

EXPLANATORY MEMORANDUM TO
THE MOTOR FUEL (COMPOSITION AND CONTENT) AND MERCHANT
SHIPPING (PREVENTION OF AIR POLLUTION FROM SHIPS)
(AMENDMENT) REGULATIONS 2010

2010 No 3035

1. This explanatory memorandum has been prepared by the Department for Transport and is laid before Parliament by Command of Her Majesty.

2. Purpose of the instrument

- 2.1. The main purpose of the Regulations is to implement those provisions of EU Directive 98/70/EC as amended by 2009/30/EC (“the Directive”) which tighten or set new limits on fuel parameters which have an environmental impact. The Directive requires that, from 1 January 2011, the maximum permitted sulphur content of gas-oil (“red diesel”) used in Non-Road Mobile Machinery be reduced from a maximum of 1000mg/kg to 10mg/kg (identical to road fuel levels). It also requires a small tightening of the limit on the polycyclic aromatic hydrocarbon content of diesel fuel, introduces limits on manganese additives in fuel and relaxes limits on the maximum permissible quantity of ethanol in petrol. The Regulations also enable the Secretary of State to grant an exemption from the Directive’s requirements for gas oil in certain, exceptional circumstances.

3. Matters of special interest to the Joint Committee on Statutory Instruments

- 3.1. None.

4. Legislative Context

- 4.1. The Directive specifies mandatory quality standards for all petrol and diesel used in road vehicles and for gas oil intended for use in non-road mobile machinery (NRMM) and sold in the EU. The specified quality requirements are designed to deliver air quality benefits directly (e.g. by limiting the benzene content of petrol) or indirectly (e.g. by limiting sulphur content, to enable efficient and durable operation of catalytic emissions control systems). They are also aimed at standardising key operability parameters (e.g. octane rating of petrol and cetane number of diesel) to support a common market for vehicles.
- 4.2. These standards have been implemented into UK law by The Motor Fuel (Composition and Content) Regulations 1999, as amended (Statutory Instruments 1999 No 3107, 2001 No 3896, 2003 No 3078 and 2007 No 1608).
- 4.3. Amending Directive 2009/30/EC includes a number of changes to the fuel quality standards mandated by the previous version of 98/70/EC, as amended, and these will be implemented by the amending Regulations.

- 4.4. The Directive proposal was the subject of Explanatory Memorandum 6145/07 which was considered by the House of Commons European Scrutiny Committee on 14 March 2007 (14th Report, Session 2006/2007, reference 28351). The Committee recommended that the document was of political importance and did not clear it, pending receipt of an Impact Assessment (IA).
- 4.5. The House of Lords Select Committee on the European Union referred the EM to Sub-Committee B following the 1278th sift on 27 February 2007. The Chairman wrote to the Minister on 7 March 2007 requesting further information following the Government's further consideration of the proposal.
- 4.6. A Supplementary EM was submitted to Parliament on 2 August 2007. The SEM was considered by the House of Commons European Scrutiny Committee on 10 October 2007. The Committee recommended that the document was politically important and should be debated in Standing Committee (REPORT 36, SESSION 06/07). The debate took place on 20 November 2007, and cleared the proposal
- 4.7. The House of Lords Select Committee on the European Union referred the SEM to Sub-Committee B at the 1297th sift of 11 September 2007. The Chairman wrote to the Minister on 9 October 2007 requesting further information.
- 4.8. Ministerial letters were sent to the Committee Chairmen on 5 February 2008, 19 November 2008 and 5 January 2009 to keep them informed of developments. The House of Lords Select Committee on the European Union cleared the proposal on 20 January 2009.
- 4.9. In addition to implementing fuel quality elements of Directive 2009/30/EC, the Regulations also enable the Secretary of State to grant an exemption from the Directive's requirements for gas oil. This completes the transposition of Article 7 of the Directive as previously amended.
- 4.10. The Regulations also re-enact the restrictions on the marketing of marine diesel oil and marine gas oil previously set out in the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008 (S.I. 2008/2924) as amended ("the 2008 Regulations") together with the corresponding offences and defence. These provisions have been relocated in the Motor Fuel Regulations to bring all of the statutory requirements in relation to the marketing of fuel for marine operations within a single body of legislation to ensure consistency and clarity.

5. Territorial Extent and Application

- 5.1. This instrument applies to the United Kingdom.

6. European Convention on Human Rights

- 6.1. As the instrument is subject to negative resolution procedure and does not amend primary legislation, no statement is required.

7. Policy background

- *What is being done and why*

- 7.1. Directive 2009/30/EC amends existing EU requirements on the environmental specifications of petrol, diesel, non-road gas oil and, to a lesser extent, other liquid fuels for off-road applications. The Directive introduces a number of different requirements, some relating to the chemical composition and physical properties of fuels, others relating to reducing the lifecycle greenhouse gas emissions associated with production, delivery and use of fuels and ensuring that any biofuels used are produced sustainably.
- 7.2. The Regulations which are the subject of this memorandum relate solely to the transposition of those elements of the Directive on the chemical composition and physical properties of the fuels. These specifications set out the maximum permissible content of particular fuel parameters (e.g. the sulphur content of diesel) and limits on certain properties of the fuel (e.g. the minimum octane rating of petrol). However there are some areas where there is flexibility or where interpretation of the Directive's requirements is required.
- 7.3. The Directive amends the following aspects of fuel specifications:
 - i) The maximum permitted ethanol content of petrol is increased to 10% to reduce barriers to the increased use of bioethanol (as a means of reducing lifecycle greenhouse gas emissions). Corresponding increases are made to the maximum permitted oxygen content of petrol.
 - ii) The maximum permitted polycyclic aromatic hydrocarbon (PAH) content of diesel is tightened to 8% to reduce formation of particulate matter. In practice this has no impact as UK fuel is already well below 8% PAH content.
 - iii) The maximum permissible manganese content of fuel is regulated for the first time in two successive stages. This is intended to prevent emissions of metallic particles.
- 7.4. The UK has no flexibility to derogate from, or disapply these requirements and consequently they are included in the Regulations.
- 7.5. The most significant fuel composition requirement in the Directive is the requirement that from 1st January 2011 gas oil and other liquid fuel sold for use in non-road mobile machinery, tractors and recreational craft contain no more than 10mg of sulphur per kilogram of fuel, i.e. it should be virtually "sulphur free". Non-road mobile machinery is a very broad category of equipment including construction and agricultural equipment, but also portable generators, railcars and locomotives and inland waterway vessels. The gas oil used in these applications is colloquially referred to as "red diesel" due to it being marked with a red, excise marker dye. The purpose of sulphur free fuel is not to reduce sulphur dioxide emissions (which are already low from non-road mobile machinery), but to enable the introduction of sulphur intolerant emissions

control technologies. These technologies are being introduced from 1st January 2011 in order to comply with the Stage IIIB air pollutant emissions standards contained in Directive 2004/26/EC. Sulphur free fuel is therefore an essential enabler of these standards. Continued use of current, relatively high sulphur, gas oil would result in irreversible damage to these emissions control systems, replacements for which are estimated to cost in the order of £1000 for an average sized machine.

- 7.6. The Directive permits a number of flexibilities in relation to the introduction of sulphur free gas oil and requires some interpretation in defining the scope of inland waterways. Firstly the Directive permits Member States to allow the sulphur content to be up to 20mg/kg at the point of delivery to the end user, to account for minor contamination within the fuel supply chain. This is in particular intended to accommodate the situation where common road tankers are being used alternately for deliveries of sulphur free gas oil and of higher sulphur fuels such as 1000mg/kg sulphur heating gas oil. Contamination up to 20mg/kg sulphur content is not sufficient to adversely impact on emissions control equipment and this derogation avoids the cost of fuel distributors having to buy additional road tankers. The Regulations therefore implement this flexibility in the UK. Secondly, the Directive permits Member States to delay the introduction of sulphur free gas oil by one year for rail vehicles and/or tractors provided they can ensure this will not compromise the correct functioning of emissions control systems. It is proposed that the regulations implement this one year delay for rail, since the Stage IIIB emissions standard does not apply to railcars and locomotives until 2012 and there are no plans for the early uptake of Stage IIIB engines in this sector. This will avoid additional fuel costs of 1p/litre across the 674 ktonnes of fuel used annually for rail (a total saving of around £8m in 2011). However, Stage IIIB emissions limits do apply to new tractors from 1st January 2011 and there is no mechanism by which the supply of higher sulphur fuel could be limited to older tractors. Consequently the regulations do not implement a one year derogation for tractor fuel.
- 7.7. Thirdly, the Directive has not previously applied to gas oil for inland waterway use and it is necessary to define the point at which inland waterways cease and the sea begins. Stage IIIB emission standards do not currently apply to inland waterway vessels and consequently they do not require sulphur free fuel be used to enable the correct functioning of emissions control equipment. In addition marine stakeholders have identified potentially significant cost and safety concerns in the marine sector related to the indirect effects of introducing sulphur free gas oil. For the purposes of these regulations, and to minimise the regulatory burden, the approach adopted is consistent with the UK regulations implementing International Maritime Organisation and EU requirements on the sulphur content of fuel for sea-going marine use, but amending this for increased legal clarity. That legislation applies IMO marine fuel sulphur content limits to vessels operating on the sea, including “estuaries and arms of the sea”. Although not explicitly defined in the legislation, the extent of estuaries is generally interpreted as including tidal sections of rivers. Consequently the present Regulations require the supply of sulphur free gas oil to vessels generally operating on non-tidal sections of rivers, lakes and lochs, leaving IMO marine fuel sulphur use requirements to apply on tidal sections of rivers.

- 7.8. The Directive also maintains existing limits on the volatility of petrol sold during the summer (regulated to control evaporative emissions of hydrocarbons). However, the terms of an existing derogation for Member States with cool summer temperatures (including the UK) are modified by the Directive to require Member States to apply for permission to use this derogation. The UK has made use of the derogation since the Directive was introduced. Recent air quality modelling carried out for the Department confirms that the derogation has no identifiable negative impact on achieving the UK's air quality objectives and oil refiners indicate that it avoids costs of up to £150 million per annum. For these reasons the Department has submitted an application to the European Commission to continue to use the derogation. As they stand, the regulations continue to apply the derogation. Should the Commission refuse the Department's application it would be necessary to make a subsequent amendment to the Regulations in 2011.
- 7.9. In parallel with increasing the maximum permitted ethanol content of petrol to 10% the Directive requires that Member States ensure that supplies of 5% ethanol content petrol are maintained until 2013. This is intended to support operation of older cars some of which are not compatible with 10% ethanol content. In practice we do not expect fuel suppliers to switch to 10% ethanol content in petrol until after 2013, but Member States are required to transpose this provision. The UK fuel supply infrastructure is currently only able to handle two grades of petrol, "Premium" and "Super" (the latter accounts for about 4% of petrol sales). In order to ensure widespread availability of 5% ethanol petrol, but minimise constraints on fuel suppliers, should they switch to 10% ethanol content petrol earlier than expected, the regulations require Super grade petrol sold at high throughput petrol stations prior to 2014 to contain no more than 5% ethanol.
- 7.10. The Directive also tightens the quantity of petrol that may be sold as leaded petrol (in support of historic vehicles) from 0.5% to 0.03% of total sales. The Regulations accordingly tighten the quantity of leaded petrol permits that may be issued to 0.03% of the previous year's petrol sales.
- 7.11. Finally, the Regulations correct an omission in the existing regulations to enable the Secretary of State to grant exemptions if "exceptional events" result in disruption of supply to refineries, so that refiners are unable to meet the environmental standards for gas oil (in practice sulphur is the only component in gas oil which is currently controlled). Should such circumstances arise the Fuel Quality Directive requires Member States to inform the European Commission, who may then authorise less stringent standards for a limited period. The Secretary of State has powers under the existing Motor Fuel Regulations to grant exemptions for petrol and diesel content, provided that the European Commission has agreed. However, this power was not extended to cover gas oil when that fuel was introduced into the scope of the Directive and the Motor Fuel Regulations. The current amending Regulations remedy this omission.
- *Consolidation*
- 7.12. The Directive simplifies existing legislation by modifying two existing Directives (98/70/EEC and 1999/32/EC) and repealing one which is redundant

(93/12/EC). The UK Regulations also delete provisions in the current Motor Vehicle (Composition and Content) Regulations which are now spent and revoke the provisions in the 2008 Regulations which are re-enacted in these Regulations along with further provisions regulating the maximum sulphur content of fuels used in inland waterways vessels. The Department intends to consolidate all amendments to the 1999 Regulations should any further significant amendment to the Regulations be required.

