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RTFO Impact Report (Nov 2008)

Impact of the Renewable Transport Fuels Obligation (Amendment) Order 2009 on the availability of automotive fuels in the HIE Region

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Executive Overview

The initial Report in July highlighted the fact that the introduction of E5 bio-gasoline (as opposed to B5 bio-diesel) as part of the UK Government's Renewable Transport Fuels Obligation (RTFO) presented some significant challenges, primarily due to the chemical properties of the product. In essence the product requires more onerous product handling criteria given the propensity to denature when coming into contact with water. The impact of the recent Renewable Transport Fuels Obligation (Amendment) Order 2009 simply moves the dates back - the challenges remain the same. The key issue of the approval of 7% blend bio-diesel (B7) which would help push the required date back for the introduction of bio-gasoline is not part of this Amendment Order or the consultation process. The change to 7% blend bio-diesel (B7) however is in Article 18 of the European Renewable Energy Directive (RED) and it is being pursued by the European Committee for Normalisation (CEN) – a European standards body.

Due to the uncertainty Grangemouth refinery has stopped preparing for the introduction of E5 bio-gasoline. Distribution remains the main area of concern given the fact that bio-gasoline cannot be shipped by the current marine vessel fleet. At some stage this potentially will lead to the unavailability of the product in the northern parts of the mainland HIE Region where supply is via the sea-fed terminal at Inverness and on the islands. Investment in a blending plant in Inverness would appear to be a solution for that area but there is still no evidence that one is being planned. The islands remain the main cause for concern as the economics of such blending facilities are probably not robust given the low volumes.

Furthermore, the issues also extends to the retail petrol station network although the timeframe has been extended to probably 2010/11 There is considerable cost associated with introduction of E5 bio-gasoline and given the economic fragility of the network due to the small size of petrol stations, the age of facilities and the low sales throughput at the majority, there is the risk that many could close without swift intervention.

Introduction

This report has been commissioned by the Highlands and Islands Enterprise and follows on from the original Report provided by Experian Catalist in July 2008 entitled "RTFO Impact Report - Impact of Renewable Transport Fuels Obligation on Gasoline (Petrol) availability in the HIE Region". The July report covered the following topics:

- Renewable Transport Fuel Obligation Legislation and the proposed introduction of bio-fuels – to reach 5% of all road fuels by 2010/11
- Bio-Fuel classifications (diesel & petrol)
- Bio-gasoline (petrol) production
- Bio-gasoline chemical properties
- Bio-gasoline storage, transport and handling
- Current Product Supply, Distribution and Retailing within HIE
- Implication of RTFO E5 Bio-gasoline Implementation on Supply, Distribution and Retailing (in the HIE Region)

- Economic and Practical Impact of E5 Bio-gasoline introduction with respect to supply, distribution and retailing (in the HIE Region)

Requirement for this Report – a consequence of the Gallagher Review

In February 2008 the Secretary of State for Transport invited the Renewable Fuels Agency (RFA) to undertake a review of the indirect effects of the introduction of bio-fuels. This was done in the light of new evidence suggesting that an increasing demand for bio-fuels might indirectly cause carbon emissions to *rise* because of land use change, and concerns that demand for bio-fuels may be driving food insecurity by causing food commodity price increases.

The review published on 7th July 2008, and now know as the Gallagher Review, noted that mechanisms do not yet exist to accurately measure, or to avoid, the effects of indirect land use changes from bio-fuels stating that, as a result, there was a risk that any bio-fuel target could lead to a net *increase* in greenhouse gas (GHG) emissions. It also noted that assessments underpinning the European Union's 10% target for 2020 and in the UK the RTFO did not adequately address indirect land use change. As a result a framework to prevent bio-fuels causing land use change has been proposed, during which time the rate of the introduction of bio-fuels should be slowed.

On 15th October 2008 the Government announced the publication of a proposed amendment to the Renewable Transport Fuels Obligation (RTFO) Order 2007 (SI 3072) and put the details out for consultation. The consultation is on the Renewable Transport Fuels Obligation (Amendment) Order 2009 which proposes that the introduction of bio-fuels be slowed resulting in a delay of up to three years compared to the original RTFO targets. The Amendment also includes the addition of two new bio-fuels that would qualify under the RTFO rules.

