

Response of Technology for Life* to Review of EU biofuels directive, Public consultation exercise, DGTREN, European Commission

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Definitions: In all the questions of the Commission “biofuels” should mean all renewable energy sources (RES) generated transport energy, i.e. including electricity, hydrogen, etc. from all RE sources, not only bioenergy, as is the purpose of the biofuels directive. And “biofuels” mean traffic biofuels only, not biofuels for electricity and heat production. Because these concepts are confusing, we urge the Commission to start using term RES-T (RES based traffic/transport), e.g. RES-T directive as a reference to the so called “biofuels” directive 2003/30/EC. This would be analogous to RES-E (RES based electricity) and RES-H (RES based heat) that are used now. And when referring specifically to biofuels used for traffic and transport, term “traffic biofuels” should be used instead of “biofuels”. In the following answers we use only the following terms:

- RES-T: includes traffic biofuels, RES electricity and RES hydrogen etc.
- traffic biofuels: not including electricity and non-bioenergy based hydrogen (but including biohydrogen)
- alternative traffic fuels: includes RES-T and all fossil traffic fuels except crude oil based.

Question 1.1

Is the objective of promoting biofuels still valid?

Promoting RES-T is more valid now than ever before. Both energy security and climate change concerns are more acute and better known now than a few years ago, and the same applies to traffic emission generated direct health hazards.

The traffic energy security concerns are primarily due to dependency on crude oil that presently has 98% share of the EU traffic energy consumption. Crude oil price has risen considerably and fluctuated a lot. It will continue to do so for many different reasons, including the approaching global oil production peak. The resulting market disturbances may also lead to distribution interruptions as has already happened in the US. Natural gas has widely been presented as the substitute for crude oil, but it can not fulfil that promise in the long term since its reserves are not larger than those of crude oil. At most it can act as a bridge to more abundant fuels, such as RES-T. Further vulnerability regarding natural gas arises from the policies of some countries, especially Russia. This means that natural gas should no longer be regarded as the main future substitute to crude oil in traffic use as is the case in the EU, where natural gas target has been set at 10% by 2020 and biofuels only 8% by 2020 of the EU traffic energy consumption.

We do agree of the 10% natural gas target for 2020, including especially methane directly, but also LPG and secondary fuels such as methanol, hydrogen and DME as well as FT diesel and other synthetic fuels derived from natural gas. But the target for RES-T should be considerably higher. There are only two abundant alternatives to replace crude oil when its price climbs: RES-T and alternative fossil fuels derived from coal, peat and unconventional fossil fuel resources. Synthetic traffic fuel

production from coal, peat and unconventional fossil fuels is well known technology and highly attractive to the traffic fuel business, since those fuel resources are centralized just as is the case with crude oil, the resources are often located in connection with crude oil resources, and logistics and refining technologies are rather similar to those used with crude oil. However, choosing this route will double lifecycle greenhouse gas emissions per vehicle kilometre compared to crude oil based traffic fuels. It is the largest threat to combating climate change. Traffic is already now the only sector in the EU that is still increasing, and increasing rapidly, its greenhouse gas (GHG) emissions, especially carbon dioxide. Thus, it is the priority sector for climate change mitigation policy.

Therefore, it is of the utmost importance that the route of biofuels and other RES-T are politically chosen. Of those technologies biofuels offer the largest short and medium term potential.

The other means of lowering traffic GHG emissions, such as energy efficiency and modal shifts, should be promoted as well. They have very large techno-economical potential, but very low social acceptance. Very high energy efficiency motor vehicles offering 80% reductions in fuel consumption and CO₂ emissions are known technology. But such vehicles can not offer the size, performance and comfort (and collision safety) of current vehicles. They must be light. The large majority of people do not voluntarily accept such technology. The same applies to modal shifts, where walking, cycling and public transport would be both cheaper and offer lower emissions. Most people can not voluntarily change their habits. Biofuels can offer similar levels of GHG reductions without the need to change vehicles and habits. It can be done simply by changing the fuel available in gas stations. Social acceptance of biofuels is very important element to consider when weighting GHG emission reduction policies. On the other hand, biofuels also offer opportunities to improve the engine efficiencies since most of the biofuels are technically better quality fuels than gasoline and diesel oil (Table 1).

Table 1. Performance of conventional and alternative fuels in ordinary gasoline and diesel engines.

