



Brussels, 1 December 2010

Ref: 010/290/AB

To: Commissioner Dacian Cioloş

CC: Georg Haeusler, Alina Ujupan, Jean-Luc Demarty

**Subject: Addressing Indirect land use change in the framework of the EU biofuels policy**

Dear Commissioner Cioloş,

We are writing to present a groundbreaking report by the Institute for European Environmental Policy (IEEP) on the anticipated impacts of current EU biofuel policies with respect to indirect land-use change (ILUC).<sup>1</sup> The conclusions of the IEEP report underscore the need for the Commission to act on its legal obligations as specified in the Renewable Energy and Fuel Quality Directives.<sup>2</sup>

The IEEP report is based on the information provided in the National Renewable Energy Action Plans (NREAPs) and on the best available science produced to date under the auspices of the Commission. It can therefore be seen as the most accurate illustration of likely impacts of EU biofuel policies on land-use change and associated greenhouse-gas (GHG) emissions.

The main conclusions from the analysis of the 23 NREAPs submitted at the time of publication of the IEEP report reveal that:

- Europe is set to significantly increase biofuel use by 2020 by which time biofuels will provide 9.5% of transport fuel with 92% coming from food crops;
- An area over twice the size of Belgium will likely be converted into fields and plantations as a result of the anticipated increase in biofuel consumption;
- When land-use change is taken into account, biofuels will cause an extra 27-56 million tonnes of GHG emissions per year – the equivalent of an extra 12-26 million cars on Europe's roads by 2020; and
- Unless EU policy changes, the extra biofuels that Europe will use over the next decade will cause on average 81-167% more climate damage than fossil fuels.

<sup>1</sup> IEEP (2010), *Anticipated Indirect Land Use Change Associated with Expanded Use of Biofuels and Bioliqids in the EU*, available at: [http://www.transportenvironment.org/Publications/prep\\_hand\\_out/lid/611](http://www.transportenvironment.org/Publications/prep_hand_out/lid/611)

<sup>2</sup> Directive 2009/28/EC, Article 19(6); Directive 2009/30/EC, Article 7d(6).

These GHG emissions from ILUC are currently unaccounted in the existing methodologies for calculating GHG emissions from biofuels, presenting a misleading picture of their actual impact. It is critical that the Commission act on its legal obligations.

The Renewable Energy and Fuel Quality Directives set out clear reporting and proposal obligations on the Commission to address ILUC resulting from EU biofuel policies.<sup>3</sup> The first obligation is to submit a report by 31 December 2010 “reviewing the impact of indirect land-use change on greenhouse gas emissions and addressing ways to minimise that impact.”<sup>4</sup> Anything less than a full report is inadequate.

The second obligation requires the Commission to determine whether an accompanying proposal is appropriate. The recent IEEP report is the latest addition to a long list of scientific studies pointing out that EU biofuel policies, if left unchanged, will increase GHG emissions from the transport sector. It reaffirms the need for the Commission to submit a meaningful proposal that will address and minimise emissions from ILUC in line with its legal obligations. It is imperative that the proposal is based on the best available scientific evidence and contains a concrete methodology for tackling emissions from ILUC.

Failure to act will have significant and ongoing implications for our climate system and forests and biodiversity worldwide. Immediate action is required to prevent deforestation, destruction of natural areas, and loss of biodiversity from EU biofuel policies. In addition, any delay by the Commission in complying with its legal obligations will undermine investment certainty and create a domino effect of further delays for completing several related provisions.<sup>5</sup>

We therefore call upon the Commission to comply with its reporting and proposal obligations.<sup>6</sup> We urge the Commission to put forward legislation introducing separate ILUC factors for the different categories of biofuel feedstocks. The United States has already taken a first step in addressing ILUC with feedstock-specific ILUC factors. Such a proposal in the European Union would send the right signals to global markets and international investors while also stimulating biofuels that do not increase GHG emissions, trigger deforestation and biodiversity loss, threaten land rights, and contribute to food insecurity.

→ We would appreciate an opportunity to meet with you to discuss this matter further.

Sincerely,



 BirdLife Europe

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<sup>3</sup> *Id.*

<sup>4</sup> *Id.*

<sup>5</sup> See, e.g., Directive 2009/28/EC, Article 19(6) (the European Parliament and the Council shall endeavour to decide, by 31 December 2012, on any proposal on ILUC submitted by the Commission).

<sup>6</sup> Article 11 TEU; Article 265 TFEU; see also Case T-167/04; Case 15/70; Case T-395/04; Case No C-170/02 P; Case No. T-420/05; Joined Cases C-15/91 and C-108/91; Case T-26/01; Case C-25/91; Case C-44/00.

*On behalf of:*

James Thornton, Chief Executive Officer, ClientEarth

John Hontelez, Secretary General, European Environmental Bureau

Jos Dings, Director, Transport & Environment

Laura Sullivan, Head of Europe Policy and Campaigns, ActionAid

Jorgo Riss, Director, Greenpeace European Unit

Saskia Ozinga, Campaigns coordinator, FERN

Magda Stoczkiewicz, Director, Friends of the Earth Europe

Jane Madgwick, Chief Executive Officer, Wetlands International

- Enclosures:
- Institute for European Environmental Policy, *Anticipated Indirect Land Use Change Associated with Expanded Use of Biofuels and Bioliquids in the EU* (November 2010)
  - Briefing: *The impacts of Europe's biofuels plans on carbon emissions and land* (November 2010)
  - ClientEarth, *Legal Briefing: Legislative Mandate to the Commission on Indirect Land-Use Change* (October 2010)
  - EU Civil Society Statement, *EU Climate Policy in Transport Must Not Cause Irreversible Environmental and Social Damage* (October 2010)





# Anticipated Indirect Land Use Change Associated with Expanded Use of Biofuels and Bioliquids in the EU – An Analysis of the National Renewable Energy Action Plans

November 2010

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This report is available to download at [www.ieep.eu](http://www.ieep.eu)

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<sup>1</sup> IEEP would like to thank Ian Skinner of Transport and Environmental Policy Research for his support in peer reviewing this report to ensure its quality and accuracy.