8. Consultation outcome

- 8.1. A public consultation on the European Commission's original proposal was held in 2007 involving industry and other stakeholders. The Department took account of responses received in further developing its position in relation to the proposed Directive.
- 8.2. A public consultation on the draft regulations began on 30 March 2010 for a period of 12 weeks, and was subsequently extended to 30 September 2010 to take account of representations made by maritime organisations. These and other organisations were primarily concerned about the consequences of the introduction of sulphur free gas oil for the operation of engines in non-road mobile machinery and boats. This concern was mainly directed at a potential indirect impact of the requirement whereby fuel suppliers, having limited distribution and storage facilities, might opt to meet the sulphur free gas oil requirement by supplying road diesel. Most road diesel contains some Fatty Acid Methyl Ester (FAME) biodiesel and this is known to increase the risk of microbiological contamination in the presence of water. In addition FAME has a shorter storage life than fossil diesel, suffering oxidation, which can precipitate solids, if stored for in excess of 6-12 months. This could potentially lead to fuel filters being blocked by contaminated or oxidised fuel, resulting in engines stopping.
- 8.3. Shipping users considered themselves to be particularly susceptible due to such factors as the practice of storing laid-up boats with full fuel tanks (to prevent condensation and corrosion) and the difficulty of accessing vessel fuel tanks for inspection and removal of water. In addition safety implications of engine stoppages are greater in shipping than in land-based NRMM, especially in the case of larger vessels and vessels operating from rivers out to sea.
- 8.4. Further, although gas oil for stationary applications is not covered by the regulations, concerns about indirect impacts on the reliability of standby emergency generating equipment, if this was also supplied with gas oil containing FAME, were expressed by many of the country's large electricity supply companies. A number of consultees in these sectors and in the farming and construction sectors thought that the consultation version of the Impact Assessment did not reflect the costs to users of using the new fuel, particularly where it was likely to contain biofuels.
- 8.5. In the event most fuel suppliers now plan to supply biofuel free gas oil or road diesel for the time being. This has served to allay the above concerns to a large extent. Further information is contained in section 7 and Annex 2 of the Impact Assessment, the latter detailing the input assumptions used to revise the estimated cost impact of the Regulations. A full summary of all comments

received on this and other aspects of the Regulations and the Department's response to these will be published on the DfT Consultation website (www.dft.gov.uk/consultations/closedconsultations).

9. Guidance

- 9.1. The Department has published advice for users of sulphur free gas oil and biofuels on its website in the form of a Core script and downloadable leaflet (www.dft.gov.uk/pgr/roads/environment/). Copies of these texts accompany this Memorandum at Annexes A and B.

10. Impact

- 10.1. The impact of this measure is primarily attributable to the extra cost involved in removing sulphur from gas oil, and of making provision for its distribution, storage and use. The main business sectors affected will be oil refining, distribution and retail businesses and those businesses, charities, voluntary bodies and individuals who use gas oil in their off road machinery. The latter includes owners and users of construction and maintenance equipment, agricultural and forestry tractors, rail engines, inland waterways vessels and recreational craft. Any users of such equipment in the public sector would be similarly affected.
- 10.2. An Impact Assessment is attached to this Memorandum.

11. Regulating small business

- 11.1. Oil refiners are generally large or medium-sized businesses. Small firms are involved in the distribution of road fuel and gas oil to end users. Since unit fuel cost increases will be the same for large and small firms, the latter should not be disproportionately affected by fuel cost increases. They will also benefit from the relaxation of sulphur limits at point of sale.
- 11.2. Small businesses such as farms and those involved in the boat hire/marina or construction business may be disproportionately affected by the need for extra care of the fuel, especially if road diesel containing biofuel is supplied instead of gas oil, and may incur one-off costs for taking precautionary measures. There is no scope within the Directive to allow any relaxation for small businesses. However, only around 25% of sulphur free gas oil demand is expected to be met by supplying fuel with biodiesel content and costs to boat hire/marina businesses are minimised by the approach to defining the geographic scope of inland waterways outlined in paragraph 7.7 above. Users can minimise costs by sourcing gas oil without biofuel wherever possible. These issues are addressed more fully in the Impact Assessment.

12. Monitoring and review

- 12.1. Monitoring for compliance and reporting to the European Commission are already required under the Fuel Quality Directive.

13. Contact

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Annex A

Fuel Quality Directive Gas Oil Requirements

Introduction

1. EU Directive 2009/30/EC introduces a requirement that, from 1st January 2011, all gas oil (commonly known in the UK as 'red diesel') marketed for use in “non-road mobile machinery (NRMM)” i.e. “off-road equipment”, and recreational craft must contain no more than 10 milligrams of sulphur per kilogram of fuel (virtually ‘sulphur free’). NRMM includes tractors and other agricultural equipment, forestry equipment, construction equipment, forklifts, portable generators, railway engines, and inland waterway vessels. In the case of gas oil for use in railway vehicles the introduction of sulphur free gas oil will be one year later (1st January 2012).
2. Sulphur free gas oil is needed to ensure the reliable operation of pollutant emissions control systems, which will be fitted to new off-road equipment from 2011 to meet EU emissions requirements. Without sulphur free fuel these systems would suffer progressive and irreversible damage, which would ultimately bring the equipment to which they are fitted to a halt. The introduction of sulphur free fuel will have a number of direct and indirect impacts of which users will need to be aware. However, with proper handling, any problems are likely to be quite limited. Indeed sulphur free gas oil has already been supplied in some regions of the UK, without any reported problems.
3. Legislative requirements for gas oil for other purposes, such as heating or stationary equipment, will not change, however some fuel suppliers may, for logistical reasons, choose to supply sulphur free gas oil for these applications as well.

UK Gas Oil Supply

4. At present UK fuel supply includes two 'diesel' grades, road diesel and gas oil which is supplied for off-road equipment, coastal shipping, commercial heating applications and stationary equipment. Gas oil currently contains up to 1000 milligrams of sulphur per kilogram, but road diesel is already sulphur free. The oil industry has indicated that they expect to meet the sulphur free gas oil requirement largely by supplying road diesel for use in off-road equipment. Duty rates applicable to gas oil are, however, not affected by the introduction of sulphur free gas oil. Thus fuel suppliers will supply road diesel with a red excise marker dye added for off-road equipment use.
5. Because road diesel contains some biodiesel (up to 7%), much off-road equipment gas oil is also likely to contain biodiesel by 1st January 2011. Biodiesel blends of up to 7% are compatible with existing off-road equipment engines provided good housekeeping arrangements have been adhered to in storage of the fuel.

Fuel Storage

6. Because of these changes in fuel quality, increased care will be needed in the storage of sulphur free gas oil where this contains biodiesel. The oxidation

stability of this fuel will be poorer than that of current gas oil. Over time oxidation can precipitate solids with potential to block filters in fuel distribution systems or in off-road equipment fuel systems. To minimise the likelihood of this occurring, it is recommended that users take particular care to ensure a fuel turnover period of once every 6 months and, in any event, no longer than once every 12 months.

7. Sulphur free gas oil containing biodiesel will also be more prone to bacterial contamination than current gas oil. Bacterial growth can also potentially result in blockage of fuel filters and increased corrosion. Prolonged use of contaminated fuel could result in damage to engines. Bacterial growth can be prevented by eliminating water from fuel storage tanks and conducting monthly checks that tanks remain free of water. Where a bacterial growth outbreak has occurred, this can be addressed either by emptying and cleaning the tanks, or by seeking specialist help to tackle the outbreak with biocide additives and filtering.
8. Sulphur free gas oil containing biodiesel is a better solvent than current gas oil. As a result it may pick up deposits already in fuel storage and dispensing systems and in fuel tanks on off-road equipment. To prevent those deposits from blocking filters, a one-time replacement of storage tank and off-road equipment fuel filters, outside the regular service interval, after 2 to 3 tank throughputs of sulphur free gas oil, is recommended.
9. Fuel seals in sight gauges on older fuel storage tanks may be incompatible with sulphur free gas oil, irrespective of whether it contains biodiesel, and may require replacing. Users should examine sight gauges following the switchover to sulphur free gas oil. If there are signs of leakage they will need a one-off replacement of these seals. If they are having fuel storage tanks serviced in advance of the introduction of sulphur free gas oil, it would be worth their while getting fuel seals replaced as a precaution.

Compatibility of Off-Road Equipment with Sulphur Free Gas Oil

10. Modern off-road equipment should have no problems running on sulphur free gas oil. Indeed the road diesel that fuel suppliers are mainly likely to supply to meet the sulphur free gas oil requirement is produced to more demanding quality specifications than gas oil. Fuel seals and pipes in some older equipment may be incompatible with sulphur free gas oil and require replacing. Users should examine joints, seals and pipes in the fuel systems of their machinery following the switchover to sulphur free gas oil. If there are signs of leakage, seals and/or fuel pipes may need a one-off replacement. If they are having equipment serviced in advance of the introduction of sulphur free gas oil, it would be worth their while getting fuel seals and pipes replaced as a precaution.

Q&A

Q1. What is the change in gas oil quality requirements?

A1. By 1st January 2011 gas oil used in all diesel engined non-road mobile machinery (i.e. off road equipment) and recreational craft will have to contain no more than 10 milligrams of sulphur per kilogram of fuel (virtually 'sulphur free'). Your fuel supplier should be able to advise you, nearer the time, of when they are switching.

Q2. Why are gas oil quality requirements changing?

A2. Sulphur free gas oil is needed to ensure reliable operation of new, cleaner off-road equipment engines being introduced from 2011 in support of EU air quality objectives.

Q3. What are the implications for gas oil users?

A3. Sulphur free gas oil will require improved fuel storage “housekeeping” arrangements. If you have tanks storing gas oil you will need to ensure that these are free of water and monitor them monthly to ensure that they remain so. It is recommended that you turnover the contents of the tank every 6 months, but in any event, no less often than every 12 months. If a bacterial outbreak occurs in your fuel you will need to empty and clean your tanks, or seek specialist help to tackle the outbreak with biocide additives and filtering. Where fuel tank location or geometry prevents their cleaning, bacterial growth will eventually be flushed through, but this is likely to require repeated changes of fuel filters to prevent blockages.

Users should also replace fuel filters on storage tanks and off-road equipment as a one-off exercise, after 2 to 3 fuel tank throughputs, to prevent deposits picked up by the new fuel blocking filters.

Users of older off-road equipment and storage tanks with sight gauges should check for any signs of fuel leakage. If leakage does occur the equipment will need a one-off replacement of any leaking fuel seals or fuel pipes.

Q4. What will sulphur free gas oil cost?

A4. Fuel suppliers are likely to supply road diesel, but with an excise duty marker added, to meet this obligation. Fuel prices fluctuate, but the underlying cost of road diesel is around 1 pence per litre more than current gas oil. Consequently the cost of sulphur free gas oil is likely to increase by around this amount.

Q5. Are older engines compatible with this fuel?

A5. Most engines are fully compatible with this fuel. However, some fuel system components on older engines, in particular fuel seals and pipes, may not be compatible with sulphur free gas oil. Users of older equipment should examine fuel systems in the months following the switchover and replace seals or pipes with compatible ones if there are signs of leakage.

Q6. How does this affect gas oil used for heating or static equipment?

A6. Regulations on the sulphur content of gas oil used for heating and in static equipment are not changing. However, some fuel suppliers may choose to supply sulphur free gas oil for heating and static applications as well as for off road equipment use. Users storing gas oil for use in both heating and off-road equipment may also choose to switch all of their fuel supply to sulphur free rather than install an additional fuel tank to store the fuels separately.

The same fuel storage and fuel system compatibility issues apply for heating and static applications as for off-road equipment, although these may be exacerbated by higher storage capacities, slower fuel turnover and older fuel seal materials than are typical on off-road equipment. Consequently particular attention should be paid to ensuring that fuel storage tanks are free of water and debris and that tank gauges and filters are compatible with biodiesel before starting to use sulphur free gas oil. Heating gas oil users may wish to refer to their fuel supplier or service company for guidance on fuel filtration.

Operators of standby emergency power generation equipment may wish to make specific arrangements with their fuel suppliers to continue to be supplied with higher sulphur gas oil with no biodiesel content in order to ensure that these issues are not encountered.

Q7. How does this affect marine gas oil?

A7. Gas oil sold for use in inland shipping vessels and recreational craft operating on inland waterways must be sulphur free by 1st January 2011. However, regulations on the sulphur content of gas oil used in sea-going vessels are not changing. It is not anticipated that suppliers of fuel for sea-going marine operations will switch to sulphur free gas oil, however users may wish to check this with their fuel suppliers nearer the time.

The same fuel storage and fuel system compatibility issues would apply for marine applications as for off-road equipment, although these may be exacerbated by increased risk of water contamination and safety concerns.

Q8. How will this affect gas oil duty rates?

A8. The introduction of sulphur free gas oil does not affect fuel duty rates.

Q9. How do I know if I am buying heating gas oil or sulphur free gas oil for off-road equipment?

A9. Sulphur free gas oil for off-road equipment is not visually distinguishable from heating gas oil. Make sure your fuel supplier knows what use you need the fuel for. They will be able to tell you what standard the fuel they supply you with meets.

Q10. What are the British Standards for gas oil?

A10. Industry standards for gas oil for a range of applications are defined in BS 2869. The appropriate grades for different applications are;

11. Grade	12. Application
13. A2	14. Non-road mobile machinery/propulsion fuel
15. D	16. Heating & stationary power generation fuel

Q11. Where can I find more detailed information?

A11. There are a number of sources of more detailed information.

Your fuel supplier will be able to provide you with information on the fuel you are buying e.g. with which standards it complies.

Industry standards for gas oil are defined in British Standard BS 2869. Copies of this can be purchased from the British Standards Institution:

<http://www.bsi-global.com/upload/Standards%20&%20Publications/shop.html>

Information on the compatibility of different materials in fuel storage systems with the biodiesel component of diesel and sulphur free gas oil can be found in Concawe FAME Handling Document:

“Guidelines for Handling and Blending FAME” Report No 9/09”

Guidance on fuel tank cleaning and preventing bacterial growth outbreaks is available from the Energy Institute;

**GUIDANCE FOR THE INVESTIGATION OF THE MICROBIAL
CONTENT OF PETROLEUM FUELS AND FOR THE
IMPLEMENTATION OF AVOIDANCE AND REMEDIAL STRATEGIES**

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Annex B

Off-Road equipment and use of gas oil

Changes to Gas Oil Used in Off-Road Equipment

If you use gas oil (often known as “red diesel”) then there are changes from January 2011 which you need to know about:

EU Directive 2009/30/EC requires that, from 1st January 2011, all gas oil marketed for use in non-road mobile machinery (i.e. mobile off road equipment) must contain no more than 10 milligrams of sulphur per kilogram of fuel (virtually ‘sulphur free’).

