

Almost two years after the publication of its first draft the reviewed Fuel Quality Directive has been adopted, but what consequences will this have for the industry?

The new EU directive on fuel quality standards and its implications*

Even though the rather technical fuel quality directive (FQD) has taken a back seat in recent months, overshadowed by the much politicised Renewable Energy Directive, it is nevertheless a crucial piece of legislation for the EU bioethanol industry.

There are three key reasons for this: a) it introduces a decarbonisation mechanism with a view to reducing greenhouse gas (GHG) emissions of fossil fuels; b) it allows – under certain conditions – direct blending of ethanol in warmer parts of Europe; and c) it makes E10 blends possible by increasing the maximum ethanol content and oxygen content in petrol.

The new Directive will amend, rather substantially, a 10-year old Directive that sets technical specifications based on health and the environment for fossil fuels.

It was first changed in 2003 and then had to be reviewed two years later partly due to biofuels.¹ Contrary to the existing provisions of Directive 98/70, in which biofuels are merely mentioned as one of several fossil fuel components, the amended text gives the strong impression that the

Directive is now a law on biofuel quality standards.² This is mainly due to the fact that the new Directive introduces a mechanism to monitor and reduce GHG emissions, the so-called decarbonisation mechanism.

Decarbonisation mechanism

The EU committed itself under the Kyoto Protocol to reduce GHG emissions by at least 20% unilaterally by 2020 and by 30% if a global agreement can be reached. All sectors will need to contribute to these goals.

The combustion of road transport fuel is responsible for around 20% of community GHG emissions. Therefore the new FQD requires fuel suppliers to reduce life cycle GHG emissions³ of the fuel they put on the market.

By 2020 they need to achieve a (mandatory) reduction of at least 6% compared to the EU-average level of GHG emissions in 2010 with possible interim targets of 2% by 31 December 2014 and 4% by 31 December 2017. The fuel suppliers are free to choose how to achieve these targets. They

can either decrease their emissions by reducing flaring and venting at production sites (upstream) or by using more biofuels or alternative fuels (downstream). These instruments are not mentioned in the body of the law; they are mentioned in a recital.

Biofuels used for compliance with the GHG reduction target need to comply with the sustainability criteria, which are defined by the Renewable Energy Sources Directive (RES-D) and have been entirely copied into the FQD.⁴

An additional (indicative) 4% reduction may be obtained through the use of carbon capture and storage technologies and electric vehicles (2%) and the purchase of credits under the Clean Development Mechanism of the Kyoto Protocol (2%).

The total required reduction by 2020 could therefore be increased to up to 10%. The strong link between the RES-D and the FQD is not only demonstrated by having the sustainability criteria in common but also through the fact that a review of this decarbonisation mechanism needs to take place in 2014.

The new law states that: 'At the latest in 2014, the Commission shall submit a report to the European Parliament and the Council relating to the achievement of the GHG emission target for 2020 referred to in Article 7a, taking into account the need for consistency between this target and the target referred to in Article 3(3) of Directive 2009/.../EC [on the promotion of the use of energy from renewable sources], concerning the share of energy from renewable sources in transport, in the light of the reports referred to in Articles 20(6) and 20(7) of that Directive'.

Addressing volatility

The issue of increased volatility by direct use of ethanol into petrol is the second most important element of the FQD. Taking away the obstacles for directly blending ethanol in the biggest part of the EU increases, in theory, market opportunities for ethanol producers.

