

Successfully Deploying E10 Petrol

E10 Working Group Recommendations

FINAL REPORT March 2017



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2: Executive Summary

The UK has committed to 80% greenhouse gas (GHG) reductions by 2050. The transport sector contributes approximately a quarter of the UK GHG emissions, which Government aims to significantly reduce, with GHG emissions from cars and vans being eliminated by 2040. Much of this will be achieved through introducing ultra-low carbon vehicle technology such as electrification and hydrogen gas. However, the UK will remain reliant on liquid fuels for many decades to come and sustainable biofuels can play a significant role. The Transport Energy Task Force (TETF) identified E10 petrol as being a low risk, lower carbon and sustainable fuel to help decarbonise petrol powered vehicles.

The E10 Group was established to consider how to successfully introduce E10 petrol to the UK road fuel market to increase the proportion of renewable energy in transport and reduce the Greenhouse Gas (GHG) intensity of transport fuel in the UK, by enabling the large fleet of petrol vehicles to operate on the lowest carbon fuel with which they are suitable to use.

The specific objectives for E10 are to contribute significantly to meeting the Renewable Energy Directive (RED) transport sub-target of 10% by 2020 and contribute to the Fuel Quality Directive (FQD). In the UK, these directives are implemented through the Renewable Transport Fuels Obligation (RTFO) and the Motor Fuels Greenhouse Gas Reporting Regulations.

This Report of the E10 Group builds on the recommendations of the TETF¹ which recommended that transport energy policy should maximise GHG savings in a sustainable manner. Full details of the TETF and its report can be found on the LowCVP website.

The output from the E10 Group, contained in this final report, constitutes a broad consensus of opinion on a wide range of issues developed through the activities of the group. However, the views and opinions of organisations and their representatives that participated in the E10 Group may differ from those in this report

Key Messages

The E10 Group identified the following key messages for government, which it considered necessary to the successful deployment of 95 E10. These are intended to be viewed as a coherent set of requirements and should be read and interpreted together.

Decarbonising Transport

The Group agrees with the long-term objective of the UK government to decarbonise transport by 2050. However, in the medium-term (to 2030) enabling the existing fleet of petrol and diesel vehicles to operate on the lowest carbon fuel to which they are suitable will have the greatest impact on transport carbon. There are a limited number of methods to reduce the carbon impact of the 18 million petrol vehicles currently operating in the UK.

Why introduce E10?

The Group agrees that the benefits of introducing 95 E10, with a high bioethanol content, in the UK are:

- The substitution of bioethanol for petrol is one of the most **cost effective means of reducing carbon** emissions from transport currently available to the UK.
- E10 petrol offers a means of reducing GHG emissions from existing and future petrol vehicles. **No more bioethanol can be deployed within E5 petrol** as it has been blended to the maximum level possible since 2013, and no alternative low carbon fuel or technology is currently available to reduce carbon emissions from the existing 18.5 million petrol vehicles.
- **Modern petrol cars are designed, certified and optimised to use E10** in order to deliver the low emissions Government demands and the fuel consumption and performance motorists expect. The small number of E10 unsuitable cars is declining rapidly due to their age, two-thirds will be scrapped by 2020.
- E10 will be an **important component** in helping the UK to **meet the Renewable Energy Directive² transport sub-target** for renewables by 2020 with minimum risk, contributing a further 1% towards the target of 10%³.
- The UK has an **existing Bioethanol production capability** with sufficient capacity to meet the expected E10 demand.

What are the challenges?

There are a number of challenges in introducing E10 petrol which the Group agrees can be overcome. These include:

- While 92% of petrol vehicles are suitable to use E10 petrol, a minority of older vehicles are not. Therefore, E10 petrol must be introduced and labelled as a completely new fuel grade.
- The UK fuel supply chain is efficient and optimised to provide two petrol grades 'Regular' 95 E5 and 'Super' 97 E5. Adding a third grade would add cost and require investment in a market where volume is not increasing.
- Bioethanol has a lower energy content than petrol and consequently the volumetric fuel consumption using E10 petrol is expected to be 1.5% worse than E5 petrol.
- Fuel duty which is charged on a volumetric basis will penalise E10 petrol use.
- Ensuring consumers are empowered to make informed decisions following the introduction of E10 petrol.

How should E10 be introduced?

The Group agrees that 95 E10 should be introduced and deployed rapidly to a high market share (85%) due to the nature of the UK fuel supply chain and in order for the UK to benefit environmentally and economically. The successful, rapid deployment of 95 E10 with high bioethanol content, will require fully co-ordinated action from all stakeholders involved, and in particular it will require Government to play a leadership role, to explain the rationale for the introduction of this new low carbon fuel, provide motorists with clear messages, and to allow stakeholders to plan effectively while complying with Competition Law regarding anti-competitive activity⁴.

In order to launch 95 E10 successfully the following actions are required:

1. Clear consumer advice

The E10 Group agrees that it is vitally important that consumers understand the rationale for introducing 95 E10, which is to increase the sustainability of transport fuels, reduce the carbon intensity of petrol and secure UK jobs, and that consumers are empowered to make an informed choice on using 95 E10 when launched. The Government, is best placed to explain why 95 E10 is being deployed, and the E10 Group believe this should be achieved through a public information campaign led by Government and supported by a range of stakeholders including fuel suppliers and retailers, vehicle manufacturers, motoring organisations and environmental bodies.

The campaign should be combined with resources to check a specific vehicle's suitability to use 95 E10, clear pump labelling, compelling evidence of the impact of using 95 E10 and use of social media as well as traditional media channels.

2. A coordinated launch

We recommend 95 E10 is launched in a coordinated manner UK-wide. To achieve this the Government should play a leadership role. A very substantial majority of the Group believe this would be most effectively achieved through mandating the introduction of 95 E10 in addition to amending the RTFO.

If not mandated, Government should lead the introduction of 95 E10 by setting a clear timeframe and actions it will take to support the introduction of 95 E10. It will be vitally important to set a clear date for the launch and to be the lead partner in a public information campaign. This will allow the industry to comply with Competition Law while being able to plan with certainty and ensure motorists are well informed.

3. Supply of sustainable bioethanol

To ensure the supply of sustainable bioethanol increases sufficiently to support a 95 E10 petrol market, the RTFO obligation will need to be increased with an appropriate crop cap.

The RTFO obligation can only be increased from April 2017 at the earliest. The launch of 95 + E10 would need to follow this date avoiding the transition to summer fuel grades, which takes place between April and June.

4. A compelling case for motorists

There should be a compelling case for motorists to switch rapidly to 95 E10 petrol, as the regular grade of petrol, to avoid supply constraints associated with the two grades of petrol handled in the UK fuel supply chain.

If the introduction of 95 E10 is mandated, then to ensure 95 E10 is accepted by motorists, fuel duty should be adapted to reflect the energy content. The availability of Regular and Super petrol grades and the price differential between the petrol grades will provide a strong incentive. A mandate will provide greater certainty and time to prepare for the introduction of 95 E10.

If the introduction of 95 E10 is not mandated, then there is very limited potential for 95 E5 and 95 E10 grades of petrol to be available in addition to 97 E5. There will need to be other incentives for motorists and retailers to adopt 95 E10 over 95 E5. A significant

duty differential⁵ may be needed to incentivise the rapid transition to this lower carbon fuel in this case.

There may also be opportunities for fuel retailers to market 95 E10 on its different characteristics, along with price, compared to 95 E5. It will have a lower carbon footprint and octane may also differ depending on the blending process.

If introduced a fuel duty differential will need to be carefully considered. Government should work with industry to define how fuel duty should be adapted. However, due to EU state aid issues which HMRC would need to resolve, this may not be practical in the timeframe envisaged to deploy 95 E10 petrol.

5. Support for the existing vehicle fleet

Every new petrol car sold since 1st January 2011 has been fully warranted to use E10 and the majority of new cars since 2000 are also warranted to use it. Consequently, in 2015 over 92% of petrol cars on UK roads were fully warranted to use this fuel and this percentage is increasing as older cars reach the end of their economic life. Older cars which were either not warranted to use E10 or it's not known if they can use E10, can be catered for through the Super 97 E5 petrol grade acting as a legacy grade until 2020.

A large proportion of E10 unsuitable vehicles are also pre-Euro 4 emission regulation standards. Complementary measures, such as Clean Air Zones, to encourage the take-up of newer vehicles and which will directly assist the transition to E10, should be considered while reducing emissions affecting climate change and air quality.

When should E10 be introduced?

E10 should be deployed to make a material contribution to the achievement of the UK's Carbon Budgets and in sufficient time to meet the RED target. Initially the proposed date to deploy **95 E10 was the autumn 2017 and with concerted effort this could be achieved**. However, if the current legislative timetable makes this difficult, then E10 needs to be ready and available when the RTFO obligation is increased.

Industry is committed to working with the Government to make the deployment of 95 E10 a success at the earliest possible opportunity within the legislative process and in a form that is consistent with the pump labelling regulations required by Alternative Fuel Infrastructure Directive. We urge the government to commit to deploying E10 and prepare the amendments to the supporting regulations in order to be implemented as soon as practicably possible. This would allow industry to plan, whilst allowing time to ensure that motorists are well informed and that the necessary regulations have been introduced.

¹ Transport Energy Task Force see <http://www.lowcvp.org.uk/projects/transport-energy-task-force.htm>

² Renewable Energy Directive see <https://ec.europa.eu/energy/en/topics/renewable-energy/renewable-energy-directive>

³ Contribution to RED target See Section 7.

⁴ Anti-competitive activity see: <https://www.gov.uk/cartels-price-fixing/overview>

⁵ LowCVP Secretariat fuel duty examples. (see Section 14)

3: Introduction

The Low Carbon Vehicle Partnership (LowCVP) established the E10 Group, at the request of the Department for Transport (DfT) in August 2015 as a mechanism for stakeholders to help the Government to examine and formulate options for policy regarding transport energy.

Specifically, to build upon a previous report by the Transport Energy Task Force (TETF) which made recommendations to government on how the EU 2020 greenhouse gas emissions reduction and renewable transport fuel targets should be reflected in UK policy and determine how low carbon fuels could help reduce greenhouse gas emissions from UK transport in the period to 2030 and beyond.

Transport is a major source of greenhouse gases. Around a quarter of domestic carbon dioxide (CO₂) and other greenhouse gas emissions in the UK come from transport. Reducing greenhouse gases from transport will help the UK achieve its long-term goal of reducing the greenhouse gas emissions by at least 80% compared to 1990 levels by 2050. Biofuels can help reduce greenhouse gas emissions from transport. The TETF recommended that transport energy can and should make a significant contribution to GHG savings particularly in the longer term and that options should be adopted which minimise risk and uncertainty. If the UK Government wishes to meet the EU 2020 transport targets there are two measures which would probably be necessary to achieve them:

- Displacing diesel with higher biodiesel levels from waste (using B7) and,
- Displacing petrol with higher bioethanol levels (E10: bioethanol made from crops or wastes/residues, and blended in petrol above 5% and up to 10%).

The E10 Group were asked to make policy recommendations to DfT, and other Departments as appropriate, on the deployment of E10 in order that it makes a significant contribution to meeting the RED and FQD transport targets.

This document has been developed in consultation with members of the E10 Group. It contains views and information from a range of sources including industry experts, government departments and published research. A series of workshops facilitated the collection of evidence and made recommendations on specific issues. A high-level group considered the evidence and directed the drafting of the final report which reflects the broad consensus of the group. Where consensus wasn't achieved the variety of views are reflected in the document. The report and the recommendations contained within it were produced independently of, and do not necessarily reflect, the views of the Her Majesty's Government.

The E10 Group first met on 5 August 2015 and delivered its findings to the Department for Transport in January 2017.

4: Membership

The E10 Group was chaired by Andy Eastlake and hosted by the Low Carbon Vehicle Partnership (LowCVP).