<sup>2</sup> This report was prepared by IEEP for Transport and Environment and partners

## Summary

- This study represents a first analysis and estimate of the effects of Indirect Land Use Change (ILUC) associated with the increased use of conventional biofuels that EU Member States have planned for within their National Renewable Energy Action Plans (NREAPs). These documents specify how European governments plan to deliver their transport targets under the Renewable Energy Directive (RED). 23 NREAPs were available at the time of drafting and the analysis is based upon these. ILUC effects have been calculated using recently released studies by the European Commission.
- The RED target, for 10% of transport fuel to be from renewable sources by 2020, is anticipated to stimulate a major increase in the use of conventional biofuels up to 2020, contributing up to 92% of total predicted biofuel use or 24.3 Mtoe in 2020. This would represent 8.8% of the total energy in transport by 2020; 72% of this demand is anticipated to be met through the use of biodiesel and 28% from bioethanol.
- Member States are anticipating importing significant proportions of these fuels and their associated feedstocks. Figures reported equate to 50% of bioethanol and 41% of biodiesel in 2020. However, actual imported levels of feedstock are anticipated to be higher as it is unclear whether the imports anticipated by Member States refer to feedstock for 'domestic' processing into biofuels as well as imports of processed biofuels.
- Additionally Member States are estimated to be sourcing 4349 Ktoe of bioliquids from conventional feedstocks in 2020. Used for heating and electricity, these will have similar ILUC consequences as for biofuels representing an additional emission source of greenhouse gas emissions (GHG). ILUC impacts from these bioliquids are estimated to equate to an area of between 1 and 1.9 million ha and GHG emissions of between 211 and 400 MtCO<sub>2</sub>e.
- In 2020 15,047 Ktoe of the biofuels used would be additional to 2008 levels and sourced from conventional ie primarily food crop based feedstocks; this can be considered to be additional demand stimulated by the RED.
- Using currently available data, this additional demand for these fuels is anticipated to lead to between 4.1 and 6.9 million ha of ILUC ie an area equivalent to just larger than Belgium to just under that of the Republic of Ireland.
- This additional ILUC was calculated to result in between 44 and 73 million tonnes of CO<sub>2</sub> equivalent (MtCO<sub>2</sub>e) on an annualised basis ie between 876 and 1459 MtCO<sub>2</sub>e in total.
- Under the RED biofuels must deliver a required level of GHG savings relative to fossil fuels to count towards the targets. Even when this saving is taken into account estimated additional GHG emissions arising from ILUC are between 273 and 564MtCO<sub>2</sub>e (for the period 2011 to 2020) or between 27 and 56 MtCO<sub>2</sub>e annually. The latter equates to up to 12% of emissions from EU agriculture in 2007 or 6% of total transport emissions. Put another way this would be equivalent to between 12 and 26 million additional cars on the road across Europe in 2020.
- Based on this assessment, and the assumptions adopted, use of additional conventional biofuels up to 2020 on the scale anticipated in the 23 NREAPs would lead to between 80.5% and 167% more GHG emissions than meeting the same need through fossil fuel use.
- This analysis was based on what were considered the most appropriate assumptions using the evidence and models available at the time of drafting. However, sensitivity analysis shows that even with far lower estimates of ILUC arising per unit of additional biofuel consumption and of GHG emissions per unit area of ILUC the use of conventional biofuels envisaged in the NREAPs fails to deliver the reduction in GHG emissions required under the RED, and leads to an increase in GHG emissions overall.
- This analysis underlines the need to address the question of ILUC as a priority for biofuels policy and to include ILUC in the criteria for assessing whether biofuels should count towards the delivery of targets under the RED for 2020, and more generally EU European climate change mitigation goals. Moreover, it also raises urgent questions about the appropriateness of projected levels of conventional biofuel use by Member States in 2020. Many have focused little effort in their NREAPs on promoting advanced biofuels or pursuing a greater efficiency in their transport sector so as to reduce the overall climate burden.

## 1. Introduction

The EU Renewable Energy Directive, RED, on the promotion of the use of energy from renewable sources<sup>3</sup> (Directive 2009/28/EC) is a powerful measure at the heart of European energy and climate policy. It sets out two targets aimed at the promotion of renewable energy. The first requires the delivery of 20% of total energy from renewable sources by 2020, with the level of effort differentiated across the Member States. The second specifically promotes the use of energy from renewable sources within the transport sector, requiring 10% of all transport fuels to be delivered from renewable sources by 2020 across every Member State. When the Directive was adopted, it was unclear precisely what technologies and approaches would be adopted by the Member States in order to deliver these targets. To reveal, open to scrutiny and monitoring, the national approaches to meeting these targets the RED also explicitly requires that each Member State produce a National Renewable Energy Action Plan (NREAP).

