greenpeace european unit, vzw-asbl
Belliardstraat 199 rue Belliard, 1040 Brussels, Belgium
t +32 2 274 1900 f +32 2 274 1910
european.unit@greenpeace.org www.greenpeace.eu
Ond. Nr./Num. d'entreprise: 0457563648

Greenpeace response to EC Public Consultation on Indirect Land Use Change impacts of biofuels

Abstract - The fundamental objectives of the Renewable Energy Directive (RED) are to combat climate change and increase the use of energy from renewable sources. The primary objective of the Fuel Quality Directive (FQD) is to decrease the carbon intensity of transport fuels used in the EU. Both Directives constitute an important part of the climate package aimed at reducing greenhouse gas (GHG) emissions and complying with domestic and international GHG reduction requirements. However, if current biofuels policies continue to ignore indirect land-use change (ILUC), GHG reductions will not be achieved. The reality is that under current policies, increased demand for biofuels will increase, not reduce, GHG emissions. This failure of the EU's biofuels policy erodes the EU's political credibility in the climate debate. This issue must therefore be taken very seriously and addressed through proposing a robust set of feedstock-differentiated ILUC factors before the end of this year as both RED and FQD stipulate.

INTRODUCTION

In April 2009, the EU legislature adopted the Renewable Energy Directive (RED), requiring Member States to use renewable energy sources to meet 10% of the final energy needs in their transport sectors by 2020.[1] This target will be met in large part through the increased use of biofuels, which are considered to be a renewable source under EU law. Under the National Renewable Energy Action Plans (NREAPs) submitted to date, by 2020 biofuels will have a 9.5% share of in surface transport energy. First generation biofuels will have a share of approximately 90% – in other words, comprising 8-9% of overall transport needs.[2] At the same time, the EU legislature adopted amendments to the Fuel Quality Directive (FQD) requiring a 6% reduction in lifecycle GHG emissions from fuels consumed in the EU by 2020.[3]

In principle, a reduction in the GHG intensity of transport fuels will best be achieved in the short-term by a GHG reduction target such as contained in the FQD. This allows fuels suppliers a wide range of options — reducing flaring, improving refineries, using less dirty crudes, employing low-carbon alternative fuels, to name a few—and hence offers the potential for significant carbon cuts. The target set in the FQD will however only be achieved if it is properly implemented, and if the monitoring and enforcement of compliance is based on a realistic carbon accounting methodology.

[1] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2001 on the promotion on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (hereinafter "RED" for Renewable Energy Directive).
[2] COD/2008/0016.
[3] Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC (hereinafter "FQD" for Fuel Quality Directive).

european unit

In addition to the technology-neutral framework provided by the FQD, which will mainly support GHG reduction options closest to the market, specific measures will be needed to promote the long-term renewable solutions in the transport sector. These measures need to rule out any use of harmful biofuels, while promoting the swift uptake of renewable electricity in all types of vehicles, including railways, and the use of truly sustainable biofuels.

The 10% target for renewable energy in the transport target does not fulfil this role, due to insufficient sustainability safeguards, and will instead lead to an expansion of unsustainable biofuels. If precautions are not taken, unsustainable biofuels will exacerbate the climate impacts of transport.

Under both the FQD and RED, it is crucial to properly account for the life-cycle emissions from all fuels, including emissions from indirect land use change (ILUC).

The EU legislature recognises that its biofuel policies may lead to land-use change. For this reason, existing biofuel policies include safeguards—in the form of "sustainability criteria"—which are supposed to prevent the conversion of forests and other natural areas for the purpose of producing biofuels directly on the converted land.[4] This phenomenon is called *direct* land-use change and it is crucial that it is prevented through the robust implementation of these criteria in producer countries.

However, regardless of the effectiveness of the safeguards against direct land use change, the pressure on land arising from the 10% target still risks driving land conversion indirectly. Biofuel production would occur on existing agricultural croplands, rather than newly deforested or converted natural areas, with those agricultural croplands lost to biofuel production moving into forests and other natural areas instead. This phenomenon is called *indirect* land-use change (ILUC). Existing policies encourage this practice, driving the destruction of forests and other natural areas causing the release of GHG emissions from vegetation and soil. In addition to these climate consequences, ILUC has implications for biodiversity, ecosystem services, human rights, and sustainable development.

Both RED and FQD contain an ILUC legislative mandate with detailed provisions requiring the EC to report by 31 December 2010 on ILUC impacts and, if appropriate, make proposals to incorporate unaccounted for GHG emissions into the statutory framework. This is the first step toward closing this loophole and reducing impacts. The timeframe set out in RED and FQD for a legislative decision is 31 December 2012, which underscores the EU legislature's urgency to find near-term solutions to ensure consistency between biofuel targets in 2020 and climate objectives.

ANSWER TO QUESTION 1

Greenpeace believes the analytical work produced by the European Commission (EC) constitutes the best available scientific evidence for determining feedstock-based ILUC factors.