This fuel is needed by cleaner engines fitted in new off-road equipment which will be made to meet stringent new EU emission standards.

These standards will improve air quality and reduce adverse health and environmental effects.

Sulphur free gas oil is also likely to contain up to 7% biodiesel content.

The majority of existing equipment should not have any problems with the new fuel but a few precautions are recommended.

Who will be affected by these changes?

Owners and users of off-road equipment. This includes tractors and other agricultural equipment, forestry equipment, construction equipment, forklifts, portable generators, inland waterway vessels, recreational craft and railway vehicles. However gas oil for stationary and heating applications may also be affected. In the case of gas oil for use in railway vehicles the introduction of sulphur free gas oil will be one year later (1st January 2012).

The UK Gas Oil Supply

The oil industry has indicated that they expect to meet the requirement for gas oil to be sulphur free by January 2011 largely by supplying road diesel with a red marker dye added for use in mobile off road equipment. Road diesel is already sulphur free.

Because road diesel contains some biodiesel (up to 7%), much gas oil for off- road equipment is also likely to contain biodiesel by 1st January 2011. Biodiesel blends of up to 7% are compatible with existing off-road equipment engines provided good housekeeping arrangements have been adhered to in the storage of the fuel.

What do I do about Off-Road Equipment?

If you own off-road equipment it is recommended that you:

- Examine fuel systems following the switch to the new fuel and ensure that any seals or pipes found to be leaking are replaced.

- If you are having older machinery serviced, replace fuel seals and pipes as a precaution.
- Replace fuel filters after the first 2 to 3 tankfuls of the new fuel.

What should I do about Fuel Storage?

Because of the changes in fuel quality, you will need to exercise increased care in the storage of sulphur free gas oil for off road equipment where this contains biodiesel.

- Remove all water from the tanks and conduct monthly checks so that they remain free of water.
- Tanks that don't already have drain points for removing water are likely to need modification.
- Examine sight gauges on older fuel storage tanks for signs of leakage and replace any leaking seals.
- If you are having tanks serviced before you receive the new fuel it would be advisable to replace fuel seals as a, one-off, precautionary exercise.
- Replace fuel filters after 2 to 3 deliveries/turnover of the new fuel.
- Ensure the content of tanks is turned over every 6 months or in any event no less often than every 12 months to help prevent blockage of filters.

What happens if I have Stationary Equipment?

Gas oil for heating or for stationary equipment is not required to be sulphur free. However, some fuel suppliers may supply you with sulphur free gas oil for these applications as well. In this case particular attention to the above precautions will be required. Heating gas oil users may wish to refer to their fuel supplier or service company for guidance on fuel filtration.

How does this apply to Marine Fuel?

Gas oil sold for inland waterway vessels and recreational craft when used on inland waterways is required to be sulphur free by 1st January 2011.

Gas oil for sea-going marine use is not required to be sulphur free. It is not anticipated that suppliers of marine fuel will switch to sulphur free, but you may wish to confirm this with your supplier nearer the time.

The same fuel storage and fuel system compatibility issues would apply to marine applications as for off road equipment. However, these may be exacerbated by the increased risk of water contamination and safety concerns

Where do I find more detailed information?

Let your fuel supplier know what purpose you need the fuel for. They should supply you a fuel that is fit for purpose and be able to advise you of the sulphur and biofuel content of the fuel.

Further advice is available on the Department for Transport website at www.dft.gov.uk/pgr/roads/environment/fuelqualitydirectivegasoilrequirements

TRANSPOSITION NOTE FOR:

(1) AMENDMENTS TO ARTICLES 1- 4, 8a AND ANNEXES I AND II OF DIRECTIVE 98/70/EC RELATING TO THE QUALITY OF PETROL AND DIESEL FUELS MADE BY DIRECTIVE 2009/30/EC; AND

(2) ARTICLE 2(2) OF DIRECTIVE 2009/30/EC

BY

THE MOTOR FUEL (COMPOSITION AND CONTENT) AND MERCHANT SHIPPING (PREVENTION OF AIR POLLUTION FROM SHIPS) (AMENDMENT) REGULATIONS 2010

1. For the purposes of this note:-

“The 1999 Regulations” means SI 1999 No. 3107, The Motor Fuel (Composition and Content) Regulations 1999 as last amended by SI 2007 No.1608, The Motor Fuel (Composition and Content) (Amendment) Regulations 2007

“The 2010 Regulations” means the Motor Fuel (Composition and Content) and Merchant Shipping (Prevention of Air Pollution from Ships) (Amendment) Regulations 2010

“The Biofuel Labelling Regulations” means SI 2004 No.3349, the Biofuel (Labelling) Regulations 2004 as last amended by SI 2009 No.3277, the Biofuel (Labelling) (Amendment) Regulations 2009

“The 1998 Directive” means Directive 98/70/EC as amended by Directive 2009/30/EC

“The 2009 Directive” means Directive 2009/30/EC

2. These Regulations do what is necessary to implement Articles 1 to 4, 8a and Annexes I and II of the 1998 Directive as amended by the 2009 Directive and Article 2(2) of the 2009 Directive. They also complete the transposition of Article 7 in respect of gas oil.

With the agreement of the devolved administrations, the Secretary of State has taken on the responsibility of implementing these Articles of the Directive for the whole of the UK via the 2010 Regulations.

(1) The 1998 Directive		
Article	Objective	Implementation
Article 3	Article 3(2) - requires Member States to prohibit placing on the market of petrol which does not comply with updated environmental specifications set out in Annex I of the 1998 Directive.	<p>This provision is implemented by regulations 3 and 4 of the 2010 Regulations.</p> <p>Regulation 3 amends regulation 2 of the 1999 Regulations to refer to the 2009 Directive. This ensures that subsequent references to “Annex I of the Directive” refer to Annex I as amended by the 2009 Directive.</p> <p>Regulation 4 makes the following amendments to regulation 3 of the 1999 Regulations;</p> <p>i) A new regulation 3(2) redefines petrol meeting the “winter petrol requirement” as petrol meeting the amended Annex I requirements, but excluding the summer Vapour Pressure limit.</p> <p>ii) A new regulation 3(3) redefines petrol meeting the “summer petrol requirement” as petrol meeting the amended Annex I requirements, but with a summer Vapour Pressure limit of 70kPa, as applicable to Member States with “low ambient summer temperatures”.</p>
	Article 3(3) - requires Member States to ensure that suppliers continue to make petrol containing no more than 5% ethanol, and 2.7% oxygen, available until 2013 in support of older vehicles which are not compatible with higher ethanol content. It also requires provision of information to consumers on the biofuel content of petrol.	<p>These provisions are implemented by regulation 4 of the 2010 Regulations.</p> <p>Regulation 4 makes the following amendments to regulation 3 of the 1999 Regulations;</p> <p>i) A new regulation 3(5) is inserted which applies to super unleaded petrol sold prior to 1st January 2014 from large filling stations (those with more than 3 million litres throughput per annum).</p> <p>ii) A new regulation 3(6) is inserted requiring the super unleaded petrol referred to in regulation 3(5) to contain no more than 5% ethanol and 2.7% oxygen.</p> <p>The requirement for provision of information to consumers on the biofuel content of petrol is already implemented by regulation 3 of the Biofuel Labelling Regulations. This requires pumps dispensing petrol containing more than</p>

		5% bioethanol to be labelled “ <i>Not suitable for all vehicles: consult vehicle manufacturer before use</i> ”.
	Article 3(4) - allows Member States with low ambient summer temperatures to permit the placing on the market of petrol with a vapour pressure of up to 70kPa during the summer period	This provision is implemented by regulation 4 of the 2010 Regulations. Regulation 4 inserts a new regulation 3(3), as described above, including a requirement that “summer petrol” has a Vapour Pressure limit of 70kPa, as applicable to Member States with “low ambient summer temperatures”.
	Article 3(6) - allows Member States to permit the marketing of leaded petrol up to a maximum of 0.03% of petrol sales	This provision is implemented by regulation 10 of the 2010 Regulations. This amends regulation 9 of the 1999 Regulations to reduce the quantity of fuel for which leaded petrol permits may be issued to 0.03% of petrol sales in the previous calendar year (a reduction from 0.5% in previous versions of the Directive).
Article 4	Article 4(1) - requires Member States to prohibit placing on the market of diesel which does not comply with updated environmental specifications set out in Annex II of the Directive. It also allows Member States to permit the placing on the market of diesel with a higher Fatty Acid Methyl Ester (FAME) content than that permitted by Annex II, but requires provision of appropriate information to consumers where such diesel is supplied.	<p>These provisions are implemented by regulations 3, 4 and 6 of the 2010 Regulations.</p> <p>Regulation 3 amends regulation 2 of the 1999 Regulations to refer to the 2009 Directive. This ensures that subsequent references to “Annex II of the Directive” refer to Annex II as amended by the 2009 Directive.</p> <p>Regulation 4 inserts a new regulation 3(4) into the 1999 Regulations requiring compliance with the amended Annex II requirements if diesel fuel is to meet the “diesel fuel requirement”.</p> <p>Regulation 6 inserts a new regulation 5(7) into the 1999 Regulations. This disapplies the FAME content limit set out in Annex II on condition that the dispensing pump is labelled according to the Biofuel Labelling Regulations. Regulation 3(3) of the latter regulations requires pumps dispensing such diesel to be labelled: “<i>Not suitable for all vehicles: consult vehicle manufacturer before use</i>”.</p>
	Article 4(2) - requires Member States to prohibit placing on the market of gas oil, for use in non-road mobile machinery, agricultural and forestry tractors and recreational	These provisions are implemented by regulation 7 of the 2010 Regulations which inserts a new regulation 5B. New regulation 5B(1) prohibits the distribution of gas oil, or other liquid fuel, for use in non-road mobile machinery, agricultural and forestry tractors and recreational craft if its sulphur content exceeds

	<p>craft, if it has more than 10mg/kg sulphur content. The Article also applies this sulphur content requirement to “other liquid fuels” used in inland waterway and recreational craft. The Article also permits Member States to allow post-refinery contamination of gas oil up to a maximum of 20mg/kg sulphur content at the point of distribution to the end user. Finally it allows Member States to delay the implementation of sulphur free gas oil for rail use until 1st January 2012, provided that the correct functioning of emissions control equipment is not compromised.</p>	<p>10mg/kg. Regulation 5B(2) prohibits sale of the same fuels if the sulphur content exceeds 20mg/kg at the point of sale.</p> <p>Regulation 8 of the 2010 Regulations inserts a new regulation 6(6) into the 1999 Regulations permitting gas oil with up to 1000mg/kg sulphur content to continue to be distributed and sold for use in rail applications until 31st December 2011. This will not compromise the correct functioning of emissions control systems as sulphur-intolerant emissions control systems are not being introduced in the rail sector until 2012.</p>
Article 7	<p>Article 7 - allows Member States, subject to authorisation by the Commission, to permit less strict fuel quality limit values in the event that disruption of oil supplies renders compliance difficult.</p>	<p>This provision is already implemented for petrol and diesel by regulation 7 of the 1999 Regulations. Regulation 9 of the 2010 Regulations, amending regulation 7 of the 1999 Regulations, extends the Secretary of State’s power to grant such exemptions to gas oil and other liquid fuels.</p>
Article 8a	<p>Article 8a(2) - requires the manganese content of fuel to be limited to 6mg/litre prior to 1st January 2014 and to 2mg/litre thereafter.</p>	<p>This provision is implemented by regulations 5 and 7 of the 2010 Regulations.</p> <p>Regulation 5 inserts regulation 4(4) and (5) into the 1999 Regulations prohibiting the distribution of petrol or diesel with manganese content in excess of 6mg/litre prior to 1st January 2014 and the distribution of petrol or diesel with a manganese content in excess of 2mg/litre thereafter.</p> <p>Regulation 7 inserts a new regulation 5B(5) and (6) into the 1999 Regulations prohibiting the distribution of gas oil, or other liquid fuel, with a manganese content in excess of 6mg/litre prior to 1st January 2014 and the distribution of gas oil, or other liquid fuel, with a manganese content in excess of 2mg/litre thereafter.</p>

	<p>Article 8a(4) to (6) - require Member States to ensure that fuels containing metallic additives are labelled at the point of sale “<i>Contains metallic additives</i>” in a clearly visible and legible manner.</p>	<p>This provision is implemented by regulations 6 and 7 of the 2010 Regulations.</p> <p>Regulation 6 inserts a new regulation 5(8) and (9) into the 1999 Regulations prohibiting the sale of petrol or diesel fuel containing metallic additives, unless the words “<i>Contains metallic additives</i>” are prominently displayed on the dispenser.</p> <p>Regulation 7 inserts a new Regulation 5B(3) into the 1999 Regulations, prohibiting the sale of gas oil containing metallic additives unless the words “<i>Contains metallic additives</i>” are prominently displayed on the dispenser.</p>
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(2) The 2009 Directive		
Article	Objective	Implementation
Article 2(2)	<p>Article 2(2) - amends Article 4(b) of Directive 1999/32/EC, as amended by Directive 2005/33/EC, to remove references to fuel used by inland waterway vessels</p>	<p>This provision is implemented by regulation 17 of the 2010 Regulations which removes references to inland waterway vessels from Schedule 2A of the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008, as amended by SI 2010 No.895 The Merchant Shipping (Prevention of Air Pollution from Ships) (Amendment) Regulations 2010.</p>

SSTitle: The Motor Fuel (Composition and Content) and Merchant Shipping (Prevention of Air Pollution from Ships) (Amendment) Regulations 2010 Lead department or agency: Department for Transport Other departments or agencies:	Impact Assessment (IA)
	IA No:
	Date: 09/12/2010
	Stage: Final
	Source of intervention: EU
	Type of measure: Secondary legislation
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Summary: Intervention and Options

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

The UK is projected to fall short of meeting EU air quality objectives for nitrogen dioxide and particulate matter (PM) in a number of areas. Non Road Mobile Machinery is a significant emissions source (5% of UK NOx and 4.3% PM). The Regulations will help meet these objectives, primarily by reducing the sulphur content of gas oil, enabling the effective working of emissions control equipment on new NRMM, which significantly reduce NOx and PM emissions. The costs involved make it unlikely that such fuel would be made available unless it was mandatory. Changes to the maximum limit on ethanol content of petrol are also necessary to allow a greater use of biofuels which reduce lifecycle greenhouse gas (GHG) emissions from fuel. Consumption of petrol accounts for 8% of UK GHG emissions.

