

European Commission
DG Energy - ENER.DDG1.C.1
'Regulatory policy & Promotion of renewable energy'
Rue De Mot 24-26
B-1049 Bruxelles - Belgium
[ENER-ACCOUNTING-RES-TRANSPORT](#)

31 May 2011

Subject: Public consultation: Accounting methods and conditions for the 10% renewable energy in transport target – and on the need for additional types of biofuels being listed in Annex III of the Renewable Energy Directive

Dear Sir or Madam,

I am writing to you on behalf of the European Fuel Oxygenates Association (EFOA) in response to the above consultation.

Founded in 1985, EFOA is a sector group of Cefic, the European Chemical Industry Council, and brings together 11 member companies which represent the majority of European fuel ether production: Ecofuel/ENI, Evonik Oxeno, Hellenic Petroleum, LyondellBasell, Lukoil, Neste Oil, PKN Orlen, Repsol YPF, Sabic, Saras, and Total.

EFOA acts as the voice of the European producers of the fuel ethers (MTBE, ETBE, TAAE & TAME) in a wide variety of technical and government initiatives and is recognised by the European Commission as a stakeholder on air quality, fuel quality and biofuels.

Please find hereafter, the EFOA input concerning the above consultation.

[EFOA contribution to Section D: Energy content of biofuels:](#)

[According to the National Renewable Energy Action Plans, Member States estimate that the contribution of biofuels will be approximately 9.5% of energy consumed in transport, most of which is expected to be biodiesel and bioethanol.](#)

[1. Do you think additional types of biofuels need to be listed in Annex III of the Directive? If yes, which ones and could you provide values?](#)

[Please provide references for suggested values](#)

EFOA asks the Commission to include into the annex III of RED the following three bio-ethers: tertiary amyl methyl ether (TAME), tertiary hexyl methyl ether (THEME or THxME) and tertiary hexyl ethyl ether (THEE or THxEE). TAME is already widely used fuel ether and the heavier ethers produced as by-products in the etherification process.

1. Bio-TAME

For TAME literature data is available both for the lower heating value (LHV MJ/kg) /1,2/ and density /3,4,5/. The mass based energy content LHV (MJ/kg) is varying from 36,3 to 36,5 MJ/kg depending on source /1,2/. The suggested value is 36 MJ/kg.

The suggested density, depending on measurement temperature, is 775 kg/m³@15°C or 770 kg/m³@20°C. Applying the density on the energy content by mass (MJ/kg) ends up to energy content by volume 28,1 to 28,2 MJ/l and to the suggested approximate value 28 MJ/l.

The above mentioned energy content for bio-TAME: 36 MJ/kg and 28 MJ/l and bio-TAME energy content from renewable sources 18 %, have already been used in the preparation of the Finnish renewable energy taxation legislation.

2. Bio-THxEE (tert-hexyl ethyl ether) and bio-THxME (tert-hexyl methyl ether)

There is only limited data available concerning the heavier ethers THxEE and THxME, since they are not typically extracted in the ether production. It is, however, possible to evaluate the lower heating value for both ethers by using the LHV, oxygen content and heat of formation data.

By using the data available for MTBE, TAME and ETBE, which are ethers similar to THxEE and THxME, it can be evaluated by using linear correlation, that energy the content by mass (MJ/kg) of both THxEE and THxME is approximately 38 MJ/kg. The suggested approximated density of both ethers is 790 Kg/m³ and energy content by volume is 30 MJ/l.

References:

1. API publication 4261, 3rd ed., June 2001, Alcohols and ethers
2. GREET Transportation Fuel Cycle Analysis Model, GREET 1.8b, developed by Argonne National Laboratory, Argonne, IL, released May 8, 2008.
<http://www.transportation.anl.gov/software/GREET/index.html>
3. Automotive fuels handbook – K. Owen, T. Cooley – SAE international – 1990.
4. Alternative fuels technology series, volume 2 – comparative properties of conventional and alternative fuels, E.M. Goodger, Cranfiels press, 1982.
5. FERC REACH consortium - <http://www.reachcentrum.eu/en/consortium-management/consortia-under-reach/ferc-reach-consortium.aspx>
6. Tertiary alkyl ethers- preparation and properties, T.W. Evans and K.R. Edlund, Industrial and engineering chemistry, vol 28, no 10, 1936.

2. Do you think more precision in terms of decimals is necessary in the values in the Annex? If yes, could you provide such values?

