



Department
for Transport

Renewable Transport Fuel Obligation Annual Report 2021



Renewable Transport Fuel Obligation Annual Report 2021

Presented to Parliament
by the Secretary of State for Transport
by Command of His Majesty

June 2023



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Contents

Executive summary	4
1. Introduction	6
2. Sign-off of report	10
3. Assurance report	11
4. Outturn for 2021 (subjected to an assurance review)	14
5. Forecasts	16
6. Scheme outcomes	19

Executive summary

Introduction

1. This report has been produced to ensure transparency in the financial reporting of the Renewable Transport Fuel Obligation (RTFO). As the RTFO is classified as an imputed tax and spending measure, it is not reported within the Department for Transport's Annual Report and Accounts.
2. The RTFO is one of the Government's main policies for reducing greenhouse gas (GHG) emissions from transport in the UK. It requires that a certain percentage of UK road and non-road transport fuel supplied is renewable and that it meets the sustainability criteria.

Outturn for 2021

3. The total value of the RTFO, which comprises an imputed tax for 2021, is **£ 1,974.9 million**. This is calculated as the difference between the cost of renewable fuels supplied and the fossil fuels they have replaced. See section 4 for more details.

Forecasts

4. The forecast total value of the RTFO for 2022 is **£ 2,479.6 million**. The driver for the increase in the outturn is the increase in the volume of fuels supplied, combined with the increasing fuel cost, including the premium of renewable fuels over fossil fuels. See section 5 for more details.

Scheme outcomes

5. In 2021, the average GHG saving from the renewable fuels supplied under the RTFO was 83% compared to fossil fuels, representing a total saving of 5.07 million tonnes of CO₂ equivalent (eq.)¹.
6. The RTFO is meeting its objective of reducing GHG emissions from UK transport fuel. All the renewable fuels rewarded under the RTFO meet the mandatory sustainability criteria. The RTFO is designed and managed to ensure a high level of compliance with its requirements. For more details on the outcomes of the scheme, see section 6.

¹ <https://www.gov.uk/government/statistics/renewable-fuel-statistics-2021-final-report>

Signature and assurance review

7. This report is signed by the Permanent Secretary, Department for Transport (section 2). The outturn figure for 2021 has been subjected to an assurance review (see section 3) by the National Audit Office (NAO) on behalf of the Comptroller and Auditor General, in line with the Direction issued by HM Treasury.

1. Introduction

Purpose of this report

- 1.1 This report has been produced to ensure transparency in the financial reporting of the Renewable Transport Fuel Obligation (RTFO). The transactions generated by the RTFO are not income or expenditure attributable to the Department for Transport (DfT) and the RTFO is not reported within the Department's Annual Report and Accounts as its inclusion would not be compliant with the Government's Financial Reporting Manual.
- 1.2 This report gives an outturn figure for the value of the RTFO for the 2021 Obligation year (January to December) alongside the outcomes for the scheme. A forecast is also given for the 2022 RTFO year. The National Audit Office (NAO) on behalf of the Comptroller and Auditor General has subjected the 2021 outturn data within this report to an assurance review: the assurance report is included on page 11.

The RTFO

- 1.3 The RTFO is one of the Government's main policies for reducing greenhouse gas (GHG) emissions from transport in the UK, supporting the Government's Transport Decarbonisation Plan² and wider Net Zero Strategy³.
- 1.4 The RTFO requires that a certain percentage of UK road and non-road transport fuel is renewable and provides a valuable incentive for the renewable transport fuel industry which contributes towards meeting this obligation. The scheme started in 2008 and has been amended over the years to strengthen sustainability provisions, increase targets and introduce greater incentives for certain feedstocks and fuel types.
- 1.5 For the 2021 obligation year, fossil and renewable fuels used in road transport and non-road mobile machinery were covered by the RTFO, as well as renewable fuels used in aircraft.

² <https://www.gov.uk/government/publications/transport-decarbonisation-plan>

³ <https://www.gov.uk/government/publications/net-zero-strategy>

- 1.6 The RTFO operates with tradable certificates. These are called Renewable Transport Fuel Certificates (RTFCs) and are awarded to suppliers of renewable transport fuel that meet the sustainability requirements. To be awarded, suppliers must provide evidence to the RTFO Administrator that demonstrates that their fuel is sustainable.
- 1.7 All applications for RTFCs must be independently verified and most fuel supplied is also certified by voluntary schemes (98% in 2021). To provide an additional check on compliance, the RTFO Administrator performs a series of random and risk-based checks on applications, including in-depth investigations where necessary.
- 1.8 Obligated fuel suppliers to the UK market⁴ are required to demonstrate that renewable transport fuel has been supplied for a set proportion of their total obligated fuel supply. For the 2021 obligation year, fuel suppliers were required to demonstrate this by redeeming RTFCs equivalent to 10.679% of the volume of fossil and unsustainable renewable fuel supplied. Suppliers could meet this obligation by redeeming certificates that were received for their own renewable transport fuel supply, or by redeeming certificates that were bought from other suppliers of renewable transport fuel.
- 1.9 In 2018, the RTFO was amended to introduce a crop cap⁵ from 15 April 2018, and to introduce a target, from 2019 onwards, for a specific sub-set of advanced fuels termed 'development fuels' which are awarded separate development fuel RTFCs (dRTFCs).
- 1.10 The development fuel target takes into account the fuel type, production pathway and feedstock, and aims to incentivise those fuel pathways which need greater support and fit the UK's long-term strategic needs. Eligible fuels include aviation fuel, drop in fuels, hydrogen and synthetic natural gas. It was introduced on 1 January 2019 and requires that obligated suppliers provide a proportion of their total obligated fuel supply as development fuels. For 2021 this proportion was 0.556%.
- 1.11 Suppliers also have the option to buy-out of their obligation, paying 50 pence per litre of renewable transport fuel for which they have not redeemed an RTFC. This protects consumers from excessive increases in fuel prices by setting a maximum value for RTFCs. There is also a separate buy-out price of 80 pence per litre for the development fuel target. Any receipts from suppliers that buy-out are surrendered by the Department to the Exchequer, in line with HM Treasury rules. Buy-out receipts are not hypothecated.
- 1.12 Fuel suppliers can meet up to 25% of their obligation with certificates issued in the previous year. This reduces the impact of unexpected events and provides some protection against year-to-year volatility of fuel prices. An exception to this was in 2020, when there was no carry over from 2019 to 2020. This is because the renewable energy target for 2020 had to be met by fuel that was provided in 2020. Any RTFCs issued in 2019 may be carried over into the year 2021.

⁴ Those supplying at least 450,000 litres per year.

⁵ The crop cap sets an upper limit, by volume, on the contribution that crop-derived biofuels, excluding dedicated energy crops, can make towards discharging a supplier's obligation. The crop cap decreases year on year and in 2021 was 3.83% of the total fuel supplied by a given fuel supplier.

