Title: ***Motor Fuel Composition and Content Regulations – Extension of petrol protection grade requirement***	**Impact Assessment (IA)**
IA No: DfT00225	**Date:** 30/10/2013
Lead department or agency: DfT	**Stage:** final
	Source of intervention: EU
Other departments or agencies:	**Type of measure:** Primary legislation
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Summary: Intervention and Options

RPC: AMBER

Cost of Preferred (or more likely) Option				
Total Net Present Value	**Business Net Present Value**	**Net cost to business per year** (EANCB on 2009 prices)	**In scope of One-In, One-Out?**	**Measure qualifies as**
£0m	£0m	£0m	Yes	Zero Net Cost

What is the problem under consideration? Why is government intervention necessary?

In March 2013 a revised petrol standard (EN228) was introduced which allows retailers to sell petrol containing up to 10% ethanol by volume (E10). An estimated 2.5 million vehicles may not be compatible with E10 (12% of petrol car fleet). Fuel suppliers have indicated they don't plan to introduce E10 on a large scale in the foreseeable future and E5 (containing up to 5% ethanol by volume) is expected to remain widely available. However, as the introduction of E10 is a commercial decision, there is a risk that E5 'protection grade' fuel could disappear from petrol stations forcing owners of incompatible vehicles either to pay for an engine conversion or risk damage to their vehicle. Currently, there is a legislative provision for the supply of 'protection grade' fuel which expires at the end of 2013. This impact assessment looks at extending this provision to until the end of 2016.

What are the policy objectives and the intended effects?

The policy objective is to mitigate risk of limited availability of an E5 petrol grade should higher blends of ethanol (i.e. E10) be introduced at a larger scale in the immediate future. This would minimise costs for older non-compatible vehicles by saving them conversion costs. By extending the current legal requirement for a protection grade beyond 2013 the Government will limit risks (i.e. damage to incompatible vehicles) and minimise consumer costs (i.e. vehicle conversion costs).

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option 0 – Do Nothing: Let the existing legislative provision for a petrol protection grade expire at end 2013.
Option 1 – Legislative: Amend the Motor Fuel (Composition and Content) Regulations 1999 – requiring the ethanol content of super unleaded petrol sold at larger filling stations to be no more than 5% by volume (E5) – in order to extend the end date from 31st December 2013 to 31st December 2016.

Option 1 is recommended as it minimises risks and costs to consumer whilst imposing small or zero burdens on industry

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 01/2017

Does implementation go beyond minimum EU requirements?			yes		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	**Micro** Yes	**< 20** Yes	**Small** Yes	**Medium** Yes	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)			**Traded:** 0	**Non-traded:** not known	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: Baroness Kramer Date: 01/11/2013

Summary: Analysis & Evidence

Policy Option 1

Amend the Motor Fuel (Composition and Content) Regulations 1999 – requiring the ethanol content of super unleaded petrol sold at larger filling stations to be no more than 5% by volume (E5) – in order to extend the end date from 31st December 2013 to 31st December 2016.

FULL ECONOMIC ASSESSMENT

Price Base Year 2012	PV Base Year 2013	Time Period Years 3	Net Benefit (Present Value (PV)) (£m)		
			Low: n/a	**High:** .350	**Best Estimate:** 0

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	n/a		n/a	**n/a**
High			1.1	**3.1**
Best Estimate	0		0	**0**

Description and scale of key monetised costs by 'main affected groups'

Under the central scenario E5 'protection grade' fuel continues to be widely available and the regulation (which requires certain retailers to supply a protection grade) does not bind: no costs would be incurred.

If the regulation binds from 2014 (high scenario), there will be minor changes to the cost of supplying renewable transport fuel (as required by the Renewable Transport Fuel Obligation). These are likely to be passed through to petrol and diesel motorists which could cost £3.1m over a 3 year appraisal period.

Other key non-monetised costs by 'main affected groups'

If the regulation caused a change in the balance of biofuels supplied between petrol and diesel this might have minor impact on CO_2, ILUC and food prices. If waste biodiesel substitutes for crop ethanol, this might represent a cost saving. However, if crop biodiesel substitutes for crop ethanol costs may be incurred.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	n/a		n/a	**n/a**
High	365	2014	0	**353**
Best Estimate	0		0	**0**

Description and scale of key monetised benefits by 'main affected groups'

The central estimate is that the regulation does not bind: there are no monetised benefits.
If the regulation does bind, there would be large savings to owners of non-E10 compatible petrol vehicles. The cost of conversion for vehicles can be considered an upper estimate of the saving (because owners of these vehicles would likely seek out cheaper options than conversion). If 730,000 conversions of non-compatible cars are avoided, saving £500 each, the total cost saving would be £365m in 2014.

Other key non-monetised benefits by 'main affected groups'

There would be benefits in terms of confidence that operators of vehicles not compatible with E10 would be able to continue to use their vehicles until at least 2016 (even if the regulation doesn't bind).

Key assumptions/sensitivities/risks **Discount rate (%)** 3.5%

The central assumption is that there are no costs or benefits, as fuel suppliers are expected to continue to supply a super E5 grade in response to market demand (the regulation does not bind).
The scenario where the regulation binds are shown, but we expect this would be highly improbable, especially across the whole country.