[4] This is the theory. Unfortunately, the evidence to date indicates that the 'sustainability criteria' and GHG saving threshold that were agreed in the final Directive will not provide the environmental protection that is needed, both due to inadequacy of the criteria and/or of the implementation.

Numerous scientific publications and research from the EC's Joint Research Centre (JRC 2008, 2010), the Food and Agricultural Organization of the United Nations (FAO 2008), the Renewable Fuels Association (RFA 2008) and the United Nations Environmental Programme (UNEP 2009), to name a few, indicate that GHG emissions caused by ILUC are substantial and in most cases outweigh any savings from biofuel usage.[5] Indeed, the EC's own studies underscore that ILUC emissions cannot be ignored lest EU biofuel policies become a net contributor to climate change.

The EC's analytical work shows that the expected land-use conversion resulting from the policy is very significant. Importantly, none of the studies comes out with zero or negative ILUC emissions for any land-using biofuel feedstock.[6] Nor does any study show that moving from today's levels of biofuels use to levels expected by 2020 would, without additional safeguards, result in net GHG emission reductions. As a result, there is a clear need for corrective action.

Despite some variation in the assumptions underlying the studies and differences between models, similar conclusions can be drawn from all EC studies on two issues relevant for policymakers:

- the aggregate impact of the policy by 2020 based on Member States' predicted use of biofuels in their NREAPs ; and
- the marginal GHG emissions for different biofuel feedstocks under different studies that indicate those biofuels leading to GHG emissions increases and those that still meet the GHG-savings threshold (the basis for differentiated "ILUC factors").

Aggregate emissions impact of the policy as a whole

The landscape for this analysis has become much clearer with the submission of the majority of NREAPs, in which EU countries project what shares of biofuels they will use. The 23 Member States that submitted their plans so far include larger countries and therefore represent a large share of the transport fuel market. It is now possible to calculate aggregate ILUC impacts based on actual predicted biofuel usage rather than fictitious assumptions.

According to our preliminary analysis of the NREAPs,[7] Member States plan to use an additional 15.1 Mtoe[8] of first generation land-using biofuels by 2020 and 5.4 Mtoe of bioliquids, of which 4.4 Mtoe of conventional bioliquids.[9] The split between biodiesel and ethanol is approximately 73% in favour of biodiesel. Biofuels are expected to have a 9.5% share of the fuel market for surface transport and first-generation biofuels will constitute more than 92% of this share.[10] The use of bioliquids in electricity and heat sectors will add an additional 2% to this total.

[5] For a complete list of studies saying that ILUC should be accounted, see the *T&E Briefing: The Science of Biofuels and Indirect land use change* (September 2010). http://www.transportenvironment.org/Publications/prep_hand_out/lid/522
[6] This is not the case with dedicated energy crops, which were not studied in the Commission's studies, despite the fact that they also use (sometimes fertile) land. ILUC impacts of energy crops could also be substantial and should be further studied.
[7] We are including the analysis of 23 out of 27 NREAPs.
[8] toe = tonne of oil equivalent. 1 toe = 41.868 GJ by convention
[9] Bioliquids consumed in the electricity and heat sector are subject to the same sustainability criteria as biofuels in transport and have the same impacts on land use change. However, we did not manage to find, what are the levels of their current use or the so-called baseline. For this reason, we assumed that the baseline was zero.
[10] Includes road, rail and inland waterway transport, excludes maritime and air transport. For simplicity reasons when the rest of this paper talks of 'transport' we mean 'surface transport'.

Although the figures from the NREAPs analysis differ from assumptions used in the studies, it is nevertheless possible to calculate aggregate ILUC impacts of increases in biofuel consumption using the ISPRA study[11] with the updated numbers. This gives us the best approximation of the actual ILUC impacts due to EU biofuel policy.

Combining predicted biofuel usage with land-use change from the ISPRA study, it is possible to calculate how much land will be converted worldwide to meet the 10% target. The global land-use change will be in the range of 5.1 and 8.4 Mha due to the predicted increase of biofuels and bioliquids consumption, as illustrated in Table 1.[12]

Table 1: Estimated Land-Use Change Due to ILUC from biofuels and bioliquids

Table 1	Increase in production from 2008 to 2020 from NREAPs (K toe)	Overall land increase to meet 2020 targets (k ha)	
		Minimum additional land	Maximum additional land
Ethanol	4 250	1 658	2 210
Biodiesel	10 797	2 483	4 319
Ethanol + Biodiesel	**15 047**	**4 141**	**6 529**
Total Bio liquids (Conventional Bio liquids)	5 462 (4 350)	1 000	1 892
Total	**20 509**	**5 141**	**8 421**

As noted above, converting forests and other natural areas into croplands releases GHG emissions. Translating the hectares figure into emissions according to the IPCC figures, we come up with the one-off release of GHG emissions resulting from increased use of biofuels and bioliquids between 1087 and 1859 Mt CO_2, as illustrated in Table 2. If these emissions are divided over 20 years as specified in RED, this means that the annual GHG emissions resulting from increased use of biofuels and bioliquids will be between 55 and 93 MtCO2e.