- 1.13 The RTFO guidance⁶ sets out information on complying, reporting, and verifying with the RTFO process for renewable and fossil fuel suppliers as well as independent verifiers.
- 1.14 Renewable fuels supplied under the RTFO are produced from globally derived feedstocks (see Figure 7). The complexity of these global supply chains brings accompanying compliance risks, which are mitigated through the assurance regime outlined in paragraph 1.7. This combination of third-party verification, voluntary scheme certification, and RTFO Administrator checks provides assurance over the sustainability and traceability of fuels supplied under the RTFO. Non-compliance is rare, but where identified can result in the revocation of certificates and/or the issuing of civil penalties. The RTFO Administrator also works proactively with other regulators and assurance/certification entities to address emerging issues and concerns.
- 1.15 DfT publishes data relating to the RTFO in regular renewable fuel statistics releases⁷. These reports are prepared and published following the Code of Practice for statistics⁸. The reports contain wide-ranging information on the renewable fuels supplied under the RTFO such as fuel type, feedstock, country of origin, and GHG savings achieved. Section 6 of this Annual Report provides a summary of this information.
- 1.16 The RTFO scheme process also periodically undergoes an internal advisory report. The last report was completed in December 2020 and looked at the scheme's supervisory role in the context of certifying bodies. Prior to that, another internal audit took place in 2018 that looked at the scheme's approach to risks and risk scoring, the recommendations of which have been subsequently addressed.

Recent Updates to the RTFO

- 1.17 Following a public consultation, the price for a supplier to buy-out from their obligation was raised from 30p to 50p per RTFC. This was implemented for the 2021 obligation year onwards. The buy-out price was increased due to increases in the cost of biofuels relative to petrol and diesel which meant that there is a risk that suppliers will 'buy-out' of their obligations to supply renewable transport fuel. The increase in the buy-out price therefore provides a greater certainty of delivering continued GHG savings from the RTFO scheme.
- 1.18 Further updates to the RTFO were introduced from January 2022. This included a 5% increase in the main obligation between 2021 and 2032 with an immediate 1.5% increase in 2022. The land criteria were strengthened to protect highly biodiverse wooded land and new criteria were established to address the impacts of biofuels made from forest biomass and to manage soil carbon impacts associated with using agricultural residues in biofuel production. The amendments also expanded the eligible transport modes from January 2022 so that renewable fuels of non-biological

⁶ <https://www.gov.uk/government/publications/renewable-transport-fuel-obligation-rtfo-compliance-reporting-and-verification>

⁷ <https://www.gov.uk/government/collections/renewable-fuel-statistics>

⁸ <https://code.statisticsauthority.gov.uk/>

origin used in maritime as well as in fuel cell powered trains and other alternatively powered non-road vehicles are eligible for support in the form of RTFCs.

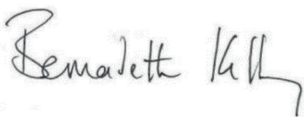
- 1.19 E10 petrol, which contains between 5.5 and 10% bioethanol, was introduced in UK forecourts from September 2021, replacing E5 as the standard blend of petrol. This change enables greater quantities of bioethanol to be used in transport helping suppliers to meet increased obligations and increasing overall GHG savings.

The GHG Reporting Regulations

- 1.20 Another policy that ran parallel with the RTFO until the end of 2020 is the Motor Fuel (Road Vehicle and Mobile Machinery) Greenhouse Gas Emissions Reporting Regulations 2012 as amended ('the GHG Reporting Regulations'), which came into effect on 15 April 2012. The GHG Reporting Regulations were a key measure for reducing GHG emissions from the fuel supplied for use in transport. They required that suppliers of fuels for use in road transport and non-road mobile machinery to achieve at least a 4% and 6% reduction in life cycle GHG emissions in 2019 and 2020, respectively, relative to a fossil fuel baseline set in 2010. From 2021 onwards there is no longer a GHG reduction target, although the reporting requirements continue.
- 1.21 Like the RTFO, the GHG Reporting Regulations ran by a tradable credit scheme. Eligible fuels that had a GHG intensity below the GHG target level for the relevant year were awarded GHG credits for each kg of CO₂ eq. saved. The majority of this target was met through the RTFO, although there were some other ways suppliers could generate credits such as supplying fossil gases or electricity for use in transport. They could also raise credits through upstream emission reductions (UERs), which are projects that reduce GHG emissions from upstream processes related to crude or gas extraction and other processes before the fossil raw material for transport fuel is refined.
- 1.22 As there was no longer any GHG Reporting Regulations target in 2021, the tradeable credit scheme finished in 2020. As a result, there were no additional costs of the GHG Reporting Regulations and so, unlike the 2019 and 2020 Annual Reports, there is no GHG Reporting Regulations section in this report.

2. Sign-off of report

- 2.1 As Accounting Officer for the Department for Transport I am responsible for ensuring that there is a high standard of financial management, including a sound system of internal control and effective financial systems. This responsibility includes the Renewable Transport Fuel Obligation (RTFO). I am content that appropriate financial controls over the RTFO are in place and that sufficient checks and reviews have been made to produce accurate and reliable financial data within this report. The assurance review by the National Audit Office, on behalf of the Comptroller and Auditor General, relates to the 2021 outturn. I have taken all reasonable steps to be aware of and provide necessary information to the auditors and I am not aware of any additional relevant information.



Dame Bernadette Kelly DCB

31 May 2023

Permanent Secretary
Department for Transport
Great Minster House
33 Horseferry Road
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3. Assurance report

Renewable Transport Fuel Obligation Order (2007) Annual Report - Assurance Report 2021

ASSURANCE REPORT TO THE SECRETARY OF STATE FOR TRANSPORT IN RELATION TO THE DISCLOSURE OF THE ADDITIONAL COST OF RENEWABLE TRANSPORT FUEL SUPPLIED UNDER THE RENEWABLE TRANSPORT FUEL OBLIGATION

I have evaluated through a reasonable assurance engagement the disclosure of the outturn related to the additional cost of renewable transport fuel supplied under the Renewable Transport Fuel Obligation (RTFO) included as section 4 in the Renewable Transport Fuel Obligation Scheme Annual Report for the year ended 31 December 2021.

Subject matter, criteria and limitations

- 3.1 The Secretary of State for Transport is required by HM Treasury direction, as an imputed tax and spend measure, to prepare an annual report in respect of the RTFO scheme established under the Renewable Transport Fuel Obligations Order 2007 (as amended). Included within this report, at section 4, is a disclosure of the outturn related to the additional cost of renewable transport fuel supplied under the RTFO scheme for the period 1 January 2021 to 31 December 2021. This disclosure is derived from a model designed by the Department for Transport, with observable inputs.
- 3.2 I have reviewed the output of the model and considered the adequacy with which the model derives a figure for the additional cost of renewable transport fuel supplied under the RTFO scheme. I have not considered alternative measurement or evaluation methods. I have considered whether the disclosure has been properly prepared in accordance with HM Treasury direction.
- 3.3 My review extended only to providing assurance on the disclosures made for the period 1 January 2021 to 31 December 2021. My historic evaluation is not relevant to future periods due to the risk that the model may become inadequate because of changes in conditions.