What are the policy objectives and the intended effects?

To allow an improvement in air quality by enabling a reduction in pollutant emissions (oxides of nitrogen or NOx and particulates) from Non Road Mobile Machinery through more stringent fuel standards, leading to health and environmental benefits.

To reduce the contribution of transport to greenhouse gas emissions and therefore climate change by removing barriers to the increased use of bioethanol in transport fuels.

What policy options have been considered? Please justify preferred option (further details in Evidence Base)

The EU directive to be implemented is a mandatory requirement on all Member States. The options considered are: do not implement, the base option (0), and: do implement.

Implementation (Option 1) will enable improved air quality with associated health and environmental benefits, remove barriers to bioethanol use and avoid infringement by the European Commission, and is the preferred option.

Further tightening of fuel quality requirements is not warranted as this would not deliver significant additional air quality or greenhouse gas emissions savings and would undermine the harmonised EU market for fuels

When will the policy be reviewed to establish its impact and the extent to which the policy objectives have been achieved?	It will be reviewed 12/2010
Are there arrangements in place that will allow a systematic collection of monitoring information for future policy review?	Yes

UUSELECT SIGNATORY Sign-off For final proposal stage Impact Assessments:

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) the benefits justify the costs.

Signed by the responsible Minister: Norman Baker..... Date: 20th December 2010.

Summary: Analysis and Evidence

Policy Option 1

Description:

Price Base Year 2010	PV Base Year 2010	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -£285m	High: -£403m	Best Estimate: -£357m

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£38m	1	£31m	£346m
High	£59m		£36m	£423m
Best Estimate	£48m		£35m	£398m

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

Recurring costs are driven by the additional cost of desulphurising NRMM fuel (£256m over 10 years) and blending of biodiesel into 25% of the NRMM fuel supply (£94m over 10 years). These costs will be borne by suppliers and are assumed to be passed through to NRMM fuel consumers. Transition costs (£48m one-off) (largely due to biodiesel being blended in 25% of the NRMM fuel supply) are borne by NRMM fuel consumers and suppliers.

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

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	n/a		£6m	£61m
High	n/a		£2m	£20m
Best Estimate	n/a		£4m	£40m

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

Recurring benefits are driven by GHG savings from biodiesel blended into 25% of the NRMM fuel supply (£40m over 10 years) Maximum of 5 lines

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

Desulphurisation of gas oil supports air quality benefits (PM and NOx) by enabling the introduction of sulphur intolerant exhaust after-treatment technologies on NRMM. These benefits have been quantified and accounted against the regulations responsible for introducing new NRMM emission technologies rather than here.

Relaxation of barriers to blending increased quantities of bioethanol into petrol

Key assumptions/sensitivities/risks

Discount rate (%) 3.5

Key assumptions are on desulphurisation costs, the proportion of downgraded road diesel which will be supplied as NRMM fuel, fossil fuel price projections, biofuel price projections and transition costs.

Impact on admin burden (AB) (£m):			Impact on policy cost savings (£m):	In scope
New AB: n/a	AB savings: n/a	Net: n/a	Policy cost savings:	No

Enforcement, Implementation and Wider Impacts

What is the geographic coverage of the policy/option?	United Kingdom				
From what date will the policy be implemented?	01/01/2011				
Which organisation(s) will enforce the policy?	Local authorities				
What is the annual change in enforcement cost (£m)?	Minimal				
Does enforcement comply with Hampton principles?	Yes				
Does implementation go beyond minimum EU requirements?	No				
What is the CORR ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)	Traded: 0.1		Non-traded: -0.9		
Does the proposal have an impact on competition?	No				
What proportion (%) of Total PV costs/benefits is directly attributable to primary legislation, if applicable?	Costs: N/A		Benefits: N/A		
Annual cost (£m) per organisation (excl. Transition) (Constant Price)	Micro	< 20	Small	Medium	Large
Are any of these organisations exempt?	No	No	No	No	No

Specific Impact Tests: Checklist

Set out in the table below where information on any SITs undertaken as part of the analysis of the policy options can be found in the evidence base. For guidance on how to complete each test, double-click on the link for the guidance provided by the relevant department.

Please note this checklist is not intended to list each and every statutory consideration that departments should take into account when deciding which policy option to follow. It is the responsibility of departments to make sure that their duties are complied with.

Does your policy option/proposal have an impact on...?	Impact	Page ref within IA
Statutory equality duties^{PP1} Statutory Equality Duties Impact Test guidance	No	15
Economic impacts		
Competition Competition Assessment Impact Test guidance	No	15
Small firms Small Firms Impact Test guidance	Yes	14
Environmental impacts		
Greenhouse gas assessment Greenhouse Gas Assessment Impact Test guidance	Yes	15
Wider environmental issues Wider Environmental Issues Impact Test guidance	No	15
Social impacts		
Health and well-being Health and Well-being Impact Test guidance	Yes	15
Human rights Human Rights Impact Test guidance	No	15
Justice system Justice Impact Test guidance	No	15
Rural proofing Rural Proofing Impact Test guidance	Yes	15
Sustainable development Sustainable Development Impact Test guidance	No	16

¹ Race, disability and gender Impact assessments are statutory requirements for relevant policies. Equality statutory requirements will be expanded 2011, once the Equality Bill comes into force. Statutory equality duties part of the Equality Bill apply to GB only. The Toolkit provides advice on statutory equality duties for public authorities with a remit in Northern Ireland.

Evidence Base (for summary sheets) – Notes

Use this space to set out the relevant references, evidence, analysis and detailed narrative from which you have generated your policy options or proposal. Please fill in **References** section.

References

Include the links to relevant legislation and publications, such as public impact assessment of earlier stages (e.g. Consultation, Final, Enactment).

No.	Legislation or publication (first 12 references only - subsequent references in the body of the text.)
1	The Motor Fuels (Composition and Content) Regulations 1999 (SI 1999 No 3107) as amended by Sis 2001/3896, 2003/ /3078 and 2007/1608
2	Directive 2009/30/EC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0088:0113:EN:PDF
3	Air Quality Strategy for England Wales Scotland and Northern Ireland 2007 Cm 7169 NIA 61/06-07 http://www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-qualitystrategy-vol1.pdf
4	Directive 97/68/EC http://eur-lex.europa.eu/LexUriServ/site/en/consleg/1997/L/01997L0068-20040520-en.pdf
5	Directive 98/70/EC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31998L0070:EN:HTML
6	Council Directive 1999/32/EC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:1999:121:0013:0013:EN:PDF
7	Council Directive 93/12/EEC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31993L0012:EN:HTML
8	Partial Regulatory impact Assessment on proposed amendments to the EU Fuel Quality Directive http://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/consultations/archive/2007/consuleupetroldieselreqs/pdfpartialriaefuel.p
9	DfT Public Consultation on Commission draft Fuel Quality proposal http://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/consultations/archive/2007/consuleupetroldieselreqs/
10	DfT Public Consultation on draft regulations to implement Directive 2009/30/EC http://www.dft.gov.uk/consultations/closed/2010-26/
11	The Renewable Transport Fuels Obligation Order 2007 http://www.legislation.gov.uk/ukSI/2007/3072/contents/made
12	Directive 2009/28/EC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:en:PDF

Evidence Base

Ensure that the information in this section provides clear evidence of the information provided in the summary pages of this form (recommended maximum of 30 pages). Complete the **Annual profile of monetised costs and benefits** (transition and recurring) below over the life of the preferred policy (use the spreadsheet attached if the period is longer than 10 years).

The spreadsheet also contains an emission changes table that you will need to fill in if your measure has an impact on greenhouse gas emissions.

Annual profile of monetised costs and benefits* - (£m) constant prices

	Y ₀	Y ₁	Y ₂	Y ₃	Y ₄	Y ₅	Y ₆	Y ₇	Y ₈	Y ₉
Transition costs	23									
Annual recurring cost	40	42	43	43	43	42	42	42	42	42
Total annual costs	63	42	43	43	43	42	42	42	42	42
Transition benefits										
Annual recurring benefits	4	4	5	5	5	5	5	5	5	5
Total annual benefits	4	4	5	5	5	5	5	5	5	5

* For non-monetised benefits please see summary pages and main evidence base section



Microsoft Office
Excel Worksheet

Evidence Base (for summary sheets)

There is discretion for departments and regulators as to how to set out the evidence base. However, it is desirable that the following points are covered:

- Problem under consideration;
- Rationale for intervention;
- Policy objective;
- Description of options considered (including do nothing);
- Costs and benefits of each option;
- Risks and assumptions;
- Administrative burden and policy savings calculations;
- Wider impacts;
- Summary and preferred option with description of implementation plan.

Inserting text for this section:

Select the notes here and either type section text, or use **Paste Without Format** toolbar button to paste in the standard EBodyPara Style. Format text by applying EB styles from the toolbar.

Evidence Base (for summary sheets)

AMENDMENTS TO THE MOTOR FUEL (COMPOSITION AND CONTENT) REGULATIONS 1999 AND MERCHANT SHIPPING (PREVENTION OF AIR POLLUTION FROM SHIPS) REGULATIONS 2008

1. Title of Proposal

Amendments to the Motor Fuel (Composition and Content) Regulations 1999 (Ref 1) with regard to the specifications for petrol, diesel and gas-oil and consequential amendments of the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations 2008.

2. Purpose and Intended Effect

Objectives

The purpose of the Regulations is to implement those elements of Directive 2009/30/EC (Ref 2) which specify new or revised requirements for road fuels and for gas oil for use in non-road mobile machinery (NRMM) (e.g. agricultural and construction equipment, rail locomotives, inland shipping etc). This will enable reductions in air pollutant emissions from transport and in particular oxides of nitrogen or NOx emissions and particulate matter, and thus contribute to the delivery of European and UK strategies on air quality for nitrogen dioxide and particulate matter.

This objective will be achieved by reducing the maximum permitted sulphur content of gas oil intended for use in NRMM and recreational craft. This will enable the use of new emission control technologies on NRMM which are being introduced from 2011 to meet tighter emissions standards for NRMM; these would otherwise be poisoned by sulphur in the fuel. Although NRMM emissions are small when compared with emissions from road transport, they are not insignificant, (5% of NOx and 4.3% of UK PM emissions in 2001).

In view of the new requirements for gas oil used in inland shipping and recreational craft, the Regulations also amend the Merchant Shipping (Prevention of Air Pollution from Ships) Regulations to repeal previous marine fuel sulphur content requirements and consolidate amended marine fuel requirements in the Motor Fuel (Composition and Content) Regulations.

The Regulations are also aimed at reducing the contribution of UK transport to greenhouse gas emissions and therefore climate change, by enabling increased use of biofuels. This will be achieved by increasing the maximum permitted level of ethanol in petrol from 5% to 10%, This will assist fuel suppliers to meet targets for greenhouse gas emissions from their fuels. The Directive's requirements in

relation to greenhouse gas emissions targets (and for labelling of biofuels) will be implemented by two separate sets of regulations.

This Impact Assessment updates the IAs which were the subject of consultation in 2007 on the Commission's original proposal and the consultation which commenced in March 2010 on the draft (Motor Fuel (Composition and Content)) implementing regulations.

3. Background

i) UK Air Quality Objectives

Due to the significant impact of air pollution on health and the environment, European and international (UN-ECE) legislation sets legally binding health and ecosystem based air quality objectives. The UK Government is committed to achieving these air quality objectives.

The UK Air Quality Strategy (Ref 3) currently projects that, including the effects of all already agreed emissions reduction measures, the UK will fall short of meeting EU legally binding air quality objectives for concentrations of nitrogen dioxide (NO₂) and particulate matter (PM₁₀) in a number of areas in the UK. These are mostly urban areas and busy roads. The indicative objective for ozone (O₃), of which oxides of nitrogen (NO_x) and hydrocarbons (HC) are the two main precursors, is also likely to be exceeded in a small number of locations in the UK, however a large component of ozone concentrations is transboundary in nature.

In addition to road vehicle emission standards, one of the existing measures to reduce NO_x and PM₁₀ emissions is emissions standards for 'non-road mobile machinery' (NRMM), e.g. construction and agricultural equipment, but also including railcars, rail locomotives and inland waterway vessels. Directive 97/68/EC, as last amended by 2010/26/EC (Ref 5) specifies 5 stages of emissions standards to apply to these engines. From the beginning of 2011 'Stage IIIB' standards come into force. These standards will require emissions control technology which is intolerant to sulphur in the fuel.

Limits on the maximum permissible vapour pressure of petrol are set in legislation to assist in the control of evaporative emissions of hydrocarbon during warm weather. This is to assist in compliance with air quality objectives for carcinogenic hydrocarbon species (benzene) and ground-level ozone (of which hydrocarbons are a precursor). The UK is, however, already fully compliant with its air quality objectives on benzene.

ii) The EU Fuel Quality Directive

Directive 98/70/EC of the European Union sets harmonised requirements on the environmental specification of petrol and diesel. The parameters regulated are controlled either in view of their direct impact on emissions of air quality pollutants, e.g. limits on the lead content of petrol, petrol vapour pressure limits, diesel polycyclic aromatic hydrocarbon content limits, or their impact on vehicle emissions control equipment e.g. limits on sulphur content (which reduces the efficiency of catalytic emissions control systems).