[11] Indirect Land Use Change from increased biofuels demand - comparison of models and results for marginal biofuels production from different feedstocks. Joint Research Centre, Institute for Energy, Ispra, July 2010, commissioned by DG ENV/CLIMA, July 2010 (referred to as 'Ispra for CLIMA');

[12] The highest estimates from one of the studies (Leitap) were not included in this review - these results are especially high for biodiesel, namely 1928 kha per Mtoe of biodiesel.

Table 2: Additional emissions from increased use of biofuels and bioliquids [13]

Table 2	Additional emissions from increased use of biofuels and bioliquid	
	One-off ILUC emissions	ILUC emissions on the annual basis (divided over 20 years as specified in RED)
	Mt CO_2eq	Mt CO_2eq
Minimum (Biofuels + Bioliquids)	1 087 (876 + 211)	55 (44 + 11)
Maximum (Biofuels + Bioliquids)	1 859 (1 459 + 400)	93 (73 + 20)

After incorporating approximate direct savings from the approximate aggregated use of biofuels due to displacement of fossil fuels, we still end up with a policy that will be a net emitter of 27 to 56 Mt CO_2 per year for biofuels alone (table 3). This is the equivalent of adding an extra 12 to 26 million cars on European roads by 2020.

Table 3: Additional emissions from increase use of biofuels including GHG savings from biofuels use (divided over 20 years)

Table 3	ILUC emissions from biofuels on the annual basis (divided over 20 years as specified in RED)	ILUC Emissions including GHG savings from biofuels use (divided over 20 years)
	Mt CO_2eq	Mt CO_2eq
Minimum (Biofuels alone)	44	27
Maximum (Biofuels alone)	73	56

The IPTS study[14] came up with similar results. According to the JRC report[15], which calculated GHG impacts of the IPTS study, increasing biofuels from current shares to 7% would lead to estimated one-off GHG emissions of 1.092 Mt CO_2-eq.[16] Averaging this over a 20-year timeframe would yield around 54.6 Mt CO_2 per year (excluding GHG savings from biofuels use).

[13] The use of bioliquids would result in additional one-off emissions in the range of 210 – 400 Mt CO2.
[14] Impacts of the EU biofuel target on agricultural markets and land use: a comparative modelling assessment. Joint Research Centre, Institute for Prospective Technological studies, Seville, July 2010, commissioned by DG AGRI of the European Commission (referred to as 'IPTS for DG AGRI')
[15] Biofuels: a New Methodology to Estimate GHG Emissions Due to Global Land Use Change. A methodology involving spatial allocation of agricultural land demand, calculation of carbon stocks and estimation of N2O emissions" by R. Hiederer, F. Ramos, C. Capitani, , R. Koeble, V. Blujdea, O. Gomez, D. Mulligan and L. Marelli. EU Report 24483, 2010.
[16] Marelli et al. 2010.

There is one Commission study that came up with net GHG savings from the policy as a whole: the IFPRI study. Its main outcome is that there is a global net balance of nearly 13 Mt CO_2 savings per year, over a 20-year horizon, due to an increase of biofuels from 3.3% to 5.6%.

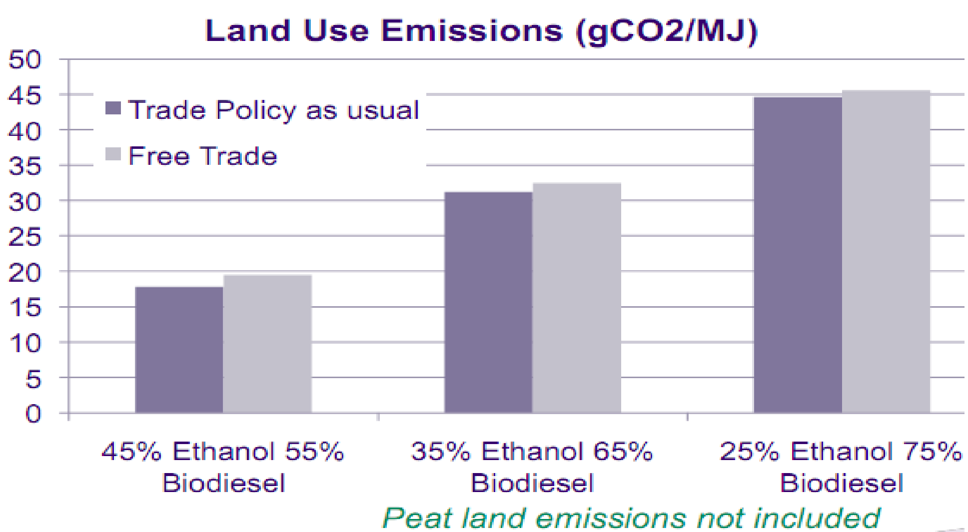
Under the 5.6% scenario, direct emission savings from biofuels are estimated at 18 Mt CO_2 with additional ILUC emissions at 5.3 Mt CO_2 (mostly in Brazil), resulting in a global net balance of nearly 13 Mt CO_2 savings per year over a 20-year horizon.[17] This equates to roughly 32 gCO2eq/MJ.