Specific purpose of this assurance report

- 3.4 This report has been prepared to provide the Secretary of State with reasonable assurance over whether section 4, the outturn related to the additional cost of renewable transport fuel supplied under RTFO, gives a true and fair view for the period 1 January 2021 to 31 December 2021.

Responsibilities

- 3.5 The Permanent Secretary on behalf of the appointed administrator, the Secretary of State for Transport, is responsible for preparing section 4, the outturn related to the additional cost of renewable transport fuel supplied under RTFO, and for being satisfied that this note is true and fair. My responsibility is to gather appropriate evidence to support an opinion on section 4, the outturn related to the additional cost of renewable transport fuel supplied under RTFO, in accordance with International Standards on Assurance Engagements 3000, Assurance Engagements Other than Audits or Reviews of Historical Financial Information.

Performance of the engagement in accordance with International Standards on Assurance Engagements 3000, Assurance Engagements Other than Audits or Reviews of Historical Financial Information

- 3.6 I performed a reasonable assurance engagement in accordance with the principles of International Standards on Assurance Engagements 3000, Assurance Engagements Other than Audits or Reviews of Historical Financial Information issued by the International Auditing and Assurance Standards Board. The objective of a reasonable assurance engagement is to perform such procedures as to obtain information and explanations which I consider necessary in order to provide me with sufficient appropriate evidence to express a positive conclusion on the disclosure. No other section of the annual report has been evaluated under this engagement.

Quality control and compliance with ethical standards

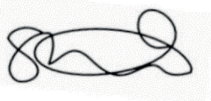
- 3.7 I apply International Standard on Quality Control (UK) 1, Quality Control for Firms that perform audits and reviews of Financial Statements, and other Assurance and Related Service Engagements. Accordingly, I maintain a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.
- 3.8 I have complied with the independence and other ethical requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants, which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour.

Summary of work performed

3.9 The additional cost of renewable transport fuel is estimated using a cost model. My assurance work included an examination of this cost model, to confirm that this is consistent with its intended function and that its inputs are consistent with the underlying source data. I also made enquiries with management as to the controls surrounding the collection of data where it was from internal sources.

Conclusion

3.10 In my opinion, section 4 of the RTFO annual report, showing the outturn related to the additional cost of renewable transport fuel supplied under the RTFO scheme for the period 1 January 2021 to 31 December 2021, is both fairly stated and properly prepared in accordance with HM Treasury direction.



Sarah Che

01 June 2023

Director

National Audit Office

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4. Outturn for 2021 (subjected to an assurance review)

RTFO outturn

RTFO outturn for 2021	£ 1,974.9 million
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Table 1 RTFO outturn 2021

Cost estimation methodology and data sources

- 4.1 The RTFO requires that a certain percentage of UK road and non-road transport fuel supplied is renewable. The most significant renewable fuels deployed through this mechanism are bioethanol (31.6% of renewable fuel supply in 2021), which is typically blended into fossil petrol and biodiesel (51.9% of renewable fuel supply in 2021, when including biodiesel ME and off-road biodiesel), which is typically blended into fossil diesel.
- 4.2 Renewable fuels have historically been more expensive than fossil fuels. Fuel suppliers/retailers are likely to pass some of these additional costs onto the final consumer. Renewable fuels also tend to have lower energy content per litre, so the use of renewable fuels increases the cost of motoring.
- 4.3 This price difference between fossil fuels and renewable fuels can be observed in the market. The Department receives renewable fuels market price data that is produced weekly by 'Argus Media', a leading global provider of market data⁹.
- 4.4 We have estimated the cost imposed by the RTFO using monthly volumes of renewable fuels as reported through the RTFO statistics¹⁰ and price differentials as reported through Argus Media's market reports. To take account of the lower energy content of renewable fuels, we compare fuel costs in terms of £/MJ and not £/litre,

⁹ <https://www.argusmedia.com/en>

¹⁰ <https://www.gov.uk/government/collections/renewable-fuels-statistics>

based on energy density factors quoted in the RTFO Standard Data¹¹. The outturn also includes the cost of buy-outs required to meet the main and development fuel obligation.

- 4.5 Since the biodiesel price varies depending on the feedstock, we have generated separate estimates for biodiesel from different feedstocks. For bioethanol, there is just one market price and no distinction between feedstocks. For the remaining renewable fuels that are not bioethanol or biodiesel, pricing information is not readily available. We have used proxies for these small-volume fuels, based on their closest substitute fuels.
- 4.6 The outturn for 2021 (£1,974.9 million) is significantly larger than the outturn for 2020 (£1,600.2 million) and larger than the outturn for 2019 (£998.7 million). The largest factors driving this is the increase in the price differential, as the price of renewable fuels has increased, and the increase in fuel consumption in general after Covid-19. The other factor is that the development fuel obligation buy-outs accounts for 7% of the total cost of the scheme in 2020 and 9% in 2021. With an increasing supply over time, this results in a higher absolute buy-out burden (£164.2m in 2021 versus £119.6m in 2020).
- 4.7 The 2021 report has been conducted on an annual basis, in line with the 2020 and 2019 reports but differing from the 2018 RTFO reporting year which ran from 15th April 2018 to 31st December 2018.

¹¹ <https://www.gov.uk/government/publications/renewable-transport-fuel-obligation-rtfo-compliance-reporting-and-verification>

5. Forecasts

Future RTFO value	
RTFO forecast for 2022	£ 2,479.6 million

Table 2 Future RTFO value forecast

Cost estimation methodology and data sources

RTFO Forecast for 2022

- 5.1 The forecast for 2022 (£2,479.6 million) has been modelled using the same methodology and data sources as the outturn for 2021, with the following exceptions:
- Data was extracted in September 2022, at which point fuel supply volumes were available from January to August. At this point, RTFCs had been issued to 42% of the renewable fuel so far supplied. Detailed feedstock information is unavailable until RTFCs have been awarded. To increase the reliability of the data for January to August 2022, we have estimated what the fuel supply looks like by mapping actual fuel supplied volumes onto the 42% of fuels already certified, assuming most of the fuel already supplied will eventually become certified (historically nearly 100% of fuel supplied is certified). The supply for the remaining months of the year (September – December 2022) was assumed to be the monthly average of fuel supplied from January to 14th September 2022.
 - Actual price data, extracted from Argus Media, was available from January to December 2022.
 - The forecast for 2022 includes the cost of buy-outs required to meet the development fuel obligation for forecasted fossil fuel supply, whilst assuming that enough certificates will be carried over to cover the main obligation.
- 5.2 The main driver for the increase from 2022 is an increase in the volumes of renewable fuels supplied.

