



Department
for Transport

Renewable Transport Fuel Obligation Annual Report 2022



Renewable Transport Fuel Obligation Annual Report 2022

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

April 2024



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This publication is available at www.gov.uk/official-documents.

ISBN 978-1-5286-4800-4

E03106543 04/24

Printed on paper containing 40% recycled fibre content minimum

Printed in the UK by HH Associates Ltd. on behalf of the Controller of His Majesty's Stationery Office

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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 2022

3. The total value of the RTFO, which comprises an imputed tax for 2022, is **£ 2,701.2 million**. This is calculated as the difference between the cost of renewable fuels supplied and the fossil fuels they have replaced, combined with the cost of buyouts from suppliers who did not meet their main obligation, development fuel obligation, or both. See section 4 for more details.

Forecasts

4. The forecast total value of the RTFO for 2023 is **£ 2,419.5 million**. The driver for the decrease in the outturn is a fall in fuel price spreads (the difference of a renewable fuel to a fossil fuel alternative). See section 5 for more details.

Scheme outcomes

5. In 2022, the average GHG saving from the renewable fuels supplied under the RTFO was 82% compared to fossil fuels, representing a total saving of 7.18 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

¹ <https://www.gov.uk/government/statistics/renewable-fuel-statistics-2022-final-report>

compliance with its requirements. For more details on the outcomes of the scheme, see section 6.

Signature and assurance review

7. This report is signed by the Second Permanent Secretary, Department for Transport (section 2). The outturn figure for 2022 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 2022 Obligation year (January to December) alongside the outcomes for the scheme. A forecast is also given for the 2023 RTFO year. The National Audit Office (NAO) on behalf of the Comptroller and Auditor General has subjected the 2022 outturn data within this report to an assurance review: the assurance report is included on page 11.
- 1.3 The RTFO obligation applies to fuel supplied on a calendar year basis (1 January – 31 December). Fuel suppliers have until 15 September the following year to redeem RTFCs for the fuel supplied during the previous calendar year. This means that for the 2022 obligation year, suppliers could redeem certificates against their obligation until September 15 2023, after this deadline buyout values are calculated for any unmet obligation and the reporting year is essentially closed. Following the closure of the reporting year, final statistics for the 2022 compliance year are compiled and published in November 2023. These statistics are used to inform this annual report, which is subject to an independent assurance engagement by the NAO prior to publication in spring the following year (2024).

The RTFO

- 1.4 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.

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

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

- 1.5 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.
- 1.6 For the 2022 obligation year, fossil and renewable fuels used in road transport and non-road transports (such as non-road mobile machinery, or NRMM) were covered by the RTFO, as well as renewable fuels used in aircraft and renewable fuels of non-biological origin used in maritime (see paragraph 1.18).
- 1.7 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.
- 1.8 All applications for RTFCs must be independently verified and most fuel supplied is also certified by voluntary schemes (99% in 2022). 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.
- 1.9 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 2022 obligation year, fuel suppliers were required to demonstrate this by redeeming RTFCs equivalent to 12.599% 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.
- 1.10 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).
- 1.11 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 2022 this proportion was 0.908%.
- 1.12 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

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 2022 was 3.67% of the total fuel supplied by a given fuel supplier.

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.

- 1.13 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 were able to be carried over into the year 2021.
- 1.14 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.
- 1.15 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.
- 1.16 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.
- 1.17 The RTFO scheme process also periodically undergoes an internal advisory report. The last report was completed in August 2023 and focussed on the role and recognition of voluntary schemes in the RTFO. Prior to that, an internal audit took place in December 2020 looking at the scheme's supervisory role in the context of certifying bodies while another took place in 2018 that looked at the scheme's approach to risks and risk scoring. The recommendations of these reports have subsequently been addressed, apart from one that is due to be addressed no later than September 2024, whereby the RTFO Unit will review the published list of accepted voluntary schemes.

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/>

Recent Updates to the RTFO

- 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 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.

2. Sign-off of report

2.1 As an 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 2022 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.



Jo Shanmugalingam

22/03/24

Second Permanent Secretary
Department for Transport
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3. Assurance report

Renewable Transport Fuel Obligation Order (2007) Annual Report - Assurance Report 2022

INDEPENDENT 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. Outturn for 2022 (Subject to an assurance review) in the Renewable Transport Fuel Obligation Scheme Annual Report for the year ended 31 December 2022.

Subject matter, criteria and limitations

- 3.1 The Secretary of State for Transport is required by a direction issued by HM Treasury, 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. Outturn for 2022 (Subject to an assurance review), 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 2022 to 31 December 2022. 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 considered whether the disclosure has been properly prepared in accordance with HM Treasury direction.
- 3.3 My review extended only to providing reasonable assurance on the disclosures made for the period 1 January 2022 to 31 December 2022 and confirming that they have been prepared in accordance with the HM Treasury direction. 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 that Section 4. Outturn for 2022 (Subject to an assurance review), showing the outturn related to the additional cost of renewable transport fuel supplied under RTFO scheme for the period 1 January 2022 to 31 December 2022 is both fairly stated and properly prepared in accordance with the HM Treasury direction.