BUSINESS ASSESSMENT (Option 1)

Costs: 0	Benefits: 0	Net: 0	Yes	Zero net cost

Evidence Base (for summary sheets)

Introduction

This Impact Assessment focuses on the possible extension of the current legal requirement for a petrol protection grade contained in the Motor Fuel Composition and Content regulations 1999 (as amended) which expires at the end of 2013.

The regulatory option is considered against a 'do nothing' baseline. For the purpose of the analysis the baseline comprises three possible scenarios relating to the availability of an E5 petrol grade in absence of a legal requirement. Informal discussions with UK fuel suppliers indicate that the most likely scenario is for the continued availability of E5 with the possible gradual introduction of E10 for some suppliers. Costs and benefits assessed against the most likely scenario will give our best estimate of the policy impact. Costs and benefits for alternative less likely scenarios are also explored to provide for a high cost estimate.

Firstly the IA explains the legislative context for biofuels, the E10 blend and vehicle compatibility estimates. It follows a description of the problem under consideration and the rationale for intervention. The policy option is explored in more detail with an analysis of costs and benefits against the baseline. Detailed methodology and specific impacts are contained in the annexes. The IA concludes summarising costs and benefits of the proposed option and outlining the case for the preferred approach.

Consultation

An earlier version of this impact assessment was published during the public consultation on this policy measure. The following comments were received (and comments/amendments which have been made to the impact assessment are shown alongside)

issue 1	The analysis of vehicle compatibility and costs does not include motorbikes.
response 1	We have been unable to find information on motorcycle compatibility and costs. This has been acknowledged qualitatively in the impact assessment.
issue 2	The impact assessment assumes that ethanol displaced by this policy will be replaced with waste-derived biodiesel rather than crop-derived biodiesel.
response 2	A sensitivity looking at the case where crop biodiesel is used in place of waste biodiesel is explored in annex D.
issue 3	Numbers of classic/vintage cars in the fleet have been underestimated.
response 3	We acknowledge that there is uncertainty around the number of pre-1980 vehicles in this fleet. Changing the assumption on the number of these vehicles makes no difference to the net benefit estimated in the central scenario presented in this impact assessment (as 'protection grade' petrol is assumed to be available to owners of pre-1980 vehicles) and little difference to the net benefit in the high scenario (as the proposed policy only guarantees the supply of 'protection grade' petrol until 2016) meaning that any conversion costs for these vehicles would only be delayed for up to 3 years rather than avoided.
issue 4	It may not be possible to convert pre-1939 cars to become E10 compatible.
response 4	This possibility has been acknowledged in the text. It has not been possible to quantify this potential impact due to a lack of evidence.
issue 5	Owners of older cars may choose not to pay £X to £Y to convert their cars to become E10 compatible and may instead choose to use E10 and deal with any potential

	consequences (e.g. engine damage and loss of re-sale value).
response 5	This possibility has been acknowledged in the text. It has not been possible to quantify this potential impact due to a lack of evidence.
issue 6	Restricting fuel suppliers' freedom to supply the grades of petroleum which they want to may increase costs through the supply chain.
response 6	This has been acknowledged in the next. It has not been possible to quantify this potential impact due to a lack of evidence.

Background

RTFO targets/biofuel mandates

Directive 2009/28/EC requires 10% of energy used in transport to be from renewable sources by 2020. Biofuels will contribute significantly to meeting this transport target, particularly in the period till 2020, as other options are limited due to lead in time for technological and market development. The UK currently incentivises the supply of renewable energy through the Renewable Transport Fuel Obligation (RTFO) which sets target for increasing the amount of biofuel usage in transport. Currently the RTFO mandate is set at 4.75% per volume of total fuel supplied. This can be met either by blending bioethanol in petrol or biodiesel in diesel. Alternatively, obligated suppliers also have the option to pay a buy-out price per litre of obligation or purchasing Renewable Transport Fuel Certificates.

What is E10?

E10 is a blend of up to 10% bioethanol with at least 90% petrol. Petrol currently marketed in the UK contains up to 5% bioethanol (E5). In March 2013 the standard for petrol (EN 228) was approved by the British Standard Institution (BSI); this means that UK fuel suppliers can start to supply blends with up to 10% ethanol should they choose so. E10 is already readily available in some Member States, including France, Finland and Germany. The new petrol grade has been introduced successfully in Finland and France. However, in Germany a lack of adequate consumer information and misleading media coverage led to confusion and a negative reaction from motorists.

Most petrol stations in the UK offer two petrol grades: the standard grade (with 95% of sales) is premium (or 95RON[1]) unleaded and a 'super unleaded' product of at least 97RON. If suppliers chose to supply E10 it is likely they would do this as part of their regular offering (i.e. in premium unleaded) and maintain lower ethanol blends in their more expensive 'super' product. Additional detail on petrol grades is in Annex C.