But there are three reasons why this outcome seriously underestimates the true ILUC impact of the policy:

- First, as noted above, the NREAPs indicate that predicted biofuel usage will be much higher than 5.6% and the biodiesel/ethanol split will be hugely skewed toward biodiesel (while the study looks at an almost even split), making the projections based on this assumption irrelevant for our purposes.

IFPRI later made a new assessment correcting for the 45/55 split, but not for the 5.6% overall volume. Its results are in the graph below.

Graph 1: the impact of a better biodiesel / bioethanol split in the IFPRI study.
http://www.theicct.org/workshops/iluc_sep10/ICCT_ILUC_workshop_IFPRI_Sep2010.pdf



This graph shows that correcting the biodiesel/ bioethanol split to better reflect reality (i.e. the 25/75% split in the right two columns) increases emissions from land use change by 26 g CO2eq/MJ (from around 19 g CO2eq/MJ to around 45 gCO2eq/MJ). That reduces the benefit estimated in the IFPRI report from 32 to 6 g CO2eq/MJ.

[17] JRC ISPRA later recalculated GHG emissions from IFPRI study on the most likely land use changes occurring around the world. For the BAU scenario total GHG emissions from ILUC are estimated at 201 Mt COeq (BAU) and 248 Mt CO eq (FT) over a period of 20 years. This means that net emissions from ILUC would be between 2 and 7 MT CO2 eq over a 20 year period.

- Second, the study virtually ignores emissions from peatlands. According to the ISPRA study these are, depending on where biodiesel is sourced, between 15 (for EU-sourced biofuels) up to 250 g CO2eq/MJ (for Indonesia-sourced biodiesel). This wipes out the remaining 6 g CO2eq/MJ benefit.

- Third, the IFPRI study's MIRAGE model turns out to be the model predicting the lowest levels of land use changes of all models analysed in the ISPRA study. Other studies arrive typically at 2 to 4 times higher values.

The above analysis shows that the same study demonstrates that whilst today's levels of biofuel may reduce emissions, the much more relevant move from today's levels of biofuels use to expected biofuels use in 2020 as recorded in the NREAPs would actually increase them. It also underscores that all Commission studies are largely consistent in terms of results.

The conclusion is that the two assumptions under which the 10% target for renewables in transport was adopted will not be met. These assumptions were that:

1. Biofuels will contribute to reducing GHG emissions. However, the studies show in contrast that the increase use of biofuels will end up amplifying, not decreasing, GHG emissions from the transport sector

2. "Second-generation" biofuels will be widely available. This studies show, however, that the share of second-generation biofuels will be less than 1% of final energy use in the transport sector in 2020, because no effective incentives are in place to promote them and the current flawed accounting system greatly favours current biofuels technologies.

Marginal GHG emissions of different biofuels

The studies also provide the information needed to address the legislative mandate in RED and FQD. The information required is "annualised emissions from carbon stock losses from ILUC" and would be based on a methodology similar to the approach taken for the other factors. This will be based on modelling, which produces reliable—if not conservative—values down to the feedstock level. There are two ways to calculate marginal ILUC emissions. On the one hand, we can extrapolate emissions per unit of fuel from aggregate emissions of the policy.[18] This would yield a feedstock-neutral ILUC factor applicable across the board. On the other hand, models can extrapolate marginal ILUC emissions for small increases in consumption of specific biofuel feedstock. This would yield feedstock-specific ILUC factors, which is the preferred alternative because it better reflects actual differences in emissions from different feedstock.

For calculating feedstock-specific ILUC factors, the IFPRI study represents the best available information on marginal ILUC emissions produced to date for EU biofuel policies, as illustrated in Table 4. We, however, share the view of the EC Joint-Research Centre (JRC) that emissions per hectare of oil-palm emissions from tropical peat oxidations in the IFPRI-MIRAGE model are about an order of magnitude too low[19].

[18] If we calculate marginal GHG impacts of biofuels on the basis of the assumed use and split of biofuels according to NREAPs and marginal land-use change from ISPRA study, we also come up with the range for an ILUC factor between 38 and 201 g CO2/MJ, as illustrated in Annex II.
[19] JRC (2010a) p113 "ILUC model comparison": http://ec.europa.eu/energy/renewables/consultations/doc/public_consultation_iluc/study_4_iluc_modelling_comparison.pdf

Table 4: IFPRI Study Marginal ILUC Factors

Table 12 Marginal Indirect Land Use emissions, gCO2/MJ per annum. 20 years life cycle.

	MEU_BAU		MEU_FT	
	Without Peatland effects	With Peatland effect	Without Peatland effect	With Peatland effect
Ethanol	*17.74*	*17.74*	*19.16*	*19.18*
Ethanol SugarBeet	16.07	16.08	65.48	65.47
Ethanol SugarCane	17.78	17.78	18.86	18.86
Ethanol Maize	54.11	54.12	79.10	79.15
Ethanol Wheat	37.26	37.27	16.04	16.12
Biodiesel	*58.67*	*59.78*	*54.69*	*55.76*
Palm Oil	46.40	50.13	44.63	48.31
Rapeseed Oil	53.01	53.68	50.60	51.24
Soybean Oil	74.51	75.40	67.01	67.86
Sunflower Oil	59.87	60.53	56.27	56.89

Source: Authors' calculations
Note:The marginal coefficient is computed in 2020 after the implementation of the 5.6% mandate.