Petrol is made up of volatile organic compounds (VOCs). To reduce petrol evaporative emissions and therefore VOCs, a maximum limit on

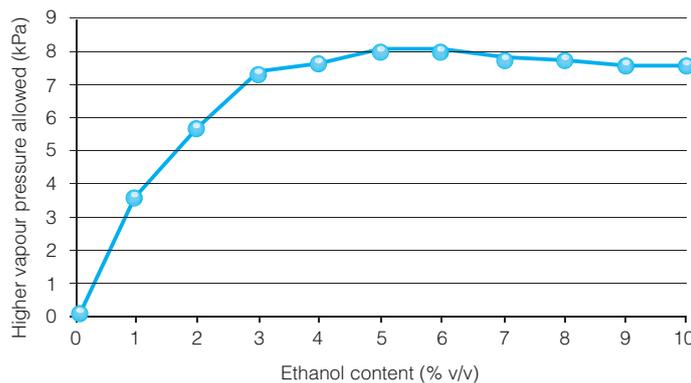
the volatility of petrol of 60 kilo pascals (kPa) has been introduced. As the volatility of the petrol is linked to the ambient temperature (the higher the temperature the higher the volatility) member states with a low ambient temperature can have petrol during summer time with a higher vapour pressure of maximum 70 kPa. According to the new FQD those (arctic) member states are Denmark, Estonia, Finland, Ireland, Latvia, Lithuania, Sweden and the UK.⁵

When ethanol is blended into petrol the vapour pressure can increase up to 8KPa and therefore under normal circumstances go well over the 60kPa which is legally permitted (the Vapour Pressure Curve diagram shows the development of the pressure when the volume of ethanol grows).

For all other non-arctic member states direct blending of ethanol is not that straightforward. In order to comply with the vapour pressure limit, refiners must remove light hydrocarbons from the base petrol. This increases the production costs and the unwillingness of refiners to blend in the bioethanol. The US – the world's biggest ethanol fuel consumer – experienced the same problem, and solved it by granting a waiver.

The EU has now followed this example for non-arctic regions but under certain strict conditions. The member states need to notify the

Vapour pressure waiver on ethanol blending



Source: FQD, Annex III

Permitted waiver in kPa depending on the ethanol content

European Commission if they want to apply the waiver, and the Commission will then assess whether a waiver can be granted and for how long, depending on the fulfilment of the following two elements:

● **Socioeconomic conditions:**

The higher vapour pressure has to avoid socio-economic problems, including time-limited technical adaptation needs

● **Environmental and health condition:**

The higher vapour pressure may not result in negative environmental or health consequences and, in particular, should not impact on the compliance with community legislation on air quality, both in the member state concerned and other member states.

Going beyond E5

A third very important new feature of the law is the possibility to increase the blending level of ethanol.

Since 1986 ethanol can be used in petrol in volumes up to

5%. The FQD now extends the use of ethanol in petrol to up to 10%. The oxygen content has been increased to 3.7% to allow for higher ethanol

content.⁶ These changes have been made in anticipation of the 10% renewable energy in transport target laid down by the RES-D.

However, some older vehicles are not warranted to use petrol with a high biofuel content.⁷ These vehicles may travel from one member state to another. Therefore the FQD seeks to ensure the continued supply of petrol suitable for these older vehicles for a transitional period.

The member states need to supply petrol with an oxygen content of maximum 2.7% and an ethanol content of maximum 5% v/v until 2013. Member states may

Environmental specification for market fuels for vehicles equipped with positive ignition engines:

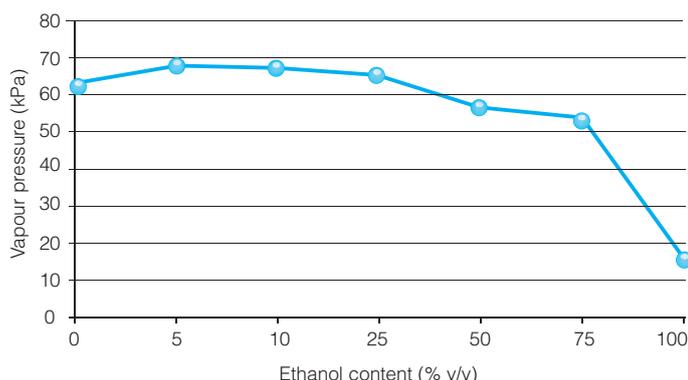
Type: Petrol

Parameter	Unit	Limits	
		Minimum	Maximum
Research octane number		95	—
Motor octane number		85	—
Vapour pressure, summer period (a)	kPa	—	60,0 (b)
Distillation:			
— percentage evaporated at 100 °C	% v/v	46,0	—
— percentage evaporated at 150 °C	% v/v	75,0	—
Hydrocarbon analysis:			
— olefins	% v/v	—	18,0
— aromatics	% v/v	—	35,0
— benzene	% v/v	—	1,0
Oxygen content	% m/m		3,7
Oxygenates			
— Methanol			3
— Ethanol (stabilising agents may be necessary)	% v/v		10
— Iso-propyl alcohol	% v/v	—	12
— Tert-butyl alcohol	% v/v	—	15
— Iso-butyl alcohol	% v/v	—	15
— Ethers containing five or more carbon atoms per molecule	% v/v	—	22
— Other oxygenates	% v/v	—	15
Sulphur content	mg/kg	—	10
Lead content	g/l	—	0,005

(a) The summer period shall begin no later than 1 May and shall not end before 30 September. For member states with low ambient summer temperatures the summer period shall begin no later than 1 June and shall not end before 31 August.

(b) In the case of member states with low ambient summer temperatures and for which a derogation is in effect in accordance with Article 3(4) and (5), the maximum vapour pressure shall be 70 kPa. In the case of member states for which a derogation is in effect in accordance with Article 3(4) for petrol containing ethanol, the maximum vapour pressure shall be 60 kPa plus the vapour pressure waiver specified in Annex III.

Vapour pressure curve



require the placing on the market of such petrol for a longer period if they consider it necessary. The Directive has not set a time limit on this grandfather clause.

LCA on fossil fuel

One of the main objectives of the Directive is to reduce GHG emissions from fuels. Lacking, however, is a methodology to establish the life cycle GHG emission (except for biofuels as in this case the methodology of the RES-D will be used). The methodology for the calculation of life cycle GHG emissions from fuels has been left to the committee that needs to set implementation rules but needs to do this before 1 January 2011.

The fuel baseline standard – based on the lifecycle GHG emissions per unit of energy from fossil fuels – needs to be set as well. This baseline mentioned in the RES-D is set at, for the time being, 83.8 gCO₂eq/MJ, which is lower than the emissions of the marginal oil used in the EU (the horizontal line in the diagram shows the present baseline). The fuel suppliers need to provide information on the origin of their crude. In the near future more petrol will be made from unconventional oil sources and therefore the fossil fuel comparator is likely to increase.

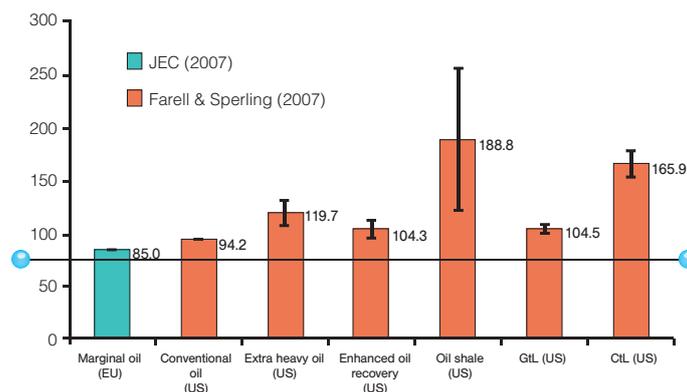
Possible effects

● **Decarbonisation**

mechanism: The choice of the way and means for oil companies (fuel suppliers) to reduce GHG emissions is still open. Oil companies have always publicly stated that it was next to impossible to achieve the 10% reduction. Emission reduction through measures at upstream and refinery level, they stated, could be marginal at best.

However, downstream savings could be achieved by using vast volumes of biofuels. These statements

WTW emissions for petrol g CO₂eq/MJ petrol



have triggered the polemic debate about sustainability of biofuels. Whether fuel suppliers will use biofuels and to what level is uncertain. The present Directive does not force them to do so whereas the RES-D leaves them no choice.