Responsibilities

3.5 The Second Permanent Secretary on behalf of the appointed administrator, the Secretary of State for Transport, is responsible for:

- preparing Section 4. Outturn for 2022 (Subject to an assurance review), 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;
- providing the auditor with access to all information of which management is aware that is relevant to the preparation of the RTFO Annual Report such as records, documentation and other matters;
- providing the auditor with additional information and explanations needed for the assurance engagement;
- providing the auditor with unrestricted access to persons involved in preparation of the RTFO Annual Report from whom the auditor determines it necessary to obtain audit evidence; and
- ensuring such internal controls are in place as deemed necessary to enable the preparation of the RTFO Annual Report to be free from material misstatement, whether due to fraud or error.

3.6 My responsibility is to gather appropriate evidence to support an opinion on Section 4. Outturn for 2022 (Subject to an assurance review), the outturn related to the additional cost of renewable transport fuel supplied under RTFO, in accordance with *International Standards on Assurance Engagements (UK) 3000, Assurance Engagements Other than Audits or Reviews of Historical Financial Information*.

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

3.7 I performed a reasonable assurance engagement in accordance with International Standards on Assurance Engagements (UK) 3000, Assurance Engagements Other than Audits or Reviews of Historical Financial Information issued by the Financial Reporting Council. 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

- 3.8 I apply *International Standards on Quality Management (UK)* and in particular, *International Standard on Quality Management (UK) 1, Quality Management for Firms that perform audits or reviews of Financial Statements, or other Assurance and Related Service Engagements*. Accordingly, I maintain a comprehensive system of quality management. The system of quality management includes assessing risk against our quality objectives and implementing suitable controls and responses to management these identified risks including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.
- 3.9 I have complied with the Financial Reporting Council's *Revised Ethical Standard 2019*, which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behaviour. I am independent of the Department for Transport in accordance with the ethical requirements that are relevant this assurance engagement in the UK.

Summary of work performed

- 3.10 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

- 3.11 In my opinion, Section 4. Outturn for 2022 (Subject to an assurance review) 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 2022 to 31 December 2022, is both fairly stated and properly prepared in accordance with HM Treasury direction.



Sarah Che

27 March 2024

Director

National Audit Office

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4. Outturn for 2022 (subjected to an assurance review)

RTFO outturn	
RTFO outturn for 2022	£ 2,701.2 million

Table 1 RTFO outturn 2022

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 biodiesel (45.2% of renewable fuel supply in 2022, when including biodiesel ME and off-road biodiesel), which is typically blended into fossil diesel and bioethanol (37.4% of renewable fuel supply in 2022), which is typically blended into fossil petrol.
- 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 2022 (£2,701.2 million) is significantly larger than the outturn for 2021 (£1,974.9 million) and larger than the outturn for 2020 (£1,600.2 million). The largest factors driving this is the increase in the price differential, as the price of renewable fuels has increased on average across the year, and the increase in fuel consumption and supply year-on-year as a result of recovering after Covid-19 and RTFO targets increasing over time. The other factor is that the development fuel obligation buy-outs accounted for 8% of the total cost of the scheme in 2021 and 10% in 2022. With an increasing supply over time, this results in a higher absolute buy-out burden (£280.9m in 2022 versus £164.2m in 2021).
- 4.7 The 2022 report has been conducted on an annual basis, in line with all previous 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 2023	£ 2,419.5 million

Table 2 Future RTFO value forecast

Cost estimation methodology and data sources

RTFO Forecast for 2023

5.1 The forecast for 2023 (£2,419.5 million) has been modelled using the same methodology and data sources as the outturn for 2022, with the following exceptions:

- Data was extracted in November 2023, at which point fuel supply volumes were available from January to September. For this forecast, volumes are taken from January to July due to incomplete monthly data in August to September skewing forecasts. At this point, RTFCs had been issued to 48% 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 September 2023, we have estimated what the fuel supply looks like by mapping actual fuel supplied volumes onto the 48% 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 (August – December 2023) was assumed to be the monthly average of fuel supplied from January to 14th July 2023.
- Actual price data, extracted from Argus Media, was available from January to November 2023. Full December 2023 data has not yet been observed, so is assumed equal to November 2023.
- The forecast for 2023 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 decrease from 2022 is, despite the increase in fuel volumes, a fall in fuel price spreads (the difference of a renewable fuel to a fossil fuel

alternative). 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.

Million litres supplied (cumulative)