Otto engine fuel	Octane number	Diesel engine fuel	Cetane number
Gasoline	90-100	Diesel oil	40-55
Methanol	107	Rape oil	> 38
Ethanol	108	DME	> 55
Propane	112	Biodiesel	48-72
Methane	130	Ecopar FT-diesel	73-81
Hydrogen	> 130	NExBTL syndiesel	84-99

The external cost of fossil traffic fuel use is order of 2% of the EU GDP (220 B€a) and biofuels could decrease it substantially due to their lower emissions. The employment and trade benefits are added to this.

When considering alternative uses of bioenergy for electricity and heat, it is important to factor in the abundance of low emissions options for electricity and heat compared to traffic. E.g. in Finland traffic use emits 5 times more CO₂ than electricity generation per primary energy input unit. Therefore it is

clear that bioenergy used for traffic offer larger emission cuts. Currently biofuels are the only large scale alternative to fossil fuels in traffic and, thus, traffic should have the priority in the use of bioenergy resources. Of the bioenergy resources waste/side streams should have clear priority over energy crops, i.e. the following order:

1. Putrescible waste from municipal, industrial and agricultural sources
2. Side streams from agriculture, forestry and bioresource industries, especially paper and sugar industry
3. Energy crops

Although road traffic is and should be the primary focus of the alternative traffic fuel promotion policy, also rail, air, maritime and inland waterway traffic are necessary targets for this policy.

Question 2.1

With existing policies and measures, will biofuels achieve a market share of 5.75% in the European Union by the end of 2010? (Please give reasons for your answer)

No, because some countries are free-riding, e.g. Finland that has the largest per capita bioenergy resources. Thus, additional measures are needed and Commission has the main role to play there.

Question 2.2

What are the main factors favouring the development of biofuel use in the EU? What are the main obstacles?

EU has the world's strongest expertise and usage history of biofuels and related technologies, going back to 19th century. The EU industry is ready for large scale dissemination of these technologies as soon as clear political will emerges, otherwise market forces will not do it. The popular support for environmental protection, and biofuels as part of the agenda, is the highest in the world. Energy security concerns are now widely shared among the EU citizens. The work of the Commission and the European Parliament has been in line with these facts. We have high respect for EC and EP for their enormous contribution. Also some member countries, especially Sweden, have shown great innovativeness for promoting and using wide diversity of traffic biofuel technologies.

The main obstacle is the lack of political will in some countries arising from vested interests and ignorance. This is shown in domestic policies and negative contributions in the EU ministerial council, especially energy council.

Question 3.1

Looking towards 2010, is the present European system of indicative targets and support for biofuels appropriate or does it need to be changed?

The present system of indicative targets and their levels until 2010 is good. And Commission has reacted in a timely manner on target settings of free-riding countries using the power the biofuels directive currently grants. It is necessary that the Commission will next year begin utilizing the new power option given by §4 of the 2003/30/EC for setting mandatory targets for free-riding countries. In all these target settings the whole RES-T should be included, not only biofuels, i.e. increase of RES-E based traffic should compensate for less progress in biofuel dissemination. The whole RES-T sector should be included in the country reports.

The support system needs to be changed. A wider range of support instruments need to be used, some of them mandatory and some left for member countries to choose, but with Commission recommendation and support (some policies are still objected or implementation made difficult by the Commission; this should be solved by Commission internally and externally by published guidelines).

The mandatory instruments and other measures that should be set in EU level include:

1. Traffic biofuels are energy/fuel/CO₂/excise tax free (but they may have VAT). This is allowed but not required by the energy taxation directive (2003/96/EC) that sets minimum tax level (above zero) for all fossil traffic fuels but minimum tax level for traffic biofuels is zero. It has resulted in perverse implementation against the spirit of the directive at least in Finland, where traffic biofuels are taxed more than fossil fuels. This issue can be solved either by an amendment to the directive, or by lower level legislative instruments. See also answer to 4.2.
2. Improving the European EN fuel standards substantially, as recommended by §9.1 (g) and 9.3 of the fuel quality directive (2003/17/EC). The blending level of biofuels into both gasoline and diesel should be much higher than permitted now. The standards should allow the maximum biofuel blends that are technically possible in current vehicles. E.g. in Brazil 20-26% ethanol is blended with all gasoline and all gasoline vehicles work fine with it. But the EN 228 standard and (2003/17/EC) currently allow only 5% ethanol blends in the EU. It should be raised at least up to 20%, allowing weather related country specific variations for cold regions and seasons as is the current practise everywhere. The same applies to new fuels like E85 (it works fine in wintertime in Alaska as well as in summertime in Texas, but the composition, including ethanol content, varies). Also, new standard development is needed for pure or very high blended biofuels.
3. FFV law (FFV = flexible fuel vehicle, here including all fuels and technologies, not only ethanol): new directive that requires the auto industry to gradually increase fuel flexibility in the new vehicles sold in the EU (and declare it in their warranties). The E85, E100, M85 and M100 flexibility for gasoline vehicles cost only some 100€ but many vehicles do not have it, since it is not required. The same applies to B100 flexibility for diesel vehicles. Flexibility for gaseous fuels, like methane and hydrogen (bi-fuel and dual-fuel vehicles), costs more, but it should be kept as an important option for auto industry, especially since the gaseous fuels offer the largest emission reductions of both GHGs and conventional pollutants (the lowest emission bars in Figures 1 and 2 are waste based biogas). The law is needed soon, since the EU target for natural gas and hydrogen is 15% in 2020 and it takes about 10 years for the car fleet to renew. The gaseous fuels cost much less than liquid fuels so although the vehicles cost more, there are overall savings via cheaper fuel. This law does not include dedicated biofuel (e.g. CBG) and electric vehicles (i.e. they do not have to be flexible), but it does include hybrid vehicles (they need to be flexible, either for liquid fuel and/or able to use grid electricity). This type of law has been suggested at least in the US, Finland and Sweden. It is difficult but not impossible to make it effective in a single member country; EU wide implementation is clearly better.
4. Biofuel mandate law: each litre of gasoline and diesel fuel sold in the EU must contain a minimum amount of biofuels. This is the easiest way to achieve given targets. It also works technically everywhere in all climates up to some 10% level. After that level the biofuel obligation system might work better.

5. Setting up a voluntary certification system for quality of production processes and products of small biofuel producers. Otherwise the distributed agricultural resource may not come into efficient use, since PR of some centralized producers may question the quality of the products of small producers.
6. Modifying the rules for state aid for environmental protection to allow tax reductions/exceptions that promote RES-T use.
7. Use tariffs and other measures to enable competitive production domestically, but allowing competitive pricing for imported biofuels also, i.e. both should be competitive.
8. Replacing vehicle HC exhaust norms preferably by NMVOC or alternatively by NMHC norms. Otherwise methane vehicles may suffer in the future if HC norms get much stricter. Methane has no direct health effect, so it should not be regulated by HC norms, but by GHG emissions only.
9. Require RES-T vehicle specifications (in vehicle sales) to state CO₂ emissions per km for both fossil and biofuel (if flexible vehicle), using the IPCC/UNFCCC net calculation method for CO₂ for biofuels, i.e. no usage time emissions. At first, continuing giving only usage time emissions is fine, but the goal should be to give WTT (well-to-tank) or WTW (well-to-wheel) emissions of CO₂ or preferably all GHGs as CO₂ equivalent (Table 2, Figure 1-2).
10. Support for technology research and demonstration.

Table 2. Lowest LCA CO₂ emitting cars in Swedish market in 2003 (www.gronabilister.se). Biofuel cars, even large ones (e.g. Volvo V70 Bi-fuel) have very low emissions compared to highest efficiency gasoline (Toyota Prius hybrid) and diesel (Audi A2 and VW Lupo 3L cars) as well as natural gas vehicles (Opel Astra with CNG).