Vehicle compatibility estimates

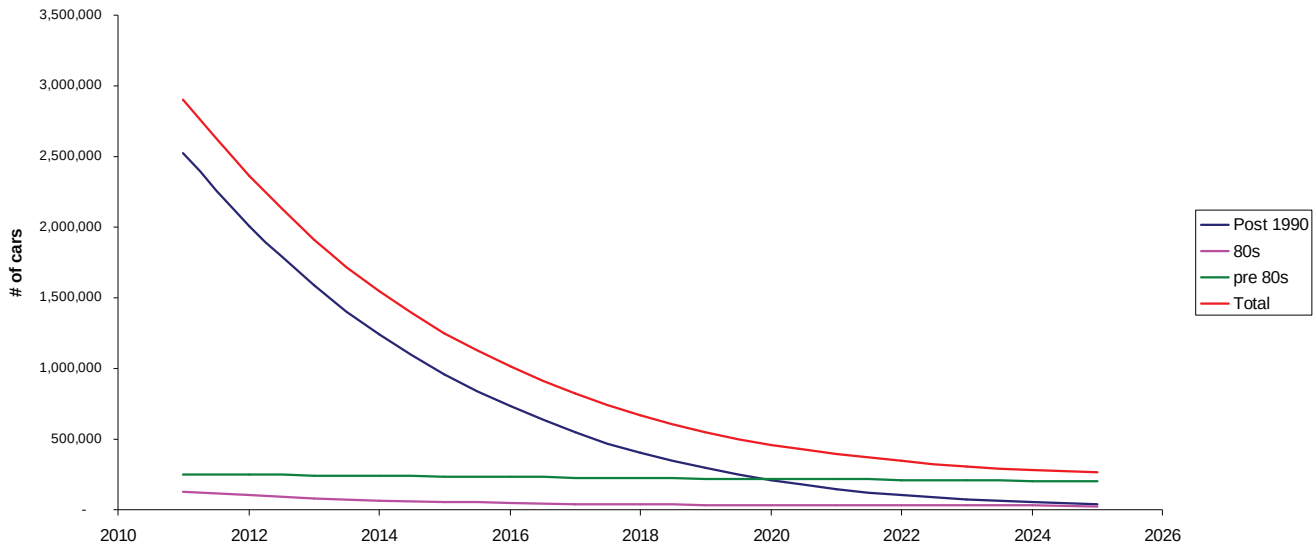
Estimates by the Society of Motor Manufacturers and Traders (SMMT) for 2012 show 88% of petrol cars are confirmed E10 compatible. 12%, 2.5 million cars, were classified non-compatible (of which 1.6 million are known to be non-compatible and 900,000 of unknown compatibility). This estimate of incompatible vehicles does not include motorcycles (for which it has not been possible to acquire compatibility data).

The non-compatible car fleet is eight years older on average than the compatible car fleet. Many of these older cars are not used primarily for transport and could instead be considered as 'collectible' classic cars – for example, cars produced before 1980 travel less than 3,000 miles per year on average (estimated to be around 244,000[2] in 2013). Newer non-compatible vehicles are more likely to be in use as a main form of transport, and these cars are more likely to belong to motorists with lower incomes. We have estimated that the number of newer non-compatible cars will decline and by 2020 amount to less than 250,000 (see chart 1 below).

[1] RON (Research Octane Number) is a measure of fuel performance, with some manufacturers recommending the use of high-RON fuel for particular models.

[2] This figure is based upon data supplied by the Society of Motor Manufacturers and Traders. This figure was contested during the public consultation. See Consultation section on p.3

Chart 1. Initial analysis on rate of decline of non-compatible cars shows that post 2020 the majority of non-compatible cars are likely to be classic cars (produced before 1980).



Note. Based on 2011 data. More detail is in table 1 in Annex A

Similarly, as vehicle mileage declines by age, the demand for E5 as protection grade will also decline and at a faster rate. For example, we have estimated that by 2015 the E5 fuel required for older non-compatible vehicles would be less than 1 billion litres per year (see chart 2 in Annex A) which represents around 5% of the total petrol supplied.

Problem under consideration

Some fuel suppliers have indicated that they may start supplying E10 in UK forecourts this year. There is no certainty about timing and locations of introduction which depend on individual suppliers' commercial considerations and market developments.

Newer vehicles are compatible with E10 blends, but a significant number of older petrol vehicles are only compatible with blends up to E5.

From informal discussions with fuel suppliers we expect that E5 sales will remain widely available in the immediate future: retailers are unlikely to see it as commercially sensible to be unable to serve a still significant share of the fleet. It is more likely a gradual introduction by some suppliers in the period 2013-2016 with possible increasing uptake of the new petrol grade in the period 2016-2020. Therefore this IA considers how the proposed option can mitigate the high cost, low risk scenario.

There would be a number of impacts if E10 becomes the main petrol grade while many drivers are still using non-E10 compatible cars. In particular older vehicle owners will have to use more expensive super unleaded fuel as this would function as protection grade once E10 is introduced (see details on vehicle compatibility section).

The current legal requirement for super unleaded to be supplied as a protection grade (i.e. with maximum ethanol content of 5%) will expire in 2013. This requirement currently only holds for retailers who choose to sell super unleaded fuel, and where total fuel sales exceed 3 million litres per annum.

Government intervention aims to make a legal requirement for the protection grade to be supplied beyond 2013, to ensure continued supply of an E5 petrol blend for the benefit of non-compatible vehicle owners, whilst minimising the burden to Industry.