The membership of the Task Force consisted of:

Ahmed Mulla - Wm Morrison Supermarkets
Alex Miles - Enerkem Limited
Alister Jackson - ExxonMobil
Andrew Quenet - Total UK Limited
Anna Lindt - Society of Motor Manufacturers and Traders
Avishai Moor - Sainsbury's
Barrie Salmon - Tank Storage Association
Chris Patience - Automobile Association
Chris Hodder - Rowan Public Affairs Ltd
Clare Wenner - Renewable Energy Association
Daphne Ferguson - Enerkem Limited
Eddie Jenkinson - Co-operative Energy
Grant Pearson - Ensus
Hugh Tucker - UK Petroleum Industry Association
Hugh Bray - Tank Storage Association
Izzy Hexter - Sainsbury's
Jeff Simms - Sainsbury's
Jill Talbot - Phillips 66
John Davidson - Phillips 66
Lucy Natrass - E4Tech
Marcus Sheldon - Shell International

Marie-Helene Labrie - Enerkem Limited
Mark Rolph - Downstream Fuel Association
Mark Chesworth - Vivergo Fuels
Marta Chrusch - BP Oil UK
Martin Cook - Mabanaf
Michael Goldsworthy - National Non-Food Crops Centre
Patrick Lynch - Greenergy Fuels
Peter Spuijman - Total UK
Peter Davidson - Tank Storage Association
Phil Monger - Petrol Retailers Association
Rick Taylor - Vivergo Fuels
Robert Fleming - Petroineos Manufacturing Scotland
Sacha Alberici - ECOFYS UK
Sam Jackson - Essar Oil (UK)
Steve Kenward - Motor Cycle Industry Association
Teresa Sayers - Downstream Fuel Association
Tom Sullivan - Greenergy Fuels
Tori Morgan - National Farmers Union

In addition, a number of government departments input to the work of the Group in an observer role. These were: Department for Transport, Department for Business, Energy & Industrial Strategy, Department for Environment, Food and Rural Affairs and HM Treasury.

Disclaimer

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5: Background

The Transport Energy Task Force recommended that as part of a package of measures to meet the RED transport target and reduce carbon emissions, 95 E10 should be adopted as the main grade for petrol in the UK. The E10 Group was formed to recommend how to ensure 95 E10 is adopted successfully if it were introduced into the UK to meet these objectives.

A number of petrol grades are referred to in this document. For the purposes of clarity, the following terms will be used in this document:

- 95 E5 – (BS EN228 Unleaded Petrol 95) or 'regular' petrol with 95 Research Octane Number (RON) and up to 5% ethanol,
- 97 E5 – (BS EN228 Super Unleaded Petrol 97) 'super' petrol with 97+ RON and up to 5% ethanol,
- 95 E10 – 'regular' petrol with 95 RON and up to 10% ethanol.

Policy objectives

The Transport Energy Task Force also stated that future transport energy policy beyond 2020 should be focused on delivering GHG savings in a sustainable manner and providing economic benefits to the UK.

6: Main policy options

In developing the Group's recommendations, three broad policy options were considered. These were:

- 1. Market-led introduction of 95 E10:** Increasing the RTFO and allowing commercial decisions to drive market introduction of 95 E10.
- 2. Government-led introduction of 95 E10:** Increasing the RTFO and providing government leadership in deploying 95 E10 through consumer facing measures.
- 3. Mandated introduction of 95 E10:** Increasing the RTFO and mandating the deployment of 95 E10 petrol.

The E10 Group considered the pros and cons of each of these broad approaches which are summarised below. The 'Government-led introduction' and 'Mandated introduction' of 95 E10 were considered the only feasible options for success given Competition Law compliance, a rapid deployment of 95 E10 and the need for clear consistent communications to support the deployment.

Market-led introduction of 95 E10

Increasing the RTFO and allowing commercial decisions to drive market introduction of 95 E10 is considered to be a high-risk approach to deploying 95 E10 petrol and most likely to fail.

While it requires minimum government intervention it only

Therefore, in complying with the RED transport target, the UK should seek to secure environmental and economic benefits. This should be achieved at minimum cost to consumers, industry and government.

Issues

In order to launch 95 E10 successfully in the UK the following issues will need to be addressed:

- Ensuring motorists are well informed and ready to accept 95 E10.
- Ensuring motorists demand 95 E10 in sufficient volume.
- Learn from the experience of introducing 95 E10 in other countries
- Securing sustainable environmental benefits.
- Securing existing and future investment and jobs in the UK
- Securing the supply of low carbon bioethanol.
- When could 95 E10 be deployed?
- Working within supply chain constraints.
- Potential demand for 95 E10 and 97 E5.

In addition, the following groups would need to be protected:

- Owners of non-compatible cars, motorbikes and machinery.
- Operators in rural areas.

addresses the obligated parties on the supply side of the market and does not address the serious risks of lack of demand from retailers or motorists. This approach would also make it very difficult to provide clear advice to motorists because of the inherent lack of coordination in the deployment of 95 E10.

It would run the risk of repeating the experience in Germany, where an obligation and minimal labelling advice led to confusion and rejection of 95 E10 petrol by motorists. This resulted in stock outs of E5 petrol and a loss of consumer confidence from which 95 E10 is only starting to recover now but where 95 E10 market share remains low.

There would also be a serious risk of further loss of investor confidence which could result in loss of bioethanol plants in the UK and associated jobs.

Government supported introduction of 95 E10

Increasing the RTFO and providing government support in deploying 95 E10 through consumer facing measures has the potential to help to address both supply and demand side issues.

This approach would put emphasis on commercial decisions to drive the market deployment of 95 E10. However, Government could help to ensure a coordinated deployment of 95 E10 by playing a strong leadership role in communication, providing a

strong fuel duty incentive coordinated with the RTFO obligation signal to ensure a coherent deployment of 95 E10.

It is conceivable that this approach could lead to both 95 E10 and 95 E5 petrol being deployed in limited volumes, but it is not guaranteed, and the market response is likely to be regional, rather than national, due to regional constraints in the UK fuel supply chain. If this were the case, then the Group is concerned that a very confusing situation could arise. Retailers would have to choose between stocking 95 E5 or 95 E10, while motorists would have to be aware of which fuels would be available where. This would require a significantly more robust communication campaign.

In the roll-out of E10 in France, this approach was supplemented by regional mandates aimed at ensuring 95 E10 pumps appeared on a proportion of the forecourts. This would require a significant increase in regulation if it were to be replicated in the UK and would require additional investment and added cost in the fuel supply chain for a market with constant sales volume.

The introduction of a 95 E10 petrol grade may offer a marketing opportunity for retailers based on price differential and carbon footprint, either under their distinct brand or under a Government umbrella campaign, for example 'Go Ultra Low Petrol'.

Some members of the E10 Group consider that a government supported introduction of 95 E10, combined with an effective public information campaign and a strong fiscal incentive could be successful. However, in the absence of these measures there is potential for added cost and confusion resulting from both 95 E5 and 95 E10 being available.

Mandated introduction of 95 E10

Increasing the RTFO and mandating the deployment of 95 E10 petrol would reduce uncertainty by replacing a commercial decision with a compliance requirement, and ensuring a targeted date of deployment of 95 E10, thereby allowing fuel suppliers to plan more effectively. For example, fuel suppliers would know when they need to start supplying 95 E10 and its components, and retailers would know what fuels would be available from suppliers.

Motorists would have a choice between 97 E5 and 95 E10 with the typical price differential these two grades command at the pump. This would reduce dependence on fuel duty to provide a price differential and there would be sufficient capacity in the supply chain to cater for the E10 unsuitable vehicles. There is still potential for adverse consumer reaction unless the fuel price is at least modified in line with energy content changes to give running cost parity with 95 E5. This could be achieved while ensuring HMRC revenue neutrality.

It would force motorists with E10 unsuitable vehicles to use 97 E5 grade petrol. However, ownership of these vehicles by lower income groups would be reducing rapidly by 2020. See section 16.

A very substantial majority of the E10 Group agrees that a mandated introduction of 95 E10, combined with an effective public information campaign, would be successful. But there is concern that a mandated approach should not delay the deployment of this lower carbon fuel.

7: Conclusions & Recommendations

In order to deploy 95 E10 petrol in the UK to reduce carbon emissions sustainably and contribute to achieving the UK's commitments under the RED, the following points were considered important:

- The introduction of 95 E10 will significantly reduce carbon dioxide emissions, have a positive impact on sustainability in the UK, and may help towards air quality improvements⁶, particularly from older vehicles.
- There are clear economic benefits to the UK in introducing 95 E10 petrol, both in terms of securing UK investment and jobs, but also existing ethanol plants providing a cheaper route to advanced bioethanol production in future.
- In order to ensure a successful launch, the Government should play a strong leadership role in the deployment of 95 E10 petrol. A very substantial majority of the group would prefer that Government mandate the introduction of 95 E10 petrol through the amendment of existing legislation⁷, or alternatively through the RTFO as a split mandate however this had less support. Government must keep industry stakeholders informed of their plans to ensure market certainty, support the

launch and support a public information campaign.

- A Government-led deployment of 95 E10 petrol should target the autumn 2017 for the launch date, or as soon as possible following the amendment of the RTFO obligation.
- The environmental benefits from introducing 95 E10 will depend on the average blend, which in turn will depend on the RTFO obligation and the comparative cost of bioethanol and waste biodiesel. The LowCVP Secretariat estimates the RTFO obligation will need to be increased to a minimum of 5.7% in 2017/18 and 6.9% in 2018/19⁸ to ensure the supply of 95 E10 with a high bioethanol blend, without allowing for any increase in biodiesel supply. In the absence of a mandated introduction of 95 E10 greater emphasis may need to be placed on the RTFO obligation.
- There is sufficient flexibility in the supply chain for 97 E5 petrol to cater for the limited demand from E10 unsuitable cars in the UK, thereby avoiding the need to extend the number of petrol grades in the market. However, this may not be the case if a significant number of motorists with E10 suitable cars refuse to use 95 E10.
- It is conceivable that both 95 E5 and 95 E10 petrol grades

⁶ DEFRA Air Quality Expert Group 2011 (see Section 11)

⁷ Potentially the Motor Fuels (Composition and Content) Regulations; however further consideration will be needed as to which piece of existing legislation would be the most appropriate to amend, should a mandated roll-out be taken forward.

could be supplied in the UK in limited volumes. However, this is only likely to be available around the major conurbations of London, Birmingham and Manchester. It is also clear that this would add cost, complicate logistics, require greater tank storage and may require investment in terminal facilities to supply the same volume of fuel sold. A very substantial majority in the Group believe this would be impractical on an on-going basis.

- The Motor Fuels (Composition and Content) Regulations should be amended to extend the legal requirement for the supply of a legacy (or protection) grade to at least 2020 which will be sufficient to cater for the limited number of E10 unsuitable vehicles remaining in the UK fleet. However, fuel suppliers believe this is unnecessary and stated they will continue to supply the market demand for E5 fuel while that demand exists, while vehicle manufacturers preferred this remain a legal requirement.
- Fuel duty should be adapted to take account of the lower energy content of bioethanol and to ensure motorists do not see an additional cost from using 95 E10. This could be achieved in several different ways. This will only be sufficient if 95 E10 petrol is mandated.
- If 95 E10 petrol is not mandated, and so may compete with 95 E5 petrol in the market, a compelling price differential at the pump will be required to entice consumers to use the 'new' fuel (greater differential than just consumer cost parity). If Government seeks to address this through fuel duty, then it should consult with industry.
- Motor industry support is essential to develop and manage robust vehicle E10 suitability information for motorists and to reassure owners of the suitability of the new fuel for their specific vehicle.

- A public information campaign, based on a collaboration between DfT and industry, should be developed and run for at least 3 months ahead of the deployment of 95 E10 petrol. An appropriate media company should be chosen to run this campaign.
- An independent testing programme on a range of cars which represent the UK car parc in both laboratory and "real world" driving cycles would provide robust evidence on the effect on fuel consumption of changing to 95 E10.
- At present, petrol which contains more than 5% ethanol is required to be labelled at the pump as: "not suitable for all vehicles: consult vehicle manufacturer before use". Many members of the Group would prefer that the wording of the fuel pump label should be revised to be more informative and positive, indicating vehicles that "can" use 95 E10 and should be consistent with the Alternative Fuels Infrastructure Directive treatment of vehicle/fuel compatibility labelling.
- The E10 unsuitable vehicles are older vehicles and likely to be the source of a disproportionate amount of the NOx emissions causing poor air quality. There is an opportunity for measures being planned by Defra and local authorities to target these vehicles through 'ultra-low emission zones' which could accelerate the removal of E10 unsuitable vehicles from circulation.