The Directive is implemented in the UK by the Motor Fuel (Composition & Content) Regulations 1999 as amended. The Directive has recently been amended by Directive 2009/30/EC and the proposed UK regulations are to implement the changes made to fuel specifications by 2009/30/EC. The detailed changes are discussed below.

iii) The parts of the Directive which will be implemented by the Regulations

a) Requirements related to petrol

1. Oxygenate/ethanol content - Article 3(2) requires Member States to ensure that petrol complies with the environmental specifications which are contained in Annex 1 of the Directive. The main changes of substance made by the Directive and reflected in the Annex, are an increase in the maximum permitted ethanol content from 5% to 10% by volume, designed to assist in the roll-out of bio-ethanol. Since ethanol molecules contain oxygen a corresponding increase is also made in the maximum permitted oxygen content by volume from 2.7% to 3.7%, along with an increase in the permitted levels of other oxygenates by volume.

2. As the increases in ethanol and oxygen contents are permissive rather than mandatory, the provision of fuel to consumers would not necessarily change in the UK.

3. Vehicles sold in the UK and in EU markets have only recently (since around 2006) carried manufacturer's warranties covering use of petrol containing 10% ethanol. However, the Department is not aware of general vehicle operability or reliability problems being created on modern (closed loop control, electronically fuel injected) vehicles by running on ethanol content up to 10%. Direct injection petrol-engined vehicles manufactured prior to 2006 appear to be an exception to this and may not be compatible with petrol with more than 5% ethanol content. Older (pre-1993) vehicles are also unlikely to be compatible with petrol containing in excess of 5% ethanol without modifications, (rejetting of carburettors and changing of fuel hoses and seals) though these are a small and decreasing part of the fleet.

4. In order to support continued operation of these vehicles the Directive obliges Member States to ensure that suppliers continue to provide some petrol containing no more than 5% ethanol by volume (with corresponding 2.7% maximum oxygen content by mass) until at least 2013. This date is subject to review and potential extension. However, based on current projections bioethanol content of UK petrol is not expected to exceed 5% until 2015 at the earliest.

5. Maximum vapour pressure of petrol - This parameter, which is applied to petrol distributed during the summer period, is regulated as a means of controlling evaporative emissions of hydrocarbons. Hydrocarbons are precursors to ground-level ozone formation (an air quality pollutant causing irritation to the respiratory system) and some are carcinogenic. Member States who are subject to cold summer conditions are currently allowed to relax this limit from 60kPa to 70kPa to aid vehicle-starting. The UK currently makes use of this relaxation on the grounds that UK summer temperatures are similar to summer weather conditions in Scandinavian regions. Article 3(4) of the amended Directive permits a similar relaxation, for Member States with low ambient summer temperatures, during the period 1 June to 31 August, subject to agreement by the European Commission. The UK has applied for this derogation under the terms of Article 3(5). Consequently the regulations make no change in UK petrol summer vapour pressure.

6. Leaded petrol - Article 3(6) of the Directive reduces the maximum permitted quantity of petrol which may be sold as leaded petrol (to support operation of historic vehicles) from 0.5% to 0.03% of total petrol sales.

b) Requirements relating to diesel

1. PAH and Biofuel limits - Article 4(1) of the Directive requires Member States to ensure that diesel fuel complies with the environmental specifications in Annex II of the Directive. The only changes of substance are a reduction in the maximum permitted polycyclic aromatic hydrocarbons (PAH) content from 11% to 8% and the introduction of a 7% limit on FAME (Fatty Acid Methyl Ester) biodiesel content. Member States are however permitted to allow marketing of diesel with more than 7% FAME content, but must ensure the provision of appropriate information to consumers on its FAME content. The regulations implement this by permitting marketing of diesel containing more than 7% FAME provided that pumps dispensing it are marked according to the requirements of the Biofuel (Labelling) Regulations 2004 as amended. These latter regulations require that pumps dispensing diesel containing more than 7% FAME are labelled to say that the fuel is not suitable for all vehicles and that motorists should consult the vehicle manufacturer before using it.

2. PAH content of diesel is regulated in order to control formation of particulate emissions when the fuel is burnt in vehicle engines. However, the UK would see no immediate impact of the PAH content reduction as UK diesel already meets the proposed 8% limit with a considerable margin.

c) Requirements relating to non-road gas oil

1. Sulphur content - Article 4(2) of the Directive tightens the permitted sulphur content of gas oil used in non road mobile machinery (NRMM), agricultural tractors and recreational craft (commonly known as "red diesel") from the current 1000mg/kg to 10mg/kg (virtually 'sulphur free') from 1st January 2011, and prevents use of other liquid fuels exceeding this sulphur content in inland waterway and recreational craft. This is to enable the use of catalytic emissions control technologies on NRMM engines which would otherwise be poisoned by high fuel sulphur content. These emissions control systems are being introduced on new NRMM engines from 1st January 2011 in order to meet the NRMM Stage IIIB emissions standard in Directive 2004/26/EC. Stage IIIB does not at present apply to engines for inland waterway vessels, but tightening the sulphur content of fuels supplied for these applications is a precursor to proposals for tightening their emissions standards.

2. NRMM includes agricultural equipment, forestry equipment, construction equipment, forklifts, portable generators, railway engines, and inland waterway vessels. Similar emissions standards apply for

agricultural tractors by virtue of Directive 2005/13/EC. In the case of gas oil for use in rail vehicles, the regulations implement a one year later introduction of sulphur free gas oil as permitted by the Directive (i.e. rail gas oil must be sulphur free from 1st January 2012). This reflects the fact that the Stage IIIB emissions standard does not apply to engines for rail vehicles (both locomotives and diesel multiple units) until this later date and that there are no plans amongst UK rail operators to introduce Stage IIIB compliant engines in advance of the mandatory date.

3. The Article also allows Member States to accommodate minor contamination in the supply chain by permitting up to 20mg/kg sulphur content in non road gas oil at the 'point of final distribution to end users' (while requiring no more than 10mg/kg sulphur content as the fuel leaves the refinery or import terminal). Given that this will have a negligible impact on emissions control technology, and that it is extremely difficult to deliver gas oil to users at 10mg/kg sulphur due to contamination in the distribution chain, the regulations implement this permitted flexibility for gas oil supplied in the UK.

4. Article 2 of the Directive adds 'recreational craft' (as defined in Directive 94/25/EC) to the list of equipment types for which gas oil sulphur content is controlled. It is important to note that the requirements of the Directive and the regulations apply only to gas oil sold for use in mobile applications and do not apply to gas oil sold for heating or stationary, power generation applications.

d) Requirements relating to fuel additives

Article 8a sets a limit on the manganese content of fuel of 6 mg/litre from 1st January 2011 and 2mg/litre from 1st January 2014 and requires a label to be displayed where fuels containing metallic additives are sold. This reflects concerns that some metallic additives may impair the functioning of certain vehicle technologies or that they may result in emissions of particles containing metallic compounds which could have adverse health implications. However, metallic additives are not used in UK fuel so this provision is not expected to have any practical impact on UK fuel supplies.

iv) Rationale for Government Intervention

Petrol, diesel and gas oil fuel quality requirements are set at an EU level in order to ensure a harmonised market, both for the fuels themselves and also for machinery/vehicles that use them. The EU requirements are implemented into UK law.

The delivery of the air quality benefits expected from the emissions limits in the Non-Road Mobile Machinery EU directive 2004/26/EC is dependent upon use of the correct fuel quality. Since there is a cost implication in removing sulphur from off-road gas oil it is unlikely that the required fuel quality will not be made available unless reduced sulphur content is made mandatory. Therefore these regulations will make reduced sulphur content mandatory for NRMM gas oil.

At present, fuel quality legislation restricts the ethanol content of petrol to 5% by volume. This restricts reduction in lifecycle greenhouse gas emissions from petrol by limiting the use of bioethanol. Legislative amendments are therefore required in order to relax the statutory limit on ethanol, thus assisting in the uptake of biofuels and reducing road transport CO₂ emissions.

4. Simplification Measures and Administrative Burdens

The Directive provides for simplification of legislation by modifying two existing Directives (Directive 98/70/EC and Directive 1999/32/EC (Ref 6)). It also repeals an existing redundant Directive (93/12/EEC (Ref 7)). The overall effect is to create a shorter and clearer legislative framework, the removal of a current area of overlap and less ground for legal uncertainty. In addition the Directive includes elements which relax current controls on petrol ethanol content (regulated primarily to ensure compatibility of petrol with vehicles in the fleet) in order to remove current legislative restrictions on the uptake of biofuels. This relaxation in legislative requirements reflects the fact that most modern vehicles are compatible with higher ethanol blends in petrol, up to 10%. At the same time the legislation requires the continued availability of petrol with not more than 5% ethanol for vehicles not compatible with higher ethanol blends.

The proposed UK Regulations also delete provisions in the current Motor Fuel (Composition and Content) Regulations which are now spent.

5. Consultation

Within Government

During discussions in EU fora, the Department developed the initial version of this IA (Ref 8) in close co-operation with other Government Departments with a key interest in biofuels and fuel quality, namely DECC, BIS and DEFRA, and in consultation with the Devolved Administrations.

Public Consultation

A public consultation on the European Commission's original proposal was held in 2007,(Ref 9) involving industry and other stakeholders. The Department took account of responses received in further developing its position in relation to the proposed Directive.

A public consultation on the draft regulations began on 30 March 2010 for a period of 12 weeks (Ref 10). Ministers subsequently agreed to an extension of the consultation period to 30 September 2010 following representations made by maritime organisations, many of which had not been included in the original consultation list.

These, and other organisations were primarily concerned about the consequences of the introduction of sulphur free gas oil for the operation of engines in equipment and boats. This concern was mainly directed at a potential indirect impact of the requirement, which was that fuel suppliers, having limited distribution and storage facilities, might opt to meet the sulphur free gas oil requirement by supplying road diesel. Most road diesel contains some FAME biodiesel and this is known to increase the risk of microbiological contamination of fuel in the presence of water. In addition FAME has a shorter storage life than fossil diesel, suffering oxidation, which can precipitate solids, if stored for in excess of 6-12 months. This could potentially leads to risks of fuel filters being blocked by contaminated fuel resulting in engines stopping.

Shipping users considered themselves to be particularly susceptible due to such factors as the practice of storing laid-up boats with full fuel tanks (to prevent condensation and corrosion) and the difficulty of accessing vessel fuel tanks for inspection and removal of water. In addition safety implications of engine stoppages are greater in shipping than in land-based NRMM, especially in the case of larger vessels and vessels operating out to sea.

Although gas oil for stationary applications is not covered by the regulations, concerns about indirect impacts on the reliability of standby emergency generating equipment, if this was also supplied with gas oil containing FAME, were expressed by many of the country's main electricity supply companies. A number of consultees in these sectors and in the farming and construction sectors thought that the consultation version of the Impact Assessment did not reflect the costs to users of using the new fuel, particularly where it was likely to contain biofuels.

These concerns expressed by stakeholders are addressed in more detail in section 7 below, and in Annex 2 which details the input assumptions used to revise the estimated cost impact of the regulations. A full summary of all comments received on this and other aspects of the Regulations and the Department's response to these will be placed on the DfT Consultation website. (www.dft.gov.uk/consultations/closedconsultations).

6. Options

Option 0 Do not implement the Directive

Option 1: Implement the Directive

7. Costs and Benefits

Sectors and Groups Affected

The main sectors affected will be oil refining, distribution and retail businesses, fuel consumers and users, including owners and operators of non road mobile machinery (including inland waterways vessels), tractors and recreational craft

7A. Benefits

Option 0: Do not implement the directive

Economic - There would be no economic benefits if the Directive were not implemented.

Environmental - There would be no significant environmental benefits to the UK in not implementing the directive.

Social - There would be no social benefits in not implementing the Directive.

Option 1 Implement the directive

Petrol Vapour Pressure Limits

There will be no additional benefits arising from continuation of the current petrol vapour limits during the summer period for which the Government has applied to the European Commission under the terms of Article 3(5).

Ethanol- Petrol Blends

The Regulations permit increased ethanol content in petrol in support of increasing biofuel roll-out.(being encouraged by the Renewable Fuels Obligation (Ref 11) and forthcoming amendments to it). Since the increased limit is entirely permissive, and there is no minimum ethanol content limit, there are no direct benefits. The object of this provision is to act as an enabler to the CO2 reduction targets contained in Article 7a of the Directive and the transport biofuels target in the Renewable Energy Directive (2009/28/EC), (Ref 12) which are being implemented by means of separate regulations. The costs and benefits of increasing the quantity of ethanol in petrol will therefore be the subject of the Impact Assessments which will accompany these separate regulations.

Diesel Polycyclic Aromatic Hydrocarbon (PAH) Content

As indicated above, the UK would see no change as UK diesel already meets the proposed 8% limit with a considerable margin. There are therefore no benefits associated with this requirement.

Fuel Additives

There is negligible use of metallic additives such as manganese in the UK. There are therefore no benefits associated with this requirement.

Off-Road Gas Oil Requirements

Lower sulphur gas oil is required for the operation of the emissions control technology needed to meet the EU Stage IIIB and subsequent Stage IV emissions standards for non-road mobile machinery and tractors prescribed in Directives 2004/26/EC and 2005/13/EC. In particular the Stage IIIB standard requires fuel with a sulphur content below 50mg/kg, as the catalytic emissions control systems being used to meet these standards would otherwise be irreversibly damaged by high fuel sulphur content. This would result in engines stopping. The emissions savings from Stages IIIB and IV were estimated and included in a Regulatory Impact Assessment, <http://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/consultations/aboutia/ria/nrmmemissions?page=1> and are reproduced here to indicate the benefits which will be enabled by the removal of sulphur. However, as these benefits have already been attributed to the emissions regulations, they have not been included on the Summary Analysis and Evidence sheet for this option.