Plats	Märke	Modellbeteckning	Drivmedel	Bränsleförbrukning blandad körning (l/100 km)	energimått	CO ₂ beräknat, blandat körning (g/km)	storleksklass
1	Opel	Astra Kombi 1,8 CNG	BIOGAS	6,3		9	Lilla mellan
2	Audi	A2 1,2 TDI 3L	RME	3,5		10	Småbil
3	Volkswagen	Lupo 3L TDI	RME	3,5		10	Minibil
4	Opel	Zafira CNG (Bifuel)	BIOGAS	7,4	Nm3 gas, o	10	Familjebuss
5	Volkswagen	Golf Variant 2,0 BiFuel	BIOGAS	7,4	Nm3 gas	10	Stora mellan
6	Volvo	S60 Bi-Fuel CNG	BIOGAS	8,2	Nm3 gas	11	Stora mellan
7	Volvo	S80 Bi-Fuel CNG	BIOGAS	8,2	Nm3 gas	11	Storbil
8	Volvo	V70 Bi-Fuel CNG	BIOGAS	8,7	Nm3 gas	12	Storbil
9	Ford	Focus Kombi Flexifuel	E85	8,7		51	Stora mellan
10	Ford	Focus Kombi-Sedan Flexifuel	E85	8,7		51	Lilla mellan
11	Audi	A2 1,2 TDI 3L	DIESEL	3,0		82	Småbil
12	Volkswagen	Lupo 3L TDI	DIESEL	3,0		82	Minibil
13	Smart	City Coupé 37kW & 45 kW	BENSIN	4,7		117	Minibil
14	Opel	Corsa ECO Easytronic	BENSIN	4,9		122	Småbil
15	Volkswagen	Lupo FSI	BENSIN	4,9		122	Minibil
16	Toyota	Prius	BENSIN	5,1		128	Lilla mellan
17	Opel	Astra Kombi 1,8 CNG	NATURGAS	6,3		137	Lilla mellan
18	Opel	Corsa 1,0 3d & 5d	BENSIN	5,6		139	Småbil
19	Honda	Jazz 1,4 LS	BENSIN	5,7		141	Småbil
20	Hyundai	Getz 1,1 GL	BENSIN	5,8		144	Småbil
21	Volkswagen	Polo 1,4 FSI 3d & 5d	BENSIN	5,8		144	Småbil

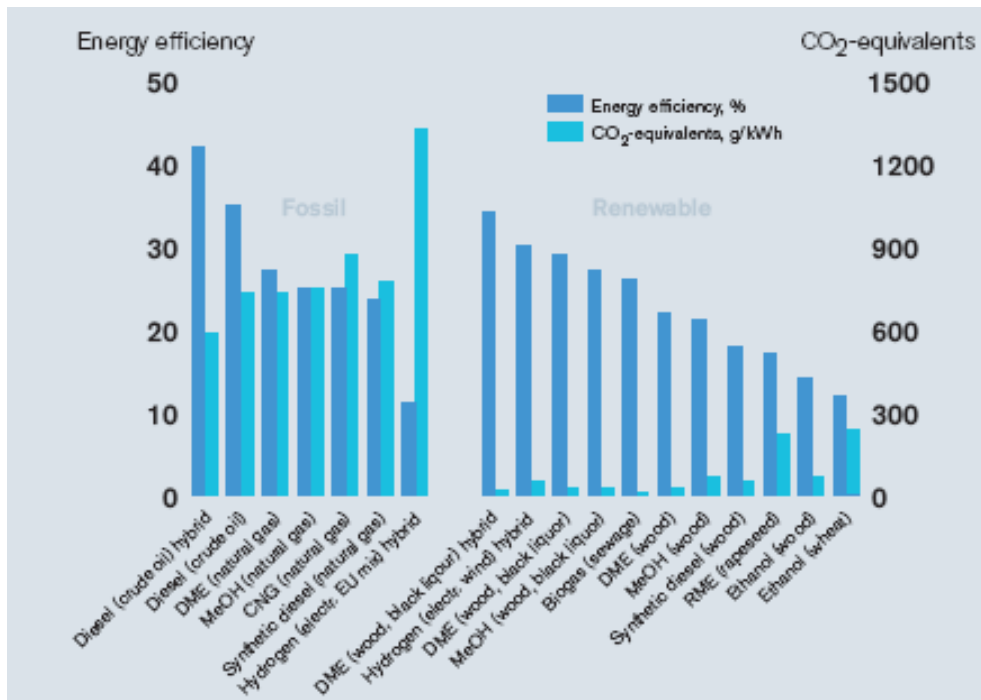


Figure 1. WTW GHG emissions and energy efficiency for trucks (Volvo 2004).