Despite being a very conservative set of data compared to other studies (see Annex I), it could serve as a basis for the first set of ILUC factors until further research is completed. In addition, these factors should incorporate precautionary assumptions about the conversion of peatlands. If the Commission feels that relying on marginal ILUC emissions from the IFPRI study is inadequate, it can request JRC scientists to provide feedstock-specific values based on their existing modelling comparison study in the ISPRA study.

Gathering additional information should not be used however as pretext for delaying a legislative proposal. All studies confirm that marginal ILUC impacts of land-using biofuels are substantial and, in most cases, increase emissions of biofuels compared to fossil fuels, indicating the urgent need for legislative action.

From the table in Annex I of this submission, it can be seen that ILUC emissions range from 16 gCO_2eq/MJ (IFPRI study for sugar beet under BAU scenario with conservative assumptions about the biodiesel/ethanol split) to 352 gCO_2eq/MJ (LEITAP for EU biodiesel scenario). If these marginal ILUC emissions are added to direct emissions from producing biofuels (cultivation, transport and processing), then the GHG emissions of most biofuels feedstocks are higher compared to fossil fuels. The range in the Annex-I is also due to the fact that the studies that we summarize have used two different methodologies, as mentioned above.

The use of additional biofuels up to 2020 as reported in the NREAPS would lead to between 80% and 167% more GHG emissions than meeting the same need through fossil fuel use.

ILUC impact beyond carbon

GHG emissions are not the only impact of ILUC. Biodiversity is also adversely affected by land conversion in the form of ecosystem degradation and habitat loss. Biodiversity and ecosystems—and the services they provide—are closely connected to each other and to the climate system. Biodiversity is crucial for both mitigation of and adaptation to climate change.

Often considered "nice to have," biodiversity is actually essential for humankind's continued existence on this planet. Put simply, biodiversity forms ecosystems and ecosystems provide services, such as clean air and water supply. Without biodiversity many of the ecosystems and their services will probably collapse. Without these ecosystem services, the planet will become uninhabitable for many forms of life and in many regions.

In fact, ecosystem-based adaptation has been highlighted as a win-win strategy because it "can be cost-effective and generate social, economic and cultural co-benefits and contribute to the conservation of biodiversity."[20] If ecosystems have been degraded or lost because of increased pressure from biofuel policies their assistance in adaptation is also lost. Therefore, the EU should refine its ILUC modelling to specifically protect biodiversity, not just carbon.

Furthermore, increased demand for biofuels also has social impacts. The latest OECD-FAO Agricultural Outlook concludes that food prices could rise by 40% by 2019, partly because of the increasing demand for biofuels. In 2019, 16% of the global production of vegetable oils would be used for biofuels, which is described as a conservative estimate.[21] With the demand for food also on the rise, conflicts over forests, land boundaries, and land-use will be heating up. And indeed tensions are already rising: the World Bank recently warned that EU and US biofuel policies have already resulted in land-grabbing. Investors around the world have begun a land rush in African and other developing regions of the world, pushing out areas that had been previously used for food.

ANSWER TO QUESTION 2

Greenpeace has a clear answer to the second question posed by the EC: Yes, from the accumulated scientific evidence, including the EC's own studies, the EU must take action to address ILUC.

It is also clear that, without legislative action, ILUC emissions will erase any GHG benefits from EU biofuel policies. This means that, under the existing legal framework, Member States will be mandating and subsidising harmful biofuels that actually increase GHG emissions compared to fossil fuels. At present, the EC is drafting a report on ILUC impact of biofuels and considering the form of any legislative proposal to minimise this impact. In Greenpeace's view, determining a set of appropriate ILUC factors is the only viable, science-based approach to address ILUC in the short to medium term, within the context of RED and FQD.

In addition, the EC should launch an immediate review of the sustainability of the target for renewable energy in the transport target. In accordance with a precautionary approach, Member States should also be required to review the sustainability of the share of biofuels under existing NREAPs and eliminate support for biofuels that are suspected to increase GHG emissions until at least an indirect land use change factor is in place and functioning. Any delay in taking action will result in more carbon emissions and irreversible damage to the environment.

[20] Secretariat of the UN Convention on Biological Diversity (2009). Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change. Montreal, Technical Series No. 41. http://www.cbd.int/doc/publications/cbd-ts-41-en.pdf

[21] http://www.agri-outlook.org/document/9/0,3343,en_36774715_36775671_45438665_1_1_1_1,00.html

ANSWER TO QUESTIONS 3 AND 4

RED sets out four statutory requirements on the EC in fulfilling its legislative mandate: (i) it should be based on the best available scientific evidence; (ii) include a concrete methodology for emissions from carbon stock changes caused by ILUC; (iii) ensure compliance with RED, particularly Article 17(2); and (iv)include safeguards to ensure the certainty of investment.