The emissions savings were calculated using emissions inventory estimates for the new emissions limits and include both those from rail as well as other NRMM engines. The table below shows the UK emissions savings which each standard is estimated to bring relative to a baseline of Stage IIIA standards (consequently the benefits listed for the two stages are not cumulative). The estimates are if the full NRMM fleet were brought to the respective standard, but in fact Stage IV compliant machinery will begin to enter into use before the fleet is fully Stage IIIB compliant.

	NOx (ktonnes p.a.)	PM (ktonnes p.a.)
Stage IIIB	4- 6	1.6 - 2.9
Stage IV	11 - 20	1.6 - 2.9

Using the current damage costs for NOx and PM10 these equate to the following monetised benefits at 2010 prices:

		£m p.a.
Stage IIIB	Low	14
	High	86
Stage IV	Low	19
	High	100

However, it should be remembered that the introduction of 10mg/kg sulphur (virtually 'sulphur free') gas oil does not by itself deliver these benefits, rather it enables use of the emissions control technology which does deliver these benefits. For this reason these costs are not included in the summary sheets, they are presented here for context.

Indirectly the introduction of sulphur free gas oil is however predicted to deliver some greenhouse gas benefits. This is because some fuel suppliers intend to meet this requirement by supplying road diesel, containing FAME biodiesel for NRMM use. Based on information provided by fuel suppliers the Department estimates that this will account for 25% of NRMM gas oil supply. This is estimated to deliver the following lifecycle greenhouse gas benefits.

	Global GHG Savings (MTCO2)	Net Sectoral Change (MTCO2)		Undiscounted Monetised GHG Savings (£m) 2010		
	lifecycle	traded	non-traded	Low	Central	High
2011	0.03	-0.01	0.07	1.9	3.9	5.8
2012	0.03	-0.01	0.08	2.2	4.4	6.6
2013	0.04	-0.01	0.09	2.5	5.0	7.6
2014	0.04	-0.01	0.09	2.5	5.0	7.5
2015	0.04	-0.01	0.09	2.5	5.0	7.6
2016	0.04	-0.01	0.09	2.5	5.1	7.8
2017	0.04	-0.02	0.09	2.6	5.0	7.7
2018	0.06	-0.02	0.09	2.6	5.1	7.7
2019	0.06	-0.02	0.09	2.6	5.2	7.9
2020	0.06	-0.01	0.09	2.7	5.4	8.2
TOTAL	0.44	-0.12	0.88	20.29	40.58	61.34

Note - the methodology used in calculating the GHG savings is at Annex 3

Leaded petrol limits

As leaded petrol sales are already below the reduced percentage allowance, and the UK is already fully compliant with health based air quality objectives on airborne concentrations of lead, there will be no benefits from this requirement of the regulations.

7B Costs

Option 0: Do not implement the directive

Economic - There would be no economic costs if the Directive was not implemented as proposed. The UK would however be subject to infraction proceedings by the European Commissions leading ultimately to fines which could be unlimited.

Environmental - There would be no environmental costs if the Directive was not implemented as proposed.

Social - There would be no social costs in not implementing the Directive.

Option 1 Implement the directive

Petrol Vapour Pressure Limits

There would be no additional costs in the continuation of the petrol vapour pressure limits for the summer period which currently apply in the UK. This is however subject to the European Commission approving the UK's application for this derogation. Should the UK not be successful in its application, additional costs would be incurred by the UK oil industry. The UK Petroleum Industry Association estimate that the cost of compliance with a 60kPa vapour pressure limit during the summer period would be £150m per annum, requiring both capital investment and increased operating costs. Some offsetting revenue can be generated from sale of the higher volatility hydrocarbons removed, although UKPIA note that these will be relatively low value C5 hydrocarbons (e.g. pentane). These costs have not been included on the Summary sheet as the regulations maintain the current 70kPa derogated vapour pressure limit. In the event that the Commission do not approve the UK's application, further amendments to the regulations and an accompanying Impact Assessment will be required and these costs will be included in that Impact Assessment.

Ethanol- Petrol Blends

Since the increase in the maximum permissible ethanol content of petrol is a relaxation of regulatory requirements, and these regulations impose no obligation to supply fuels of increased ethanol content, there are no costs associated with it. As discussed earlier this measure is an enabler for high ethanol content to assist in meeting fuel lifecycle greenhouse gas reductions and biofuel uptake targets. The economic costs of supplying petrol with increased ethanol content in order to meet these targets will be included in the Impact Assessments accompanying the regulations implementing these targets. In addition to the monetary cost of these fuels the Department's emissions test data suggests that 10% ethanol in petrol increases emissions of acetaldehydes significantly. Although these are only in trace quantities they are potent ozone precursors. DEFRA suggest that at the levels observed this could lead to transient, rather than sustained, increases in ambient ozone concentrations. However it has not, at present, been possible to estimate the quantity of this.

Diesel Polycyclic Aromatic Hydrocarbon (PAH) Content

As UK fuel already meets the proposed limits there are therefore no costs associated with compliance.

Fuel Additives

Given the negligible use of manganese or other metallic additives in UK fuel no costs are anticipated for complying with these elements of the regulations.

Off-Road Gas Oil Requirements

The table below summarises the costs for fuel suppliers and users of mandating sulphur free gas oil over a 2010-2019 assessment period. These estimates cover the costs arising as a result of these Regulations. Costs associated with new NRMM emissions control technology were accounted in the Regulatory Impact Assessment (Ref 14) accompanying regulations implementing Directive 2004/26/EC. and are not included here. The cost assumptions on which these figures are based are at Annex 2. This aspect of the Regulations is assumed to impose costs in six specific areas which are discussed in detail below:-

Annual recurring costs of sulphur free gas oil.

Year	£m pv desulphurisation	£m pv FAME biofuel		
		Low	Central	High
2011	30	10.7	9.2	10.7
2012	29	6.3	10.2	11.9
2013	28	6.4	11.2	13.1
2014	27	5.5	10.5	12.0
2015	26	5.0	9.9	11.3
2016	25	4.3	9.4	10.6
2017	24	3.9	8.7	10.0
2018	23	4.7	8.5	9.8
2019	23	5.0	8.0	9.4
2020	22	5.1	8.0	9.5
TOTAL PV	256	57	94	108

Transitional costs attributable to sulphur free gas oil.

Item	£m		
	Low	Central	High
Fuel marking costs	1.3		
Fuel storage costs	33		
Water removal - marinas	0.007	0.011	0.014
Water removal - recreational vessels	2.8	9.7	17
Water removal - commercial vessels	0.29	0.48	1.5
Replacing fuel filters - general NRMM	0.32	2.6	4.8
Replacing fuel filters - rail	0.032	0.070	0.11
Replacing fuel filters - recreational vessels	0.033	0.26	0.50
Replacing fuel filters - commercial vessels	0.022	0.076	0.13
Replacing fuel seals	0	0.53	1.1
TOTAL	38	48	59

Fuel costs

The proposed reduction in gas oil sulphur content will increase refining costs. Suppliers estimate that, based on the cost difference between high sulphur gas oil and road diesel oil prior to the introduction of biodiesel, the increase in the unit cost of the fuel will be around 1p per litre. The total quantity of gas oil supplied for NRMM use (including construction, agriculture inland shipping and rail) is assumed to be 2670 ktonnes or 30,785 000 million litres per annum based on data from the Digest of UK Energy Statistics 2009.

(http://www.decc.gov.uk/assets/decc/Statistics/publications/dukes/1_20100208131106_e_@@_dukes09.pdf) Information obtained from suppliers, by the Department indicates that about 75% of fuel supplied for off road use will have no FAME biodiesel content.

The remaining 25% of fuel supplied will be road quality diesel, containing FAME biodiesel and marked with an excise marker as it leaves large fuel distribution terminals. The Department estimates that the additional cost of supplying downgraded road diesel with FAME, over and above that of providing sulphur free fuel to be in the range 0.8p to 1.3 p per litre initially, rising to 0.9 to 1.7 p per litre by 2020 as biodiesel content of diesel increases.

Implementation of the flexibility allowing gas oil sulphur content of up to 20mg/kg at point of delivery to the end user (to accommodate minor contamination from higher sulphur fuels) will avoid additional costs for dedicated road tankers etc, which might otherwise be required to remove the risk of supplying fuel at

slightly over 10mg/kg sulphur. The 20mg/kg limit permits contamination with up to 1% of 1000mg/kg heating gas oil. Fuel suppliers advised during negotiations on the Directive that good housekeeping practices enabled contamination to be controlled to these levels without the need for separate tankers for the two fuels.

Fuel marking costs

As indicated above, based on information from fuel suppliers, a proportion of sulphur free gas oil will in practice be road diesel which has been marked with an excise marker for non-road use. This would take place at large distribution terminals and, based on discussions with fuel suppliers. It is assumed that, of the 44 UK primary distribution terminals, the number installing marking facilities will be in proportion to the proportion of gas oil supplied by “downgrading” road diesel. Based on consultations with suppliers it is assumed that this is 30% (the 25% road diesel containing FAME referred to above plus a further 5% road diesel without FAME). Marking facilities are estimated to cost £100,000 per terminal.

Storage costs

Consumers using gas oil for both heating and NRMM use (e.g. cereal farms using gas oil for grain drying) will either need to install additional fuel tankage to store both high sulphur and sulphur free fuels or switch to the more expensive sulphur free gas oil for both uses. It is assumed that the former approach will be used as this has a significantly lower cost. It is assumed that 50% cereal farm holdings will install new tanks (some 32,512 holdings according to Defra data). Estimated costs are £1,028 per tank.

Water removal from fuel tanks

As discussed above, a proportion of sulphur free NRMM gas oil will be road quality diesel and contain FAME biodiesel. Increased care is needed in the storage of such fuel. The oxidation stability of biodiesel is poorer than that of current gas oil. Over time oxidation can precipitate solids with potential to block filters in fuel distribution systems or in off-road equipment fuel systems. To minimise the likelihood of this occurring, users will need to take particular care to ensure a fuel turnover period of once every 6-12 months. More significantly fuel containing FAME biodiesel is more prone to outbreaks of microbiological contamination than current gas oil. Bacterial growth can also result in formation of solids that block fuel filters bringing engines to a stop. This can be prevented by ensuring that fuel storage tanks do not contain any water and conducting monthly checks that both storage and vehicle/vessel tanks remain free of water.

In most sectors storage tanks are located above ground and fitted with water drainage taps enabling simple and rapid removal of water. No cost has been assumed in respect of these therefore. In the maritime sector however, stakeholders have indicated that almost all marina storage tanks are located below ground level. They estimate that there are some 114 fuel storage tanks at inland marinas, and have suggested that broadly 50-100% of these are not already subject to no routine cleaning at present. The cost of removing water as a precautionary measure by pumping it from underground tanks is estimated by ExxonMobil to be £500. As per the above estimates it is assumed that this action is required across 25% of marinas, in proportion to the proportion of sulphur free gas oil supplied with FAME content.

Access to remove water from fuel tanks in vessels is also generally poor according to vessel operators. A more costly process for cleaning for those vessels supplied with fuel containing FAME has therefore been assumed. Based on the 2008 survey undertaken by the Association of Inland Navigation Authorities (<http://www.aina.org.uk/>) and a survey undertaken by maritime stakeholders specifically for the purpose of this Assessment, the overall numbers of vessels operating on non-tidal sections of rivers, lakes and lochs, and so affected by the regulations, are estimated respectively at some 66,200 recreational craft and 516 commercial vessels. Stakeholders estimate that up to 100% of the former and 70% of the latter may not be subject to routine tank cleaning at present and that the cost of draining and cleaning a vessel's fuel tank could vary between £172 and £1000 for recreational craft and between £3000 and £15,000 (£5,000 most likely) for commercial vessels. Again, as per the above estimates, it is assumed that 25% of all vessels are supplied with fuel containing FAME and the cost of cleaning vessel tanks to remove water applies to these vessels only.

Cost of replacing fuel filters in NRMM and vessels

FAME biodiesel is also a better solvent than fossil gas oil. As a result use of gas oil containing FAME may loosen deposits already in fuel storage and dispensing systems and in fuel tanks on non-road equipment. Once loosened and in suspension in the fuel these deposits will accumulate on fuel filters,

which will then require, a one-time replacement. This will apply across NRMM (including inland waterway vessels) across all sectors where fuel containing FAME is used. Based on estimates for the agricultural sector provided by the National Farmers Union, the cost of replacement filters for off road equipment (including recreational craft) is assumed to be between £2 and £30. This cost is estimated to apply to 25% of the NRMM fleet (of approximately 714,000 machines) assumed to receive fuel containing FAME. The cost of replacement filter for commercial inland waterway vessels is estimated by maritime stakeholders to be of the order of £30-£300. Again this cost has been applied to 25% of the estimated 516 commercial vessels. This may overestimate the actual cost as some filters would have been replaced at an appropriate time under routine servicing arrangements.

Replacing of fuel pump seals

Engine manufacturers have indicated that off-road equipment manufactured or overhauled in the last 10 years should have no problems running on sulphur free gas oil. Fuel seals and pipes in a minority of older equipment may potentially be incompatible with sulphur free gas oil however and require one-off replacement This will depend upon such factors as individual fuel pump designs and the extent to which seals are exposed to the fuel. In the road sector, introduction of ultra low sulphur fuel in the late 1990's led to problems with only one design of fuel pump fitted to vehicles more than 25 years old. There are also reported to have been no problems in areas where sulphur free gas oil has already been supplied. It is anticipated therefore that any problems will be restricted to sectors where a significant proportion of the fleet is over 10 years old and which do not have routine maintenance regimes which would involve the rebuilding of fuel pumps at least every 10 years.