The impact of this proposed Amendment is that the envisaged challenges and problems cited in the original July report, particularly with respect to the introduction of bio-gasoline in the HIE Region, may no longer materialise in the short term - thus alleviating the need for any immediate mitigating action. As a result of these factors HIE have commissioned this further report to address the following points:

1. Summarise the present position regarding the existing RTFO issues for fuel distribution and retail in the Highlands and Islands.

2. Explain how the existing situation with respect to Bio-fuel introduction might change following the proposed amendments to RTFO by the Gallagher Review, including the potential increase of Bio-diesel limits from 5% to 7%

3. Assess the wider long term implications of this delay on the fuel distribution and retail activity in the Highlands and Islands

1. Current Position Regarding RTFO Introduction

The Renewable Transport Fuel Obligation (RTFO) is the UK government's response to the European Directive 2003/30/EC on the promotion of use of bio-fuels. The legislation introduced by the UK Government under the Energy Act 2004 came into force on 15th April 2008. The objective is to reduce the UK economy's output of carbon dioxide derived from fossil fuels burned in transport by 2.6 million tons to 3 million tons by 2010 through the gradual increase of bio-fuel content and is designed to ensure that the UK complies with the European Union Bio-fuels Directive. This was to be achieved by increasing the level of bio-fuels in transport fuels from zero to 5% over the period to 2010/11. The legislation places the obligation on the fuel suppliers; in effect the refineries and importers. If the obligations are not met there is a tiered level of penalties, other wise known as the buy-out option that would have to be paid by the suppliers.

Period	Bio-Fuel Legal Requirement	In practice
15th April 2008 – 14th April 2009	2.5641% by volume for diesel and petrol	Doubling up in diesel to 5% as on average UK petrol and diesel demand is about equal.
15th April 2009 – 14th April 2010	3.8961% by volume for diesel and petrol	Diesel has reached the 5% ceiling imposed by EU warrantee standards and EN590. Bio-fuel will therefore have to be introduced into petrol
15th April 2010 - 14th April 2011	5.2632% by volume for diesel and petrol	Both fuels will have to contain 5% of their respective bio-fuel components.

In 2008/9 bio-fuels have been making their way into transport fuel stocks in the UK (including in to the HIE Region) but this has been almost entirely limited to bio-diesel (B5). The reason for this is that to meet the current requirement for all fuels to contain 2.5% of bio-fuel content then due to the relative simplicity of introducing, handling and distribution of bio-Diesel, the suppliers have doubled up the content of bio-fuel in diesel to 5% and petrol has remained at 0%.

Grangemouth Refinery (INEOS) has continued to produce standard fossil fuel based gasoline and diesel and the traditional distribution and storage arrangements in the Region have continued to operate as before. However in 2008 some specialist fuel suppliers – Harvest Energy & Greenergy – do have some storage facilities in Scotland and we understand that they have been supplying limited amounts of gasoline with a bio content into the marketplace by road – this is mainly to the Hypermarket's retail sites.

Under this original RTFO schedule in 2009/10 fossil derived gasoline (petrol) would have to be blended with a suitable bio-fuel component to create the 3.75% blend and then in 2010/11 a 5% bio-gasoline fuel blend (E5). It was this introduction of bio-gasoline that was the cause for concern because of its entirely different handling, storage and distribution requirements – as detailed in the original July report.

More specifically sometime in 2009 INEOS was going to cease production of standard gasoline and move to producing only the base gasoline (BOB – see July Report for

details) for blending with bio-ethanol to create the bio-gasoline required under the RTFO legislation.

2. Impact of the Renewable Transport Fuels (Amendment) Order 2009 on the current position regarding RTFO Introduction

The key change is to the timetable for the introduction of RTFO after 2008/9

Period	Bio-Fuel Legal Requirement after Amendment Order	In practice
15th April 2008 – 14th April 2009	2.5641% by volume for diesel and petrol (NO CHANGE)	Doubling up in diesel to 5% as on average UK petrol and diesel demand is about equal.
15th April 2009 – 14th April 2010	3.0928% by volume for diesel and petrol	Diesel has reached the current 5% ceiling imposed by EU warrantee standards and EN590. Bio-fuel may therefore have to be introduced into petrol or there may be an increase in the allowed Diesel blend to 7%
15th April 2010 – 14th April 2011	3.6269% by volume for diesel and petrol	Diesel has reached the current 5% ceiling imposed by EU warrantee standards and EN590. Bio-fuel may therefore have to be introduced into petrol or there may be an increase in the allowed Diesel blend to 7% which may just cover RTFO
15th April 2011 – 14th April 2012	4.1667% by volume for diesel and petrol	Diesel has reached the current 5% ceiling imposed by EU warrantee standards and EN590. Bio-fuel will have to be introduced into petrol (there may also be an increase in the allowed Diesel blend to 7%)
15th April 2012 – 14th April 2013	4.7120% by volume for diesel and petrol	Diesel has reached the current 5% ceiling imposed by EU warrantee standards and EN590. Bio-fuel will have to be introduced into petrol (there may also be an increase in the allowed Diesel blend to 7%)
15th April 2013 – and subsequent periods	5.2632% by volume for diesel and petrol	Diesel has reached the current 5% ceiling imposed by EU warrantee standards and EN590. Bio-fuel will have to be introduced into petrol (there may also be an increase in the allowed Diesel blend to 10%)