Please provide references for suggested values

As clearly stated in paragraph 5 of Article 5 of the very same RED Directive: "Annex III may be adapted to technical and scientific progress", EFOA would like to exploit this public consultation's

occasion to try and possibly shed some perspective light on a subject we believe being very relevant and susceptible of desirable improvement.

In annex III, all tertiary bio-ethers, bio-MTBE, bio-ETBE and bio-TAEE seems to be treated as the sole exception to the rule that “derivatives” bio-components are considered as “bio” on their own, rather than being “back-linked” to their bio-raw material.

As examples, in fact, in the case of bio-DME no reference is made to bio-MeOH used for its synthesis and neither FAME (biodiesel) nor HVO (hydro-treated vegetable oil) are connected to their bio raw material PVO (the pure vegetable oil).

The “criteria” doesn’t even seem to be the one that all raw materials for bio-derivatives should be of bio-origin, as clearly both ETBE and FAME indeed contain a fossil fraction, respectively 53% (isobutylene) for ETBE and roughly 10% (methanol) for FAME, but only FAME is currently credited with 100% “bio” status (instead of 90), while ETBE only 47%.

Furthermore, and probably even more important, of the above described “discrimination” issue, it should be remembered that a key driver for the RES directive was reducing greenhouse gas emissions, and not only merely “blending more bio-volume”.

Then, notwithstanding an important reason for the use of bio-components is their renewable origin, and hence their “bio-energy” content becomes a relevant parameter, the way of calculating the actual value depends on whether one considers the mere “bio-energy fraction” of the bio-fuel, or rather its full “energy bio&CO₂-value”.

While we clearly won’t dispute the obvious fact that the bio-energy embedded in the bio-ethers molecule comes from the bio-alcohol, we argue that the RES-relevant energy value assessment shouldn’t stop after the bio-component is manufactured (like it looks to be the case with the default values for energy content of the transport fuels currently listed in annex III of the RED).

In other words a correct approach shouldn’t be solely based on the intrinsic properties of the biofuel blend stock “per se”, but rather account for the impact it has on the energy required to formulate the whole finished fuel, and, relevant consequence, its contribution to reduce total CO₂ emissions.

Conversely, a “narrow approach”, beyond penalising high octane bio-petrol (high cetane bio-diesel, etc.) bio-components, counter-productively prevents the accounting of significant indirect energy savings, deriving from those properties of the bio-component influencing the composition of the final fuel into which they are blended, and thus the energy used to produce that fuel.

This can be illustrated by considering the example of bio-ETBE. Two recent studies evaluated the impact on the CO₂ life cycle emissions when a refiner exploits the high blending octane and low volatility delivered by ETBE. The studies, performed by CE Delft and Hart Energy Consulting, both respected independent consultants, clearly demonstrated that by using ETBE a typical refiner uses less refinery fuel when producing finished petrol than when using ethanol directly (Study on relative CO₂ savings comparing ethanol and ETBE as a gasoline component, Hart Energy Consulting, July



2007; ETBE and ethanol : a comparison of CO₂ savings, CE Delft, October 2007). ETBE typically offered an additional "downstream" saving of 30/40% of CO₂ when compared to ethanol. This amounts to the fact that ETBE typically offered an additional saving of 24kg of CO₂-equivalent/GJ of ethanol.

The studies used the substitution method to determine the savings. This method is commonly used in the refining industry and is employed in the JEC well-to-wheel study, generally regarded as the benchmark for lifecycle analyses.

While EFOA obviously remains at disposition of the EU Commission to further elaborate and contribute on the topic, in case we are supposed to volunteer a quantitative figure proposal, for instance for ETBE, we could say that the value originally adopted by the "Biofuels" Directive 2003/30, of 16.9 MJ/kg, which represented 28% more of the currently recognised 13.2 MJ/kg would be a way more appropriated value.

To be noticed that would still be a conservative number when compared with the above mentioned expected CO₂ saving downstream (30/40).

In conclusion, EFOA suggests to capture the above described non-merely-raw-material-related "bio-energy" value and thanks the Commission for the attention.

EFOA strives to include biofuels Life Cycle Methodology to evaluate its energy content.

EFOA trusts the Commission will consider the above input from EFOA.

I look forward to having more exchanges with European Commission - DG Energy - ENER.DDG1.C.1 on the above subject.

Yours sincerely,

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