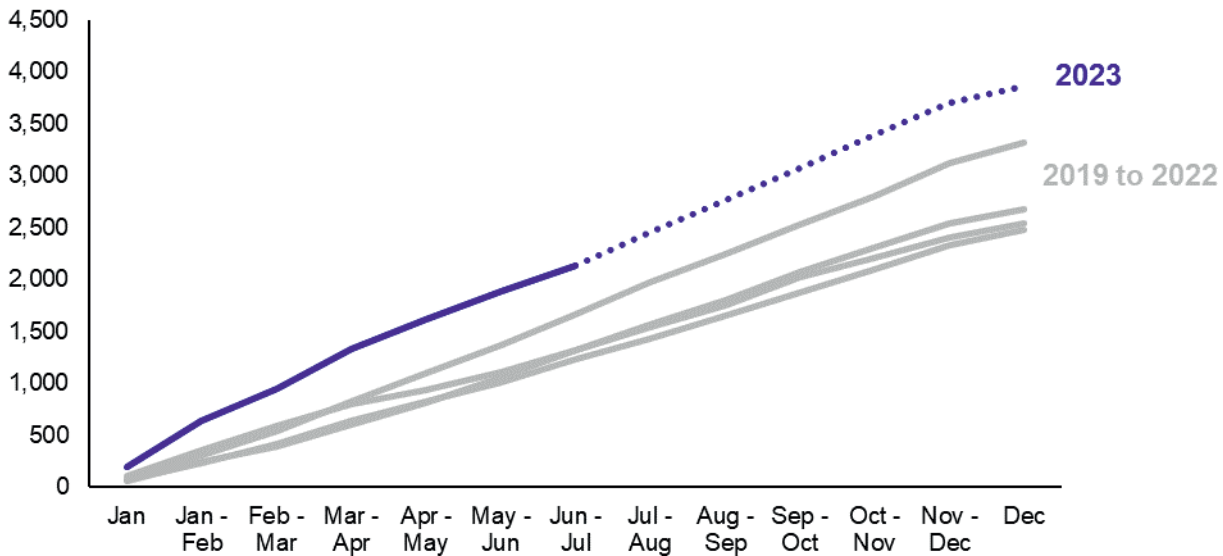


Figure 1 Cumulative renewable fuel supplied to the UK by month and year, with the year 2023 highlighted. Dotted lines indicate a linear extrapolation from the 2023 data which has been received to date. Please note that all “months” run from the 15th of one month to the 14th of the next, apart from Jan (which runs from 1st January to 14th January) and Dec (which runs from 15th December to 31st December)

Cost of renewable fuel supplied (cumulative), £million

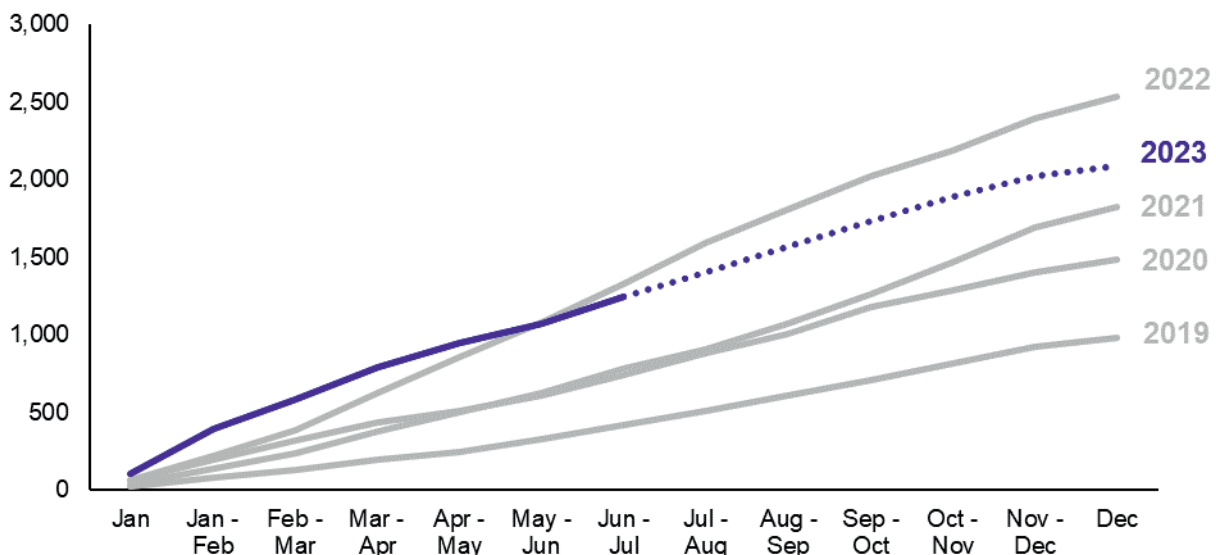


Figure 2 Cumulative cost of renewable fuel supplied for use in the UK by month and year in million pounds, with the year 2023 highlighted. Dotted lines indicate a linear extrapolation from the 2023 data which has been received to date. Please note that all “months” run from the 15th of one month to the 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 Thirdly, there has been weak outturn of development fuel supply in 2023 up to the 14th September outturn data while the target level also increased. As a result, the expectation for buy-outs has increased since 2022, increasing the likelihood that buy-outs will account for a greater proportion of the overall scheme in 2023 (see Figure 3).

Cost of RTFO over time (£million)