Rationale for intervention

Fuel suppliers are obligated to meet biofuel targets under the RTFO and will seek to do so in the cheapest way possible. At present, fuel suppliers choose to meet this obligation through supplying petrol containing up to 5% ethanol by volume (E5) and biodiesel containing up to 7% biodiesel by volume (B7). However, this situation could change and fuel suppliers may choose to supply petrol containing up to 10% ethanol by volume (E10). The incentive to supply E10 is expected to increase in future years as we approach the 2020 deadline for achieving the 10% transport sector renewable energy target required by the Renewable Energy Directive.

As higher biofuel blends are introduced this may cause problems to motorists with older non-compatible cars. Government intervention could minimise risks and consumer costs by ensuring that a petrol protection grade, i.e. with up to 5% bioethanol content, remains widely available until the car fleet is upgraded and virtually E10 compatible (there will always be the exception of 'classic' cars which are kept as collectible and not used as main mean of transport).

Policy objective

The primary policy objective is to minimise costs for older vehicle owners and ensure consumer protection by a continued availability of an E5 petrol protection grade.

An additional policy objective is to signal Government pro-active approach in ensuring consumer protection with the aim of mitigating the risk of negative reaction by consumers following the introduction of E10.

It is important that the policy, whilst it ensures the continued availability of the protection grade for older vehicles, also minimises costs to industry and does not prevent fuel suppliers from introducing the new petrol grade should they choose so to maintain market competitiveness.

Description of option

Currently the legal requirement to provide E5 as protection grade until the end of 2013 is contained in the Motor Fuel (composition and content) Regulations as amended (2010). This applies for retailers where the following two criteria are met:

a) filling stations where the total amount of petrol and diesel fuel sold is at least 3 million litres (annual)
b) filling stations choosing to supply super unleaded (RON 97 or above) in their range of petrol grades

Should both of these criteria be met, the filling station is required to supply the super grade with no more than 5% bioethanol content.

We consider a legislative option for changing the current legal requirement: extending it beyond 2013 to the end of 2016 (i.e. three more years).

This option is assessed against a baseline 'do nothing' option which consists in not making any changes in the existing legislation and let the legal requirement for the protection grade end in 2013.

As this option is not expected to change behaviours in the central scenario (i.e. E5 'protection grade' fuel will be supplied irrespective of legislation), there are no estimated costs to business associated with this measure.

One in Two Out

The existing requirement in the Motor Fuel Regulations implements the Directive 2009/30/EC, the Fuel Quality Directive. Article 1(3) of the Directive states:

"Member States shall require suppliers to ensure the placing on the market of petrol with a maximum oxygen content of 2.7 % and a maximum ethanol content of 5 % until 2013 and may require the placing on the market of such petrol for a longer period if they consider it necessary."

Although the proposed amendment is within the discretion allowed by the EU Directive (i.e. there is no explicit requirement to retain a 'protection grade' fuel stream beyond 2013 in the EU Directive), as it goes beyond the minimum requirement, it falls within the One In Two Out scope.

The proposed policy is a zero net cost measure because there is no or very small impact on business. As illustrated in detail in the cost-benefit section, under the central scenario E5 'protection grade' fuel continues to be widely available and the regulation (which requires certain retailers to supply a protection grade) does not bind, therefore no costs would be incurred.

If E10 is introduced at a large scale and the regulation binds from 2014 (high scenario), there will be minor changes to the cost of supplying renewable transport fuel (as required by the Renewable Transport Fuel Obligation). These are likely to be passed through to petrol and diesel motorists which could cost £3.1m over a 3 year appraisal period.

Review date

The proposed extension of the protection grade will expire in January 2017. This date provides a natural review date of the policy.

Costs and benefits

Central Estimate

The most likely counterfactual is that fuel retailers will continue supplying super unleaded with ethanol content below 5%, even in absence of a legal requirement. In this case, the regulation would impose no cost on industry and provide minimal benefit to consumers. The main non-monetisable benefit to drivers of non-E10 compatible vehicles would be providing certainty that they can continue to use their vehicles until at least the end of 2016.

High Cost Scenario

In the unlikely event that fuel retailers wish to introduce E10 across both premium and super unleaded streams, the regulation would be binding. There would be minor changes in fuel costs for all motorists as retailers adjusted the biofuel mix in both petrol and diesel retail streams – depending on the cost differentials for different biofuels, this may reduce or increase fuel costs. There would also be significant benefits for non-E10 compatible vehicle owners. We present the high cost scenario based on central price projections as the 'high' estimate in the summary sheets above as the intention is that this scenario represents an extreme scenario for how retailers will behave which drives high costs. We also show sensitivities around this scenario based on alternative fuel prices.

<u>Impact on E10 compatible petrol vehicles and diesel</u>

Super unleaded makes up a low share of all petrol sales, so reducing the ethanol blend in super unleaded would have only a small impact on overall blending rates. This would reduce the overall volume of ethanol supplied and increase the volume of biodiesel required to meet the RTFO. Motorists would also experience minor differences in the volumes of fuel consumed associated with different blends, affecting how much fuel duty they would have to pay.