A second potential effect is the market price for the biofuel used for achieving this particular target. Contrary to the RES-D the objective of this Directive is to reduce emissions in a relative way; it is not a volumetric objective. This could result in market preference for those biofuels that achieve the highest possible GHG saving. The higher the saving the quicker the target is achieved. Biofuels with higher GHG savings could therefore be sold at a higher price.

● **Waiver on vapour pressure:**

The effects of a higher vapour pressure being allowed are already showing in the marketplace. Under the present Directive in those countries that are considered arctic the preferred way for fuel suppliers to use ethanol is through direct blending with petrol during summer and wintertime.

No ETBE is used in those states. Direct blending is therefore likely to become the preferred option in more member states now a waiver on Reid vapour pressure is possible.

Much will depend on a) the additional costs for changing over to an infrastructure for direct blending and b) how

difficult it will be to comply with the condition on respecting air quality. But there is another element that comes into play. Now the RES-D will make the use of biofuels obligatory fuel suppliers might opt for directly blending anyhow unless of course they are the owner or main shareholder of ether production installations. If the latter is the case they will most likely stick to ETBE use.

● **E10:** The higher blending level of up to 10% will be welcomed in a number of member states such as Sweden where the E5 market is saturated and France that wants to move ahead on higher blending levels.

It also means that finally those fuel suppliers that want to supply the market with E10 can start building the required infrastructure. However, by limiting the blending by 10 in volume a problem will occur in terms of achieving the 10% target under the RES-D (which is not a volumetric but an energy target).

Fulfilling that particular target requires volumes going well over 10% (up to 15% v/v). The review in 2014 could well result in the ceiling being adjusted. However, much will depend on the willingness of car manufacturers to make changes to engines to function well with a petrol/ethanol blend higher than 10%.

Looking ahead

The law will enter into force 20 days after the publication in

the Official Journal. Publication can be expected in February 2009 at the latest. E10 could therefore already enter the market in Q1 2009 in countries such as France, Sweden and Belgium. National laws put in place to transpose the EU law therefore need to be in force before the end of 2010.

This new Directive introduces ways and instruments to make the use of ethanol in petrol more attractive, as well as in a higher ratio. Equally it could create an additional market on top of the objectives set in the RES-D. However, at this stage this is only speculation because it is not certain these biofuels will be sold on at a premium. ●

For more information:

This article was written by eBIO, +32 2 657 66 79, info@ebio.org, www.ebio.org

*This analysis is based on the text as approved by the European Parliament on 17 December 2008. Document A6-0496.

1 The current Directive relating to the quality of petrol and diesel fuels is Directive 98/70/EC (OJ L350 of 28.12.98) as amended by Directive EC/2003/17/EC (OJ L76 of 22.3.2003). In this law ethanol is one of the oxygenates that can be used in petrol and where a limit is placed on its use (5% v/v).

2 24 out of the 45 recitals are on biofuels.

3 'Life cycle greenhouse gas emissions' means all net emissions of CO₂, CH₄ and N₂O that can be assigned to the fuel (including any blended components) or energy supplied. This includes all relevant stages from extraction or cultivation, including land-use changes, transport and distribution, processing and combustion, irrespective of where those emissions occur (Article 2, paragraph 1, point 6, FQD).

4 The Renewable Energy Sources Directive (RES-D) was approved by the European Parliament together with the FQD. Publication of both laws in the Official Journal is expected for February 2009.

5 These are, in principle, those Member States where the average temperature for a majority of their territory is below 12°C for at least two of the three months of June, July and August.

6 Roughly one-third of bioethanol is made up of oxygen. Therefore blending ethanol in petrol increases the oxygen content.

7 The EU car industry has made a commitment that from 2010 all new petrol vehicles will be compatible with petrol containing a maximum of 10% ethanol (E10). Stated in a ACEA press release dated 18 December 2008.