The NREAPs are critical to understanding the anticipated consequences associated with meeting the EU RED targets. As of mid October 2010 23 Member States<sup>4</sup> had submitted their NREAP to the Commission. ***This analysis represents a first attempt to analyse the data presented by the Member States to ascertain the characteristics of the demand generated by the targets in one important area: the anticipated use of biofuels.***

To deliver the RED transport target there are a number of potential technologies available to Member States:

- use of conventional, also known as first generation, biofuels;
- use of advanced biofuels, these are specified within the RED under Article 21.2 as those derived from wastes, residues, non-food cellulosic material, and ligno-cellulosic material and count double towards the delivery of the 2020 transport target;
- efficiency gains within the transport sector that reduce fuel needs, therefore, the overall quantity of renewable energy needed to meet the target; and
- the electrification of the transport system, utilising renewable electricity.

Meeting the RED target for transport, and also to a more limited extent the use of bioliquids in heating and electricity generation, is anticipated to increase the demand for conventional biofuel and bioliquid feedstocks<sup>5</sup>. Moreover the RED is an important element of the EU's efforts to reduce greenhouse gas (GHG) emissions. As a consequence the RED specifies sustainability criteria intended to both limit the consequences of direct land use change<sup>6</sup> associated with

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<sup>3</sup> Directive 2009/28/EC can be downloaded at <http://www.energy.eu/directives/pro-re.pdf>

<sup>4</sup> Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the UK

<sup>5</sup> These include commodities such as oil seed crops including rape seed and soy, palm oil, wheat, maize, sugar cane and sugar beet.

<sup>6</sup> The RED specifies that biofuel feedstocks used to comply with the EU targets must not be grown on land that held certain environmentally sensitive characteristics after January 2008 ie that is considered highly biodiverse or a significant carbon store. Article 17 of the Directive specifies the land uses to be protected. As a consequence these land uses should be protected from being directly converted to feedstock production to meet expanded EU demand.

expanded demand for feedstocks and requires minimum (GHG) savings to be delivered by all biofuels and bioliquids used to meet the EU targets<sup>7</sup>.

***While the RED specifies mechanisms for dealing with direct land use change arising from the cultivation of feedstocks, it as yet fails to take into account indirect land use change (ILUC).*** ILUC is generated by the elevated demand for agricultural commodities as a consequence of biofuel consumption. When biofuels are grown on existing arable land, which will often be the case, ILUC can ensue elsewhere, either in the same country or in other parts of the world. This is because current demand for food and animal feed may well remain unchanged and cannot be assumed to fall. As a consequence pre-existing agricultural production can be displaced into new areas. This displacement will cause some new land to be brought into arable production possibly far from the area in which the biofuel feedstock is being grown, potentially impacting grasslands, forests or other natural habitats. ***The expansion in the area of cultivation leads to land use change, which is associated with significant GHG emissions as a consequence of the release of carbon locked up in soils and biomass. Moreover the expansion in cultivated area and more intensive use of agricultural land can pose a potentially significant threat to biodiversity globally.*** For the RED Directive to deliver the intended goal of contributing towards the EU's effort to combat climate change the additional GHG emissions from ILUC would need to be controlled, ensuring they are less than the savings in direct emission reductions delivered by biofuel use.

***Given the information held in the NREAPs and ongoing work to determine the ILUC impacts associated with biofuel use in the EU, it is now possible to estimate the ILUC consequences associated with an individual Member State's biofuel demand driven by the 2020 targets. This paper presents the initial findings of such an analysis based on the 23 NREAPs published to date.*** The aim of this exercise is to help inform debate on ILUC and its consequences. This is intended to support the Commission's work on ILUC, given that a report and new potential proposals to take account of ILUC are scheduled to be published by the end of 2010 – as specified in the RED.

## 2. Methodological Approach

This assessment incorporated 5 key analytical steps set out in figure 1, below. These represent a process starting with the collation of data from the NREAPs and using published data and methodologies to establish an acceptable baseline for measuring the ILUC impact of expanded biofuel demand associated with the RED targets. These methods allowed the anticipated area of ILUC to be estimated along with the volume of associated GHG emissions. The primary data sources used within the assessment were as follows:

- NREAP information per Member State regarding the level of conventional and Article 21.2 biofuels to be used by 2020, bioliquid usage in 2020 and other transport related actions to deliver the RED targets<sup>8</sup>;
- DG Energy data on 2008 usage of biofuels by Member State<sup>9</sup>;

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<sup>7</sup> The RED Article 17.2 requires that biofuels and bioliquids used to meet the EU targets or that are subsidised by Member States deliver a 35% GHG saving compared to the use of fossil fuels (this applies from December 2010 when the EU Directive must formally be transposed by the Member States). The required level of saving rises to 50% from 1 January 2017 and 60% from 1 January 2018 for fuels produced by installations that started production after January 2017.

<sup>8</sup> These can be downloaded at

[http://ec.europa.eu/energy/renewables/transparency\\_platform/action\\_plan\\_en.htm](http://ec.europa.eu/energy/renewables/transparency_platform/action_plan_en.htm)

<sup>9</sup> This is available at <http://www.eurobserv-er.org/pdf/baro198.pdf>

- Joint Research Centre (JRC) analysis reviewing ILUC modelling efforts and conclusions regarding potential ILUC impact in terms of land use change measured in hectares (ha) and associated GHG impact<sup>10</sup> (supported by analysis by other groups of ILUC impacts including that by Ecofys<sup>11</sup>);
- Data from the Intergovernmental Panel on Climate Change regarding GHG emissions from land use change<sup>12</sup>;
- FAO data on area of agricultural and arable land in EU Member State<sup>13</sup>;
- DG Energy data on GHG emissions per Member State in 2007 – both for transport and total GHG emissions (excluding international bunkers and LULUCF)<sup>14</sup>;
- Data on anticipated fuel efficiency and car usage up to 2020<sup>15</sup>