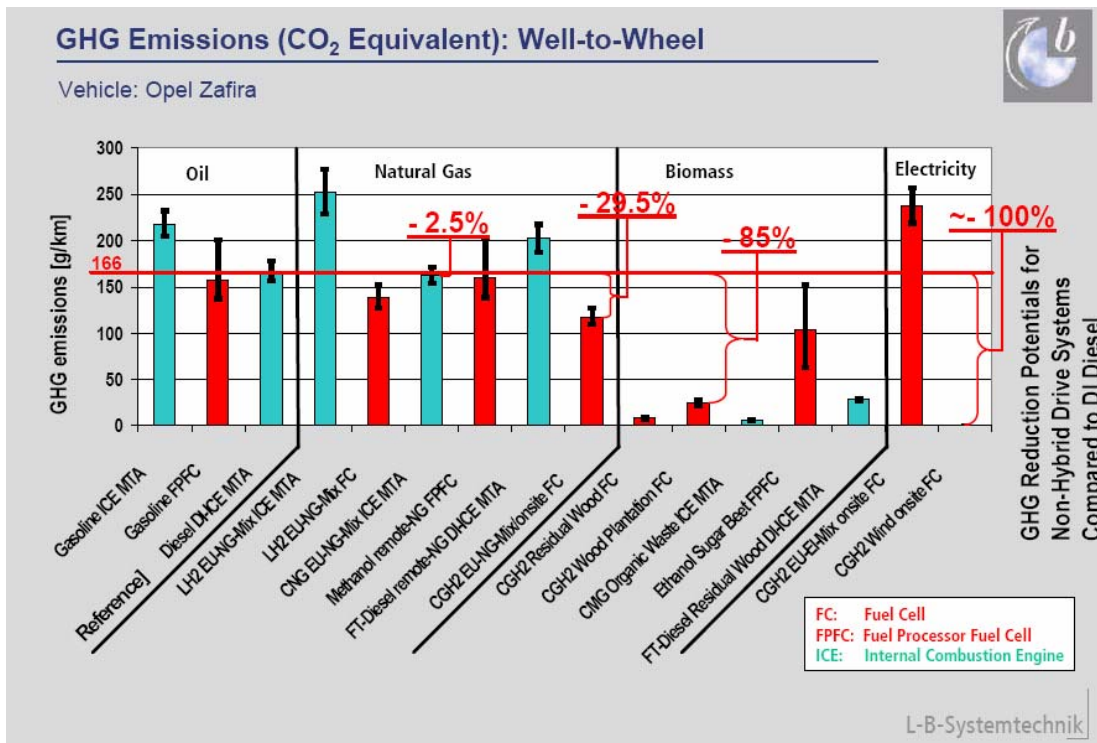


Figure 2. WTW GHG emissions for Opel Zafira (LBS 2002).

The voluntary measures recommended and supported by the Commission include:

1. High level of fossil traffic fuel taxes. And balancing this for professional traffic if necessary, in various ways.
2. Biofuel distribution law: each gas station that has annual sales above a threshold value, must sell at least one type of pure (e.g. CBG100, B100) or very highly blended (e.g. E85, M85) biofuel. This law has been introduced in Sweden this year. The alternative is to require only government companies to do so (then no legislative actions are needed). This was done in Brazil in the 1970's and it is of the main reasons for their great success story in traffic biofuel dissemination.
3. Setting car sales tax according to GHG emissions, based on net counting, i.e. zero CO₂ emissions from pure biofuel use, preferably using WTT or WTW basis. This enables lowering prices of flexible fuel vehicles, especially bi-fuel and dual-fuel vehicles that can use both liquid and gaseous fuels, as well as dedicated pure biofuel vehicles.
4. Allowing income tax vehicle credit for dedicated or flexible biofuel vehicles only.
5. Streamlining permission bureaucracy for biofuel production and distribution facilities.
6. Supporting municipalities in their biofuel vehicle policies, such as production of traffic biogas from their waste and use in their own vehicles and other captive fleets; biofuel vehicles benefit from: free parking, permission to use bus, taxi and car pool lines, no congestion charges, etc. Sweden is pioneer in these municipal incentives and their best practises should be repeated in other countries, as well as best practises found municipalities elsewhere.
7. Requiring the whole public sector to purchase RES-T vehicles by default, other vehicles requiring special substantiations. Also, these vehicles should use RES-T fuel/electricity by default and gasoline or diesel fuel use should require special permission.
8. Supporting conversion of captive fleets for RES-T nationally.
9. Streamlining regulations for vehicle conversions and relevant industry.
10. Streamlining regulations for introduction, production, distribution and use of new pure or highly blended biofuels.
11. Supporting technology research and demonstration.
12. Including RES-T technologies in their whole diversity in relevant technical basic education and also general education.

Question 3.2

What are your views on the advantages and disadvantages of the options described in section 3.2 of this paper?

If many countries are on a path to the 5.75% target including the whole RES-T, and the EU as a whole is on a path to near that target (say 5% for RES-T), and only a few countries are lagging behind, we suggest using options A+D+F+J. This grants maximum freedom for those countries that have domestically found effective policy mixes.