Milestones

Below are the indicative key milestones in the successful deployment of 95 E10 in the UK if HMG were to target the introduction of the fuel from, for example, from September 2017 and also choose to support it with a change to duty rate:

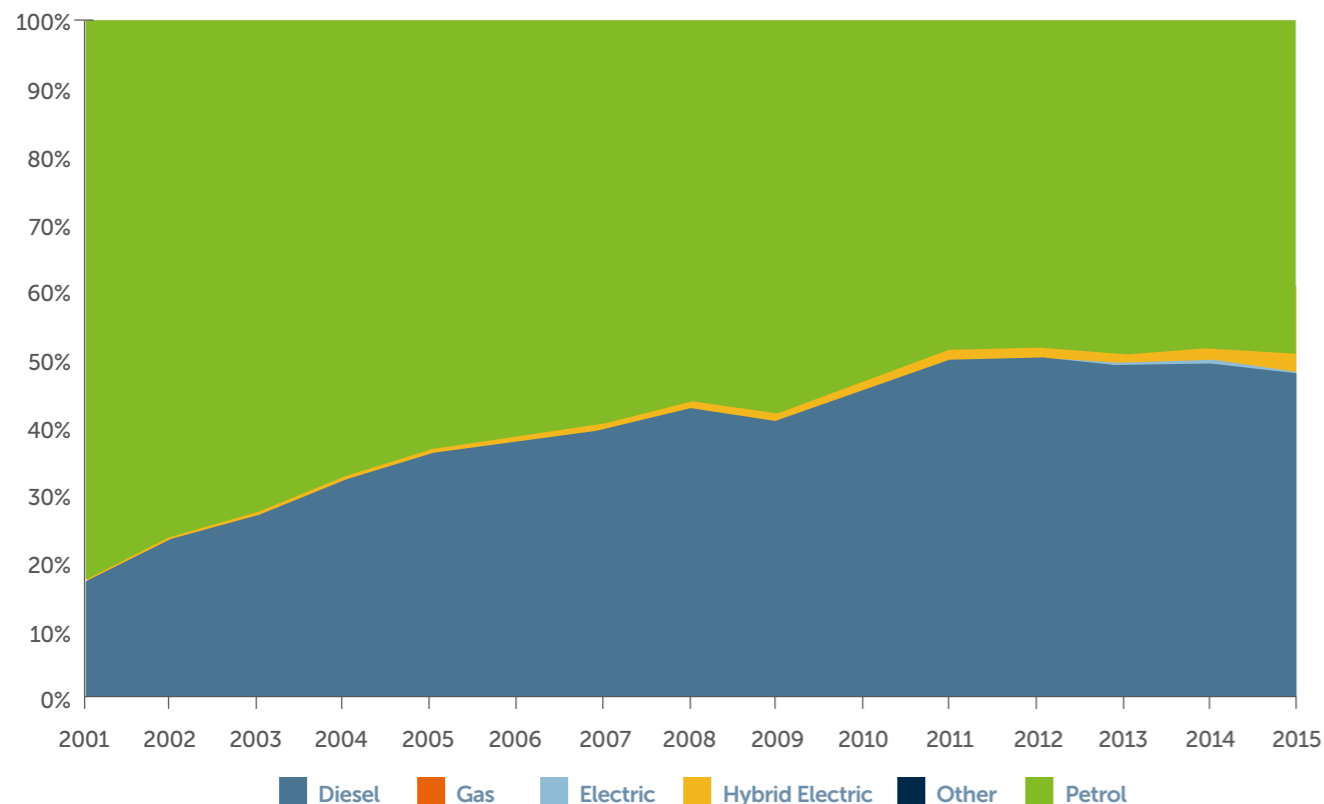
Month	Action
Winter 2016	DfT consultation on package of measures to meet the RED target.
April 2017	Confirmation to stakeholders of Government intention to continue to support the introduction of 95 E10 as part of a package of measures to meet the RED target post-consultation.
April 2017	Emission testing programme for a group of new and used cars to determine fuel consumption impact of 95 E10.
May 2017	Tender for communications agency. Development of key messages and FAQs amongst stakeholders.
Summer 2017	Announcement of the introduction of 95 E10 in the UK in 'September 2017' and of duty rate changes (as appropriate). Amend Biofuels (labelling) regulations.
Autumn 2017-18	RTFO measures come into force. RTFO obligation. Other required regulatory measures. Launch of E10 public information campaign.
Autumn 2017-18	Deployment of 95 E10. New duty rate for 95 E10 comes into force.

⁸ LowCVP Secretariat (see Section 10)

8: Evidence Base

In developing its recommendations, the E10 Group collected a wide range of evidence from government and trade association reports in the public domain, surveys of industry and motorists conducted specifically for this report, and information and statistics provided by members of the group. The key elements of the evidence base considered by the E10 Group are presented in the following sections of the report.

New Car Registrations by Propulsion Type



Graph 1: New car registrations by fuel type (2001-2015). Source: DfT

9: UK petrol vehicle market trends

Petrol will remain important as a transport fuel both in the short and medium term. The trend to diesel cars in the UK appears to be ending having peaked at 50.5% of new car sales in 2012. In 2015 and 2016⁹ petrol cars outsold diesel in the UK for the first time since 2010. In addition, the introduction of ultra-low emission vehicle technology is typically based on petrol, 70% of plug-in hybrid vehicles¹⁰ and 96% of conventional hybrid vehicles use a petrol engine. The introduction of increasingly stringent emission standards to tackle air quality also favour petrol due to the added costs of emission control technology on small diesel engines.

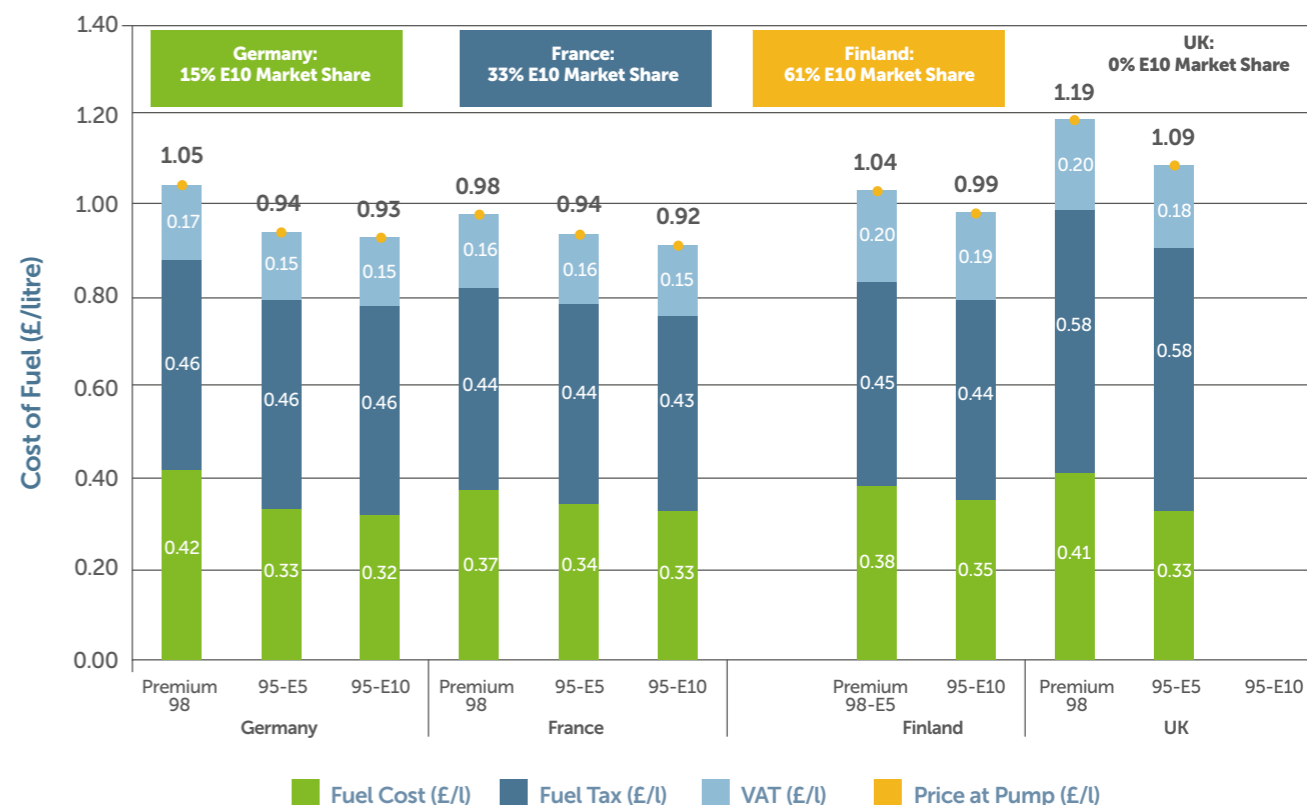
At the end of 2015 there were 30 million cars on UK roads, of which 18.5 million are petrol (61.2% of all cars), with a further 1% currently accounted for by hybrid electric and bi-fuel gas vehicles which will predominantly use petrol engines as well. E10 petrol offers a means of immediately reducing GHG emissions from existing and future petrol fuelled vehicles.

⁹ SMMT Registration data see <https://www.smmt.co.uk/2017/01/uk-new-car-market-achieves-record-2-69-million-registrations-in-2016-with-fifth-year-of-growth/>
¹⁰ SMMT AFV Registration data see <https://www.smmt.co.uk/2017/01/uk-new-car-market-achieves-record-2-69-million-registrations-in-2016-with-fifth-year-of-growth/>

10: Experience in other countries

There are notable examples where 95 E10 has been launched in other European countries, specifically Finland, France and Germany. Like the UK, Finland has two grades of petrol, while France and Germany are able to cope with more grades. In all three countries 95 E10 was launched at a reduced price to the existing E5 grade. In Germany, there was no fuel duty incentive, while in France the fuel duty incentive was relatively small, this resulted in pump price incentive equating to 1-2ppl, and associated with market shares for 95 E10 of 15% in Germany and 33% in France.

Price of Petrol Grades across EU



Graph 2: Petrol prices and taxation in Finland, France, Germany and UK. The data was compiled from various sources; AA Fuel Price Report, Autotraveler.ru, prix-carburants.gouv.fr, Gasoline-Germany.com and polttoaine.net.

Finland

In Finland 95 E10 was introduced against a background of an obligation on fuel suppliers and a taxation system based on CO2 and Energy. Government played an important leadership role in the communication campaign leading up to the launch. The campaign started a year prior to launch which ensured clear information and consistent messages were provided to motorists.

Motorists were aware and well informed of the introduction of 95 E10. In addition, there was a 5% price difference between 98 E5 and 95 E10 petrol. This resulted in a rapid take up of 95 E10 achieving close to 70% market share, although concerns over mpg spread through social media, resulting in market share dropping back to 58% for a while before recovering.

France

In France 95 E10 was mandated through a split obligation and regional mandate for the proportion of forecourts with 95 E10. Government was involvement in the communication campaign leading up to the introduction. The policy strategy has delivered a cautious but progressive introduction of 95 E10 into a three petrol grade market and 95 E10 has since achieved a 30% market share. In the autumn of 2015 the fuel duty incentive was increased producing a 0.03 euro/l difference in price on average at pump between 95 E5 and 95 E10.

Germany

In Germany, the same level of fuel duty was applied to petrol and bioethanol so providing no incentive for 95 E10 over 95 E5. In addition, the introduction of 95 E10 in Germany was badly handled and led to initial supply problems for RON 95 E5. There wasn't a national launch, little Government or industry coordination or central communications campaign. Communications were limited to issuing labelling requirements.

The impact was confusion amongst motorists, distrust of the new fuel and supply disruption for 95 E5 as 95 E10 was widely rejected by motorists. Subsequently 95 E10 market share has recovered to a disappointing 15% of petrol market in 2013.

The Netherlands

95 E10 has also been introduced in the Netherlands, where it has been introduced as a commercial decision and marketed as 'Blue One 95' slightly cheaper and more environmentally friendly fuel. It lacks government support and has achieved very little market share.

Belgium

At the time of writing 95 E10 is being deployed in Belgium, which like the UK has a supply chain optimised for two petrol blends. On the 3 November 2016, the Belgian Federal Ministry of Economy launched a broad information campaign in preparation to the introduction of 95 E10 in Belgium from 1 January 2017. Belgium has a separate mandate for petrol which increased the ethanol content from 4.5% to 8% at the start of 2017, and will increase to 10% by 2020. The mandate only applies to 95 octane petrol, 97 E5 petrol will remain on sale for vehicles which are not suitable to use E10. Currently 90% of petrol cars in Belgium are suitable to use 95 E10. At the time of writing the introduction appears to be going smoothly.