Figure 1 – Outline of the methodological steps and approach used within this analysis

	Step	Approach
1	Collation of data from the existing NREAPs on biofuel demands per MS	Proportion of renewable energy in transport sector by 2020 Total demand – biofuels, bioethanol, biodiesel Demand for conventional vs advanced biofuels vs renewable electricity in transport Supply impact ie proportion of domestic vs imported biofuels to be used
2	Identification of increase in conventional biofuel use by 2020 attributable to the RED target	Assumed a basis of Jan 2008 for pre-RED demand for bioethanol and biodiesel Assumed that Jan 2008 usage is 100% conventional biofuels Increase = projected MS usage of bioethanol/biodiesel – 2008 levels
3	Identification of anticipated ILUC associated with the increase in biofuel use	ILUC = anticipated increase in level of bioethanol/biodiesel use by 2020 x ILUC conversion factor ie kHa change per kToe relevant fuel ILUC conversion factors based on parameters derived from JRC analysis of ILUC modelling – provides an upper and lower estimate – see annex regarding calculations for approach to determining ILUC parameters
4	Identifying the GHG emission consequences associated with ILUC	GHG impact = ILUC scale x GHG conversion factor ie tCO <sub>2</sub> e per kha GHG associated with land use change based on conclusions from the JRC study and estimates from IPCC – lower, central and upper values used to create a mean GHG volumes divided by 20 to provide an annualised level of emissions in line with the RED specification and emission savings associated with biofuel usage subtracted from the total to provide a picture of additional ILUC emissions by 2020.
5	Converting the ILUC estimates into meaningful proxies	Comparing the level of biofuel related ILUC for a single Member States with the total area of arable land in that MS Comparing the GHG impacts for a single Member State to their corresponding transport emissions and emissions from agriculture Calculating the impact in terms of additional cars on the road in 2020 based on additional GHG emissions associated with ILUC

<sup>10</sup> European Commission, Joint Research Centre (JRC), Institute for Energy, 2010, Indirect Land Use Change from increased biofuels demand, Comparison of models and results for marginal biofuels production from different feedstocks, Robert Edwards, Declan Mulligan and Luisa Marelli

<sup>11</sup> Ecofys, October 2009, Summary of approaches to accounting for indirect impacts of biofuel production, Stijn Cornelissen and Bart Dehue

<sup>12</sup> For further details of their work see [http://www.ipcc.ch/ipccreports/sres/land\\_use/index.php?idp=299](http://www.ipcc.ch/ipccreports/sres/land_use/index.php?idp=299)

<sup>13</sup> This can be downloaded at <http://faostat.fao.org/>

<sup>14</sup> Available for download at [http://ec.europa.eu/energy/publications/statistics/doc/2010\\_energy\\_transport\\_figures.pdf](http://ec.europa.eu/energy/publications/statistics/doc/2010_energy_transport_figures.pdf)

<sup>15</sup> Details on car usage set out in [http://www.transportenvironment.org/Publications/prep\\_hand\\_out/lid/568](http://www.transportenvironment.org/Publications/prep_hand_out/lid/568), details on car emissions determined in discussions with external experts

### 3. Delivering the 2020 Target

The 23 NREAPs indicate that by 2020 a total of 26 Mtoe (Million tonnes of oil equivalent) of biofuels will be being made use of by the relevant Member States. This represents **9.5% of energy in transport within these Member States being sourced from biofuels in 2020**, taking account of energy efficiency gains anticipated. This compares to a total for usage of biofuels for all Member States of 10.2 Mtoe in 2008 or 9.4 Mtoe used in the relevant 23 Member States. **The 2020 target is, therefore, anticipated to stimulate a major increase in the use of biofuels by 2020, with these remaining the primary technology for delivering renewable energy in the transport sector** and delivering the RED 10% target.

Of this, the majority is **over 92% or 24.3 Mtoes of the biofuels utilised are anticipated to be conventional biofuels** ie sourced primarily from agricultural feedstocks such as oil seeds, palm oil, sugar cane and beet, wheat, soy etc. This would represent 8.8% of the total energy used in transport by 2020. Advanced biofuels are anticipated to account only for 0.6% of total energy in transport by 2020 amounting to 1.7Mtoe by 2020 in the 23 Member States. It had been hoped that the bonus provided for in the RED for the use of advanced biofuels (ie that they count double towards the achievement of the 2020 target) might better stimulate their greater use. Despite this, however, it seems that production of large volumes of advanced biofuels will not be stimulated by the RED.

The anticipated scale of total biofuel use and the selective use of advanced biofuels by Member States is highly varied given the huge differences in the size and make up of national transport sectors. For example Germany is anticipated to use by far the highest volumes of biofuels in 2020, followed by the UK, France, Spain and Italy. This high user group is anticipated to account for a total of 19.5 Mtoe of biofuel by 2020 – see figure 2. All other Member States are each anticipating using less than 1 Mtoe biofuel by 2020.

In terms of use of advanced biofuels, Cyprus states that all its biofuels will be sourced from this group by 2020 while Denmark anticipates using primarily conventional biodiesel but only advanced bioethanol sources. Meanwhile others, including some major users, such as Austria, Greece, Lithuania, Luxembourg, Slovenia and the UK anticipate 100% use of conventional biofuels in 2020. The largest user by volume of advanced biofuels in 2020 is anticipated to be Italy (400 Ktoe ie thousand tonnes of oil equivalent), followed by Spain, France, Finland, Germany and the Netherlands. Advanced biodiesel based fuels are anticipated to account for almost double that of advanced bioethanol (1022 versus 539Ktoe respectively<sup>16</sup>). Figure 2 presents the total projected usage of biofuels split between conventional and advanced biofuels, demonstrating the contrast in volumes. Figure 3 presents the overall percentage use of conventional biofuels by Member State with the proportion standing at over 80 per cent in the great majority.