For 2014, we estimate that less than 1bn litres of super unleaded would be supplied (around a 5% market share). This estimate is based upon historical supply trends. However, if the ethanol content in premium unleaded were increased, whilst being held constant in super unleaded, more drivers might choose to fill up with super unleaded. Some of these vehicles will be non-E10 compatible, but some drivers of compatible vehicles might also choose to purchase super unleaded in this situation.

We must make an assumption about the market share for super unleaded if premium unleaded E5 were replaced with premium unleaded E10, we assume an increase to a 20% market share. This assumption is

based on experiences in other Member States where E10 has been introduced. We also assume that if the regulation binds, the ethanol content in super unleaded must be reduced by at most 5% overall (e.g. from 9% to 4%[3]). We assume no impact on the choice of fuels: so hold the energy required to power petrol vehicles and the energy required to power diesel vehicles constant.

For 2014, a 5% reduction in ethanol content in super unleaded (assuming a 20% market share) would reduce ethanol consumption by 176m litres and increase biodiesel by 86m litres (assuming waste biodiesel is used to offset the reduction[4]) in order to meet the biofuel supply target set by the Renewable Transport Fuel Obligation (RTFO). In order to offset the changes in biofuel supply volumes, petrol volumes would increase by 113m litres and fossil diesel volumes would fall by 79m litres.

Fuel volumes would fall by 55m litres overall because low energy density ethanol is displaced in the fuel mix by higher energy density fuels (e.g. biodiesel, petrol) meaning that a lower volume of fuel is required to meet the energy demand.
We estimate the cost and benefits of this high cost scenario based on central fuel prices, using DfT's fuel price model. We also demonstrate three other scenarios for fuel prices. As well as the central projection, we show the impact on costs with a high and low oil price scenario, and if prices remained similar to 2012 levels.

For 2014, our central fuel price projection is that petrol and diesel would cost 55ppl (pence per litre) and 62ppl respectively, and bioethanol and biodiesel 44ppl and 75ppl. We multiply these unit costs through by the change in volume of each fuel type supplied and sum the impacts for each fuel stream in order to estimate the net central cost impact (across all fuel streams) of this legislative change. The overall cost would increase by £1.3m under the central scenario which reflects the net impact of a £14.7million fall in petrol/ethanol blend costs being offset by a £16.1m increase diesel/biodiesel blend costs (see table 1).

The low and high sensitivities show what happens if the ethanol price is relatively low and high (this is used as a proxy for shifting relative fuel prices to create a range of potential outcomes). When the ethanol price is relatively high, restricting the supply of E10 leads to a £34.2m fall in the cost of the petrol/ethanol blend and the total cost of supplying fuel falls by £18.1m. When the ethanol price is relatively low, restricting the supply of E10 leads to a £4.7m increase in the cost of the petrol/ethanol blend and the total cost of supplying fuel increases by £20.7m.

For 2015 and 2016 the central costs would be of similar magnitudes to 2014: this equates to an average annual cost of £1.1m per year, or £3.1m in present value terms (central cost scenario).

Table1– Costs of adjusting biofuel blends £m (2012 prices)

	2014	**2015**	**2016**
Central			
Petrol Cost	-14.7	-13.4	-11.7
Diesel Cost	16.1	14.4	12.8
Total Central	1.3	0.9	1.1
Low			
Petrol Cost	4.7	5.1	5.9
Diesel Cost	16.1	14.4	12.8
Total Low	20.7	19.5	18.8
High			
Petrol Cost	-34.2	-32.0	-29.4
Diesel Cost	16.1	14.4	12.8
Total High	-18.1	-17.6	-16.5
Current prices			

[3] We use 9% as the baseline for our calculations rather than 10% as fuel suppliers may not always be able to (or prefer to) maximise ethanol supply. The results are not sensitive to changing the baseline to 10%.

[4] The assumption that waste biodiesel (as opposed to crop biodiesel) would be used to offset the reduction in bioethanol supply was contested during the public consultation on this policy measure. A sensitivity where crop biodiesel is used instead of waste biodiesel is presented in annex D.

Petrol Cost	-37.3	-35.8	-34.4
Diesel Cost	23.7	22.7	21.8
Total Current	-13.7	-13.1	-12.6

Impact on business

Apart from the impacts identified in the cost/benefit analysis (which are assumed to be passed through from fuel suppliers to fuel consumers), it is considered that there will not be any significant impact on business. In the unlikely scenario that some fuel suppliers did want to introduce higher blends of ethanol both in the premium and super grade and were prevented from doing so as a result of this legislative change there could be some loss of profit from this restricted opportunity.

In the high scenario E10 would be introduced at a large scale and would involve advertising and consumer communication costs. However, these costs would derive from the suppliers' decision to introduce E10 rather than be incurred because of the legislative requirement for the protection grade.

Costs to non-E10 compatible drivers

One possibility is that certain retailers continue to sell petrol containing no biofuels as a niche product. This would likely be more expensive than the major road fuels. A more significant cost of using a non-E10 compatible vehicle in such a scenario would be the costs of travel to and from such a retailer. We do not seek to estimate the cost impact of this on non-E10 compatible vehicle owners as there is no information available to do so (and we expect protection grade to remain widely available over the period 2014 to 2017).