Evidence from Finland indicates that a rapid take-up of 95 E10 following its introduction is possible, where a national launch and communication campaign is supported by Government leadership and an incentive to adopt 95 E10. In other European countries, where all these elements have not accompanied the introduction of 95 E10 a more modest market share has been achieved. The UK can exceed the experience of Finland in deploying 95 E10 by providing a stronger incentive. This can be achieved through a mandate or a strong fuel duty differential.



11: Securing environmental benefits

The TETF asserted that in meeting the RED transport target, the UK should seek to deliver GHG and sustainability benefits, in line with proposed longer term transport energy policy objectives.

Climate Change

Bioethanol supplied to the UK is a low carbon, sustainable fuel reducing carbon emissions compared to fossil fuels by 61%. Bioethanol has a low risk of indirect effects, taking indirect land use change (ILUC) into account the reduction in carbon emissions was on average 46%¹¹ (ranging between 53% and 42%). In addition, UK sourced bioethanol has the potential when operating optimally to achieve in excess of 90% greenhouse gas savings through a variety of improvements including energy efficiency, alternative feedstock sourcing and putting carbon capture facilities in place.

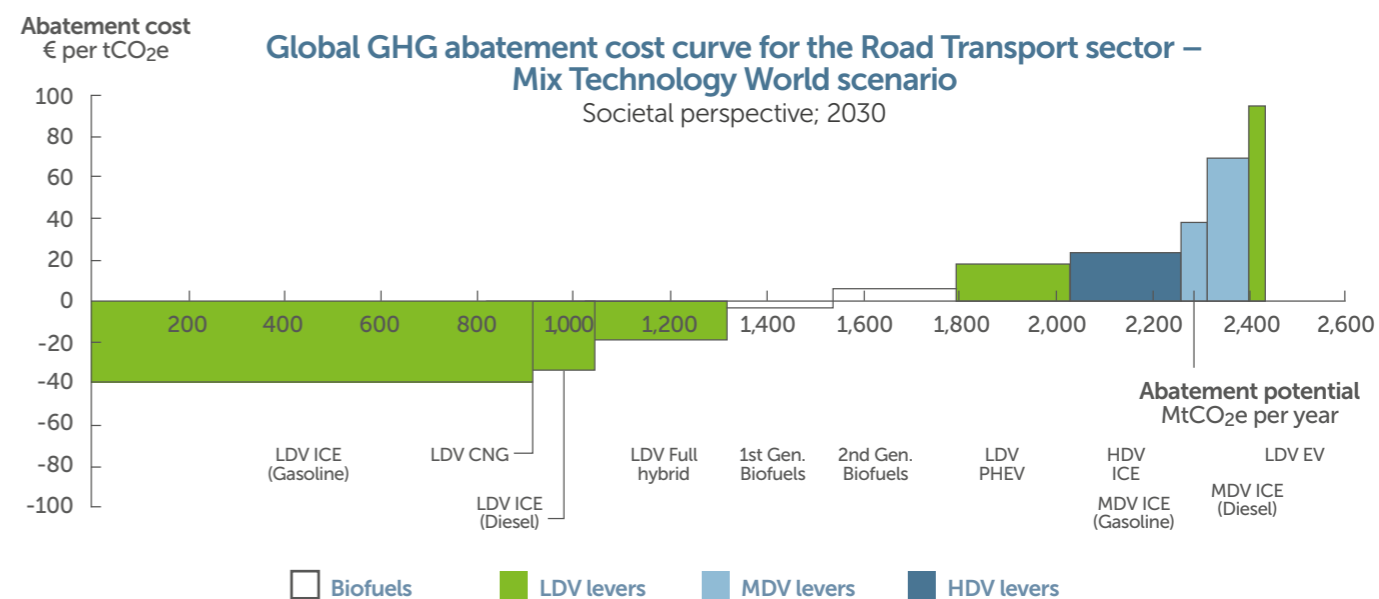
Biofuels are amongst the most effective measures the UK can deploy in reducing carbon emissions from road transport in the short-term and can play a significant role in achieving the UK's objectives and carbon budgets on the trajectory to 2050.

Air Quality

In 2011 DEFRA formed an Air Quality Expert Group¹² to consider the impact on air quality of road transport biofuels. The Air Quality Expert Group concluded that the evidence suggests the increased use of bioethanol by replacing E5 with E10 petrol will have no change in oxides of nitrogen (NOx) emissions but would lead to a reduction in the other regulated pollutant emissions; Carbon monoxide (CO), Hydrocarbons (HC), and Particulate Matter (PM). However, the Air Quality Expert Group also concluded that the reductions in emissions may be more apparent for older vehicles.

In March 2016 E10 became the reference fuel used in type approval fuel consumption and emissions testing new cars, and this will be extended to all cars on sale in the UK in August 2018. Therefore, all new cars using E10 will meet with current and future vehicle emission standards.

The introduction of 95 E10 will significantly reduce carbon dioxide emissions and may help towards air quality improvements, particularly from older vehicles. In addition, UK sourced bioethanol has been shown to have a positive impact on sustainability.



Note: The curve presents an estimate of the maximum potential of all technical GHG abatement measures below €100 per tCO₂e in a penetration scenario if each lever was pursued aggressively. It is not a forecast of what role different abatement measures and technologies will play.
Source: Global GHG Abatement Cost Curve v2.0

95 E10 is a low-cost measure with broad application in the light duty vehicle (LDV) sector. This is particularly evident when compared to measures such as electrification of transport, which are at an early stage of development and deployment, and consequently bear a high roll-out cost, with little scope for wide scale adoption in the short-term. Based on current carbon savings from bioethanol and the carbon intensity of electricity generation in the UK, the introduction of 95 E10 with 85% take-up would reduce carbon dioxide emissions by 0.76 mt per year (0.61 mt applying EU ILUC factors), which is the equivalent of replacing 2.17 million petrol cars with Nissan Leaf models.

¹¹ DfT Biofuel Statistics (2015)
¹² Defra, Road Transport Biofuels: Impact on UK air quality (2011)

12: Growth and jobs in the UK

The development of a larger bioethanol road fuel market in the UK, can secure economic benefits in terms of skills, intellectual property, employment and inward investment.

There has been considerable investment in a number of first generation bioethanol and biodiesel plants in the UK providing a combined capacity of 1,725 million litres of biofuel, direct employment for 900 people with investments ranging from £50m to £350m for the four largest plants,¹³ based on the RTFO. In addition to direct employment, each processing plant supports a larger number of indirect jobs in the supply chain. Vivergo and Ensus have estimated their bioethanol plants, when operating at full capacity, together employ 250 people directly while they estimate they could support around 8,000 jobs¹⁴ in the UK.

Building on existing plant and attracting new investment

In addition to offering employment and a source of low carbon biofuel for domestic and export markets they may also offer an attractive route to developing advanced fuels at a lower capital cost. Existing bioethanol plants potentially can be modified to produce advanced fuels at a lower capital cost than investing in a green field site. This is due to much of the downstream plant being the same for both advanced and first generation biofuels, with the investment for handling advanced biofuels required upstream in the production process. There is also potential to improve the carbon footprint of existing plants through supply chains, plant efficiency and power if there is sufficient incentive for investment.

An increase in the RTFO and an uptake of 95 E10 in the UK market could also attract new investment in advanced bioethanol production capacity and encourage the scaling up of technologies currently at pilot and demonstration scale in the UK.

Risk of loss of jobs and investor confidence

Due to policy uncertainty in this area many of the existing investments in the UK are under threat, primarily because the investment case was based on a faster growing market for bioethanol than has been delivered to date. There is a real danger of a loss of jobs and investment confidence in future advanced biofuels should 95 E10 not be deployed.

There are clear economic benefits to the UK in introducing 95 E10 petrol in the UK, both in terms of securing UK investment and jobs, but also in terms of existing ethanol plants moving to advanced bioethanol production in future and attracting additional investment to the sector.

¹³ Ecofys, UK biofuel industry overview (2013), commissioned by DfT.

¹⁴ Calculated using input-output tables for Scotland's economy: <http://www.scotland.gov.uk/Resource/0045/00457489.pdf>

13: When could E10 be deployed?

Without the introduction of 95 E10 there is very limited opportunity to increase the proportion of renewables in UK petrol. Conversely, there is limited incentive to increase the renewable content of fuel in the UK without an increase in the RTFO obligation. The DfT is working on the RTFO trajectory to 2020 and the RTFO obligation will need to increase from its current level of 4.75% sufficiently, year-on-year, to enable and encourage the supply of renewables (including bioethanol) in transport fuel. This cannot be achieved ahead of the transposition of the ILUC Directive and the amendment to the FQD into UK law. DfT expects this to happen in April 2017 with a fall-back position of autumn 2017. Therefore, the LowCVP Secretariat proposes the financial year 2017/18 is the earliest opportunity to deploy 95 E10 in the UK market by when Government is expected to have implemented any legislation required.

The introduction of 95 E10 should be timed to avoid the switch from winter to summer petrol blends. This takes place between March and June. Consequently, the introduction of 95 E10 should be timed to take place during the period July to September. A proposed time would be September as part of the summer to winter change of petrol grades.

The Alternative Fuels Infrastructure Directive which refers to a new CEN standard for vehicle/fuel compatibility labelling came into force in November 2016 and Member States have 24 months to implement the directive. The implementation of the Alternative Fuels Infrastructure Directive may require a public information campaign which could be combined with the launch of 95 E10. This would have to happen no later than October 2018.

Complying with Competition Law

Competition Law prevents anti-competitive activity including collaboration between retailers and fuel suppliers in discussing and sharing information on price and the introduction of new products. Therefore, if 95 E10 is to be deployed in a co-ordinated manner then government action is required to set the agenda and the date for the introduction of 95 E10 petrol. This will allow fuel suppliers and retailers to plan their commercial activity in response to Government policy.



¹³ Ecofys, UK biofuel industry overview (2013), commissioned by DfT.

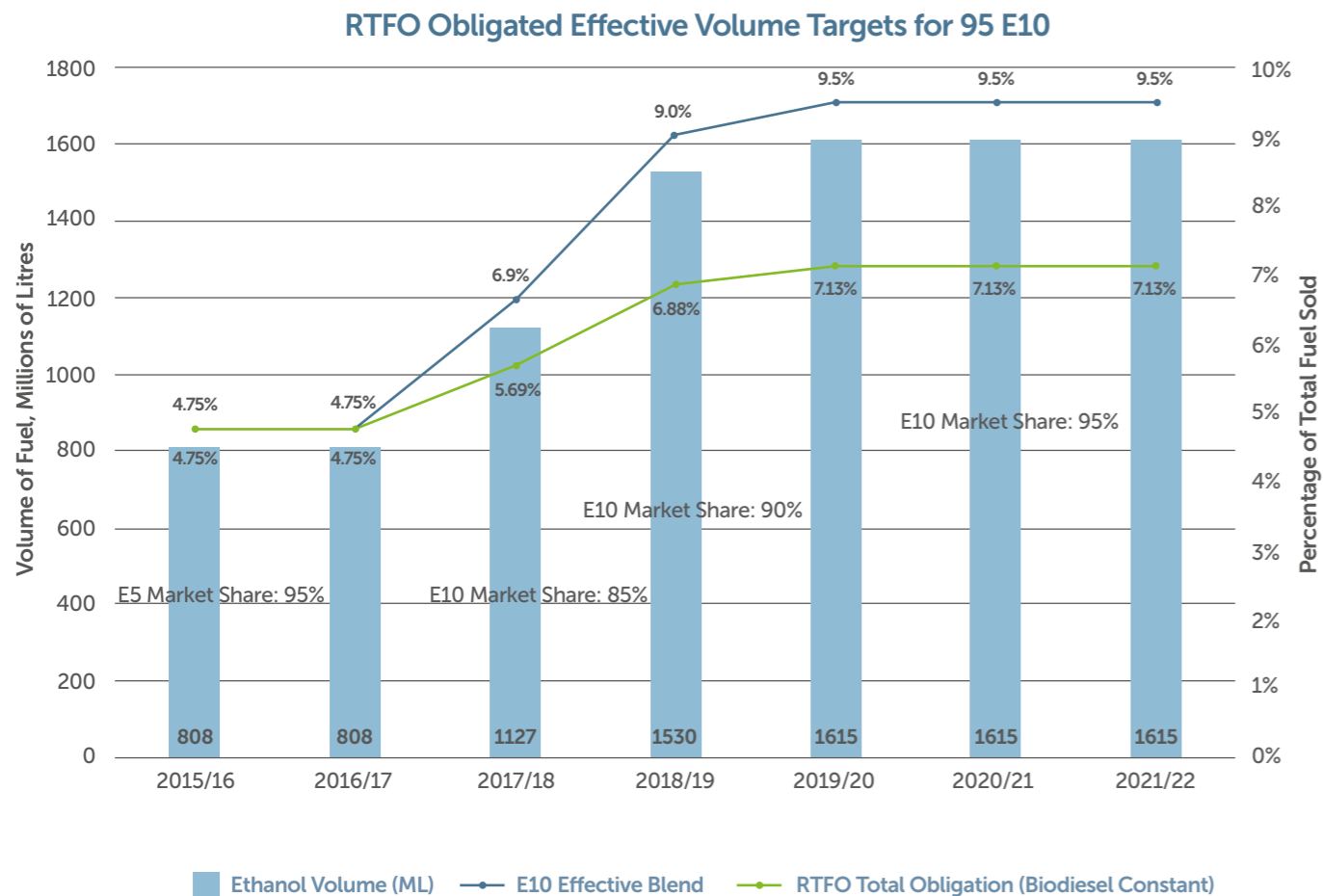
¹⁴ Calculated using input-output tables for Scotland's economy: <http://www.scotland.gov.uk/Resource/0045/00457489.pdf>

14: Securing the supply of low carbon bioethanol

In the current renewable fuel market bioethanol for E5 is being blended to the maximum limit, while biodiesel is being blended at minimum levels, using double counting, to meet the RTFO obligation. Although this is a commercial decision for each supplier, if this approach continues then it is likely that fuel suppliers would utilise the introduction of 95 E10 to use more bioethanol to meet an increased RTFO in preference to increasing the use of biodiesel, subject to the relative cost of bioethanol and biodiesel at the time.

need to increase by more than these figures to encourage an increase deployment of biodiesel.