In Greenpeace's view, only the introduction of ILUC factors can meet these requirements.[22] Below is a description of the form to be used to introduce an ILUC factor, e_{iluc}, into the formula for calculating total emissions.

Incorporating an ILUC factor into the Methodological Framework in RED, Article 17(2)

An ILUC factor would represent "annualised emissions from carbon stock losses from indirect land-use change" and join the other factors covering lifecycle emissions: $E_{[B]} = e_{ec} + e_{[d]l} + e_{iluc} + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee}$.

where

$E_{[B]}$ = total emissions from the use of the biofuel;

e_{ec} = emissions from the extraction or cultivation of raw materials;

$e_{[d]l}$ = annualised emissions from carbon stock changes caused by [direct] land-use change;

e_{iluc} = emissions from indirect land-use change

e_p = emissions from processing;

e_{td} = emissions from transport and distribution;

e_u = emissions from the fuel in use;

e_{sca} = emission saving from soil carbon accumulation via improved agricultural management;

e_{ccs} = emission saving from carbon capture and geological storage;

e_{ccr} = emission saving from carbon capture and replacement; and

e_{ee} = emission saving from excess electricity from cogeneration.[23]

ILUC can be determined based on the modelling of predictable land use change as a result of increased demand for biofuels driven by the EU's policies. The studies and underlying modelling produce reliable figures down to the feedstock level, as demonstrated in the IFPRI study and JRC report, which represent the best available scientific evidence.[24] Therefore, their results should serve as the basis for determining the values for differentiated ILUC factors for each feedstock.

[22] See also ClientEarth, Legal Briefing: Legislative Mandate to the Commission on Indirect Land-Use Change (October 2010).
[23] RED, Annex V(C)(1).
[24] *See, e.g.,* IFPRI Study and JRC Study.

In the face of uncertainty, the precautionary principle requires the use of figures based on the higher end of the spectrum. Annex V(A) under the RED, which contains the default GHG savings, should be regularly updated to reflect the scientific progress. Economic operators could adopt the default GHG savings for that biofuel listed in the table. A table would also be added to Annex V(D) and (E) under the RED with disaggregated values, which should list the feedstock-specific ILUC factors for when the economic operator elects to calculate actual emissions rather than rely on the default GHG savings.

This would allow economic operators to rely on the disaggregated value when calculating total emissions, should that be the preferred route toward showing compliance with Article 17(2). In short, by simply updating the existing framework with amendments to include ILUC emissions, the EU can guard against the promotion of harmful biofuels, and promote the use of truly sustainable biofuels as well as electricity produced from renewable energy sources.

Periodic review of the ILUC factors

In addition, it is important that the EC review these figures periodically, revising them as necessary in order to reflect the best available scientific evidence, through a transparent, inclusive and dynamic process.

ILUC factor for real wastes or residues

When economic operators avoid the dedicated use of land for biofuel production by using, for example, genuine wastes or residues; we think it is appropriate to allocate an ILUC factor equal to zero. In this circumstance, an ILUC factor may be zero when the raw material used as feedstock is derived from *real* waste and residues, i.e. with no alternative purpose.

RED currently double-counts wastes and residues toward the 10% target, to promote the use of these raw materials in the production of biofuels. The EC should consider removing this bonus upon inclusion of ILUC factors in the GHG methodology and replace it by allocating an ILUC factor equal to zero. .

In order to avoid displacement effects and hence ILUC, 'waste' and 'residues' must be defined to only include substances without any economically viable functions or useful purpose. This is important as the diversion of wastes and residues already used in other sectors to the biofuel market will likely result in their replacement with other substances with subsequent indirect impacts. As an example, if waste oils that are currently used in industrial or oleo chemical production, are diverted into biofuel production, this can lead to an increased demand for vegetable oil to replace it. Another example is tallow that is currently used in heating in the meat processing sector. If this tallow is diverted to biofuel market, it is likely that fossil fuel will be used for heating purposes, which will lead to emissions increase.[25] The definition should also be flexible enough to account for the fact that what is a waste or residue today could change over time as new markets and technologies are created, leading to competition with the feedstock.

The Greenpeace *Energy [R]evolution* [26]report demonstrates how renewable energy can cover 92% of the EU's total final energy use and 97% of electricity by 2050, with the use of biomass only relying on waste and residues. The *Energy [R]evolution* scenario includes substantial energy savings through efficiency technologies, improved public transport systems and a shift of freight transport from road to rail in the transport sector. Smart building design, the use of renewable heating technologies and the use of electricity from renewables for industrial processes replace the use of fossil fuels in the heating sector. The swift phase-out of nuclear and coal power production, the uptake of electric vehicles and the implementation of smart and super grids to allow flexible and localised electricity output and consumption allows for the smooth integration of up to 100% renewable electricity.