Based on research conducted by AEA Technology (Non-Road Mobile Machinery Usage, Life and Correction Factors www.airquality.co.uk/reports/cat15/0502141215 NRMM report Final November 2004 3.pdf) the only land based NRMM with a useful life significantly in excess of 10 years are rail vehicles, however these vehicles are subject to rigorous routine maintenance programmes. In the marine sector however a substantial proportion of recreational craft are over 10 years old and not subject to maintenance regimes which would include periodic rebuilding of fuel pumps. SMMT suggest that fuel seal failure rates would be expected to be only a fraction of a percent. However, bearing in mind the high average age of the recreational craft fleet a worst case fuel seal failure rate of 2% of the 66,200 recreation craft has been assumed. Costs in the range £250-£800 for rebuilding recreational craft fuel pumps in order to replace their seals are estimated by stakeholders.

Whilst these regulations do not apply to gas oil for use in heating or stationary applications it is probable that some fuel suppliers will supply sulphur free gas oil or road diesel with FAME for these purposes also. The same fuel storage and material compatibility issues mentioned above would apply for stationary and heating applications although these may be exacerbated by longer average fuel storage times and older fuel seal materials than are typical on NRMM. However, since the regulations do not apply to these applications, their operators may wish to make specific arrangements with their fuel suppliers to continue to be supplied with higher sulphur gas oil with no biodiesel/FAME content in order to ensure that these issues are not encountered.

Leaded petrol limits

There are no additional costs arising from the regulations.

8. Small Firms Impact Test

Oil refiners are generally large or medium sized enterprises. Small firms are involved in the distribution of road fuel and gas oil to end users. Since unit fuel cost increases incurred will be the same for large and small firms, the latter should not be disproportionately affected by fuel cost increases. Small firms such as farms and those involved in the boat hire/marina business may be disproportionately affected by the need for extra care of the fuel, particularly where the fuel contains FAME and may incur one-off costs for taking precautionary measures.

9. Competition Assessment

The requirements of these Regulations will apply equally to all fuel suppliers. No effect on competition is anticipated as a result of the changes in the fuel specifications introduced by these Regulations. The cost impact is expected to be similar across all firms in proportion to the quantity of fuel they supply.

The options proposed will not create higher costs for new fuel suppliers than for existing suppliers. However, upfront capital costs for any new entrant to the petrol and diesel market are high and

consequently new entrants are limited. The fuel market is not characterised by rapid technological change.

It is not anticipated that the increased costs to users associated with the fuel will have a significant effect on competition.

10. Legal Aid and Justices Impact Assessment

An assessment, undertaken in consultation with the Ministry of Justice, indicated that no impact on legal aid or judges is anticipated.

11. Greenhouse Gas impacts

The measure includes provisions intended to facilitate greater use of bioethanol by fuel suppliers which are aimed at achieving greenhouse reductions. These reductions will be the subject of a separate Impact Assessment which will accompany the regulations implementing aspects of the Directive relating to reducing the lifecycle greenhouse gas emissions of fuels. In addition, the requirement for sulphur-free gas oil is predicted to result in an estimated 25% of fuel supplies for NRMM begin provided in the form of road diesel with up to 7% biofuel content, This indirect effect of the regulations will therefore deliver greenhouse gas emissions savings of 0.03 Mtonnes CO₂ equivalent per annum initially, rising to 0.06 Mtonnes (See section &A above)

12. Wider Environmental issues

As indicated in sections 7A and 11 above the requirement for sulphur free gas oil will enable a reduction in pollution from NRMM and deliver indirect greenhouse gas emissions savings and the increase in permitted levels of bioethanol in petrol will facilitate the greater use of biofuels by fuel suppliers, enabling reductions in greenhouse gas emissions. The remaining elements of the proposal are not anticipated to have any further environmental impacts.

13. Health Impact Screening Test

As indicated in sections 3 and 7A the regulations will facilitate a reduction in NO_x and particulate emissions by enabling the use of new lower emission off-road equipment. This will contribute to meeting health-based air quality targets. The measure does not impact on other wider determinants of health or lifestyle-related variables. Neither will the measure impact on the demand for health or social care services. For these reasons it is judged that a full health impact assessment is not required.

14 Equality issues

An equality impact assessment screening proforma has been completed for this measure. The screening assessment found that the proposed measure was without impact in terms of equality issues.

15. Human Rights

The measure does not engage or impose any restriction on the 16 basic human rights in the Human Rights Act 2000.

16. Rural Proofing

As indicated above, where the requirement for sulphur free gas oil is met by supplying fuel containing FAME greater care will be needed by farmers and by operators of marinas situated on inland waterways in the use and storage of this fuel. The costs of doing so should be limited to one off replacements of fuel filters and/or seals on equipment (e.g. tractors) and/or storage tanks, though storage tanks at marinas and on inland waterway vessels may require additional work to remove any water. Similar considerations would apply if this quality fuel is also supplied for heating purposes (e.g. grain drying), although the regulations do not mandate use of sulphur free fuel for these purposes. The Department has developed guidance on these issues in conjunction with affected stakeholders and these are published on its website. There should be no increases in costs to rural communities in general over and above the costs borne by all fuel consumers

17. Enforcement, Sanctions and Monitoring

Enforcement provisions and sanctions with regard to non-compliance with the quality requirements of the amending Regulations will remain largely unchanged from the existing Motor Fuel (Composition & Content) Regulations which are made under the Clean Air Act 1993

(<http://www.legislation.gov.uk/ukpga/1993/11/contents>) However, since the Act applies only to motor vehicles and in the case of the sulphur content of fuel used in other engines to Great Britain only, it is necessary to make the requirements in relation to sulphur content in relation to Northern Ireland, and for metallic additives used in fuel intended for inland waterways vessels and recreational craft generally, under the powers of the European Communities Act to implement EU requirements. As a result the offences, penalties and enforcement provisions in the Clean Air Act are cited in the Regulations in respect of the aforementioned matters.

These provisions are likely to be exercised under existing enforcement arrangements by local authorities. Monitoring for compliance and reporting to the European Commission are already required under the Fuel Quality Directive.

18. Implementation and Delivery Plan

Implementation has been undertaken in close consultation with stakeholders. Advice to owners and operators of off road equipment and fuel storage facilities on the effects of sulphur free fuel with increased biofuel content has been prepared in consultation with stakeholders and has been made available on the Department's website. .

19. Sustainable Impact Development Test

The measure does not directly deliver air quality benefits and has a negative cost/benefit impact. Nevertheless it will ensure that the benefits forecast from an earlier measure which tightened emissions standards for NRMM will be delivered. Consequently the measure does not adversely impinge on sustainable development.

20. Summary and Recommendation

The Regulations will implement those elements of directive 2009/30/EC which specify new or revised requirements for fuel components which have an environmental impact. This will help reduce air pollutant and greenhouse gas emissions from road and off road transport

The former objective will be achieved principally by the requirement to reduce the amount of sulphur in gas oil ("red diesel") supplied for non road mobile machinery and recreational craft to 10 parts per million (virtually "sulphur free"). The latter objective will be achieved by increasing the permitted levels of ethanol in petrol and of biofuel in diesel.

Sulphur-free fuel is required for the reliable operation of the emission control technology needed to meet the latest emission standards for non-road mobile machinery and tractors. This technology will bring significant reductions in emissions of NO_x and particulates. These would not be realised however without the use of the new fuel because high levels of sulphur will poison the emission control system.

Increasing the permitted levels of ethanol in petrol is, in practice, a partial enabler to fuel suppliers for meeting the greenhouse gas targets for their fuels contained in Article 7a of the Directive and the transport biofuels targets in the Renewable Energy Directive, 2009/29/EC. These targets are being implemented by separate regulations. Provision is made in the Regulations for continuance of a supply of low ethanol petrol for older vehicles.

Most of the requirements are already met by fuel suppliers or are permissive and no additional costs are envisaged for these elements. Costs will be incurred however by gas oil suppliers and users as a result of the requirement for this fuel to be "sulphur free". These are attributable mainly to increased costs for refining, for red dye marking facilities where road diesel is supplied instead of gas oil, the need in certain cases for users to provide separate storage facilities, and, where FAME is contained in the fuel supplied, the need for additional measures by users to minimise microbiological contamination risks. The Regulations have adopted the derogation available under the Directive for fuel intended for rail engines but has not been able to do so in respect of agricultural tractors because of the appearance of new, sulphur-intolerant, emissions control technologies in this sector from the beginning of 2011. The Regulations also allow minor contamination in the supply chain as permitted in the Directive. The Department has been engaged in close consultation with stakeholders to raise awareness of the need for precautionary measures so as to minimise the impact of the measure.

The recommended course of action is to implement the requirements of the Directive as detailed in the Regulations.

Annexes

Annex 1 should be used to set out the Post Implementation Review Plan as detailed below. Further annexes may be added where the Specific Impact Tests yield information relevant to an overall understanding of policy options.

Annex 1: Post Implementation Review (PIR) Plan

A PIR should be undertaken, usually three to five years after implementation of the policy, but exceptionally a longer period may be more appropriate. A PIR should examine the extent to which the implemented regulations have achieved their objectives, assess their costs and benefits and identify whether they are having any unintended consequences. Please set out the PIR Plan as detailed below. If there is no plan to do a PIR please provide reasons below.

<p>Basis of the review: [The basis of the review could be statutory (forming part of the legislation), it could be to review existing policy or there could be a political commitment to review];</p> <p>Article 9 of the Directive requires the European Commission to review the requirements of the Directive and report to the European Parliament and Council accompanied, where appropriate, by a proposal for amendments to the Directive, by 31 December 2010 and every 3 years thereafter.</p>
<p>Review objective: [Is it intended as a proportionate check that regulation is operating as expected to tackle the problem of concern?; or as a wider exploration of the policy approach taken?; or as a link from policy objective to outcome?]</p> <p>The Commission's review is intended to check that the legislation is delivering the expected air quality benefits and explore the necessity and scope for further improvements in fuel quality standards. It will complement a review currently being undertaken by the European Commission of the scope and necessity for improvements in emission standards for non road mobile machinery which was required under Directive 2004/26/EC.</p>
<p>Review approach and rationale: [e.g. describe here the review approach (in-depth evaluation, scope review of monitoring data, scan of stakeholder views, etc.) and the rationale that made choosing such an approach]</p> <p>Review of air quality monitoring and emissions test data. Gathering data from stakeholders on outturn costs.</p>
<p>Baseline: [The current (baseline) position against which the change introduced by the legislation can be measured]</p> <p>The baseline is expected to be that chosen for assessment of directive 2004/26/EC relating to emissions from non-road mobile machinery which assumed no further emissions standards following the Stage II NRMM standard.</p>
<p>Success criteria: [Criteria showing achievement of the policy objectives as set out in the final impact assessment; criteria for modifying or replacing the policy if it does not achieve its objectives]</p> <p>Entry into market of new NRMM with emissions reducing technologies. Anticipated reductions in emissions have been delivered.</p>
<p>Monitoring information arrangements: [Provide further details of the planned/existing arrangements in place that will allow a systematic collection systematic collection of monitoring information for future policy review]</p> <p>Defra have a continuous programme of monitoring and modelling air quality monitoring that will enable delivery of air quality benefits to be assessed. The Department will liaise with industry bodies to ascertain the rate of introduction of new NRMM with new emissions control technologies.</p>
<p>Reasons for not planning a PIR: [If there is no plan to do a PIR please provide reasons here]</p>

Annex 2: Cost Assumptions

General

The regulations are assumed to impose costs in six specific areas;

- i) Increased fuel costs.
- ii) Costs of installing facilities at distribution terminals where road diesel is downgraded to inject excise marker into the fuel as it is loaded into road tankers.
- iii) Costs for installing additional storage tanks to segregate sulphur free NRMM gas oil from high sulphur heating gas oil, where businesses use gas oil for both applications.
- iv) Costs for removing water from inland waterway storage and inland vessel tanks where downgraded road fuel is supplied. This is to address the increased risk of microbiological contamination in fuels containing Fatty Acid Methyl Ester (FAME) biodiesel when exposed to water.
- v) Costs of a one-off replacement of fuel filters on all NRMM using fuel containing FAME.
- vi) Costs of replacing fuel pump seals on a very small proportion of older engines where original seals are incompatible with low sulphur fuels and have not been replaced in routine maintenance in the last 10 years.

Items ii to vi are one-off transitional costs, item i is an ongoing annual cost. Input assumptions for cost estimates are summarised below.

i) Fuel costs

Parameter	Assumption	Source/Justification
Cost differential between current gas oil and dedicated sulphur free gas oil	1p/l	Fuel quality stakeholder group consensus. Based on differential between diesel and gas oil trading prices prior to biodiesel introduction
Additional cost differential for downgraded road diesel containing FAME	Initially 0.8 - 1.3 p/l (1.2p/l central) Rising to 0.9 - 1.7p/l (1.2p/l central) by 2030	DfT estimate
UK annual NRMM gas oil consumption	674 ktonnes rail 979 ktonnes inland shipping 110 ktonnes construction 50% of 148 ktonnes agriculture 50% of 1666 ktonnes "other industry" TOTAL = 2670 ktonnes	Digest of UK Energy Statistics 2009 http://www.decc.gov.uk/assets/decc/Statistics/source/oil/dukes3_2-3_4.xls For agriculture and "other industry", where gas oil is used for both heating and NRMM use, a 50% split is assumed in the absence of other evidence.
Litres of gas oil per tonne	1153	Digest of UK Energy Statistics 2009

Proportion of gas oil supplied with no FAME content	75%	DfT estimate based on input from individual companies & DfT estimate of their market coverage.
Proportion of gas oil supplied containing FAME	25%	DfT estimate based on input from individual companies & DfT estimate of their market coverage.