Million litres supplied (cumulative)

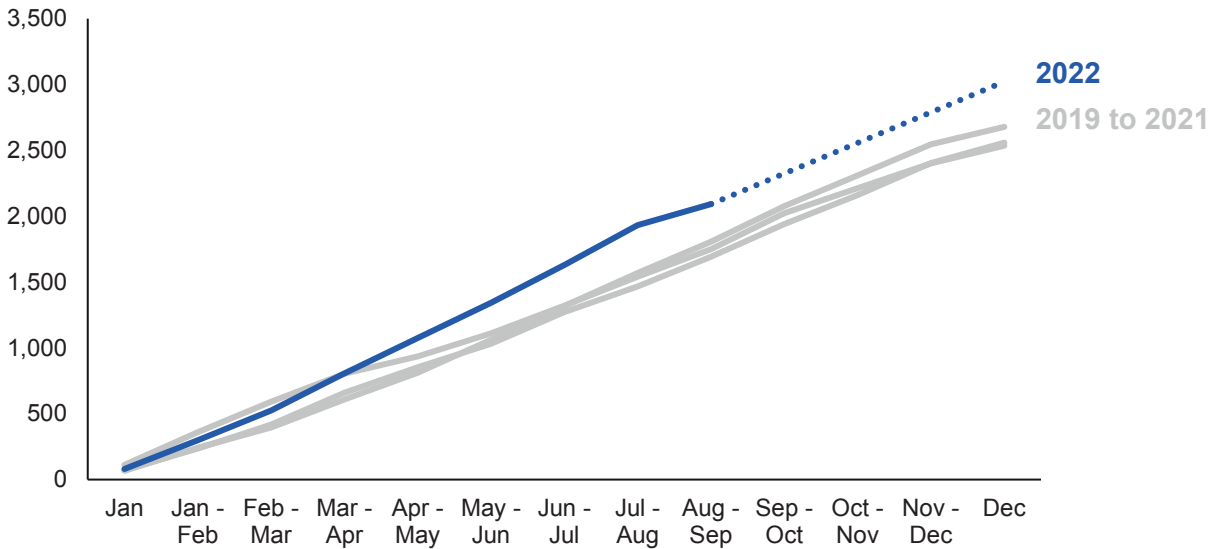


Figure 1 Cumulative renewable fuel supplied to the UK by month and year, with the year 2022 highlighted. Dotted lines indicate a linear extrapolation from the 2022 data which has been received to date. Please note that all “months” run from the 15th of one month to the 14th of the next, apart from Jan (which runs from 1st January to 14th January) and Dec (which runs from 15th December to 31st December)

5.3 A secondary driver is due to the further increase in fuel costs, especially the price premium of renewable fuels above fossil fuels. This can be seen in Figure 1 whereby fuel supplied by month has been similar across years but in Figure 2 the cost premium has fanned out upwards over time.

Cost of renewable fuel supplied (cumulative), £million

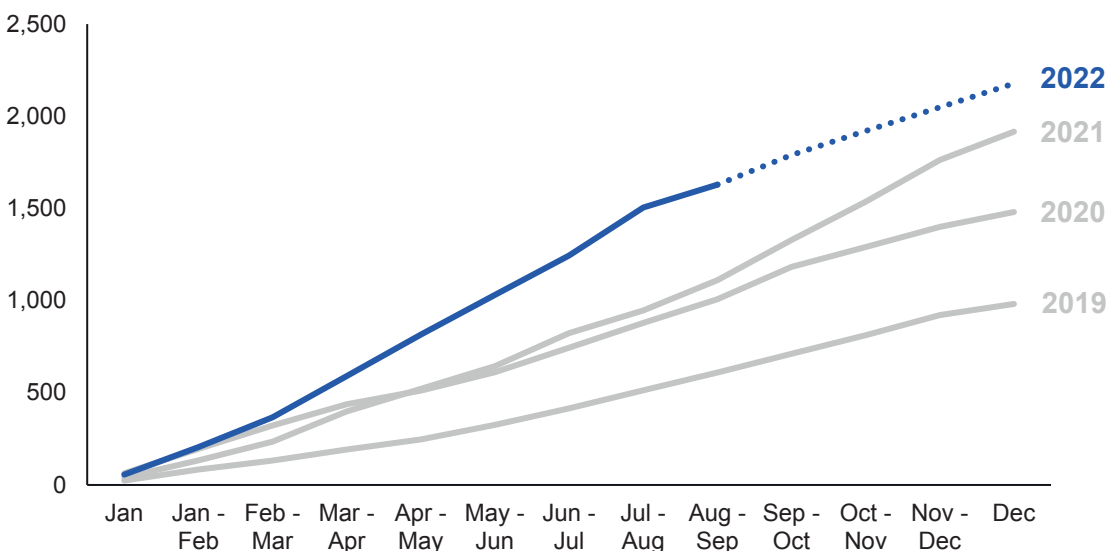


Figure 2 Cumulative cost of renewable fuel supplied for use in the UK by month and year in million pounds, with the year 2022 highlighted. Dotted lines indicate a linear extrapolation from the 2022 data which has been received to date. Please note that all “months” run from the 15th of one month to the 14th of the next, apart from Jan (which runs from 1st January to 14th January) and Dec (which runs from 15th December to 31st December)

5.4 Thirdly, there has been weak outturn of development fuel supply in 2022 up to the 14th September outturn data while the target level also increased. As a result, the expectation for buy-outs has increased since 2021 driving up further the cost estimation for 2022 (see Figure 3).

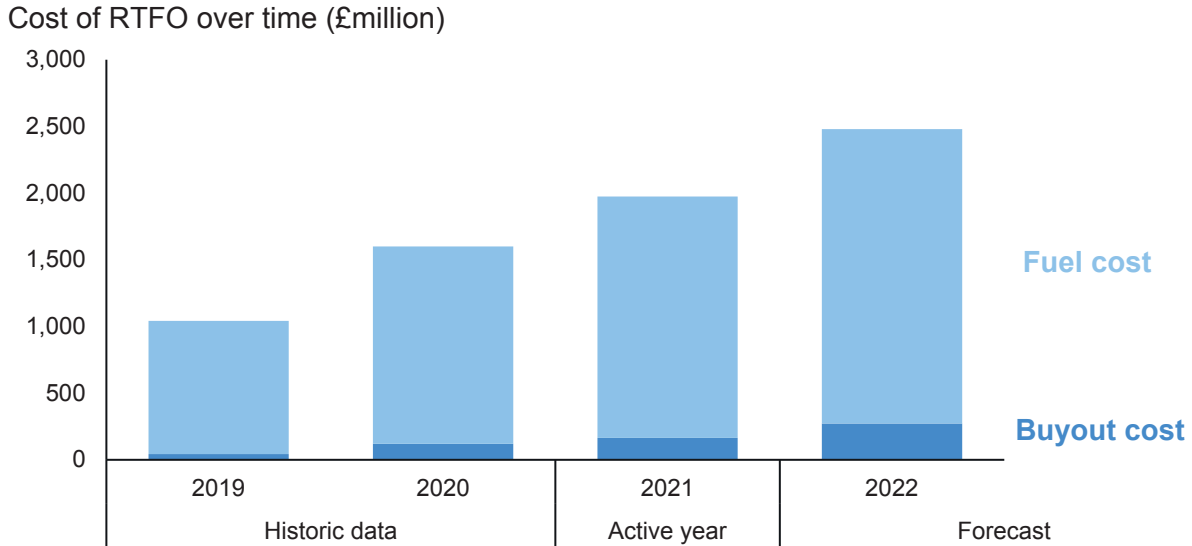


Figure 3 Cost (in £million) of the RTFO over time, by the cost of the fuel and buy-out shown.