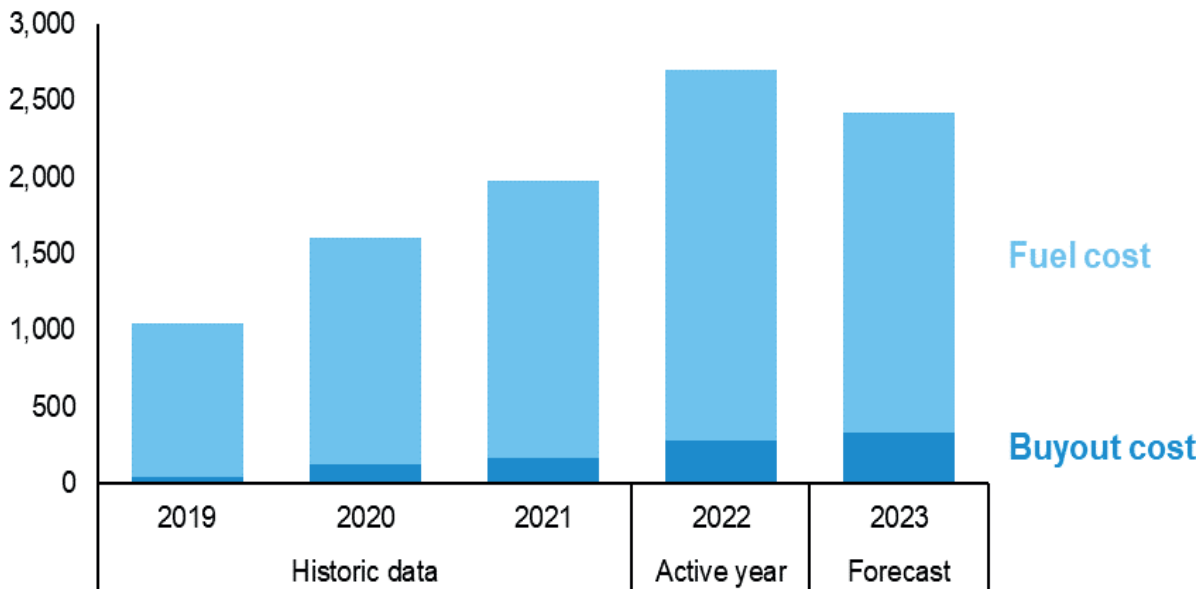


Figure 3 Cost (in £million) of the RTFO over time, by the cost of the fuel and buy-out shown.

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 2022. Further data on the RTFO can be found in the final statistical report for 2022¹².

Greenhouse gas savings

- 6.3 In 2022, renewable fuels constituted a greater share of total fuel (6.8%, 3,325 million litres equivalent supplied) compared to 2021 (5.4%, 2,562 million litres equivalent supplied), and greater than in 2019 (5.0%, 2,680 million litres supplied), reflecting a positive long-term trend (see Figure 4 and Figure 5).
- 6.4 The total renewable fuel supplied includes 3.17 billion litres of liquid fuel and a smaller volume (82.9 million kg, or 155.1 million litres eq.) of biogases (biomethane, biopropane, or bio-synthetic natural gas). There was also a small volume of hydrogen (4,899 kg, or 22,428 litres eq.). Biodiesel (including Biodiesel ME and Off-road biodiesel) and bioethanol represented 45.3% and 37.4% of the total volume of renewable fuels, respectively, with other fuels accounting for the remaining 17.3%. The increased proportion of bioethanol is likely to be driven by the introduction of E10 in late 2021, a biofuel made up of at least 90% regular unleaded and up to 10% ethanol. The introduction of E10 in late 2021 has led to a more pronounced growth in bioethanol use, resulting in a proportional decrease in biodiesel.
- 6.5 In 2022, the average GHG saving from the renewable fuels supplied under the RTFO was 82% compared to fossil fuels (excluding indirect land use change – see paragraph 6.8). This represents a total saving of 7.18 million tonnes of CO₂ eq., equivalent to taking 3.4 million petrol cars or 2.7 million diesel cars off the road for

¹² <https://www.gov.uk/government/statistics/renewable-fuel-statistics-2022-final-report>

the whole of 2022¹³. This is an increase compared to 2021 (5.81 million tonnes of CO₂ eq.).

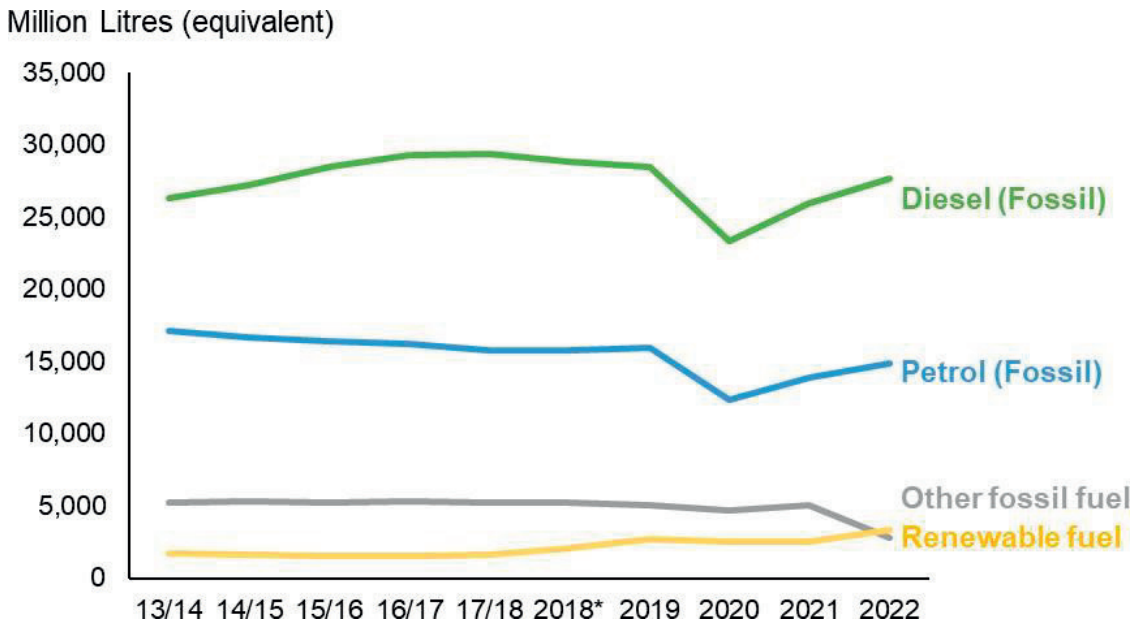
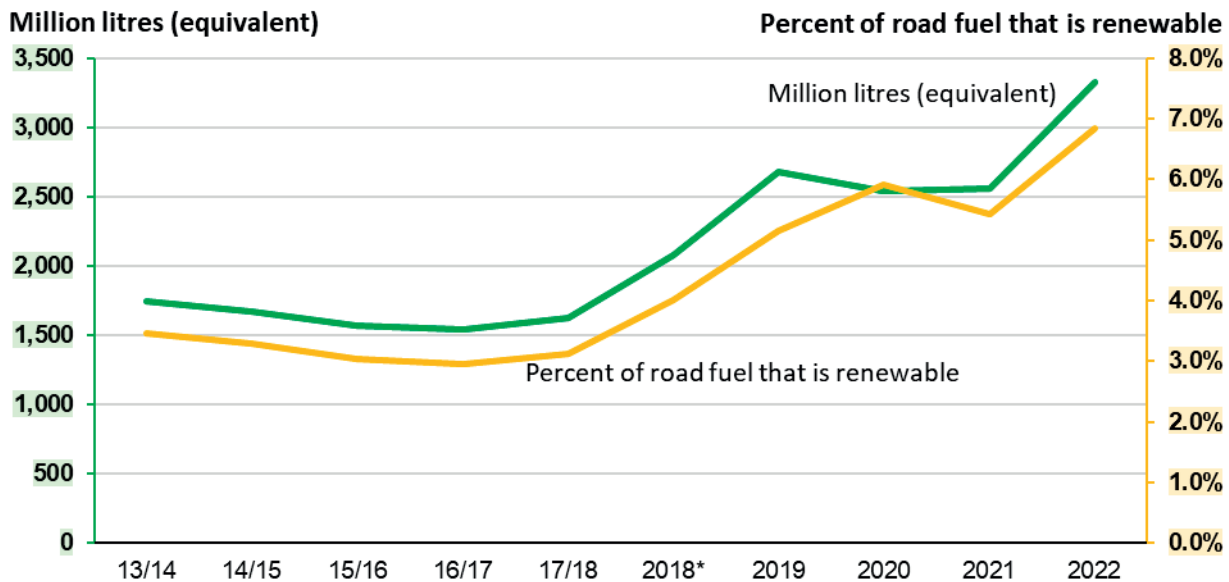