Total fuel costs are estimated by multiplying the 1p/l additional cost by the annual NRMM fuel consumption (converted to litres) and adding the additional pence per litre cost of FAME, specific to each year, for the 25% of NRMM fuel assumed to be supplied containing FAME. The additional cost per litre for FAME content is estimated on the basis of the following assumptions and methodology.

Biodiesel price projections – these have been produced by DEFRA analysts using the OECD Aglink-Cosimo model.

Pence per litre			
Year	low	central	high
2010	66	70	73
2011	64	69	72
2012	66	70	74
2013	67	71	75
2014	67	70	75
2015	67	70	76
2016	66	70	77
2017	66	70	77
2018	66	70	78
2019	66	70	79
2020	67	72	81

Fossil diesel price projections – these have been produced using the DfT fuel price forecasting model and are based upon DECC oil price projections

Pence per litre			
Year	low	central	high
2010	30	39	46
2011	30	40	47
2012	31	40	49
2013	31	41	51
2014	32	41	53
2015	33	42	55
2016	34	42	56
2017	34	43	58
2018	34	43	60
2019	34	44	61
2020	34	44	63

ii) Marking costs

Parameter	Assumption	Source/Justification
Number of UK fuel distribution terminals	44	UK Petroleum Industry Association http://www.ukpia.com/Libraries/Download/Map-Key.sflb.ashx
Proportion downgrading & marking road diesel	30%	DfT estimate of the proportion of sulphur free gas oil likely to be supplied by downgrading road diesel. Based on input from individual fuel companies & DfT estimate of their market coverage (3 out of 9 companies responding to DfT enquiries intended to supply downgraded road diesel)
Marking facility costs	£100,000	UKPIA estimate.

The transitional costs of installing marking facilities are estimated by multiplying the above figures.

iii) Storage costs

Where gas oil users use fuel both for powering NRMM and for heating applications then, if they wish to avoid the higher cost of using sulphur free gas oil in their heating applications also, they would need to install additional fuel tanks to segregate the fuel used for each purpose. The only sector identified as having significant demand for both applications is the cereal farming sector where gas oil is commonly used for grain drying.

Parameter	Assumption	Source
No of locations affected	32,517	50% of cereal farm holdings (DEFRA data) assumed to have gas oil storage tanks used for grain drying. As per assumption used in consultation IA, not challenged by consultees.
Cost per additional storage tank	£1028	5000 litre storage tank cost from internet search. As per assumption used in consultation IA, not challenged by consultees.

The total transitional cost of installing additional fuel tanks is estimated by multiplying the above figures.

iv) Water Removal from Fuel Tanks

For the majority of applications, above ground fuel storage tanks are fitted with water drain taps and there are assumed to be no costs in removing water from these tanks. However,

discussions with inland waterway stakeholders identified that on-land or pontoon storage tanks at marinas are not commonly fitted with such water drain facilities.

Parameter	Assumption	Source
Number of inland waterway fuel storage tanks	114	237 inland marinas - British Marine Federation. Inland waterway stakeholders estimate that no more than 50% of these supply fuel.
Proportion supplied with gas oil containing FAME	25%	DfT estimate based on input from individual companies & DfT estimate of their market coverage.
Proportion not subject to routine cleaning schedule at present	50-100% marinas	BMF suggestion
Cleaning cost	£500	ExxonMobil input on cost of removing water from fuel storage tanks by pumping

Total cost of clearing inland waterway fuel storage tanks of water content prior to taking deliveries of fuel containing FAME were estimated by multiplying the above factors together.

According to input from vessel operators, accessibility of fuel tanks on inland waterway vessels is poor and they are seldom fitted with water drain facilities. For this reason it has been assumed that, where fuel containing FAME is supplied a more fundamental and costly process will be required for clearing tanks of water. The following input has been used.

Parameter	Assumption	Source/Justification
No of vessels	66,200 recreational	75% of the 88,267 vessels on the Association of Inland Navigation Authorities survey. 75% is inland waterway stakeholder estimate of proportion which are diesel engined
	516 commercial	Inland waterway stakeholder input
Proportion supplied with gas oil containing FAME	25%	DfT estimate based on input from individual companies & DfT estimate of their market coverage.
Proportion of vessels not subject to routine tank cleaning at present	100% recreational 70% commercial	Inland waterway stakeholder group views
Cost of cleaning a	£172- £1000	Input from Great Ouse

typical vessel tank	(recreational vessels) £3000-£15000 (£5000 best estimate) commercial vessels.	Boating Association agreed by inland waterway stakeholder group Inland Waterway stakeholder group input.
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Total costs of vessel tank cleaning have been estimated by multiplying the above figures for recreational craft and for commercial vessels and summing the results.

v) Costs of NRMM Fuel Filter Replacement

FAME biodiesel is a good solvent. Advice from fuel suppliers is that it will loosen deposits in fuel tanks. These deposits would be captured by fuel filters, necessitating a one-off replacement of fuel filters after around 3 tankfuls of fuel.

Parameter	Assumption	Source
NRMM Fleet Size	643,772	http://www.airquality.co.uk/reports/cat15/0502141215_NRMM_report_Final_November_2004_3.pdf
Rail fleet size	4285	http://www.airquality.co.uk/reports/cat15/0502141215_NRMM_report_Final_November_2004_3.pdf
Inland Waterway fleet size	66,200 recreational craft 516 commercial vessels	As above
Proportion supplied with gas oil containing FAME	25%	DfT estimate based on input from individual companies & DfT estimate of their market coverage.
Filter cost	£2 - £30 NRMM including recreational vessels £30-300 commercial vessels	NFU consultation response

Filter replacement costs have been estimated by fleet sizes by the proportion of fuel containing FAME and the filter costs. This is likely to overestimate the costs as some fuel filters will be routinely replaced during servicing, however it has not been possible to account for this in the estimate.

vi) Costs of Replacing Fuel Pump Seals

Removal of sulphur from fuel also results in a reduction in aromatic content of the fuel. Some older fuel pump sealing materials after prolonged exposure to high aromatic content fuel can shrink if exposed to low aromatic content fuel resulting in leakage of fuel. Engine manufacturers have indicated that any engines manufactured within the last 10 years, or any fuel pumps overhauled in the last 10 years, will be fitted with seals that are compatible with low aromatic content fuel. Incidence of fuel seal shrinkage on older equipment is dependent on individual fuel pump designs and the extent to which seals are exposed to the fuel. In the on-road sector introduction of ultra-low sulphur fuels led to leakage problems with only one design of fuel pump fitted to vehicles of c.25 year's age. For this reason incidence of leakage is anticipated to be very low, and limited to sectors with a significant proportion of equipment over 10 years old and not subject to routine maintenance of fuel pumps. According to AEA technology² the only NRMM sector where the fleet has a useful life significantly in excess of 10 years is the rail sector, and rail vehicles are subject to maintenance regimes which would involve rebuilding fuel pumps at intervals of less than 10 years. However, AEA's report did not cover the inland

² http://www.airquality.co.uk/reports/cat15/0502141215_NRMM_report_Final_November_2004_3.pdf

waterway sector. Input from stakeholders indicates that a substantial proportion of the fleet is over 10 years old and, with the exception of commercial vessels, not subject to routine rebuilding of fuel pumps. The following input has therefore been used to estimate the cost of replacing fuel pump seals in response to leakage of a small proportion of recreational craft fuel pumps.

Parameter	Assumption	Source
Inland waterway fleet size	66,200	As above
Proportion of fleet requiring new seals	0-2% (1% central)	Engine industry expert opinion is a fraction of a percent generally However recreational craft have a high average age so a worst case assumption of 2% has been used.
Cost of rebuilding a fuel pump	£250-800	Low end of range is from Society of Motor Manufacturers and Traders, high end from Great Ouse Boating Association.

The total transitional cost of replacing incompatible fuel seals has been estimated by multiplying the above figures.

vi) Greenhouse Gas Benefits

Lifecycle greenhouse gas savings delivered by the proportion of gas oil supplied containing FAME biodiesel are estimated using the following assumptions and methodology. Lifecycle greenhouse gas savings per unit of FAME biodiesel relative to those of fossil gas oil are assumed to move in line with the minimum permitted under the Renewable Energy Directive sustainability criteria. These are as follows;

Year	Minimum GHG saving
2011	35%
2012	35%
2013	35%
2014	35%
2015	35%
2016	35%
2017	50%
2018	50%
2019	50%
2020	50%

Greenhouse gas savings have been monetised using DECC carbon price projections for the traded and non-traded sectors

	TRADED			NON-TRADED		
	£/tonne CO ₂			£/tonne CO ₂		
	low	central	high	low	central	high
2011	7	14	18	26	52	79
2012	8	14	18	27	53	80
2013	8	15	19	27	54	81
2014	8	15	19	27	55	82
2015	8	15	19	28	56	84
2016	8	15	19	28	57	85
2017	8	16	20	29	57	86
2018	8	16	20	29	58	87
2019	8	16	20	30	59	89
2020	8	16	21	30	60	90

Annex 3 — GHG - methodology used for calculating monetised savings

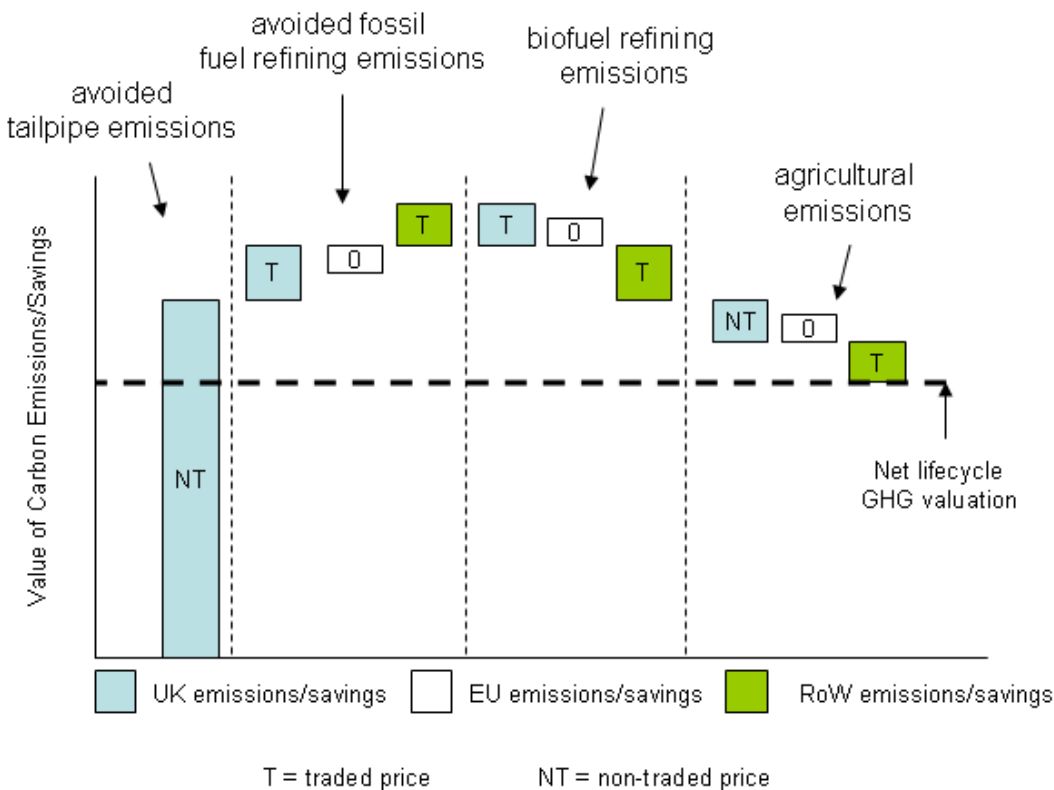
In order to monetise the net change in lifecycle GHG emissions which are projected to occur under a GHG savings obligation, GHG savings and emissions have been split into various sectors and valued at the relevant carbon price. The monetised value of GHG emissions is subtracted from the value of GHG savings to produce a value for lifecycle GHG savings.

Figure A3/1: Allocation of GHG savings/emissions to carbon prices

	UK	EU	RoW
Tailpipe	non-traded	n/a	n/a
Industry	traded	zero	traded
Agriculture	non-traded	zero	traded

Geographically, emissions/savings have been split into the UK, the EU (ex-UK) and rest of the world. From a sectoral point of view, GHG emissions savings have been split into i) tailpipe savings from displaced fossil fuel (non-traded sector carbon price used); ii) industry savings from lower emissions due to less fossil fuel refining (carbon price location dependent); industry emissions from biofuel refining (carbon price location dependent); and iv) agricultural emissions from feedstock production (carbon price location dependent). The allocation of savings/emissions to carbon price is summarised in figure A3/1.

Figure A3/2 Graphical Illustration of GHG accounting methodology



UK transport sector (tailpipe) and agricultural emissions are valued using the non-traded sector carbon price in line with cross-government GHG guidance³. There are no tailpipe emissions in the EU (ex-UK) or the rest of the world as this is a UK policy. EU (ex-UK) emissions/savings have not been valued as any change is assumed to be offset under individual member states' carbon reduction schemes and the EU ETS. Emissions/savings in the rest of the world are valued at the traded price in line with cross-government GHG guidance.

³ http://www.decc.gov.uk/assets/decc/statistics/analysis_group/122-valuationenergyuseggemissions.pdf

Annexes

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Add annexes here.