6. Scheme outcomes

Introduction

- 6.1 The main policy objective of the RTFO is to reduce GHG emissions from transport. It requires that a certain percentage of UK road and non-road transport fuel is renewable and meets minimum GHG sustainability criteria.
- 6.2 This section summarises the key outcomes of the RTFO in 2021. Further data on the RTFO can be found in the final statistical report for 2021¹².

Greenhouse gas savings

- 6.3 In 2021, renewable fuels constituted a slightly lower share of total fuel (5.4%, 2,562 million litres equivalent supplied) compared to 2020 (5.9%, 2,537 million litres equivalent supplied), but this is greater than in 2019 (5.0%, 2,680 million litres supplied), reflecting a positive long-term trend (see Figure 4 and Figure 5). The reduced overall share of renewable fuel in 2021 compared to 2020 is likely to be partially as a result of COVID-19 related disruption to fuel supply. Additionally, the carry-over of certificates was not permitted from 2019 into 2020 and so there were a number of certificates still in existence from 2019 and 2020 which suppliers were able to use to meet their 2021 obligation.
- 6.4 The total renewable fuel supplied includes 2.38 billion litres of liquid fuel and a smaller volume (96.1 million kg, or 177.0 million litres eq.) of biogases (biomethane, biopropane, or bio-synthetic natural gas). There was also a small volume of hydrogen (410 kg, or 1,877 litres eq.). Biodiesel (including Biodiesel ME and Off-road biodiesel) and bioethanol represented 51.9% and 31.6% of the total volume of renewable fuels, respectively, with other fuels accounting for the remaining 16.5%.
- 6.5 In 2021, the average GHG saving from the renewable fuels supplied under the RTFO was 83% compared to fossil fuels (excluding indirect land use change – see paragraph 6.8). This represents a total saving of 5.07 million tonnes of CO₂ eq.,

¹² <https://www.gov.uk/government/statistics/renewable-fuel-statistics-2021-final-report>

equivalent to 58 million car journeys from London to Glasgow¹³. This is a slight decrease compared to 2020 (5.24 million tonnes of CO2 eq.).

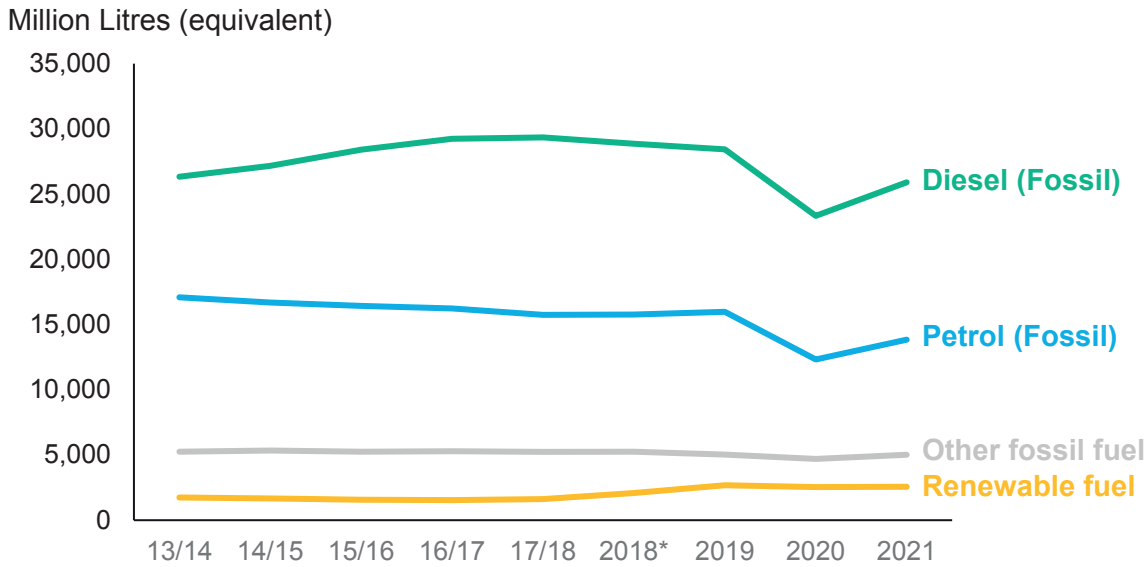


Figure 4 Road and non-road transport fuel supplied for use in the UK (* The 2018 short year has been extrapolated to represent a full calendar year).

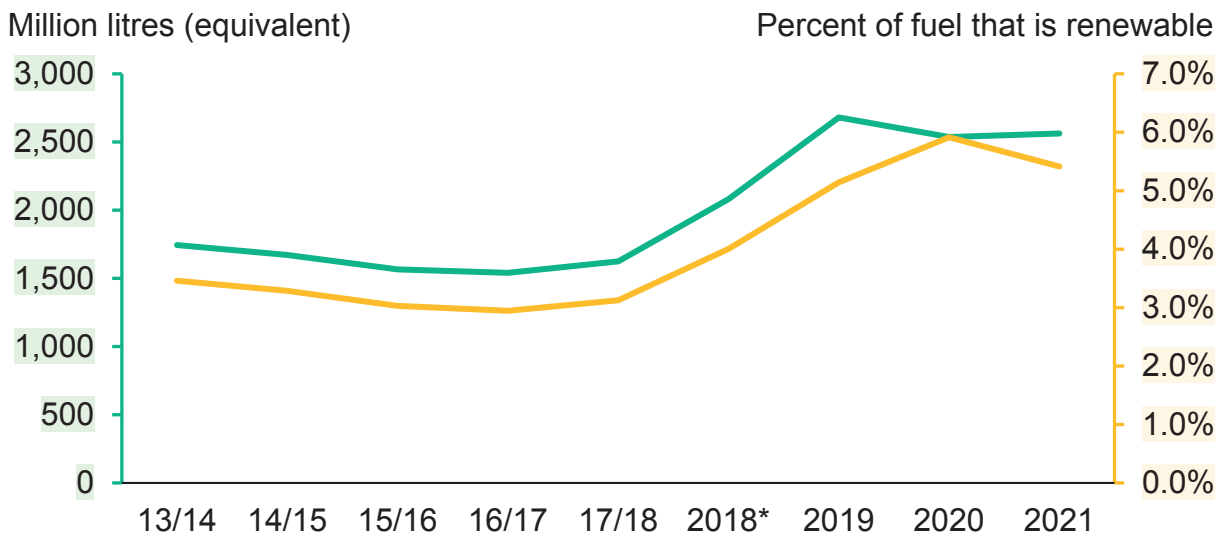


Figure 5 Renewable fuel supplied to UK transport, and the percentage of road and non-road transport fuel made up of renewable components, financial year ending 2014 to calendar year 2021