Figure 4 Road and non-road transport fuel supplied for use in the UK (* The 2018 short year has been extrapolated to represent a full calendar year).

Volume of renewable fuel, and the percentage of all fuel which is renewable: 2013/14 to 2022



* In 2018 the RTFO switched from financial year reporting to calendar year reporting. 2018 here is an estimate for the whole year based on data collected between April 2018 and December 2018

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 2022.

¹³ This calculation was produced by multiplying average annual mileage data from the [National Travel Survey](#) with passenger vehicle [conversion factors](#) to get the average annual emissions per car, followed by dividing the RTFO emissions savings by the annual emissions per car.

- 6.6 In recent years the level of GHG savings have mostly 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 greater proportion of waste-derived renewable fuels. However, in 2022 GHG savings and the proportion of waste-derived renewable fuels fell to 82% (85% in 2021) and 66% (76% in 2021) respectively, influenced by the increased share of bioethanol supplied relative to biodiesel. The RTFO awards double RTFCs to waste-derived renewable fuels as they do not have indirect land use change (ILUC – see paragraph 6.8) implications and generally have greater GHG emissions savings than crop-derived renewable fuel.
- 6.7 The considerable increase in the amount of renewable fuel supplied from 2,562 million litres-equivalent in 2021, to 3,325 million litres-equivalent supplied in 2022 resulted in a greater total mass of CO₂e saved (Figure 6).

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.