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<sup>16</sup> It should be noted that Romania did not provide details of the break down of biofuel usage within its NREAP hence total figures for advanced biofuel usage different slightly from the breakdown between biodiesel and bioethanol.

Figure 2 – Member State Usage of Biofuels in 2020 based on NREAP figures – comparing total volume usage of conventional and advanced biofuels

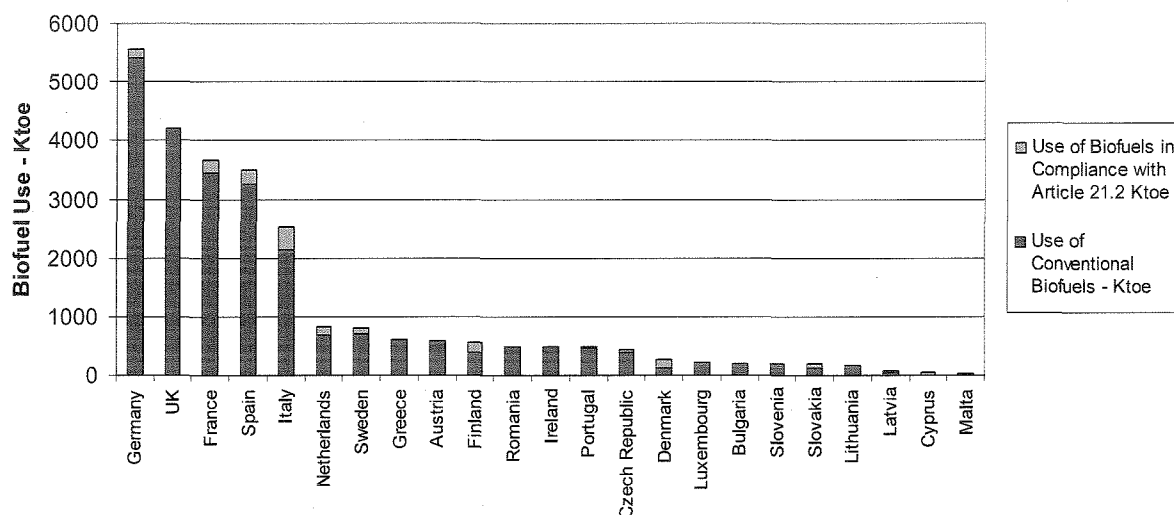
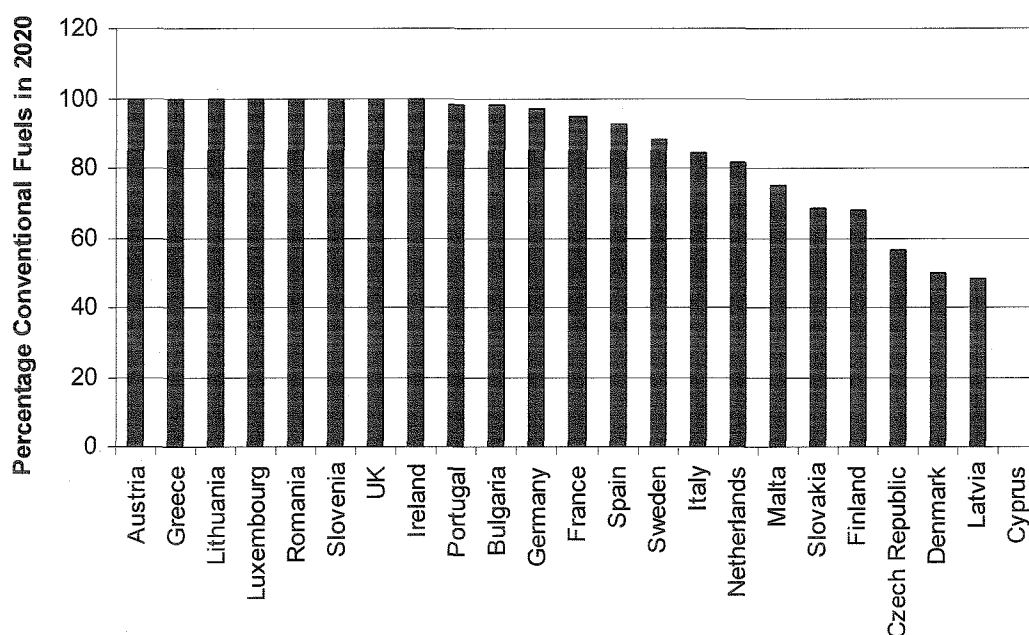


Figure 3 – Percentage of biofuel use anticipated to be from conventional biofuels by 2020