Currently there is a 5% ceiling on the bio-diesel blend to meet engine manufacturers' warranties and to meet current standard specifications EN590. However it is recognised that almost all diesel engines are quite capable of running on up to 10% bio-diesel blend without problems and a number of manufacturers, particularly in Germany, have already increased their approved levels of bio-diesel content – BMW now approves up to 7% (B7) with their diesel engines.

Although there is nothing in the RTFO Amendment Order or in the consultation documents the change to increase the allowed bio content to 7% blend bio-diesel (B7) by end 2010 is in Article 18 of the European Renewable Energy Directive (RED) and it is being pursued by the European Committee for Normalisation (CEN) – a European standards body. The standard for B7 is being proposed from Germany (E DIN 51628) but it is not yet in published form by CEN. For reference a further qualification to allow the diesel fuel bio content to increase to 10% (B10) by end 2014 is also in the Directive.

An extract from the Renewable Energy Directive proposals (RED) published by the European Parliament on 23 January 2008 refers.

Article 18: Specific provisions related to biofuels

2. Member States shall ensure that diesel fuel complying with the specifications set out in Annex V is made available by 31 December 2010 at the latest in filling stations with more than two pumps that sell diesel fuel.
*(**Annex V – Specifications for a 7% blend of biodiesel in diesel)***

3. Member States shall ensure that diesel fuel complying with the specifications set out in Annex VI, or other diesel fuel with at least 5% biofuel content by volume, is made available by 31 December 2014 at the latest in filling stations with more than two pumps that sell diesel fuel.
*(**Annex VI – Specifications for a 10% blend of biodiesel in diesel)***

There is considerable speculation that the UK will move to allow up to 7% bio-diesel blend (B7) to be brought forward to 2009. This may require changes to European law or at least approval of all the engine manufacturers as there are warranties involved. This proposal to move to B7 is still unclear at the present time.

Assuming that the 5% ceiling on bio-diesel blend is not changed then to meet the 3.1% on all fuels in 2009/10 there will have to be the availability of some bio-gasoline into the UK market. If bio-diesel remains at the maximum 5% (equating to 2.5% on all fuels) then the extra 0.6% for bio-gasoline can probably be accounted for by the specialist suppliers together with maybe one or more refineries moving to producing the correct gasoline blend stock. This would probably mean that the Scotland area would continue to have access to standard fossil fuel gasoline for 2009/10 and can put-off having to deal with the introduction of bio-gasoline until 2010/11.

Again assuming that the 5% ceiling on bio-diesel blend is not changed then to meet the 3.6% target on all fuels in 2010/11 there will have to be the availability of some bio-gasoline into the UK market. If bio-diesel remains at the maximum 5% (equating to 2.5% on all fuels) then there would have to be an extra 1.1% for bio-gasoline. Unless the bio-

diesel blend is moved to 7% max then in 2010/11 INEOS Grangemouth would have to either pay the buy-out penalty under the RTFO rules or transfer to producing BOB base gasoline for blending with ethanol.

In subsequent years when the bio-gasoline component rises to 1.7% (2011/12), 2.2% (2012/13) and 2.8% (2013+) there will be no choice and INEOS Grangemouth will almost certainly only be producing BOB base gasoline for blending with ethanol and there will be no standard traditional fossil based gasoline available in the UK.

However if the bio-diesel blend is increased to 7% then the introduction of bio-gasoline can be deferred through 2009/10 & 2010/11 but would have to be introduced by 2011/12 to meet the 4.2% on all fuels (7% on bio-diesel & 1.4% on bio-gasoline).