6.6 In recent years the level of GHG savings have gradually increased as a percentage of CO2 emitted compared to the fossil fuels they replaced. This overall positive trend in GHG savings is primarily driven by the increasing proportion of waste-derived renewable fuels (76% in 2021). The RTFO awards double RTFCs to waste-derived renewable fuels as they do not have indirect land use change (ILUC – see paragraph

¹³ <https://maps.dft.gov.uk/journey-emission-comparisons-interactive-dashboard/index.html>

6.8) implications and generally have greater GHG emissions savings than crop-derived renewable fuel.

6.7 However, the modest increase in the amount of renewable fuel supplied (from 2,537 million litres-equivalent in 2020, to 2,562 million litres supplied in 2021) and an increased share of bioethanol supplied relative to biodiesel results in a slightly reduced the total mass of CO₂e saved each year (Figure 6)¹⁴.

Indirect land use change

6.8 When agricultural land is used to grow a feedstock for renewable fuel production, there may be a 'knock-on' effect from the expansion of agricultural land use into other areas. This is called 'indirect land use change' (ILUC). ILUC may involve expansion onto areas of high carbon stock which leads to additional GHG emissions. The RTFO accounts for these GHG emissions.

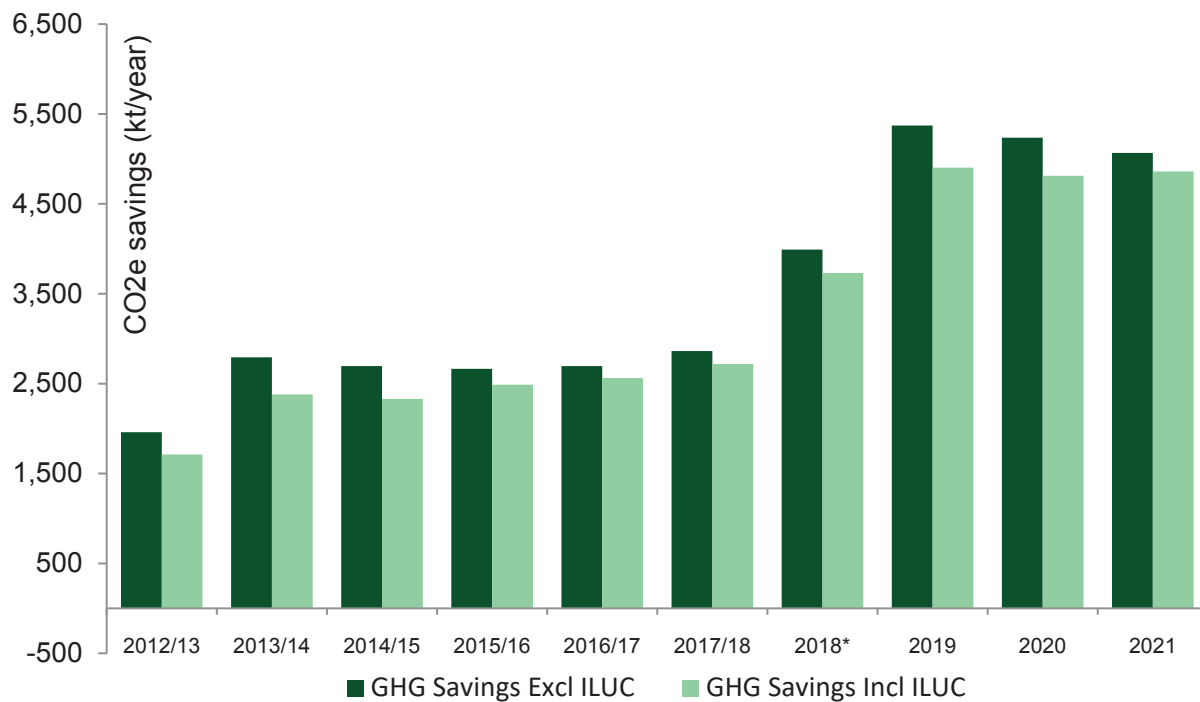


Figure 6 RTFO GHG savings excluding and including ILUC per obligation year (* The GHG savings for the 2018 short year was extrapolated to represent a full calendar year).

6.9 After accounting for ILUC, in 2021, the total GHG saving from the RTFO was 4.86 million tonnes of CO₂ eq. (Figure 6). This is a marginal increase from the total GHG savings in 2020 including ILUC (4.81 million tonnes of CO₂ eq.).

6.10 In the early years of the RTFO, there was a high proportion of crop-based feedstocks. The total GHG emission savings for these years were low, and even negative after accounting for the risk of ILUC from these crops. Since 2011 there

¹⁴ Bioethanol has a lower energy content than biodiesel which results in lower overall GHG savings. This is because the carbon intensity is measured per MJ of fuel supplied.

have been additional incentives for renewable fuels from waste-based feedstocks and in both 2020 and 2021, 76% of UK renewable fuels were made from waste.

Renewable transport fuel sustainability and sources

- 6.11 To receive RTFCs, suppliers must be able to provide evidence that their renewable fuels meet the sustainability requirements. For 2021, renewable fuels must meet a minimum GHG saving of 50% if the installation in which they were produced was operating on or before 5 October 2015, and 60% if produced in an installation that was in operation after that date.
- 6.12 Suppliers must ensure that growing crops as a feedstock for renewable fuels does not lead to a loss of biodiversity or loss of high-carbon stock land such as forest or peatland. In 2021, these sustainability requirements were met for 100% of the renewable transport fuel supplied for use in the UK.
- 6.13 A total of 46 different feedstocks made up the renewable fuel supply in 2021, 28 of which were wastes or agricultural residue. Table 3 shows the main feedstocks from which the UK's renewable fuels were made in 2021. "Other fuels" represent a mix of 11 renewable fuels including renewable aviation turbine fuel (avtur), development diesel and petrol, biomethanol and biobutane.
- 6.14 The top five waste feedstocks in 2021 were used cooking oil (over half of all renewable fuel), corn, waste starch slurry, food waste, and wheat.