Otherwise, we prefer using options G+J first, but options E+J are fine, too. This may interfere with some policies of the progressive countries that would achieve the target anyway, especially if they achieve it using captive fleets. Achieving the targets for a large part using captive fleets is preferable to using biofuel obligations or mandates etc., since it involves many additional local benefits, e.g.

improved city air and local employment. Using this preferable option should be rewarded in the EU wide policy (it is not clear how to do it).

See also answer to 3.1.

Question 3.3

How should the option(s) you favour be put into practice?

A+D: preferably not by amendment to the directive, but by Commission decisions. The actions in the case of only a few free-riders should be as light as possible for progressive countries.

J: This obviously offers a chance for a very wide co-operation with many kinds of actors, including ministries of education that may not yet been activated on this issue. The highest emphasis is needed for educating civil servants handling RES-T related issues in ministries and local administrations.

Question 3.4

Should other options than those in section 3.2 be considered?

Yes, many more, as listed in our answer to 3.1.

Question 3.5

If your preferred option(s) would have implications for granting tax reductions/exemptions for biofuels, for example if these fiscal measures had to be prohibited, would that change your answer?

These should not be considered fiscal measures! Fossil fuel taxes should be considered environmental taxes and the final goal of these taxes (just like tobacco taxes) is that they do not bring income to the government. Then the problems caused by the fossil fuel use (external costs of 220 B€/a etc.) have been beaten. There is no sense in collecting fossil fuel taxes from non-fossil fuels, except for the fossil part of the life cycle. There is still considerable fossil energy content in many biofuels but it can be substantially decreased e.g. by using the produced biofuels in their production. The best practise should form the basis of LCA GHG taxation (e.g. WTT or WTT), if such is needed in the future for biofuels. But now it should be omitted to lower the threshold for their market entry. VAT is enough.

Question 3.6

Should Member States be able to provide tax reductions/exemptions and lay down biofuels obligations at the same time – or should it be “one or the other”?

Both of these options should be open, and many more, as listed in our answer to 3.1.

Question 4.1

Should there be a system – for example, a system of certificates - to ensure that biofuels have been made from raw materials whose cultivation meets minimum environmental standards?

Yes. It should be developed as soon as possible, but lack of its existence should not slow down policies for the 5.75% target by 2010. Also, all such standards should be applied to conventional fossil fuels as well as biofuels.

If so,

- What should be addressed in the standards?

Most important feature in the standards is the ability to credit waste based fuels for their environmental performance, i.e. their cultivation does not have any environmental impact! The order of environmental priority for biofuels is:

1. Putrescible waste from municipal, industrial and agricultural sources
2. Side streams from agriculture, forestry and bioresource industries, especially paper and sugar industry
3. Energy crops

Cultivation impacts concern energy crops only.

We propose the following criteria:

- The primary metric for the environmental impact should be WTT (well-to-tank) GHG emissions (WTW would still be better, if possible). WTT/WTW energy efficiency should not override the primary metric, because it is included in the GHG metric (fossil fuels have higher energy efficiency of fuel production than biofuels but the lifecycle emissions, where the production efficiency has been taken into account, are still higher for fossil fuels, see Figure 1). The WTT GHG emissions of the biofuels must be lower than the WTT GHG emissions of the fossil fuel they replace and the fuel cycle should offer substantial, at least 50% reduction potential compared to fossil fuels, when best practises are implemented, such as using RES for production. If the cultivation takes place on land where alternative use would be food production, the WTT GHG emission analysis should use cultivation for food production as the baseline value for emissions. In that case the change of emissions is low and may result in a positive impact for biofuels. If set-aside land is used, then all cultivation related emissions must be fully taken into account. On the other hand, if degraded land is taken into use for biofuel production, and the soil is improved, it should be rewarded.
- The second crucially important measure is biodiversity. Biofuel production must not lead to deforestation of old-growth forests or decrease of biodiversity in habitats with endangered species. Otherwise, biodiversity impact can be positive or negative and simple characterization metrics need to be developed. If set-aside land is used or when perennial biofuel crops replace annual food crops, the biodiversity impact is usually positive. The same may apply if naturally occurring abundant low biodiversity land (deserts) or oceans are used. If annual food crops are replaced by annual biofuel crops or perennial fibre crops by perennial biofuel crops biodiversity impacts are likely to be low. Also, the biomass source must be renewed without desertification or degradation of the land.
- Chemical emissions are the third measure. Use of chemicals fertilizers, pesticides and herbicides should be compared to the land use biofuel production replaces. When food production is replaced by biofuel production the use of chemicals should decrease.
- And finally: biofuel crops should not include GMO plants.