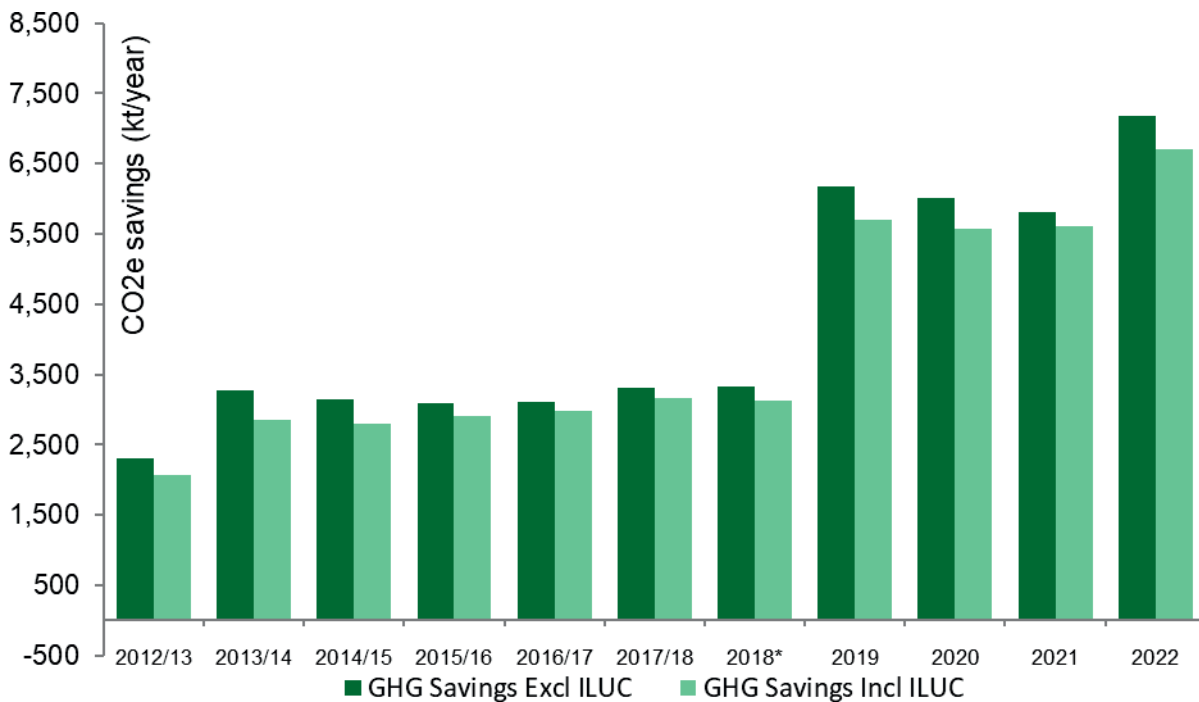


Figure 6 RTFO GHG savings excluding and including ILUC per obligation year (* The GHG savings for the 2018 short year was extrapolated to represent a full calendar year).

6.9 After accounting for ILUC, in 2022, the total GHG saving from the RTFO was 6.71 million tonnes of CO₂ eq. (Figure 6). This is an increase from the total GHG savings in 2021 including ILUC (5.60 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 have been additional incentives for renewable fuels from waste-based feedstocks. However, the introduction to E10 in late 2021 has led to a more pronounced growth in bioethanol use and subsequently increased proportions of sustainably certified crop-based feedstocks, volumes of which were still within the crop cap. In 2022, 66% of UK renewable fuels were made from waste-based feedstocks, compared to 76% in 2021.

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 2022, relative to the fossil fuel comparator of 94 gCO_{2e}/MJ, renewable fuels must meet a minimum GHG saving of 55% if the installation in which they were produced was operating on or before 5 October 2015, and 65% 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 49 different feedstocks made up the renewable fuel supply in 2022, 28 of which were wastes or agricultural residue. Table 3 shows the main feedstocks from which the UK's renewable fuels were made in 2022. "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 feedstocks in 2022 were used cooking oil (42% of all renewable fuel), corn, sugar cane, wheat, and brown grease.

Fuel type	Feedstock	Total volume (million litres equivalent)	Percentage of total renewable fuel supply
Biodiesel*	Used cooking oil	1,072.29	32.3%
Bioethanol	Corn	606.39	18.3%
Bioethanol	Sugar cane	236.65	7.1%
HVO	Used cooking oil	183.78	5.5%
Bioethanol	Wheat	152.85	4.6%
Biodiesel*	Brown grease	139.76	4.2%
Bioethanol	Starch slurry (waste)	92.88	2.8%
Bioethanol	Food waste	67.96	2.0%
HVO	Palm oil mill effluent	66.06	2.0%
Biodiesel*	Soy	63.66	1.9%

Fuel type	Feedstock	Total volume (million litres equivalent)	Percentage of total renewable fuel supply
Other fuels	Other feedstocks	634.21	19.1%
Total		3,316.49	100.0%

Table 3 Most common fuel types and feedstocks for UK renewable fuels in 2022. *Biodiesel includes Biodiesel ME & Off road biodiesel.

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 soy (2.0%) and palm (1.4%). In total, 3.5% of renewable fuel was made from high ILUC feedstocks, up from 1.7% in 2021, but down from 6.46% in 2019 and 7.20% in 2020.

6.16 As in 2021, a small volume of hydrogen was produced using wind power in 2022. Opposed to 2021, this wasn't awarded any certificates in 2022. There were several new feedstocks added in 2022, summarised in Table 4.

6.17 Feedstocks for UK renewable transport fuel were sourced from a total of 90 countries, compared to 89 in 2021 and 18 when the RTFO began in 2008-09. The top five supplying countries are China, USA, UK, Brazil and Malaysia. Last year, in 2021, the five top countries were China, UK, USA, Ukraine and France. The proportion of renewable fuels supplied by the UK increased to 11% compared to 10% in 2021. 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
Arable (rotational) grass	Biomethane (liquified)	0.15	<0.01%
Whole crop rye	Biomethane (liquified)	0.17	0.01%
Rapeseed residue single counting	Diesel (origin Bio)	0.26	0.01%
Cashew nut shell liquid	Pure bio oil	0.01	<0.01%

Table 4 New feedstocks in 2022.

Meeting the 2022 obligation

6.18 The main obligation for 2022 (12.599%) was met by suppliers.¹⁴ One obligated supplier achieved this partially through buy-out.

¹⁴ 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 6.8% of total fuel in 2022 (see paragraph 6.3).

6.19 The development fuel obligation for 2022 (0.908%) was also met by suppliers. However, all suppliers achieved this by at least partially buying out of their obligation.