The proposed amendments to the RTFO obligation introduction a 'crop cap' or cap on the maximum percentage of crop based biofuels. It is important that an appropriate level crop cap is applied, and that the crop cap should be sufficiently high to ensure the supply of sustainable bioethanol is not constrained from meeting the level of demand for 95 E10 petrol.



Graph 4: The required increase in bioethanol supplied to the UK market to ensure 95 E10 is available to at least 85% of the market share in 2017/18. The RTFO Total Obligation is represented as a percentage of total volume of fuel sold and increases to the minimum level required for 95 E10 to be supplied (assuming there is no increase in other renewable fuels).

The LowCVP Secretariat has estimated that an increase in the RTFO obligation to a minimum of 5.7% in 2017/18 is necessary to match the supply of bioethanol to meet the deployment of 95 E10 petrol. This assumes 95 E10 is deployed in the autumn of 2017 and achieves an 85% market share of petrol sales market in the 6 months from 1st October 2017 to 30th March 2018. The RTFO obligation should then increase to a minimum of 6.9% in 2018/19 with an assumed 95 E10 market share of 90%, and then again until 95 E10 reaches the current market share of regular petrol, 95%, in FY 2019/20. These figures are reflected in the graph above and represent the minimum RTFO obligation required to support the deployment of 95 E10 blended to the blend wall in 2020 in line with the recommendations of the TETF. The RTFO obligation will

15: Working within supply chain constraints

UK fuel supply chain has been rationalised and restructured in recent decades with a move away from vertical integration of the supply chain with multinationals divesting themselves of refineries, major fuel distribution assets and retail service stations.

UK Fuel Supply Chain

There are currently 6 refineries in operation in the UK each with capacity between 215,000-330,000 barrels per day (bbl/d). Once refined fuel is distributed by pipeline, sea, rail or road to oil terminals and storage facilities.

There are 50 major oil terminals located across the UK, (less than 1 per UK county) at which fuel is stored and blended for distribution by road tanker to the retail forecourt market. Terminals vary in size and capacity considerably from 250 tanks providing more than 600,000 m3 of storage capacity, to as little as less than 10 tanks and 15,000 m3 of storage capacity.

The road fuel distribution network is focused around the major conurbations of London, Birmingham and Manchester which are fed by 5 of the UK's refineries, and linked by a network of pipelines to major oil terminals. The distribution network is much thinner in the South West, East and North of England, Scotland, Wales and Northern Ireland.

Typically, the refineries, terminals and forecourt chains are owned by separate companies. The UK has a highly efficient but interdependent regional supply with refineries serving regions of the UK, terminals supplying fuel to a number of forecourt chains from the same terminal, and complex product swap and supply agreements. As a result of this, a single refiner, terminal operator or forecourt owner faces commercial risk from replacing 95 E5 with 95 E10, as there will be uncertainty that existing customers/suppliers will accept the change. This risk is best mitigated against by Government determining the date 95 E10 is deployed.

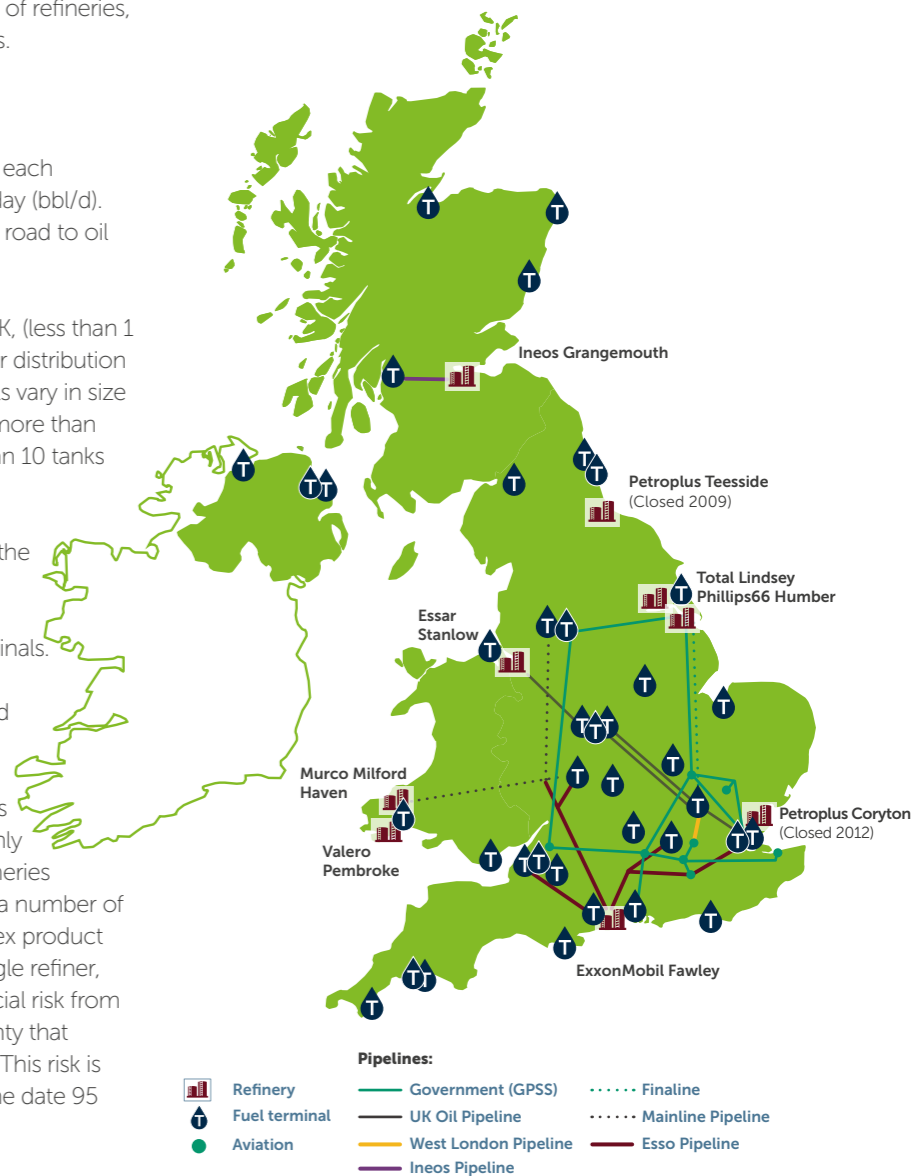
This provides a cost effective well utilised supply chain. However, the level of interdependency of the supply chain has been built to supply two grades of petrol, which may limit the ability to offer a third grade of petrol or greatly vary the volume split between the two existing grades.

Supply chain for existing grades of petrol

UK sales of petrol are 17,560 million litres per annum (2014/15, HMRC Oils Bulletin), of which Regular RON 95 grade accounts for 95% and Super RON 97-98 accounts for 5%. The retail sites and fuel supply chain in the UK have been developed to supply these fuel grades in these volume and proportions.

Regular RON 95 and Super RON 97-98 petrol is blended from separate Blendstock for Oxygenate Blending (BOB) specified to produce the appropriate level of oxygenate, vapour pressure and octane of the finished product. Ethanol has most pronounced effect on vapour pressure and octane, driving the quality of the BOB required for blending. Consequently, once produced at the

UK refining & product distribution terminals (Indicative summary only - does not show all locations)



refinery the BOB for each grade of petrol must be handled separately through the distribution network until blended at the terminal, from where it will be distributed as the finished product to the forecourts. Consequently, refinery, terminal and forecourt

capacity will constrain the potential volume of supply of Super grade petrol.

Advice from fuel supply industry is that there is a degree of flexibility in the supply chain which is likely to allow the petrol fuel grades to be supplied in the proportions up to 85% Regular RON 95 and 15% Super RON +97 with the existing infrastructure. To vary the proportion of throughput beyond this would require a significant lead time and require investment.

Therefore, if E10 were to be deployed as the Regular grade of petrol nationally and the Super grade retained as E5, then the supply chain could cope with market shares of 85% 95 E10 and 15% 98 E5 respectively.

Blending a third grade of petrol

UK fuel supply has been developed and optimised to supply 2 grades of petrol: Regular RON 95 and Super, typically RON +97, both of which are E5 petrol, containing up to 5% bioethanol or other oxygenates currently.

Crude oil is refined to produce a number of products, including one derived from petroleum known as BOB, which is the base petrol product ready to be blended with bioethanol and other oxygenates and additives to produce the finished petrol ready for retail. Separate BOB is produced for blending Regular and Super petrol to achieve both the required octane rating and other blend specifications of the final product.

As an illustration, and recognising not all facilities work in the same way, some BOBs used for blending 95 E5 petrol grades could be used to blend 95 E10 petrol grades. This would result in a higher level of oxygenates and octane rating of the finished product. This is referred to as Splash Blending. BOB produced for 95 E10 petrol grades is normally different from those currently produced to blend E5 petrol grades to take account of the higher level of oxygenate from the bioethanol and other properties in the final product. This is referred to as Matched Blending.

The blending process takes place usually at the terminals, often after the duty point, rather than at the refineries to avoid ethanol absorbing water in the distribution system and to reduce volatility and evaporative emissions. Some refinery blending may take place where road tankers deliver directly to forecourts in the vicinity of the refinery.

Blending at the terminal occurs in two ways: blending at the rack (or inline blending) when the road tanker is filled for delivery, or batch blending (or tank blending) where a batch of fuel is blended and the finished product is held in a tank ready for loading onto a road tanker for delivery. The latter process provides better quality control of the blended product and is used where higher volume throughput of product is required. Smaller terminals, or terminals handling smaller volumes, are more likely to blend at the rack.

Rack blending, at some but not all facilities, is relatively flexible and would allow for splash blending product of 95 E5 or 95 E10 from the same terminal possibly using the same BOB. However, this may cause fuel quality issues with higher oxygenate levels and other blend parameters in the 95 E10 product, as well as additional cost. If separate BOB was supplied for 95 E5 and 95 E10 then these blendstocks would have to be distributed and stored separately to avoid mixing, adding cost due to more complex logistics of supply and more assets being employed to deliver the same volume of fuel. Batch blending would require additional tankage for storage of 95 E5 and 95 E10 ready for dispensing, thus adding cost and assets for delivering the same volume of fuel whether or not separate BOBs were produced for blending to 95 E5 and 95 E10.

While larger terminals tend to be more capable of supplying three grades of petrol, this would increase the complexity of the logistics of supply and require more assets to be deployed in distribution, therefore increasing cost of supply for the same volume of fuel

sales. However, smaller terminals and terminals handling small volumes are unlikely to be able to cope with an additional grade of petrol.