The further increase to 10% blend bio-diesel (B10) as envisaged in the Renewable Energy Directive is due to take place by end 2014 which is outside the scope of the RTFO Amendment horizon. (the last period is from 15 April 2013)

Gasoline Production
It is our judgement that INEOS Grangemouth is likely to continue to produce standard fossil based gasoline for some time yet – at least until 2010 or 2011.

INEOS have advised that they are not currently progressing investment for the production and storage of BOB (Blendstock for Oxygenate Blending) because of RTFO legislation being delayed due to the Gallagher Review. With the significant investment required for production & storage of BOB the lack of clarity at Government level means they are unlikely to make major decisions yet about switching production of gasoline which in turn means extending the lead time for when BOB may be available.

As a result there is the potential that the Government may have unrealistic expectations about how quickly the required BOB will be available from the refinery should the expected delay to bio-fuel introduction be removed.

The Government appears to be keen to see if second generation bio-fuels are an option with respect to enabling the UK to meet its EU renewable fuels targets and also alleviate some of the environmental concerns around the production of the bio-fuel feedstock. However there does not seem to be much enthusiasm from the perspective of INEOS to invest in the handling and blending of such product as the legislation surrounding it, like the issues surrounding the existing RTFO legislation, is not clear. Without such clarity, commercial organisations are not willing to make investments that could be rendered inappropriate by changes in Government sentiment.

Indications are that once INEOS has decided to move to BOB production it will be all or nothing and they would not go back to fossil fuel gasoline production runs due to the low volumes required and the additional cost of doing so. However should they be persuaded to do so then they are likely to require additional storage facilities, the cost of which will have to be borne by the market at some stage or through subsidy from Government.

Under the Renewable Transport Fuels Obligation (Amendment) Order 2009 there are two ‘new’ bio-fuels added to the list – bio-butanol & renewable diesel (from waste fats) –

however it is our understanding that these two fuels will have little impact in the short to medium term therefore can effectively be ignored for the purposes of this Report.

Supply and Distribution

Overall, the consensus of the industry is that while there is ambiguity surrounding the timing of the introduction of bio-fuels, and particularly for bio-gasoline, both in terms of timing and the bio-fuel material itself, the industry in unwilling to invest. This affects the supply chain right from the refinery gate to the retail site.

There is no evidence of any investment in Inverness Terminal to handle bio-gasoline. We understand that BP are aware of the situation and have a future project for this but there is no scheduled timing.

We have been made aware of the concerns that even if investment were to be made, the terminal is space constrained and may require the relocation of the blending plant to another area in Inverness. Practically this would prove to be very expensive and present some logistical issues with pipelines serving the site.

The issues surrounding the economics of investing in blending plants on the larger islands still remains unresolved.

The consultation has no impact on these issues other than pushing back the time when investment decisions would have to be made.

Retail Forecourts

All the professional advice from the industry has made it very clear that before the first introduction of bio-gasoline all the tanks, pipework and lines to be used must be thoroughly cleaned and checked. (see Appendix 1 for a more comprehensive list of recommended actions to deal with bio-fuels on the forecourt) The absolute basic requirement is to remove all traces of water - water which is present in most underground tanks and does not pose a problem with standard fossil fuel based gasoline. Industry technical standards also maintain that once bio-gasoline has been put into a tank then there is no going back to standard gasoline.

The basic costs for this tank cleaning are estimated to be in the region of £3000 per site. The main concerns across the UK including in the HIE Region are that small sites will find it hard to fund such cleaning without some form of assistance.

It should be pointed out that other than adhering to professional standards there is actually nothing to prevent an operator taking the risk and having a load of bio-gasoline dumped into tanks that have not been cleaned. There is a significant risk that this will affect consumers who fuel at the site as the fuel quality and content may cause engine problems resulting in breakdowns and expensive repairs.

Small sites that have low throughputs will also have the issue of bio-fuels being stored in their underground tanks for long periods of time. Bio-fuels in general do not respond well to being stored for long periods and there may be technical changes in the fuel specification whilst in the tanks that promote the growth of algae and change the viscosity of the fuels so that it may block the filters. Storage for long periods will also expose the

product to the risk of contamination with water and result in the build up of sludge material and off-spec gasoline requiring further costs to clean up. To our knowledge there is limited research on the effects of storing bio-fuels for long periods in 'old' underground tanks.