Fuel type	Feedstock	Total volume (million litres equivalent)	Percentage of total renewable fuel supply
Biodiesel	Used cooking oil	1232.56	48.2%
Bioethanol	Corn	419.01	16.4%
Bioethanol	Starch slurry (waste)	133.56	5.2%
Bioethanol	Wheat	97.89	3.8%
Bio Petrol	Used cooking oil	60.57	2.4%
HVO	Used cooking oil	60.19	2.4%
Bioethanol	Sugar beet betaine residue	48.10	1.9%
Biomethane	Food waste	46.90	1.8%
Bioethanol	Food waste	43.49	1.7%
Bioethanol	Sugar cane	42.16	1.6%
Other fuels	Other feedstocks	374.06	14.6%
Total		2,558.48	100.0%

Table 3 Most common fuel types and feedstocks for UK renewable fuels in 2021.

- 6.15 High ILUC feedstocks, which are considered to have an ILUC value of 55 gCO₂/MJ, represented a small volume of renewable fuel, such as palm (1.6%) and palm fatty acid distillate (0.06%). In total, 1.68% of renewable fuel was made from high ILUC feedstocks, down from 6.46% in 2019 and 7.20% in 2020.
- 6.16 As in 2020, a small volume of hydrogen was produced using wind power in 2021. There were several new feedstocks added in 2021, summarised in Table 4.

6.17 Feedstocks for UK renewable transport fuel were sourced from a total of 89 countries, compared to 91 in 2020 and 18 when the RTFO began in 2008-09. The top five supplying countries are China, USA, UK, Ukraine and France. Last year, in 2020, the five top countries were China, UK, USA, Malaysia and Spain. The proportion of renewable fuels supplied by the UK decreased to 10% compared to 12% in 2020. Figure 7 shows countries of feedstock origin for biodiesel and bioethanol, by their percentage share of supply of renewable fuel for use in the UK.

Feedstock	Used to produce	Total volume (million litres equivalent)	Percentage of total renewable fuel supply
Druff	Biomethane	0.07	<0.01%
End of life tyres (renewable component)	Bio-synthetic natural gas, development diesel and petrol, hydrogen	2.99	0.12%
Ethanol from extraction from medicinal plants	Bioethanol	0.98	0.04%
Forestry residues	Biodiesel	0.29	0.01%
Glycerol	Biomethane	<0.01	<0.01%
Nut shells	Biomethane	1.28	0.05%
Pot ale	Biomethane	0.02	<0.01%
Pot ale syrup	Biomethane	0.01	<0.01%
Rye silage	Biomethane	0.01	<0.01%
Salmon oil – category 1 & 2	Pure bio oil	2.45	0.10%
Spent wheat grains	Biomethane	0.14	0.01%

Table 4 New feedstocks in 2021.

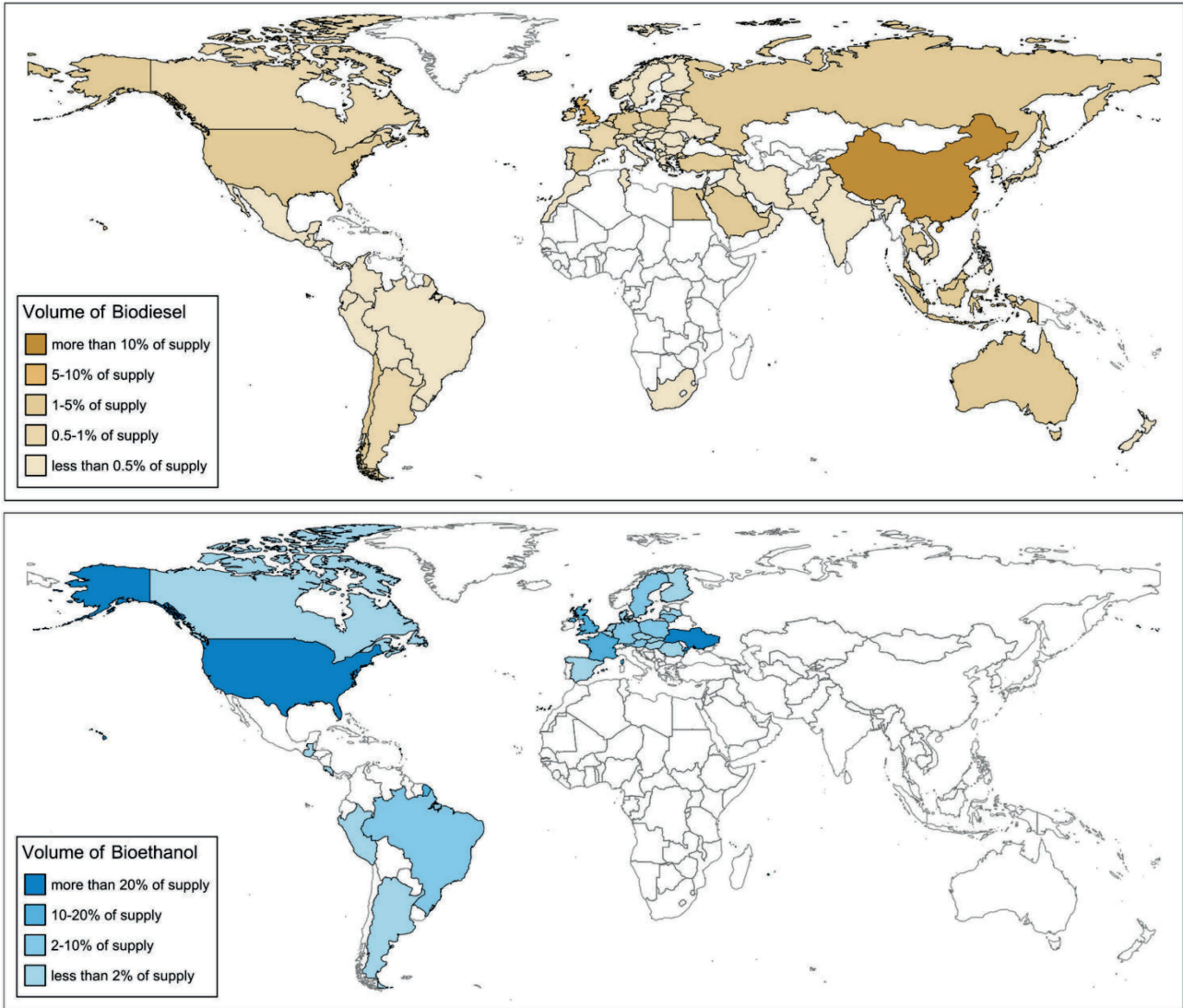
Meeting the 2021 obligation

6.18 The main obligation for 2021 (10.679%) was met by suppliers.¹⁵ One obligated supplier achieved this partially through buy-out.

6.19 The development fuel obligation for 2021 (0.556%) was also met by suppliers. However, all but two suppliers achieved this by at least partially buying out of their obligation.

6.20 In 2021, 4,824 million RTFCs were redeemed. 4.1% of the total obligation (predominantly the development fuel sub-target) was met through buy-out. Figure 8 shows the number of RTFCs redeemed each year for the total obligation including both the main obligation and development fuel sub-target.