For more information, please contact :

Sébastien Risso

Greenpeace EU unit, 199, rue belliard, 1040 Bruxelles

Email : sebastien.risso@greenpeace.org

[26] Greenpeace, Energy [R]evolution, EU energy roadmaps compared (2010). http://www.greenpeace.org/raw/content/eu-unit/press-centre/policy-papers-briefings/Comparison-EU-Energy-Roadmaps.pdf

Annex I: Marginal emissions from indirect land use change – Summary of Commission's modelling studies

This Annex provides an overview of the Commission modelling studies and how different biofuel feedstock perform in terms of GHG emissions, when ILUC is added. The values provided are intended to provide an overview of marginal emissions from different modelling exercises. Note that different methodologies are used (i.e. marginal ILUC modelling in the case of JRC ISPRA and IFPRI and average ILUC factor in the case of IPTS report). Also note that in case GHG savings have negative values, it means that a specific biofuel will increase emissions compared to fossil fuels.

Scenario	ILUC emissions including emissions from peatlands	direct emissions from RED (default value)	GHG emissions from biofuels including ILUC	GHG savings (from the RED)	GHG savings (after ILUC is included)
LEITAP Biod EU-Deu*	352	44	396.2	47%	-373%
FAPRI Biod EU	99	44	143.3	47%	-71%
AGLINK Biod EU	40	44	84.2	47%	0%
AGLINK Biod US **	42	58	100.3	31%	-20%
GTAP Biod mix EU	73	44	117.2	47%	-40%
LEITAP Biod INDO***	326	29	355.1	65%	-324%
GTAP Biod Ind/Mal	79	29	107.7	65%	-28%
LEITAP Wht Eth EU-Fra	143	26	169.4	69%	-102%
FAPRI Wht Eth EU	69	26	95.0	69%	-13%
AGLINK Wht Eth EU	100	26	126.4	69%	-51%
IMPACT Wht Eth EU	39	26	65.0	69%	22%
GTAP Wht Eth EU	140	26	166.2	69%	-98%
IMPACT Wht Eth US	39	26	65.0	69%	22%
LEITAP Maize Eth US	151	43	194.0	49%	-131%
AGLINK Coarse Grain Eth US	89	43	132.2	49%	-58%
GTAP Coarse grains Eth US	37	43	79.6	49%	5%
IMPACT Maize Eth US	19	43	61.7	49%	26%
IMPACT Coarse Grains Eth EU	20	43	63.3	49%	24%
AGLINK Sugar cane Eth Bra	23	23	46.4	71%	45%
IFPRI BAU sugarbeet	16	40	56.1	52%	33%
IFPRI BAU sugar cane	18	23	40.8	71%	51%
IFPRI BAU maize	54	43	97.1	49%	-16%
IFPRI BAU wheat	37	26	63.3	69%	24%
IFPRI BAU palm oil	50	29	79.1	65%	6%
IFPRI BAU rapeseed	54	44	97.7	47%	-17%
IFPRI BAU soybean	75	58	133.4	31%	-59%
IFPRI BAU sun flower	61	41	101.5	51%	-21%
IFPRI BAU (JRC report)	34	21	65.0		22%
IFPRI FT (JRC report)	41	28	69.0		18%
IPTS AGLINK CG (JRC report)	63	48	111.0		-32%
IPTS AGLINK GM (JRC report)	64	48	112.0		-34%
Petrol (draft FQD)		85.8			
Diesel (draft FQD)		87.4			
Fossil fuel comparator in the RED		83.8			

** US biodiesel we assumed soy

*** Ind/Malay we assumed palm oil

Greenpeace european unit

Annex II: Discussion on the GHG calculation methodology of biofuels

Default Values for Biofuels

The default GHG saving is the simplest option. Economic operators claim the default GHG saving listed for each biofuel to determine compliance with the 10% target:

> [W]here a default value for greenhouse gas emission saving for the production pathway is laid down in part A or B of Annex V and where the e_l value for those biofuels or bioliquids calculated in accordance with point 7 of part C of Annex V is equal to or less than zero, [GHG savings may be calculated] by using that default value.[27]

In effect, economic operators claiming default GHG savings are relying on a typical calculation of total emissions from use of that specific biofuel, which then incorporates a margin of error before comparing it to the fossil-fuel comparator to determine its GHG savings. The GHG savings is pre-calculated and listed in an Annex V table. No other calculations are necessary. The table can be found in Annex V(A) of RED with default values for 24 different biofuel production pathways, ranging from a default value of 16% for “wheat ethanol (process fuel not specified)” to a default value of 83% for “waste vegetable oil biodiesel” (*abridged table set out for illustrative purposes*):

Typical and default values for biofuels if produced with no net carbon emissions from land-use change

Biofuel Production Pathway	***Typical GHG Saving***	***Default GHG Saving***
sugar beet ethanol	61%	52%
wheat ethanol (process fuel not specific)	32%	16%
wheat ethanol (straw as process fuel in CHP plant)	69%	69%
corn ethanol (natural gas as process fuel in CHP plant)	56%	49%
sugar cane ethanol	71%	71%
rape seed biodiesel	45%	38%
sunflower biodiesel	58%	51%
soybean diesel	40%	31%
palm oil biodiesel (process not specified)	36%	19%
palm oil biodiesel (process with methane capture at oil mill)	62%	56%
waste vegetable or animal oil biodiesel	83%	83%
hydrotreated vegetable oil from rape seed	51%	47%
hydrotreated vegetable oil from sunflower	40%	26%

E.g. under the 35% GHG-saving threshold, economic operators relying on default GHG-saving values for “wheat ethanol (process fuel not specified)” would be precluded from counting that biofuel toward the 10% target because its GHG saving of 16% is under the 35% GHG-saving threshold. At a default value of 83%, however, “waste vegetable oil biodiesel” easily meets the 35% GHG-saving threshold and Member States may count the biofuel use toward their targets.