Another possible reaction is that non-compatible vehicles are converted to ensure E10 compatibility. Many non-compatible cars are expected to be worth very little, so may be scrapped rather than upgraded, so this provides a conservatively high estimate of the potential cost impact. Internal estimates of the cost of upgrades are a range of £220 to £1250, with a central estimate of £500 per vehicle (see Annex B).

A policy to extend the protection grade until the end of 2016 will not mean that all conversions can be avoided: if petrol with ethanol content below 5% is unavailable beyond 2016, some conversion costs (or the costs of whatever other action non-E10 compatible vehicle owners take) will still be incurred. For 2014, we estimate that there will be 730,000 non-compatible cars that would have left the fleet by 2017. If a cost is incurred for all these vehicles, the central estimate for the cost of upgrading that number of cars would be £365m (£353m in 2013 present value terms), within the range £161m-913m. As the fleet declines between 2014 and 2016, the number of affected vehicles would decline, so the central cost would fall to £216m if conversion was required to non-compatible vehicles in 2015 and £96m if this occurred in 2016. It should be noted, however, that owners of older vehicles may choose not to convert their cars to become E10 compatible and may instead choose to use E10 and deal with any potential consequences (e.g. engine damage and loss of re-sale value). It has not been possible to capture this potential eventuality in the cost-benefit modelling due to a lack of evidence.

Table 2 – Benefit of avoided vehicle compatibility conversions £m (2012 prices)

	2014	2015	2016
Central	365	*216*	*96*
Low	161	*95*	*42*
High	913	*541*	*241*

Note that these would be one-off transitional costs if we assume all vehicles are converted in any given year there will be no need to make further conversions in later years

Although these are perhaps high estimates of the benefits, they are orders of magnitude above the potential scale of the cost (and given fluctuations in prices, it is not clear that lower ethanol blending would impose costs on motorists).

If fuel retailers intended to roll-out E10 across both super and premium unleaded from 2014, the net present value (in 2012 prices and 2013 values), by year would be:

Table 3 – Present Value of Costs, Benefits and Net Present Value by year £m (2012 prices, 2013 values

		2014	2015	2016	Total
PVC	**Central**	**1**	**1**	**1**	**3.1**
	Low	-4	-4	-4	-11.2
	High	4	4	4	11.9
	Current	-13	-12	-11	-36.8
PVB	**Central**	**353**			**353**
	Low	155			155
	High	882			882
NPV	**Central**	**352**	**-1**	**-1**	**350**
	Low	159	4	4	166
	High	878	-4	-4	870

Non-Monetised Costs and Benefits

Under the high scenario, the regulation would change the balance of biofuels supplied. The regulation would reduce the volume of ethanol consumed and increase the volume of biodiesel required. The source of the biodiesel will determine whether the policy drives a CO_2 saving or a CO_2 cost, as ethanol is less carbon intensive than crop-derived biodiesel, but more carbon intensive than biodiesel produced from waste. If biodiesel derived from waste is used, there would be CO_2 savings; if more crop-derived biodiesel is used the regulation might be expected to increase carbon emissions.

Changing the balance of biofuels might also impact on Indirect Land Use Change (ILUC) and food prices.

Given the relatively small changes in biofuel volumes and the uncertainty in the direction of change, we do not estimate these impacts or seek to monetise them.

Restricting fuel suppliers' freedom to supply the grades of petroleum which they want to may increase costs through the supply chain.

Impact on small businesses

The regulation will apply to all filling stations having sales of both petrol and diesel above 3million litres annually. We do not have detailed data on the size of businesses to which the regulation would apply. There might be a possibility of some filling stations falling within the definition of micro or small business. In the central estimate there would be no impact on industry. In the high cost scenario, benefits would outweigh costs.

Impact on equalities

We have considered the impact of the proposed measure on equalities. We do not find that the proposed extension would have a disproportionate effect on any particular group.

Annex A: Vehicle compatibility estimates

Assumptions around the non-compatible car fleet in 2011: The Society for Motor Manufacturers and Traders (SMMT) produced a database of cars in use in 2011 which considers their compatibility with E10. This database was based on the DVLA vehicle database, with information from vehicle manufacturers used to categorise petrol cars as either compatible, incompatible or of unknown compatibility. The approach is conservative: unless a particular variant of car is certainly compatible, it was not treated as compatible. For the purposes of this impact assessment, we treat non-compatible and of unknown compatibility the same, since the advice to motorists for both categories would be the same (not to use E10).

That data (2011 car fleet) showed just over 2.9million cars as being non-compatible (i.e. either confirmed as non-compatible, or of unknown compatibility). Around 1.7million of these cars were produced before the year 2000 (300,000 in 1985 or earlier), with 1.2million produced since 2001, and only around 50,000 since 2008.

In order to assess the impacts on users of those cars, we need to produce projections of how many of those cars will remain in use in the coming years. The 'scrappage rate' refers to the proportion of cars of a given vintage being removed from the fleet in a given year, while the 'survival rate' refers to those cars remaining on the road.