¹⁵ Note that the actual equivalent share of fuel supplied is somewhat less than the obligation level due to buy-out, carry-over of certificates from previous years and predominantly because renewable fuels produced from eligible waste feedstocks and renewable fuels of non-biological origin are awarded double certificates. Renewable fuels represented 5.4% of total fuel in 2021 (see paragraph 7.2).



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Figure 7 Global feedstock sources for UK Biodiesel and Bioethanol 2021

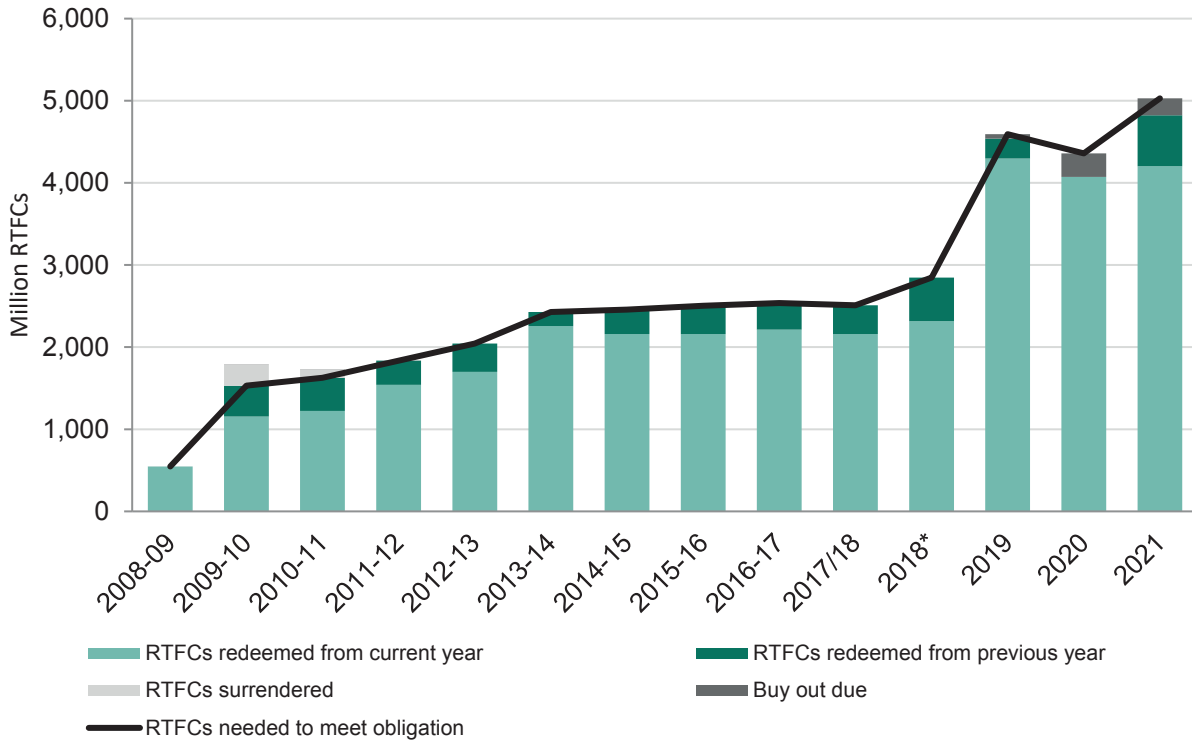


Figure 8 RTFCs redeemed and surrendered. The figures shown here include the development fuel sub-target, brought in from 2019.

6.21 As the Administrator of the RTFO, DfT operates systems and processes designed to prevent and detect inaccurate or non-compliant applications for RTFCs. It also has powers to impose civil penalties if certain requirements of the RTFO Order are not complied with. In 2021, 4.7 million RTFCs were revoked due to inaccurate applications made that year. No civil penalties were imposed.

Modelled RTFC prices

6.22 We have modelled certificate prices for the 2021 obligation year using market price data for fuels (since RTFC price data is not publicly available). For this purpose, we assume used cooking oil biodiesel is the marginal fuel supplied under the RTFO and therefore it is the price differential between diesel and used cooking oil biodiesel which determines the RTFC price. We estimate that RTFC prices in 2021 ranged from £0.30 per RTFC to £0.47 per RTFC, with a mean value of £0.38 per RTFC.

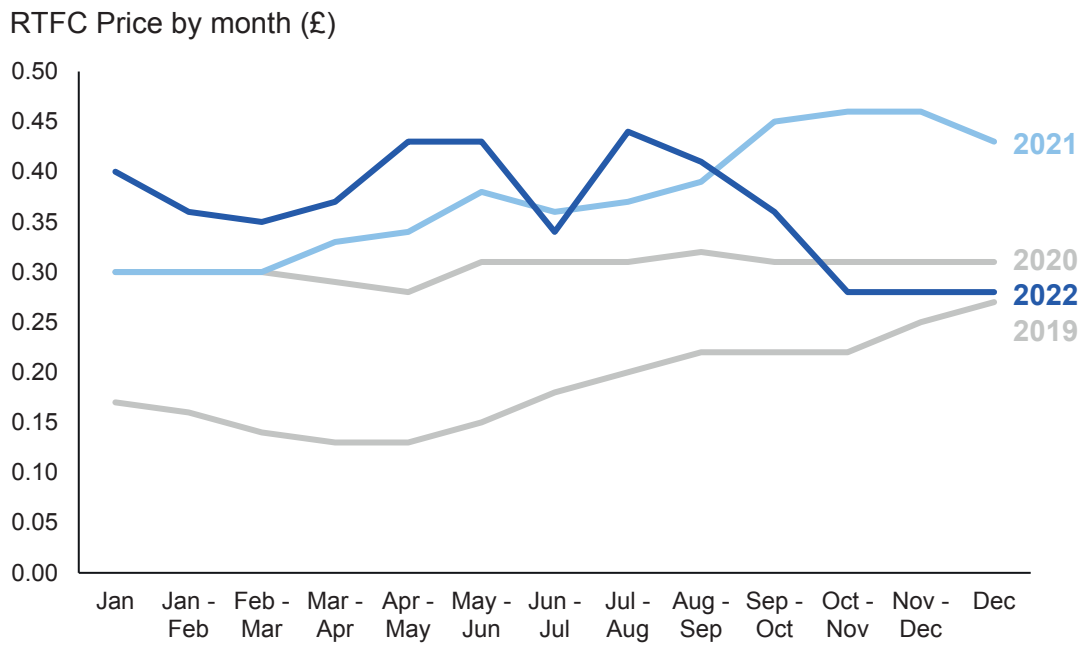


Figure 9 Volatility in RTFC prices, 2019 to 2022

Conclusion

6.23 The RTFO continues to meet its objective of reducing GHG emissions from UK transport fuel. All the renewable fuels rewarded under the RTFO meet the mandatory sustainability criteria. The RTFO is designed and managed to ensure a high level of compliance with its requirements.

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