6.20 In 2022, 5,772 million RTFCs were redeemed. 5.7% 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.

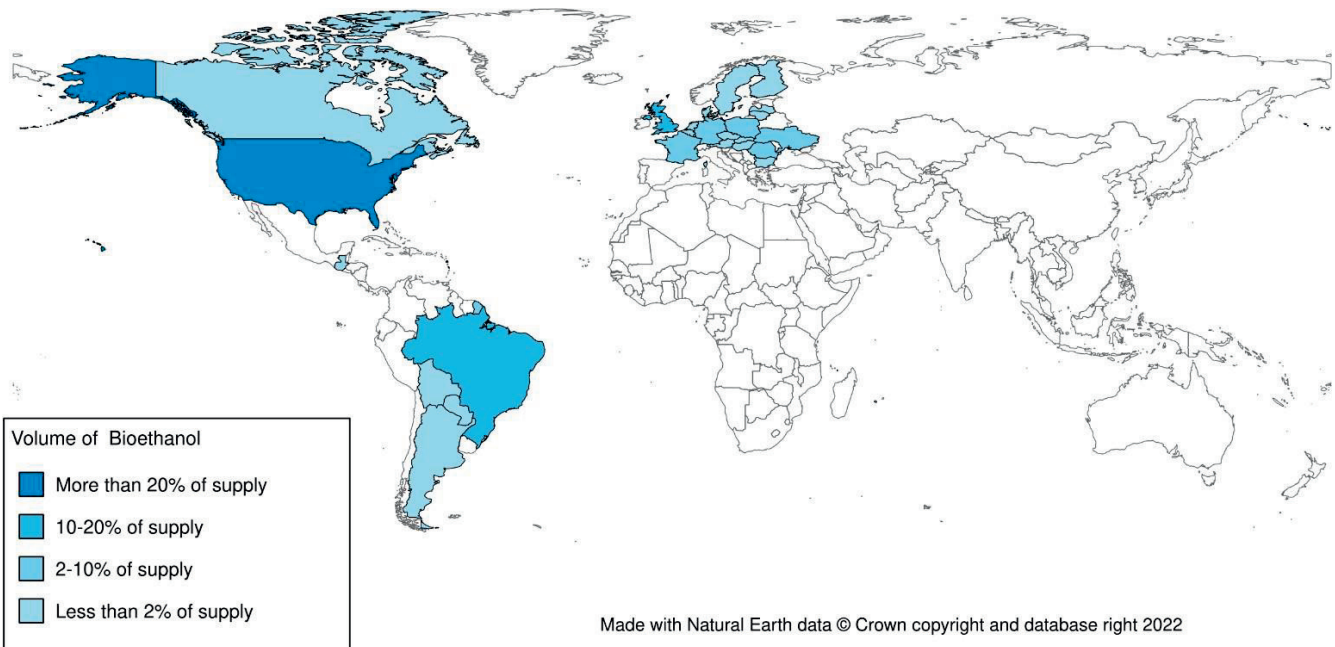
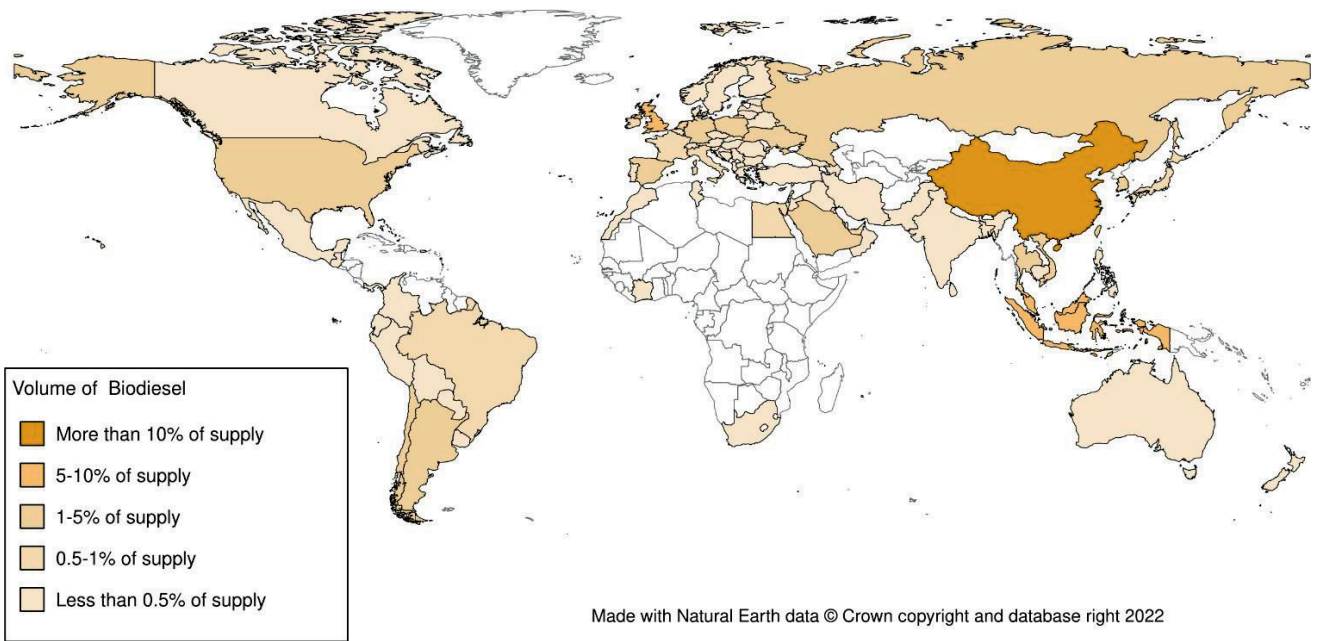