DfT has standard assumptions about the rate at which cars are scrapped dependent on age. However, this does not account for classic cars, which are less likely to be scrapped. This may be the case because of their value and their limited day-to-day mileage, which might minimise wear and tear and the chance of being involved in accidents.

To produce scrappage rates for the E10 incompatible fleet we categorised cars into three categories by year of production: 1990 or newer, 1980s, or pre 1980. DfT's fleet model was used to estimate the scrappage rate for newer cars, and DVLA statistics were used to provide estimates for the older car categories. The average scrappage rate for cars built in the 1980s was 20% between 2007 and 2011 (i.e. 20% of cars made in the 1980s were scrapped each year). The average scrappage rate per year for cars built before 1980 was less than 2%. We apply these rates by age, not model year, so the 2011 scrappage rate for a car produced in the 1980s would be 20%, but by the 2020s it would decline to below 2%.

This gives the following projection of non-E10 compatible cars by year:

Table 1 - Projected number of non-E10-compatible cars, by category and year

'000s of vehicles	Post 1990	1980s	Pre 1980s
2011	2,524	127	252
2012	2,011	101	248
2013	1,589	82	244
2014	1,243	67	240
2015	961	56	236
2016	733	47	232
2017	550	41	229
2018	406	37	225
2019	294	33	221
2020	211	31	218
2021	149	30	214
2022	104	30	211
2023	74	29	207
2024	53	29	204
2025	39	28	200

We also have access to data from the DVLA MOT database on the average mileage of cars by age. This shows that annual mileages decline with age. For example, cars produced before 1980 averaged less than 3,000 miles per year. Because of this, the average mileage of non-E10 compatible cars is projected to decline from 7,000 miles per year in 2011 to 5,000 miles per year in 2020.

Historic fuel efficiencies are taken from DfT's car fleet model. This includes an assumption of 0.05% annual improvements annually before 1990. Weighting by the size of the non-E10 compatible fleet suggests that fuel efficiency for post 1990 non-E10 compatibles is 36mpg, for 1980s non-compatibles 34mpg and for pre 1980 non-compatibles 33mpg.

This enables us to estimate fuel demand from these vehicles based on the projections. Some of this demand will be for super unleaded, for two reasons. Firstly, some drivers will choose super unleaded because it is the recommended fuel for their car, or because they believe it offers better performance. Secondly, some classic car owners seeking to avoid biofuels may choose super unleaded from certain suppliers who have confirmed that there are no biofuels in their super unleaded.

Table 2 - Total Demand for fuel from non-E10 compatible cars (millions of litres)

	Post 1990	80s	Pre 80s	Total	Total post 80s
2011	2,305	80	102	2,488	2,386
2012	1,781	61	100	1,942	1,842
2013	1,363	47	99	1,508	1,410
2014	1,031	36	97	1,165	1,068
2015	**770**	**29**	**95**	**894**	**799**
2016	567	23	94	684	590
2017	410	19	92	521	429
2018	291	16	91	398	307
2019	203	13	89	306	216
2020	**139**	**12**	**88**	**240**	**152**
2021	94	12	86	193	106
2022	63	12	85	160	75
2023	43	12	84	138	54
2024	29	11	82	123	40
2025	**20**	**11**	**81**	**112**	**32**

Annex B – Conversion Cost Estimates

The Department commissioned research[5] on the potential for compatibility problems with higher ethanol blends. The report identified both the components likely to be at risk and the costs to rectify or replace those components. These were:

- Flexible fuel hoses and seals - degradation (<£50),
- Fuel filters – blocked by debris released by the solvent action of ethanol (<£50),
- Fuel pumps – as per fuel filters and degradation of seals and other flexible components (£100-£300),
- Carburettors – corrosion (£85),
- Fuel injectors – blockage and degradation of seals (£100 each),
- Pressure regulator – as per fuel injectors (£150)
- Fuel tank - constructed of materials that are not resistant to ethanol requiring replacement with one that is (£100 to £300).

No single vehicle will require all of these components to be changed because a vehicle will either have a carburettor or fuel injection, but not both. Many vehicles will probably need only a limited number of the components changed.

The actual cost of modification or repair to a consumer will depend crucially upon the cost of the labour, which might vary between £50 per hour in a non-franchised garage and £100 per hour in a franchised one.

At the least expensive end of the range, a vehicle might need no more than some fuel hoses and seals changed (£100), taking no more than two hours in an independent garage (£100) and so costing about £200 in parts plus labour.

At the other extreme, if the whole vehicle fuel system needed to be upgraded, or the consumer was advised that it did, then the work might take a whole day, leading to a labour cost of between £500 and £1000 (depending upon the hourly rate charged) and a cost for the components of perhaps £650, excluding the fuel tank. This would produce a high estimate of between £1150 assuming a non-franchised garage and £1650 for a franchised garage.
In reality, it is likely that most owners of vehicles of the ages under consideration would take them to non-franchised garages for modification. We have assumed that an average labour cost of £60 per hour will reflect the likely split between the use of franchised and non-franchised garages. On the basis of an average labour cost of £60 per hour, the estimated range of costs would run from £220 to £1250.