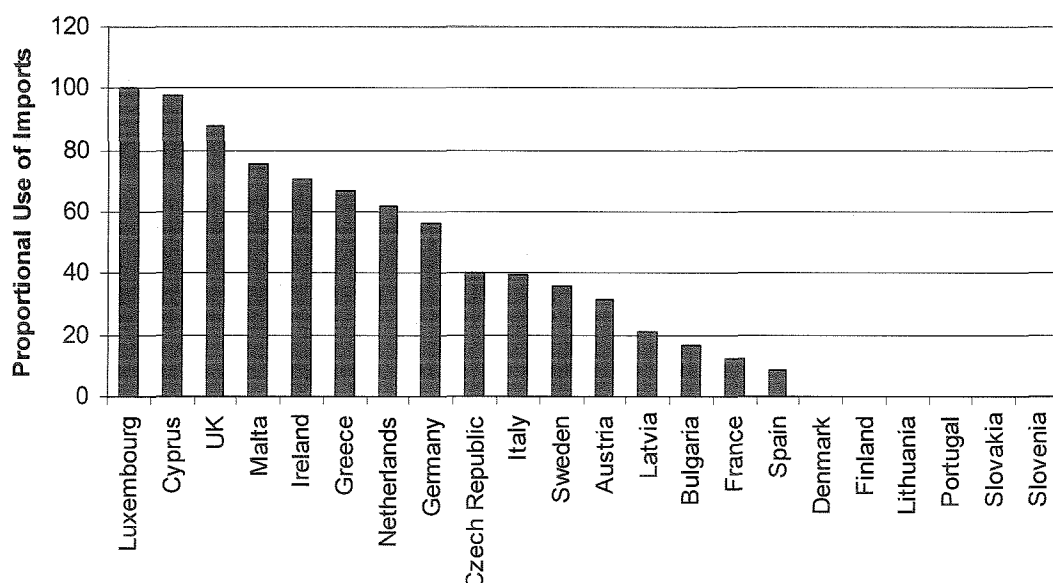
***There is much higher usage of biodiesel anticipated in 2020 than bioethanol; 72% of biofuels are anticipated to be sourced from biodiesel.*** In total 18.9 Mtoe of biodiesel are anticipated to be consumed in 2020 compared to 6.2 Mtoe of bioethanol. Only Sweden anticipates making use of over 50% bioethanol in 2020; by contrast Slovenia and Luxembourg would be utilising approximately 90% biodiesel.

In 2020 Member States are certainly not all anticipating to be sourcing their biofuels domestically with ***many relying on a high proportion of imports*** to secure biofuel supplies. On average the 23 Member States are anticipating importing 50% of bioethanol and 41% of biodiesel in 2020, equating to 3.1 and 7.7 Mtoe respectively. The reliance on imports and the total volumes involved varies significantly across the Member States, with imports accounting for between 100% and 0% of biofuels depending on the country. It should, however, be noted that it is unclear from many of the NREAPs whether the figures for imports relate explicitly to

the importing of all materials to be used as biofuels in 2020 into the country concerned ie whether they include both raw feedstocks for conversion to biofuels in country and pre-processed biofuels or whether they relate only to pre-processed biofuels. Examining the figures it is considered that a mixture of approaches to this calculation has been applied by national governments. Therefore, overall levels of imports related to biofuel consumption may higher than reported. Imports relate to levels entering the market in that particular Member State, therefore, probably include exports from other EU countries.

The UK is anticipated to be importing by far the largest quantities of bioethanol in 2020, anticipating use of 1.5 Mtoe of imported bioethanol or 81% of its total bioethanol usage; levels of imports of bioethanol by all other Member States lie below 450Ktoe. Germany and the UK anticipate significantly greater volumes of biodiesel imports than other Member States, 2.9 and 2.2 Mtoe respectively or 64 and 91% of their biodiesel usage. ***In total the UK is expected to be the highest importer of biofuels by volume utilising 3.7 Mtoe of imported biofuels in 2020.*** Figure 4 presents the anticipated reliance on imports of biofuels per Member State in percentage terms.

Figure 4 – Reported reliance of the Member States on the imports of Biofuels to Meet Demand in 2020



\*It should be noted that Romania did not report the breakdown between different biofuel sourcing and usage within the NREAP therefore they are excluded from this figure.

Liquid fuels from biomass can also be used in stationary energy sources, such as diesel generators or space heaters replacing fossil fuels to provide heat and power. These bioliquids would be anticipated to be sourced in the same manner to biofuels and are subject to the same sustainability criteria under the RED. For those countries utilising bioliquids this would result in impacts additional to those associated with transport demand. Consequently, bioliquids should also be considered in any ILUC assessment for biofuels and also within policies designed to alleviate this. The scale of additional impact associated with bioliquids is discussed in section 8 of this report. ***Within their NREAPs only eight of the 23 Member States explicitly specified that they anticipate making use of bioliquids within these stationary sources, generating an additional demand for 5,462Ktoe primarily associated with heating*** - anticipated usage by Member State is presented within Table 1. Additionally the UK noted in their NREAP that they have yet to determine levels of bioliquid usage.



Table 1 – Anticipated use of bioliquids in heating and electricity supply

Member State	Total bioliquids in stationary sources – Ktoe by 2020
Austria	3
Denmark	9
Finland	3021
Germany	836
Italy	568
Portugal	932
Slovenia	28
Sweden	65
Total	5,462

#### 4. Anticipated Increase in Biofuel Usage Associated with the RED

To assess the ILUC impacts associated with the increase in biofuels use generated by the RED it is necessary to understand the baseline usage of biofuels prior to the Directive coming into force. Within this analysis the baseline usage of biofuels is assumed to be equivalent to total consumption in 2008, based on data reported in the Euroobserver. This baseline is equivalent to others used within the RED to determine the limit of its influence. The additional biofuel demand generated by the RED would, therefore, be the difference between 2008 figures and predicted figures for 2020.