[27] RED, Article 19(1)(a).

The default GHG savings may only be used when *direct* land-use change is zero.[28] Direct land-use change is the conversion between six land categories used by the Intergovernmental Panel on Climate Change—forest land, grassland, cropland, wetlands, settlements, and other land—plus a seventh category of perennial crops, which are multi-annual crops whose stem is typically not harvested such as short-rotation coppice and oil palm.[29]

Therefore, when the biofuel feedstock is grown directly on forests or other natural areas that have been converted for that purpose, the GHG emissions of the conversion must be included in its GHG saving. Since the default GHG saving does not consider direct land-use change, it is rendered inapplicable. RED contains methodologies for calculating direct land-use change that rely on the work of the Intergovernmental Panel on Climate Change for standard values for the reduction of carbon stocks after conversion.[30]

But direct land-use change is only half the land-use problem. ILUC, by contrast, occurs when the biofuel feedstock is grown on existing cropland. Unless the default is adjusted to account for ILUC emissions, the default GHG-savings values will chronically underreport emissions thereby incentivizing reliance on them to avoid having to account for GHG emissions from direct land-use change. For this reason, the default GHG-saving values must be adjusted to take this scenario into account.

Actual Values and Disaggregated Values for Biofuels

In lieu of the default GHG savings, economic operators may engage in more arithmetic to calculate the GHG saving for the biofuel.[31] Rather than rely on a typical calculation in the default GHG saving, economic operators may determine the GHG emissions for each factor themselves. The sum of these factors is then compared to the fossil fuel comparator to determine the GHG saving for the biofuel. Economic operators select between two alternatives to calculate the factors: the actual-value alternative or the disaggregated-value alternative. Each is addressed in turn.

The actual-value alternative uses "an actual value calculated in accordance with the methodology laid down in part C of Annex V." [32] Most factors have an Annex V(C) methodology. For example, the methodology for the factor on emissions from processing, e_p, considers the "emissions from the processing itself; from waste and leakages; and from the production of chemicals or products used in processing" with further provisions outlining how to account for electricity not produced through co-generation.[33] These methodologies provide extensive guidance to Member States and economic operators on the relevant considerations for each factor.

The disaggregated-value alternative uses "disaggregated default values in part D or E of Annex V."[34] An economic operator might use the disaggregated-default alternative when calculating the actual value is too burdensome or impossible for all factors. The disaggregated values are found in tables in Annex V(D) and (E), and represent typical GHG emissions and sometimes include a margin of error (*abridged table set out for illustrative purposes*):

[28] RED, Article 17(2)(a).
[29] European Commission, Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on country rules for biofuels (leaked circa April 2010), p. 15.
[30] RED, Recital 71.
[31] RED, Article 19(1)
[32] RED, Article 19(1).
[33] RED, Annex V(C)(11).
[34] RED, Article 19(1).

Disaggregated default values for cultivation: 'e_{ec}' as defined in part C of Annex V

Biofuel Production Pathway	***Typical GHG Saving (gCO_{2eq}/MJ)***	***Default GHG Saving (gCO_{2eq}/MJ)***
sugar beet ethanol	12	12
wheat ethanol	23	23
corn ethanol	20	20
sugar cane ethanol	14	14
rape seed biodiesel	29	29
sunflower biodiesel	18	18
soybean diesel	19	19
palm oil biodiesel	14	14
waste vegetable or animal oil biodiesel	0	0
hydrotreated vegetable oil from rape seed	30	30
hydrotreated vegetable oil from sunflower	18	18

Once each factor is determined—whether relying on its actual or disaggregated value—their sum yields the total emissions from use of the biofuel. For example, an economic operator using sunflower biodiesel may decide to use the disaggregated value for the cultivation factor (e_{ec} = 18 gCO_{2eq}/MJ) but choose to determine the actual values for the remaining factors according to the Annex V methodologies. The sum of all the factors will yield the total emissions from use of that biofuel, which is then compared to the fossil fuel comparator to determine its GHG saving. Because the disaggregated values are conservative estimates, calculating the actual values should produce a lower value for GHG emissions and make that biofuel more competitive. Economic operators are allowed to select among the two alternatives, subject to certain restrictions, in an effort to provide flexibility and reduce administrative burdens. Although there is a factor and methodology for direct land-use change, there is neither a factor nor a methodology for ILUC.