Figure 7 Global feedstock sources for UK Biodiesel and Bioethanol 2022

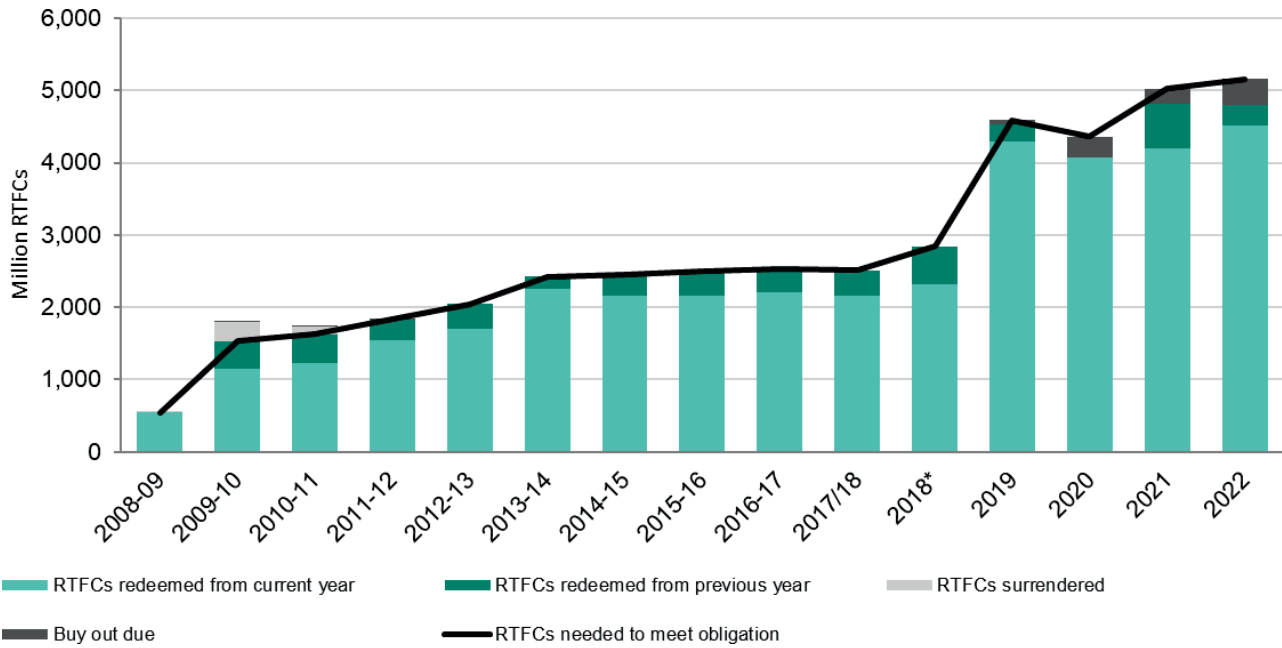


Figure 8 RTFCs redeemed and surrendered. The figures shown here include the development fuel sub-target, brought in from 2019.

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 2022, 252,376 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 2022 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 2022 ranged from £0.27 per RTFC to £0.43 per RTFC, with a mean value of £0.36 per RTFC.

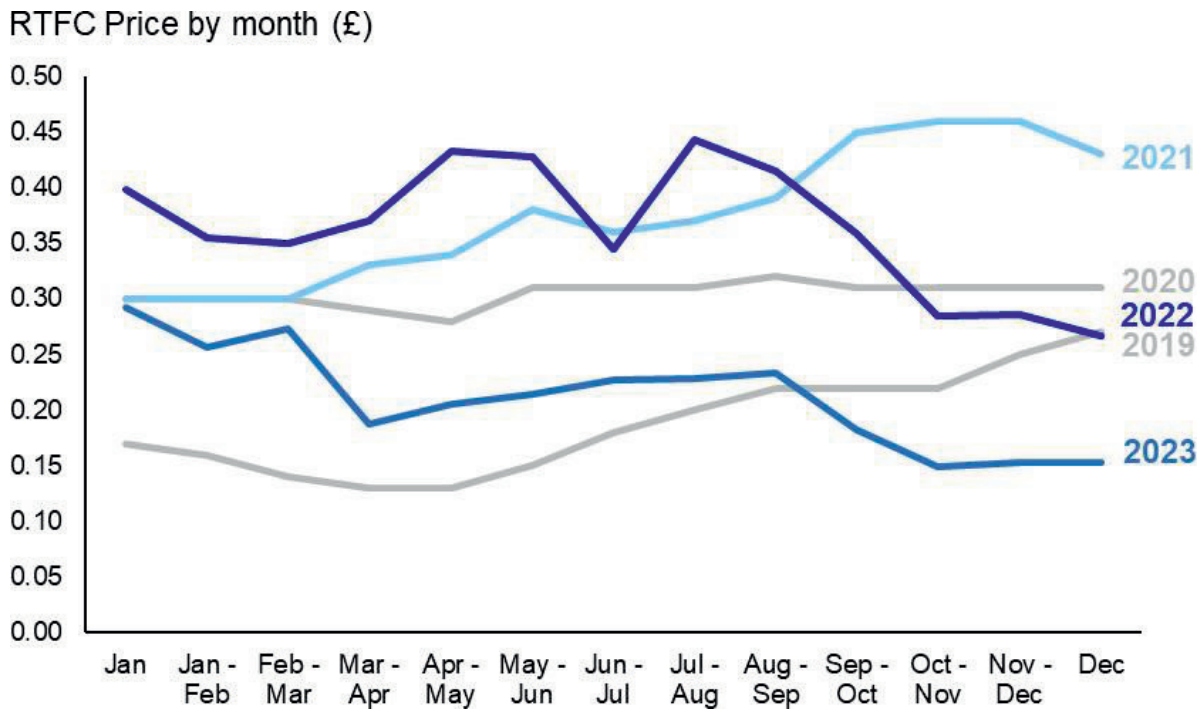


Figure 9 Volatility in RTFC prices, 2019 to 2023

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.

E03106543

978-1-5286-4800-4