At present ILUC assessments have only been completed to assess the impact of conventional biofuels. ***While it is noted that advanced biofuels, especially those based on lingo cellulosic technologies or non-food crops will also place demand on land it is not currently possible to appropriately estimate their impact with much accuracy.*** As a consequence this assessment of the increase in biofuel consumption is confined to the anticipated rise in the consumption of conventional biofuels up to 2020. Given the limited market penetration of advanced biofuels in 2008 it is assumed that all biofuel usage in that year was conventional. For the purpose of this analysis the increase in conventional fuel use associated with the RED is, therefore, total EU 2020 biofuel consumption less total 2008 biofuel use and minus any use of advanced biofuels in 2020. The uncertain impacts of advanced biofuels, which will be responsible for some additional ILUC, are thus set aside.

Based on the data specified in the NREAPs by ***2020 total additional usage of conventional biofuels is calculated to be 15.1 Mtoe, with a split of 72% new biodiesel demand and 28% new bioethanol demand.*** While the UK will not be the highest user of biofuels in 2020, it foresees the greatest increase in conventional biofuel use due to the relatively low 2008 baseline, the lack of use of advanced biofuels and low assumptions regarding energy efficiency in the transport sector by 2020. Germany, while the largest overall user of biofuels in 2020 drops to third place in the ranking of additional demand due to the relatively high 2008 baseline and the inclusion of advanced biofuels and higher levels of other renewable energy sources in the transport mix in 2020. Amongst the 23 Member States reviewed ***the UK, Spain, Germany, Italy and France account for 72% of the additional biofuel demand between 2008 and 2020.***

Table 2 – Increase in conventional biofuel usage anticipated as a consequence of the RED, between 2008 and 2020

Country	Increase in Bioethanol Usage, 2008 to 2020 (Ktoe)	Increase in Biodiesel Usage, 2008 to 2020 (Ktoe)	Increase in Biofuels Usage, 2008 to 2020 (Ktoe)
UK	1640	1764	3403
Spain	255	2380	2635
Germany	396	1963	2360
Italy	442	972	1414
France	160	916	1076
Greece	414	136	550
Czech Republic	66	396	462
Ireland	121	304	425
Netherlands	143	252	394
Sweden	250	123	373
Romania	140	228	366
Portugal	27	313	340
Finland	26	280	306
Bulgaria	42	150	192
Luxembourg	22	150	172
Slovenia	17	154	171
*Denmark	-5	130	125
Lithuania	20	85	106
Austria	25	79	104
Slovakia	43	22	65
Latvia	0	11	11
Malta	6	3	9
*Cyprus	0	-14	-14
Total	4250	10797	15047

\*Cyprus and Denmark show negative figures as they anticipate making use of a high proportion of advanced biofuels by 2020. Given that it is not possible to take account of the impacts of these fuels at present these negative figures were excluded from further analysis.

\*\* It should be noted that in their NREAP Romania did not report the split between different biofuel uses in 2020, in order to enable further calculations the total figure for Romanian biofuel usage was differentiated between bioethanol and biodiesel sources based on the average split across all other Member States.

## 5. Calculating Indirect Land Use Change

To convert the increase in biofuel demand generated by the RED into an approximation of ILUC impact it is necessary to apply a conversion factor predicting the anticipated extent of ILUC in terms of area change per unit of additional biofuel consumed. There are a number of economic models that have been developed to estimate the impact of a marginal increase in biofuel production. A comparative analysis of the outputs of these models has been undertaken by the Joint Research Council (JRC)<sup>10</sup>. The JRC analysis presents a range of potential factors that could be used to convert estimates of biofuel consumption into estimates of associated land use change and enables these to be compared and contrasted. For the purposes of this study the comparative analysis completed by the JRC has been used as a basis for determining robust ILUC conversion factors, which have been applied using upper and lower bounds.

*While the scenarios specified within the JRC study as a basis for modelling efforts are not perfectly tailored to the anticipated fuel mix in 2020, they provide the best available proxy for converting a given volume of biofuel use to anticipated area of associated ILUC.* Clearly this can be achieved only at an aggregated level. The assumptions in the different models have an

important influence on the resulting outcomes. To ensure the overall rigour of this exercise and that the model results and conversion factors were appropriately applied, we consulted a number of experts within the field and examined in detail the model assumptions to develop the best set of conversion factors for this analysis.

The ILUC conversion factors used within this assessment are presented in table 3. A summary of the logic behind the determination of these factors is presented in the Annex of this report, calculations. Lower and upper bounds were used in the analysis to take account of the differences in outcomes associated with variable modelling assumptions and consequent outputs. The ILUC conversion factors are multiplied by the anticipated additional usage of conventional bioethanol and biodiesel in 2020 to provide an estimated area in hectares of the potential ILUC.

Table 3 – ILUC conversion factors, expressed as thousand hectares of ILUC resulting from 1 Ktoe of additional biofuel consumption.

Fuel	ILUC conversion factor; 1000 ha per Ktoe	
	Lower	Upper
Bioethanol	0.39	0.52
Biodiesel	0.23	0.44

***It should be noted that the factors derived represent relatively conservative estimates of ILUC based on the JRC analysis and are likely to underestimate real GHG impacts associated with the expanded agricultural production arising from ILUC.*** This is a consequence of the assumptions used within the modelling exercises. In particular the majority of models assume higher levels of yields than are likely to be realised on land that is drawn into arable production at the frontiers of cultivation. The JRC study also notes that the mix of feedstocks used in the production of biodiesel in some cases over estimates anticipated yield increases expected in the palm oil sector. Moreover, as noted above, advanced biofuels and bioliquids will also have a land use impact additional to those arising from conventional biofuels, which it is not possible to take into account here. Finally, the calculations of GHG impacts associated with ILUC, and more generally with increased biofuel demand, are likely to inherently underestimate GHG emissions, as noted below.