- How should the system work? Are there good models to draw on?

The Environmental Impact Assessment has been used for a long time and the experience should be exploited here. There are good models for certification to start from, such as the FSC certification for forestry products, EU environmental label, the Nordic Ecolabel (the Swan), the ecological energy

certificates of Swedish (Bra miljöval) and Finnish (Norppa) Association of Nature Conservation, organic farming and fair trade certificates. These labels together cover most of the issues needed for the suggested certification of biofuels.

Small producers and co-operatives producing biofuels for themselves and for local consumption only should be exempted from this certification requirement.

- Should the biofuels directive be amended so that only biofuels which comply with environmental sustainability standards count towards its targets?

It should be so amended but to take effect after 2010 only and regarding the post-2010 targets only. Otherwise the amendment process would jeopardize the whole RES-T promotion policy.

Question 4.2

Should a wider system of certificates be introduced, indicating the greenhouse gas and/or security of supply impact of each type of biofuel?

GHG impacts are the first priority, as shown in our answer to 4.1 and the system should encompass not only biofuels but fossil fuels also.

The security of supply impacts could be added by including information of the origin of the fuel. Metrics for this should not be the transport distance or country of origin only since multiple source of fuel is valuable for security of supply, and keeping international markets open is necessary. Anyway, it is very important that rewards are given for local and national production. It is not clear what this metric should be like.

If so,

- How should this certification system work?

As answered in 4.1.

- How should the greenhouse gas and/or security of supply benefits of different biofuels be measured?

As answered in 4.1 and above.

- Should biofuels with good greenhouse gas and/or security of supply performance be rewarded within biofuel support systems for biofuels? If yes, how?

Yes, but not before 2010. This issue should be taken up for post-2010 policies. All tax deductions for biofuels (fuel tax, car sales tax etc.) should be graduated according to the best practise WTT GHG reduction compared with fossil fuels.

Question 4.3

Should there be a scheme to reward second-generation biofuels (made with processes that can accept a wider range of biomass) within biofuel support systems?

Yes, the one mentioned in answer to 4.2, based on WTT GHG emissions only. In addition, they and all the other new fuels need R&D funding.

Question 5.1

Should the EU continue acting in favour of biofuels after 2010?

The EU should continue to act in favour of biofuels and all the other RES-T technologies after 2010.

Question 5.2

If the EU is to continue acting in favour of biofuels after 2010, should this action include or exclude the definition of a quantified target for biofuels?

Quantified target for RES-T is absolutely necessary for the EU and for all member states. Separate biofuels targets within RES-T are ok, but not absolutely necessary.

Question 5.3

Should EU action include the following measures (which could be pursued without defining a quantified target):

- a) support for research, development and dissemination of good practice?

Yes.

- b) continued Community financial support for the supply of biofuels and their feedstocks?

Yes.

- c) continued scope for Member States to support biofuels through tax reductions/exemptions?

Yes.

- d) the labelling of all fuel to show the proportion of biofuel it contains?

We do not support requirement for labelling all fuel, the current practise of 5% minimum level is adequate.

- e) a campaign to inform consumers of the benefits of biofuels?

Yes.

- f) any other options?

Small producers need special support system both for information and best practise transfer, and for certifying the quality of the products and production system.

Question 5.4

If the EU is to define a quantified target for biofuels after 2010, what should it be? What year(s) should it relate to - 2015? 2020? both?

We suggest a target of at least 10% for RES-T by 2015 and at least 25% for RES-T by 2020. Separate biofuels targets within RES-T are not necessary. However, we do think that 10% for traffic biofuels by 2015 and 20% by 2020 are also fine. Then the other RES-T technologies can – and need to – be handled by other policy schemes.

Question 5.5

If the EU is to define a quantified target for biofuels after 2010, should this be expressed in terms of

- **market share (as in the present directive)?**
- **greenhouse gas savings from biofuel use?**
- **reduced oil consumption from biofuel use?**
- **reduced fossil fuel consumption from biofuel use?**

Market share as in the present directive, but including all RES-T technologies, not only biofuels.

Question 5.6

If the EU is to define a quantified target for biofuels after 2010, should this remain a purely political step (accompanied by monitoring) or should it be given concrete form?

It should have a concrete form.

If the latter, should this be in the form of:

- a) **adding reference values for later years to the biofuels directive as presently drafted?**
- b) **one or more of the options in section 3.2?**
- c) **some other form?**

Setting targets for each year after 2010 as was done for the years 2005-2010 and including concrete measures as listed in answer 3.1.