In summary, while some terminals are readily able to configure their equipment to blend ethanol up to E10, the majority of terminals are more constrained, with some only able to offer a maximum of 2 grades of petrol at the load rack and unable to cope with more without further investment.

Therefore, the ability of the supply chain to manage a third grade of petrol is likely to differ regionally, with the areas with more and larger terminals around the major conurbations such as London, Birmingham and Manchester being more likely to cope, while areas with fewer and smaller terminals, such as the South West, East and North of England, Scotland and Northern Ireland likely to be less able to cope with an additional grade of petrol.

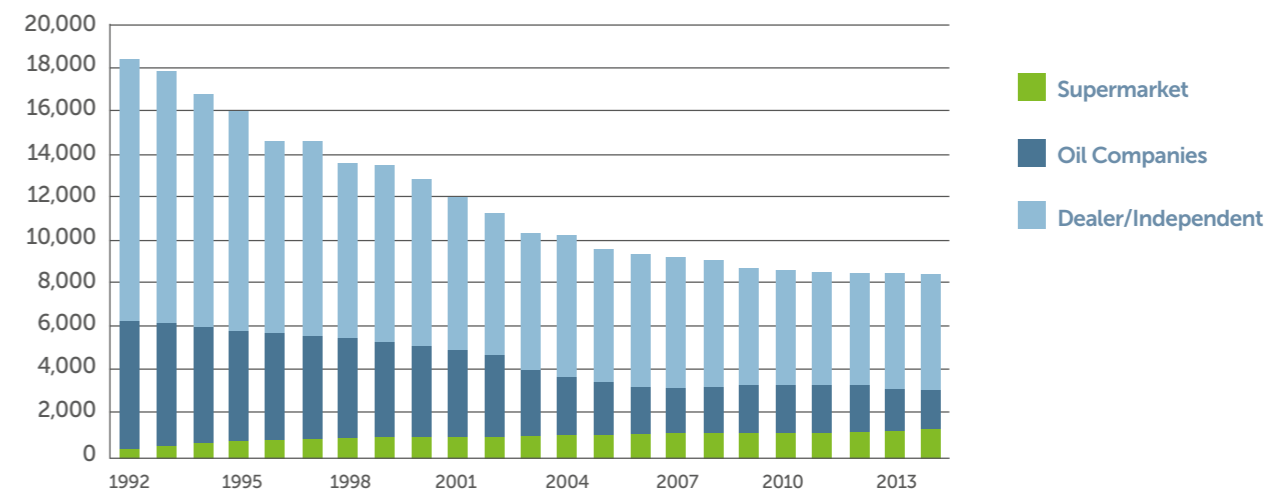
Petrol Retail

There has been a process of consolidation in forecourts for some years in the UK which is associated with the maturity of the market and improved vehicle efficiency reducing demand. There are currently approximately 8,000 forecourts in the UK, the majority being smaller independent forecourts, oil major branded forecourts and supermarkets, which have been growing in number in recent years.

Major retailers and supermarkets are consolidating into larger sites, with average annual throughputs in the order of 11 million litres. Independent forecourts make up the largest number of sites, with in excess of 6,000 sites and average annual throughput in the order of 2.8 million litres. It is important to note that throughput in rural areas can be as low as 0.5 million litres per year.

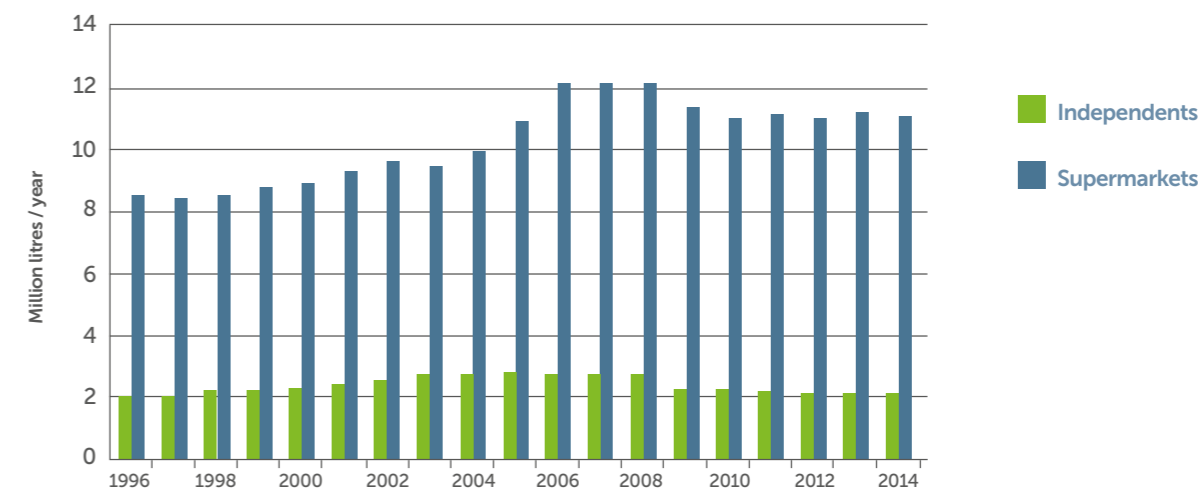
No forecourts in the UK currently have the capability to retail more than 2 grades of petrol and many independent forecourts and some supermarkets only have the infrastructure to provide one grade of petrol. Therefore, if 95 E5 and 95 E10 were made available concurrently, then these petrol grades would have to be offered through separate retail forecourts along with the super grade.

The introduction of 95 E10 petrol as a third grade does offer the opportunity of marketing this product based on its characteristics. This could involve a difference in specification particularly if linked to a difference in cost. The fuel would have a lower carbon footprint and so could be marketed as a lower carbon fuel, for example, or potentially a difference in octane.



Source: Energy Institute until 2005; Catalist onwards

Graph 5: Number of forecourts



Source: Catalist

Graph 6: Petroleum sales by sector

Rural petrol stations

There already exists cost pressure on rural forecourts, reducing the number of forecourts and increasing the cost of motoring in rural areas. The impact of introducing 95 E10 on rural operators and motorists should be investigated further and if necessary Rural Fuel Duty Relief should be extended to ensure rural operators and their customers aren't disproportionately penalised financially by the introduction of 95 E10.

Supply Chain Constraints and options to deploy E10 in the UK

The UK supply chain and forecourts can cope with supplying E10 in addition to E5 petrol. This could be achieved in two ways. Firstly, deploying 95 E10 as the Regular grade of petrol with 98 E5 being maintained as the Super grade. These two grades of petrol are already distributed separately, but due to constraints in the supply chain and forecourts for the Super grade, the market split would be limited to a minimum of 85% Regular 95 E10 and maximum of 15% Super 97 E5 grades.

Secondly, it is conceivable that three grades of petrol could be supplied, 97 E5 Super and both 95 E5 and 95 E10 Regular grades. However, this is very unlikely to be available nationally due to constraints in the supply chain. It is also clear that this would add cost and require greater tank storage throughout the supply chain for the same volume of fuel.

The fuel supply chain will need to be afforded sufficient time to ensure Management of Change processes are adequately and suitably conducted and that timetables allow for any issues that arise as a result of these processes. If large scale changeovers of tankage are required to accommodate E10, industry will need to co-ordinate to ensure supplies are maintained in local supply areas.

Finally, due to constraints at forecourts, there is nowhere in the UK where all three grades could be offered on the same forecourt without a significant investment programme, which would not be commercially viable in a declining petrol market.

16: Potential demand for E10 and E5

Modern low carbon cars and fuel

European cars have been developed to comply with European average fleet CO2 targets, and air quality regulations with reference to a test cycle and reference fuel. The FQD established E10 as a future reference fuel in 2010, and since then cars have been designed to use, and to be tested using E10 petrol.

All cars first registered in the UK since 1st January 2011 have been suitable to use E10 and the majority of new cars have been warranted to use E10 since 2000. In addition, in March 2016 E10 became the reference fuel used in type approval fuel consumption and emissions testing. This means that since then, all new cars certified for sale in the UK and Europe will be optimised to run on E10. This will be extended to all new cars on sale in the UK and Europe from August 2018.

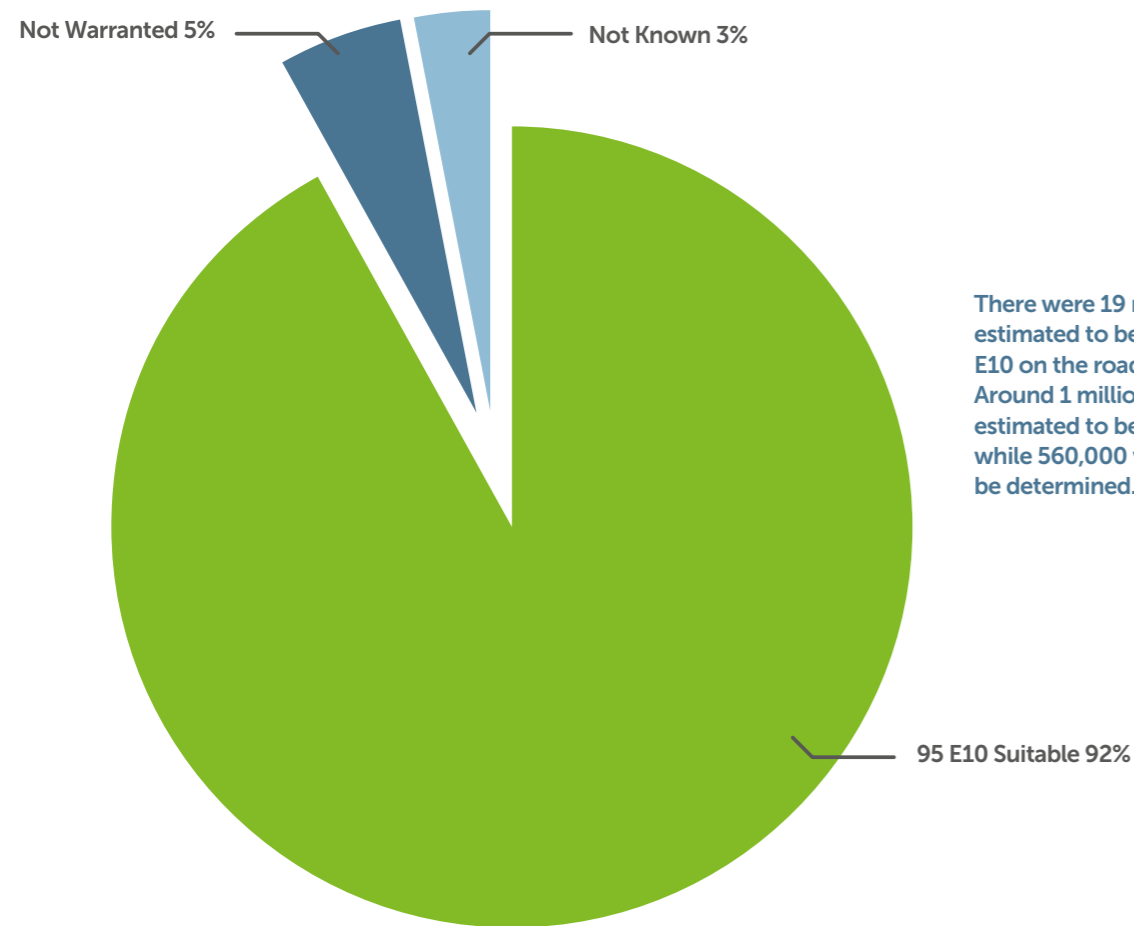
Therefore, for modern efficient cars to be able to operate optimally, they will need the lower carbon fuel they were designed to run on, E10.

Older higher-polluting cars

The vast majority of UK petrol cars can use E10. It is estimated that in 2015 more than 92% of petrol cars were suitable to use E10 petrol, an increase since 2012 when 88% of petrol cars were suitable to use E10 petrol. This is a trend which will continue as older, higher polluting cars are scrapped and replaced by new cars meeting the latest emission standards.

Despite the increasing number of vehicles which are suitable or optimised to use E10, there currently exists a significant number of vehicles which were either not warranted to use E10 or it is unknown if they were warranted to use it or not.

95 E10 Suitable Vehicles, 2015



There were 19 million petrol cars estimated to be designed to use E10 on the road in the UK in 2015. Around 1 million cars are estimated to be E10 unsuitable, while 560,000 vehicles are yet to be determined.

