0	0	0
	Actual outturn	0	32	39	112	190	216	590
Net Present Value (£m)	2018 CBA estimate (revalued in 2025)	-64	-64	-69	-146	-191	-206	-740
	Actual outturn - low	0	0	0	-22	-25	-44	-91
	Actual outturn – central	0	0	0	-17	-20	-34	-71
	Actual outturn – high	0	0	0	-12	-14	-22	-48
Net Present Value (£m) – with buy-outs (transfers)	2018 CBA estimate (revalued in 2025)	-64	-64	-69	-146	-191	-206	-740
	Actual outturn - low	0	-32	-39	-134	-215	-260	-681
	Actual outturn – central	0	-32	-39	-130	-210	-250	-660
	Actual outturn – high	0	-32	-39	-125	-204	-239	-638
Abatement Cost (£/tCO2e)	2018 CBA estimate (revalued in 2025)	367	354	342	462	458	414	409
	Actual outturn		487	483	479	475	424	450
Abatement Cost (£/tCO2e) – with buy-outs (transfers)	2018 CBA estimate (revalued in 2025)	367	354	342	462	458	414	409
	Actual outturn		4,827,191	84,988	2,485	3,450	2,099	2,812

DESNZ Carbon Values (£/tCO2e)	Low Benchmark	92	90	89	87	86	84	85
	Central Benchmark	184	181	178	175	171	168	170
	High Benchmark	277	271	267	262	257	252	256

Table 4 The costs and benefits associated with the development fuel obligation.

Notes: *estimates of GHG savings in this table reflect savings over the fuel lifecycle and if the low carbon fuels displaced fossil fuels. This table also reflects the additional GHG savings from additional low carbon fuels supplied above the baseline forecast, because of the increased RTFO target implemented from 2019.*

Abatement costs (the cost to offset one tonne of carbon dioxide or equivalent) and the DESNZ carbon values in the "Total" column reflect abatement cost weighted by the GHG emissions each year. For the DESNZ Carbon values this reflects the weighted average carbon comparator (WACC)