Question 6.1

Comments on the following issues, listed in the biofuels directive for inclusion in the Commission's progress report:

- a) **the cost-effectiveness of the measures taken by Member States in order to promote the use of biofuels and other renewable fuels?**

The cost-effectiveness of the measures shall be evaluated as costs and benefits for GHG reductions and for increased security of supply, with current and estimated future fossil fuel prices, and giving credits for other benefits, such as health benefits of reduced emissions, employment generated in EU, trade benefits due to decreased need for imported fossil energy and potential for exporting traffic fuels, economic benefits for rural areas and for farmers, and effects on Common Agricultural Policy (CAP).

- b) **the economic aspects and the environmental impact of further increasing the share of biofuels and other renewable fuels?**

Economic aspects as answered above, environmental impacts as in answer 4.1.

- c) **the life-cycle perspective of biofuels and other renewable fuels [and] possible measures for the further promotion of those fuels that are climate and environmentally friendly, and that have the potential of becoming competitive and cost-efficient?**

Life-cycle perspective is crucial, for comparing with fossil fuels replaced by RES-T. We propose using WTT and WTW as explained in answer 4.1, for their relative simplicity (still common rules of

calculation need to be specified). This can still be improved by taking, at least partially, other LCA issues into account, such as:

- production impacts of machinery for exploration, production, transport, refining, distribution and use of the fuel
- impacts of exploration, transport and distribution of the fuel
- impacts of military protection of the fuel resources

This would, however, complicate the process enormously and it would be hard to agree on common principles. These could anyway be included in the qualitative part of the assessment.

d) the sustainability of crops used for the production of biofuels, particularly land use, degree of intensity of cultivation, crop rotation and use of pesticides?

As in answer 4.1.

e) the assessment of the use of biofuels and other renewable fuels with respect to their differentiating effects on climate change and their impact on CO₂ emissions reduction?

As in answer 4.1.

f) further more long-term options concerning energy efficiency measures in transport?

Energy efficiency measures need to be taken in parallel with RES-T promotion. But RES-T technologies offer additional opportunities for engine efficiency improvements for road, rail, sea and air traffic. This applies to conventional internal combustion engines (Table 1 in answer 1.1), electric motors, and non-conventional engines, such as stirling, micro-turbines and wankel. It is necessary to take into account the poor emission performance of high efficiency fossil fuel powered vehicles (e.g. Toyota Prius middle size hybrid car in Table 2) compared to biofuel powered vehicles (e.g. biogas powered large Volvo V70 Bi-fuel vehicle in Table 2). Social acceptance is very low for really high efficiency vehicles. Thus, the efficiency alone can reduce emissions per km in practice very little, whereas biofuels, especially biogas, offer dramatic reductions in both GHGs and other pollutant emissions even without changing consumer mobility habits (however, changing those is an important target, too).

Question 6.2

What are the prospects for second-generation biofuels that can be made from a wider range of biomass? Can they be expected to be cost-competitive with first-generation biofuels and if so by when?

Their prospects are excellent due to efficient use of biomass, efficient conversion processes, availability of feedstocks, quality of produced fuels, very long experience of using such conversion processes with various fossil feedstocks, and the centralized nature of the technology allowing the current fossil traffic fuel producers to move into those technologies without losing traffic fuel market control.

Question 6.3

It is sometimes suggested that vehicles can travel more kilometres on a given amount of

biofuel than on an equal amount (measured by energy content) of conventional fuel. Are any data or explanations available on this point?

There is a lot of evidence of this e.g. in Sweden. Sweden even wanted to take it into account in their biofuel country report but it was declined by the Commission (figures are however available in the 1st Swedish country report). The technical reason for this is given in table 1 of answer 1.1. The largest benefit in ordinary engines comes from low blending, but also high blending with conventional engines have a small but measurable effect, as shown e.g. in factory fuel consumption figures of E85 vehicles. The benefit can be increased a lot when designing engines for being able to use the enhanced quality of biofuels compared to fossil fuels. The new Saab FFV is an example of this (30 hp more with E85 than gasoline). Even more benefits can be gained in dedicated biofuel vehicles, but fossil fuels would be of too low quality fuels for those engines.

Question 6.4

Problems have been reported in interpreting the directive's requirements on the calculation of the contribution of certain types of biofuel (notably ethers such as ETBE).

Could the drafting of this directive be improved on this point? If so, how?

The text in the directive is clear.