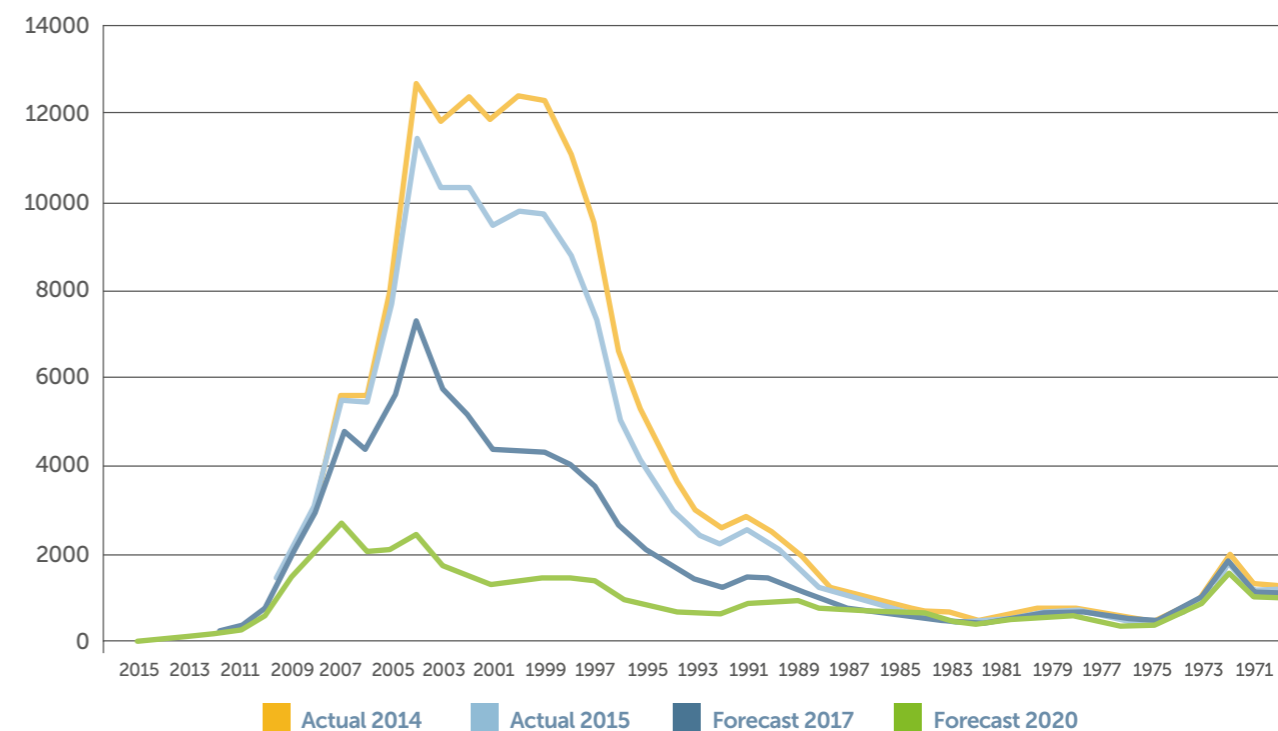
Graph 7: The graph shows the estimated breakdown of the percentage of petrol cars that are suitable to use E10 on the road in 2015.¹⁵

¹⁶ Source: SMMT Car Parc data 2015

There were 1.6 million cars which were unsuitable to use E10 petrol in 2015. This includes a significant number of historic vehicles some of which date back as far as the 1900s. Many of these vintage and cherished vehicles will be lovingly maintained, but rarely used on the road. This will also include many vehicles which are not suitable to use unleaded petrol, let alone E5 or E10 petrol, along with older high-polluting cars that were built to comply with very early emission standards, and are still in regular use, although now coming to the end of their economic life. These vehicles will be an important source of NOx emission affecting air quality in the UK today.

Forecasts of the number of unsuitable high-polluting cars which will be in use in 2017 and 2020 have been produced to assess the size of the problem in the timeframe that E10 could be introduced, based on the age profile of the fleet in 2015.

Forecast 95 E10 Unsuitable Cars
By year of first registration



Graph 8: Actual and forecast surviving E10 unsuitable vehicles by year of first registration.
Source: SMMT and LowCVP

In 2014 there were 1.8 million E10 unsuitable cars in use (including 600,000 cars for which E10 suitability is unknown), accounting for 9% of petrol cars. This number reduced to 1.6 million by 2015, and will have more than halved by 2018 to 854,000 and will have further reduced to 600,000 by 2020, a third on the current number.

E10 unsuitable cars in 2020 by age	Cars
Less than 20 years old	189,000
20-29 years old	107,000
30-39 years old	70,000
40 years old or more	234,000
Total E10 unsuitable cars in 2020	600,000

However, the E10 unsuitable cars in 2020 will include: 234,000 classic cars which are exempt from VED and 270,000 cars which predate the introduction of unleaded petrol in 1986. There are also 321,000 cars which predate the introduction of Euro 1 emission standards in 1992 and 525,000 cars which predate the introduction of Euro 4 emission standards. If in regular use, these vehicles will be an important source of NOx emissions.

Fuel used by E10 unsuitable cars

Forecasts of the volume of fuel needed to power all the E10 unsuitable cars were produced for 2017 and 2020 based on the forecast of these cars surviving, average mileage of cars by age developed from MOT odometer readings published by DfT and estimates of fuel consumption improvements based on year of first registration.

If 95 E10 had been introduced in 2014, the E10 unsuitable cars would have required 9% of petrol sales (1.5 billion litres). The fuel required to power E10 unsuitable cars will reduce to 3% in 2017 of petrol sales and 1% by 2020.

Even taking account of the existing demand for Super grade petrol, which is approximately 5% of petrol sales, the addition of the fuel required to power all the E10 unsuitable cars in 2014, 2017 and 2020 could be accommodated within the supply constraints of the Super petrol market (15%). This assumes no E10 unsuitable vehicles are already using the Super grade.

The views of motorists

Motorists were surveyed through the AA Populus Motoring Panel (24,739 respondents, September 2015 and January 2016) to understand motorists' views on fuels, the environment, how they would react to the introduction of new fuels and their use of older cars.

Polluter Pays

There was overall support for reducing the environmental impact of motor fuels. More than four-fifths (81%) agree that it is important to reduce dependency on fossil fuels. In addition, the majority (85%) agrees that more environmentally friendly fuels should be widely available. When asked about how more environmental fuels should be encouraged, just over half of respondents (57%) agree the price should reflect environmental performance. While just under two-thirds (60%) would accept a reduction in fuel economy if the fuel was more environmentally friendly.

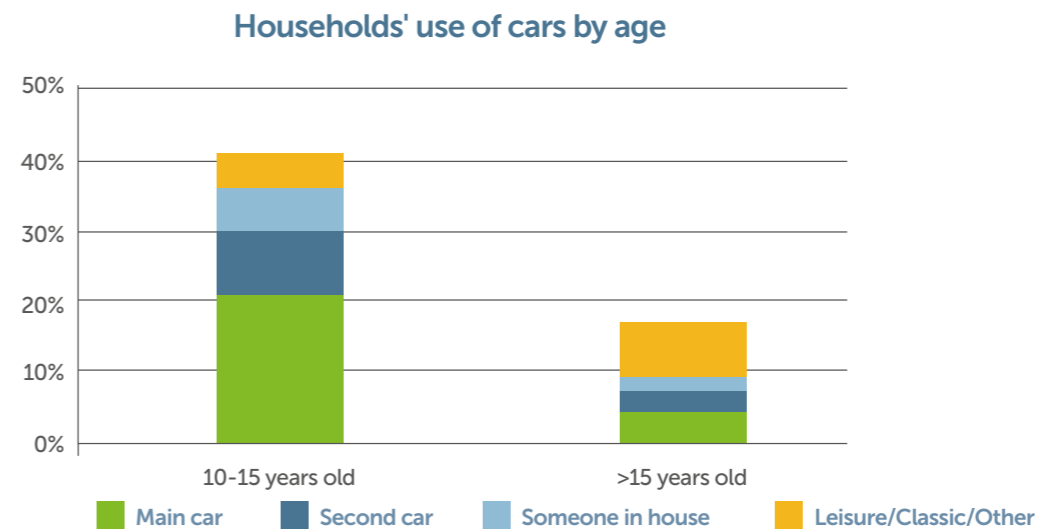
Deploying Environmental Fuel

When asked about how motorists would respond to the introduction of more environmentally friendly fuel, the majority (85%) stated that they would be happy to check their vehicle's compatibility, and use more environmentally friendly fuels if they could. However, a minority (20%) would change supplier rather than check their car's compatibility.

There was concern that those not able to use a new environmentally friendly fuel should be protected. Only a third (33%) agreed that drivers of vehicles that cannot use a more environmentally friendly fuel should have to pay more for 'normal' petrol. While almost all (97%) agree that if a fuel is not suitable for use in all vehicles it must be marked clearly on the pump.

Vehicle Use

Motorists were asked about how petrol cars were used in households as they get older. 9 out of 10 households who own a petrol car between 10 and 15 years old regularly depend on it for transport by someone in the household. Whereas only half of households owning a car over 15 years old rely on it regularly for transport.



Graph 9: How cars are used by households by age. Source: AA Populus Motoring Survey

Ownership of older vehicles by lower income groups reduces with vehicle age. 28% of income groups D and E own a 10-15 year old car, only 7% own a car over 15 years old. While only 3% of households described a car over 15 years old as being one which 'I rely on it every day, it's all I can afford'.

This implies that lower income groups are primarily dependent on used cars less than 15 years old for transport. Older vehicles require significant maintenance to keep them road worthy and so older cars are more likely to be owned by higher income households.

17: Ensuring motorists are well informed and ready to accept E10

The driver for the introduction of 95 E10 is to allow more renewable fuels to be supplied in the UK petrol market, as a result of increasing the RTFO obligation. As such, the E10 Group believes there is a need for Government to explain the rationale for the fuel.

As there will be a proportion of cars in use which will be E10 unsuitable in the timeframe proposed for the deployment of 95 E10 in order to meet the RED target, there will need to be a public information campaign to prepare the market. Experience in other European countries indicates that Government should play a leadership role in such a campaign.

The public information campaign should be developed with the objective of ensuring UK motorists are well informed and prepared for the introduction of 95 E10 ahead of the date of deployment. This should allow a 3-6 month lead-into the deployment date. A media company should be appointed to develop the campaign in sufficient time. The scope and detail of the public information campaign would need to be developed with Government and industry.

In support of the public information campaign the following actions should be taken:
 Firstly, a robust evidence base, which is credible to UK motorists, on the impact on fuel consumption of switching from 95 E5 to 95 E10 should be established. To set this up, a selection of new and older E10 compatible cars should be tested in laboratory and track tests. It is proposed that the media might be invited to participate in this programme to ensure journalists are informed and limit the risk of misinformation.

Secondly, a set of key messages and FAQs should be agreed by Government and stakeholders. This should include key messages regarding the source of bioethanol and other potential biofuels, any risks these fuels might present to the environment and how these are mitigated both now and in the future.

The public information campaign would be designed to act as an umbrella campaign and it would be designed to complement communications by key stakeholders, including: fuel retailers, fuel suppliers, vehicle manufacturers, motoring organisations and potentially NGOs.

The public information campaign and supporting vehicle testing programme should be a collaboration between Government and industry.

Catering for E10 unsuitable cars

While there are still E10 unsuitable vehicles in circulation it will be important to ensure E5 fuel availability. To this end, Government should extend the current legal requirement under the Motor Fuel (Composition and Content) Regulations for a petrol protection grade to mitigate the risk of limited availability of E5 in the eventuality E10 is introduced at a large scale, at least until 2020.

In addition, it is important to ensure motorists are informed at the pump if they need to check the suitability of the fuel for their vehicle. Currently, under the Biofuels (Labelling) Regulations and the BSi E10 fuel standard, the pump is required to be labelled with the wording:

UNLEADED PETROL 95 E10
Not suitable for all vehicles: consult vehicle manufacturer before use
 BS EN 228

Many members of the Group believe this warning raises unnecessary concern rather than providing helpful advice. Therefore, it is proposed that the label wording could be changed to something more informative and useful such as:

UNLEADED PETROL 95 E10
Suitable for all vehicles first registered since 2011: if in doubt consult vehicle manufacturer before use
 BS EN 228

However, the wording should be consistent with the Alternative Fuels Infrastructure Directive which refers to a new CEN standard for vehicle/fuel compatibility labelling which would be based on symbols. The Directive came into force in November 2016 and Member States have 24 months to implement the directive. The implementation of the Alternative Fuels Infrastructure Directive may require a public information campaign which could be combined with the launch of 95 E10.