3. Wider impact of the Renewable Transport Fuels (Amendment) Order 2009 on the longer term position regarding RTFO.

The Government appears to be keen to see if second generation bio-fuels are an option with respect to enabling the UK to meet its EU renewable fuels targets and also alleviate some of the environmental concerns around the production of the bio-fuel feedstock. Bio-butanol and renewable diesel may be fuels of the future but as of today this remains to be seen. Clarity of legislation and Government sentiment around second generation bio-fuels is such that no one is really willing to take large commercial risks and invest in facilities.

There is also no evidence that there will be a technological development to solve the product transport and handling issues as highlighted in our Report in the medium to long term. The one aspect of transportation of bio-fuels by pipeline however is likely to be solved in the medium term as this is required for bulk fuel movement.

Whilst the Renewable Energy Directive proposals indicate that approved bio-diesel is likely to increase from the current 5% (B5) blend through 7% (B7) in 2009/2010 and to 10% blend (B10) by end 2014 these values will not be sufficient on their own to postpone the introduction of bio-gasoline much past 2010/11 if the RTFO targets for all road fuels are to be met.

Finally in the medium to long term there is considerable risk in any strategy where there is an expectation that there will be availability of 100% fossil fuels gasoline. Once past 2011 it is likely that all retail fuels in the UK will meet the RTFO specification and all refiners and importers will be meeting the targets. This means that current standard 100% fossil fuel gasoline will not be available anywhere in the UK. There may be minor suppliers around Europe who may specialise in small quantities of this fossil fuel gasoline but it will be expensive as the producer will have to pay the buy-out penalty. However there is no guarantee that the product will be available. Our understanding is that it is unlikely to be available from INEOS Grangemouth past 2010/11 as once they convert to supplying BOB there will be no on-spec 100% fossil fuel gasoline available.

Overall the delay in the introduction of bio-gasoline E5 simply delays the problems rather than solves them and the issues will still have to be addressed by 2010/11. The change of timing in the Amendment will have no effect in the longer term.

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Appendix 1 : Handling bio-fuels

The following is an illustration of the onus placed upon petrol station owners and operators to prepare for the retailing of E5 bio-gasoline.

These actions are abridge from “Guidance note for filling station operators on the introduction of E5 petrol and B5 diesel” issues by the Energy Institute (www.energyinstpubs.org.uk)

- On petrol station product acceptance, storage and retailing
  - Ensure all tanks, filters, values, adaptors are free of all water contamination
  - All sludge and lose material is removed from the inside of tanks
  - All tanks and access points are water tight and weather proof
  - Any tank and pipe linings are compatible with the product
  - All 100% fossil fuel is removed before the first E5 delivery
  - All dispensing pumps are compatible with the product and in suitable enough condition
  - All filters are checked frequently to ensure no blockages occur given the souring behaviour of the product
  - Replace filters where required
  - Ensure all Health & Safely equipment is compatible and signage updated
  - Ensure all tank gauge and leak detection equipment is compatible with the product
- On going
  - Carry out on going checks for phase separation and contamination
  - Ensure filters are clean
  - All storage remains watertight
- All cleaning must be carried out by a competent contractor
- All works must be advised to the local licensing authority
- Any product contamination or phase separation must result in removal of the product from sale and safe disposal in line with the law.

Appendix 2: Authors

Justin Muir – Head of Experian Catalist. In addition to his management responsibilities, Justin's role also incorporates the development of product and consultancy solutions for the oil industry, mainly in the area of petrol station network management and forecourt fuel and shop performance and demand analysis. Before joining Catalist Justin spent ten years working for Shell, mainly in international marketing and retail development roles. During this period he gained considerable experience in network planning and was responsible for the development of new approaches to network development and management. His experience gained from over 18 years in the oil industry gives him considerable understanding of industry challenges and how organisations can use data, analysis, consultancy and products developed by Catalist to address their needs. He has experience in markets across Europe, India, Japan and South East Asia.

Arthur Renshaw – Catalist Country Manager, UK/Ireland. Arthur is the key point of contact for all Catalist UK and Irish clients and looks after all sales in the region. Prior to joining Catalist in 2001, Arthur worked for Elf Oil GB in Strategic Planning and then Retail. He left Elf to join US based consultants MPSI Systems in 1987 where he looked after oil company clients across Western Europe, South Africa and the former Eastern block. He has developed an extensive knowledge of oil company network planning techniques and processes and has developed good relationships with dealers and oil companies alike. With more than 30 years oil industry experience, Arthur is Catalist's resident expert on the oil industry in the UK and Ireland and is a regular contributor to oil industry and business journals, such as Forecourt Trader and Ireland's Forecourt & Convenience magazine.