5 http://assets.dft.gov.uk/publications/qinetiq-10-02471-assessing-fuel-system-compatability-with-bio-ethanol-and-risk-of-carburettor-icing/bioethanolstudyreport.pdf
Assessing compatibility of fuel systems with bio-ethanol and the risk of carburettor icing. Final Report. QINETIQ/10/02471 29 October 2010

Annex C - Petrol grades

As well as varying the biofuel content of unleaded petrol, retailers also differentiate by providing fuels with different octane ratings. The octane rating measures the extent to which fuel can be compressed before ignition, with some vehicles (particularly high-performance vehicles) requiring fuel to be more highly compressed pre-ignition. The most common type of unleaded petrol currently on sale in the UK has a Research Octane Number (RON) of 95 (known as premium unleaded). Many retailers supply unleaded fuel at 97RON or above, often referred to by brand, but generally termed super unleaded.

This means that there is potential for retailers to supply one or more of the following types of fuel:

i) Premium unleaded, E5 – this is the standard fuel currently supplied (sometimes called regular unleaded) making up around 95% of sales. Drivers of cars designed to use unleaded petrol, apart from some high-performance cars, including non-E10 compatible cars, are able to use this fuel.

ii) Premium unleaded, E10 – which would most likely become the main grade of fuel supplied if E10 is introduced at a large scale. Drivers of most modern cars (apart from some high-performance cars) would be able to use this fuel, but non-E10 compatible cars would not.

iii) Super unleaded, E5 – also currently widely available, making up around 5% of sales. Any unleaded car could use this fuel, including high-performance cars that require high-octane fuel and non-E10 compatible cars. However, as high-octane fuels are more expensive, those motorists driving cars that do not require super unleaded may prefer to use premium unleaded

iv) Super unleaded, E10. Any car that is compatible with E10 could use this, but motorists who do not require high-octane fuels may prefer to use cheaper premium unleaded petrol.

Prior to March 2013, unleaded petrol could be sold containing up to 5% ethanol by volume (E5). Since then, the revised petrol standard (EN228) allows blends containing up to 10% ethanol by volume (E10) and suppliers can choose to market this, if appropriately labelled. Until December 2013, larger fuel retailers (with no less than 3 million litres petrol and diesel sales) who supply unleaded petrol of at least 97RON are obligated to maintain the ethanol blend at 5% or below.

Annex D – Biodiesel Sensitivity

In response to the public consultation on a previous version of this impact assessment, the assumption that increased volumes of waste-derived biodiesel would be supplied in response to a decrease in the supply of ethanol (resulting from the requirement to retain 'protection grade' E5 petrol) was questioned. It was suggested that any enforced decrease in the ethanol might instead be offset by an increase in crop-derived biodiesel instead, as waste feedstocks are likely to be in limited supply. To address this criticism we have carried out the following modelling sensitivity.

Table 1 shows the impact of requiring fuel suppliers to retain a petrol 'protection grade' fuel stream on fuel supply costs under the central scenario where waste-derived biodiesel is supplied in response to a decrease in the ethanol supply. Table 2 shows the impact on fuel supply costs when crop-derived biofuel is supplied. Comparing the tables shows that the cost impact is higher in the scenario where crop-derived biodiesel is supplied. This is because waste-derived biodiesel is counted twice towards the Renewable Transport Fuel Obligation (RTFO) and crop-derived biodiesel is counted only once. Therefore fuel suppliers must supply twice the volume of crop-derived biodiesel (relative to waste-derived biodiesel) in order to offset an RTFO target created by an enforced reduction in ethanol supply created by this proposed legislative change.

It should be noted that these costs only apply in the high scenario. In the central scenario, it is assumed that fuel suppliers will retain an E5 protection grade and the proposed legislative change will have no impact.

Table 1: High Scenario costs when waste-derived biodiesel is supplied (£m, 2012)

	2014	**2015**	**2016**
Central			
Petrol Cost	-14.7	-13.4	-11.7
Diesel Cost	16.1	14.4	12.8
Total Central	1.3	0.9	1.1
Low			
Petrol Cost	4.7	5.1	5.9
Diesel Cost	16.1	14.4	12.8
Total Low	20.7	19.5	18.8
High			
Petrol Cost	-34.2	-32.0	-29.4
Diesel Cost	16.1	14.4	12.8
Total High	-18.1	-17.6	-16.5
Current prices			
Petrol Cost	-37.3	-35.8	-34.4
Diesel Cost	23.7	22.7	21.8
Total Current	-13.7	-13.1	-12.6

Table 2: High Scenario costs when crop-derived biodiesel is supplied (£m, 2012)

	2014	**2015**	**2016**
Central			
Petrol Cost	-14.7	-13.4	-11.7
Diesel Cost	32.1	28.7	25.6
Total Central	17.4	15.3	13.9
Low			
Petrol Cost	4.7	5.1	5.9
Diesel Cost	32.1	28.7	25.6
Total Low	36.8	33.8	31.6
High			
Petrol Cost	-34.2	-32.0	-29.4
Diesel Cost	32.1	28.7	25.6
Total High	-2.1	-3.3	-3.7
Current prices			
Petrol Cost	-37.3	-35.8	-34.4
Diesel Cost	47.3	45.3	43.7
Total Current	10.0	9.6	9.2