DfT will need to consult with stakeholders to establish the precise text alongside implementing the requirements of the Alternative Fuels Infrastructure Directive. The wording above is used as an example only.

Checking vehicle suitability

The SMMT and its members have developed a comprehensive list of the vehicles which are or are not suitable to use E10. This list will be made available online.

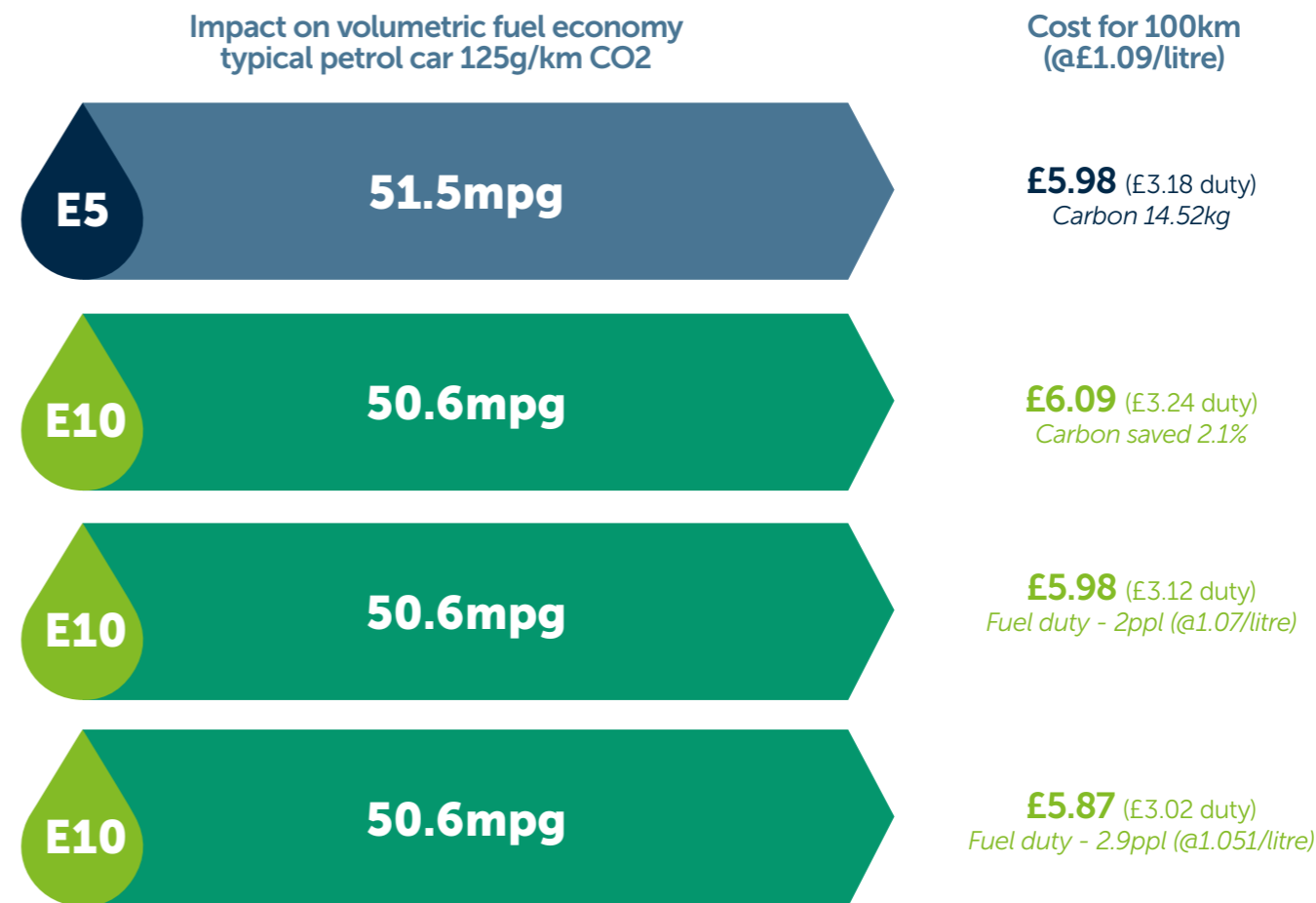
The Motor Cycle Industry Association (MCIA) has provided some guidance on motorbike and scooter suitability for E10. This is clear for the large volume brands but for vehicles from some countries, or for brands with low market share, the information is less clear and the advice would be to contact the manufacturer or use the protection grade.

Owners of other equipment using a petrol engine are advised to contact the manufacturer or to use the protection grade.

Advice should also be provided to consumers on what to do if they fill up with the wrong

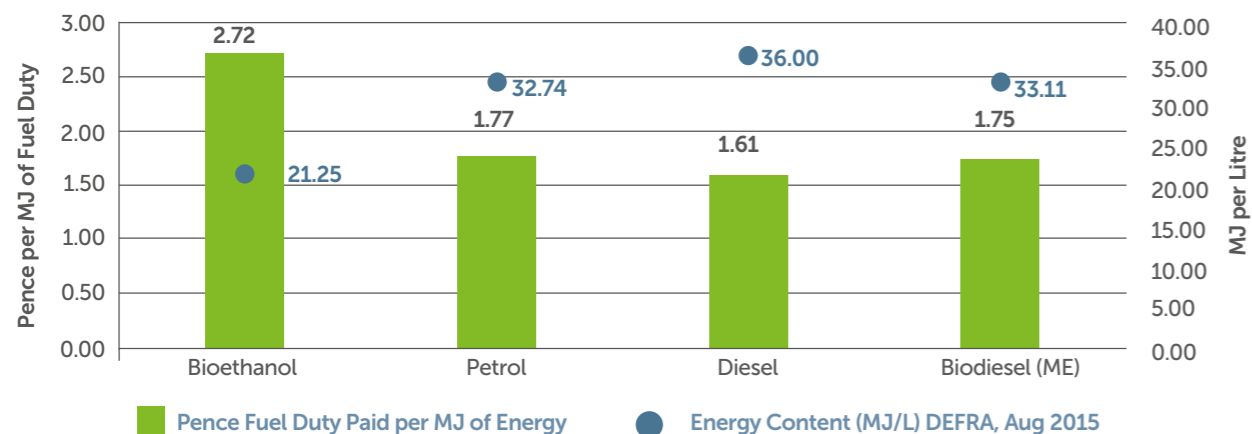
18: Ensuring motorists demand E10 in sufficient volume

Ethanol has a lower energy density than petrol, and as a consequence the volumetric fuel consumption will increase for vehicles using 95 E10 as opposed to 95 E5. Currently fuel duty is levied on a volumetric basis and consequently 95 E10 consumers will pay a greater amount of duty than 95 E5 consumers. It is recommended that consumers should be compensated for the increased fuel consumption. However, if there is both 95 E5 and 95 E10 available it is also recommended there is a financial incentive to switch to the new grade of petrol.



The energy density of petrol is typically 32.74 MJ/l while bioethanol is typically 21.28 MJ/l. As a result, a litre of 95 E10 petrol, blended at 10%, has only 98% of the energy of E5 petrol, which will result in motorists experiencing a marginal increase in volumetric fuel consumption to travel the same distance. As fuel duty is levied at 57.95p/l on all liquid fuels, irrespective of the fuel's energy content, this will cause the cost of motoring to increase in direct line with volumetric fuel consumption, independent of the energy content. The current fuel duty regime provides a strong disincentive against lower carbon fuels with lower energy density and has no reflection of carbon impact. The effective rate of fuel duty on an energy basis is 1.8p/MJ for petrol and 2.7p/MJ for bioethanol, (55% higher), as demonstrated on the next page in Graph 10.

Fuel Duty paid per MJ of energy in 1 litre of fuel (Pence per MJ)



Graph 10: The illustration of how fuel duty taxed equally on a volumetric basis results in the consumer paying more fuel duty per MJ of energy for ethanol compared with petrol.

There are precedents for reducing fuel duty to reflect energy density of the fuel. Fuel duty on natural gas, including biogas, is levied at the rate of 24.70 p/kg, and fuel duty on liquefied petroleum gas is levied at 31.61 p/kg with a commitment in the 2013 Autumn Statement to maintain the differential between the main rate of fuel duty and the rate for road fuel gases for 10 years. In addition, the Government announced in the 2014 Budget that a reduced rate of fuel duty would be applied to aqua methanol of 7.90 p/l. All these fuels are charged at a lower rate of fuel duty, partly on the basis of energy density. Fuel duty on an energy basis for methane, LPG and aqua methanol is 0.45p/MJ, 0.68p/MJ and 0.51p/MJ respectively. This is considerably lower than bioethanol. When a separate fuel duty rate was introduced for biofuels in 2003, it was levied at 27.1p/l, which was then slowly increased to match fuel duty on fossil fuel by 2010.

If motorists are to accept 95 E10 then it will be necessary to compensate them for the lower energy content of the fuel. However, in the absence of a mandated deployment of 95 E10, in order to deliver a rapid take-up of 95 E10 there will need to be a compelling proposition. The fuel duty incentive, once introduced, should remain in place until at least 2020 or while there is still 95 E5 petrol being retailed in the UK.

Administering a fuel duty differential

There are a number of ways of administering the fuel duty differential proposed. The two which have been considered, neither of which has the technical feasibility of the proposal which been discussed in detail with HMRC, are:

Fuel duty based on unblended fuel

In this case petrol and bioethanol would have separate fuel duty rates. Two approaches were considered as the basis for the fuel duty:

Firstly, fuel duty could be levied based on the energy content of the fuel. This would provide a differential in fuel duty between petrol and bioethanol which would be reflected in the cost for the 95 E10 blend compared to 95 E5. However, this would simply compensate for the reduced energy content of 95 E10 and is unlikely to provide a sufficient incentive to drive demand for 95 E10. It would increase the number of fuels with separate fuel duty rates, and would inflict an increased administrative burden.

Secondly, fuel duty could be levied on fuels based on the proportion of non-renewable GHG emissions from the fuel. Petrol would bear the existing level of fuel duty, while bioethanol, and other renewable fuels would receive a relatively reduced fuel duty rate. This could be linked to fuels receiving a Renewable Transport Fuel Certificate (RTFC) which would be eligible for a lower fuel duty. This could extend to an exemption from fuel duty, which would provide a differential of up to 3ppl between 95 E5 and 95 E10. This would more than compensate for the reduction in energy content of 95 E10. Whether all renewable fuels receiving an RTFC would attract the same or different fuel duty rates would need to be considered in order to avoid complexity and unintended consequences.

Both these approaches would result in the fuel duty paid being directly in proportion to the fossil and biofuel in the blend sold. However, this will vary with the blend and will undermine a direct relationship between the pump price and the fuel duty of the constituent fuels. (As legally E10 can contain between 0% to 10% ethanol).

Fuel duty based on Blend

Alternatively, fuel duty could be levied on the fuel blend, with 95 E10 and 95 E5 having separate fuel duty rates. In practice this could be achieved by continuing to levy fuel duty uniformly across fossil and renewable fuels but provide a rebate based on the volume of 95 E10 sold. The rebate would need to be reclaimed by the retailer from the supplier and back up the supply chain to the duty point where it would be off-set against the next period's payment to HMT. This would require an additional process, which would have to be considered to ensure it was not onerous, was robust and was acceptable to HMRC.

This could add considerable additional administrative burden but could be implemented to supplement the existing fuel duty arrangements. It would also provide a mechanism to deliver a compelling incentive and ensure a fuel duty differential is reflected in pump prices. This would be operated in a similar method to the Rural Fuel Duty Rebate scheme.

This last option provides greater ability to vary the differential in fuel duty between 95 E10 and E5, which fits better with existing fuel duty collection but will impose an administrative burden. However, there are state aid issues which HMRC would need to resolve, which may not be practical in the timeframe envisaged to deploy 95 E10 petrol.

Both the approaches raise issues as to how 95 E10 is defined and would need to be carefully considered by HMRC and industry to ensure there were no unintended consequences. The treatment of bioethanol for duty purposes may have implications for where and how it is handled, particularly at terminals. The Group strongly recommends that there is early engagement with HMRC to ensure a workable method of accounting is put in place as early as possible.



Low Carbon Vehicle Partnership,
3 Birdcage Walk, London SW1H 9JJ

Tel: +44 (0)20 7304 6880

www.lowcvp.org.uk

 @TheLowCVP