Estimates for emissions associated with ILUC only take into account the one-off release of GHGs associated with the change of one land use to another. As such they do not take account of the following additional sources of GHG emissions that would be associated with expanded and more intensified cultivation of crops:

- there is no allowance made for any sequestration forgone into the longer term by removal of a previous land cover, which might be significant in the case for example of young growth forest converted to arable;
- estimates for ILUC often do not take into account that much land brought into arable use will likely be less suited to cultivation than the existing area and therefore give lower yields for a given level of inputs, hence emissions from cultivation may be higher than the average; and
- all the ILUC models assume in addition to land use change a certain proportion of intensification of existing agricultural production, which in turn is anticipated to lead to higher GHG emissions per tonne of crop harvested. This would, for example, be associated with use of nitrogen rich fertilisers or loss of soil organic matter during ongoing cultivation.

## 6. Anticipated Indirect Land Use Change – the Size of the Challenge

*The ILUC impacts attributable to additional conventional biofuel usage by 2020 in all 23 Member States assessed within this study are between 4.1 and 6.9 million ha.* At the lower end this would be approximately equivalent to land use changing across the total area of arable land<sup>17</sup> in Hungary or double that in Denmark, Finland or Lithuania; or at the upper end would be equivalent to doubling the total area of arable land in the UK or a 50% increase in arable land in either Poland or Spain<sup>18</sup>. This would also equate to at the lower end an area slightly larger than Belgium or just smaller than the Netherlands and at the upper end an area slightly larger than Latvia or Lithuania<sup>19</sup> and just under that of Republic of Ireland. Another way of putting this would be that this is the same area as between 82% and 138% of land used for palm oil production in Indonesia during 2008<sup>20</sup>.

Table 4 presents the ILUC estimates arising from projected biofuel usage per Member State. It should be noted that this land use change is unlikely to take place in the country in question but will impact either within or beyond Europe, with the nature of this determined by the feedstocks used; as a consequence this represents a significant European footprint across the globe. To continue the comparison with the area of palm oil production in Indonesia, ***at the upper end of the estimates, the UK, Spain and Germany would each be responsible for an ILUC impact that was equivalent to more than 20% of land currently used for Indonesian palm oil production.***

To provide a sense of scale of the anticipated ILUC impact figure 5 compares the anticipated change associated with a Member State's consumption of conventional biofuels to the area of arable land in use within that Member State. In this respect the proportionate ILUC impact is highest in those Member States with limited area of arable land per capita ie effectively those characterised by denser development patterns and higher per capita transport needs. ***The UK, Slovenia, Malta and Luxembourg would all be responsible for ILUC (at the upper level) equivalent to more than 20% of their own arable land area.***

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<sup>17</sup> Arable land is defined by the Food and Agriculture Organization of the United Nations (FAO) as: land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category. Data for "Arable land" are not meant to indicate the amount of land that is potentially cultivable - this is a wider category under the FAO statistics, called agricultural land.

<sup>18</sup> Based on data for 2007 from the FAO

<sup>19</sup> Based on Eurostat data from 2004 regarding country area.

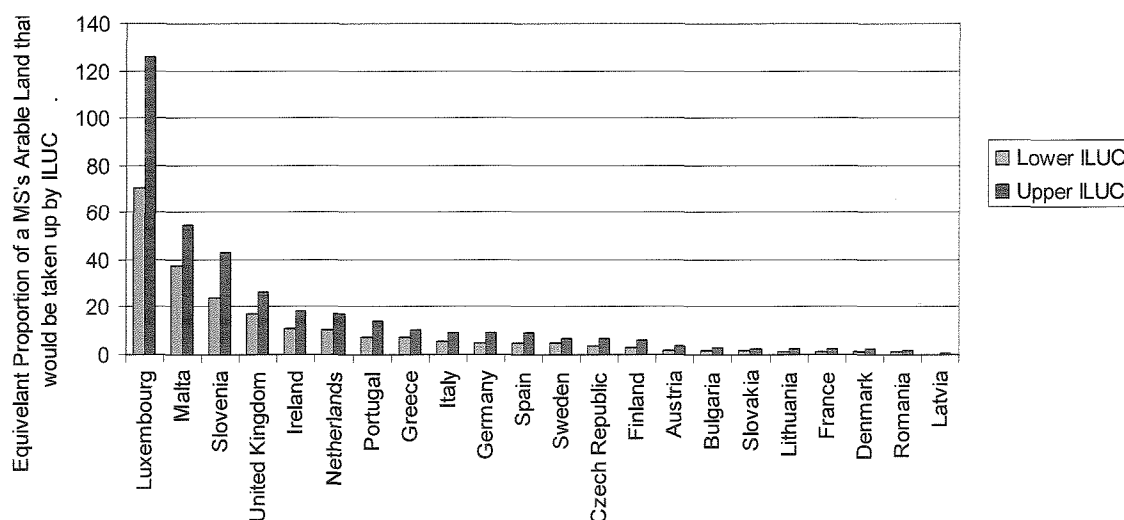
<sup>20</sup> Based on figures for production in 2008 from the FAO -

<http://faostat.fao.org/site/567/DesktopDefault.aspx?PageID=567#ancor>

Table 4 – Estimated ILUC per Member State associated with increased demand for conventional biofuels between 2008 and 2020.

	Lower estimate of total ILUC - 1000 ha	Upper estimate of total ILUC - 1000 ha
United Kingdom	1044	1615
Spain	647	1167
Germany	606	1059
Italy	395	651
France	273	481
Greece	192	273
Sweden	126	183
Ireland	117	195
Czech Republic	117	206
Netherlands	113	183
Romania	107	172
Portugal	83	150
Finland	74	135
Bulgaria	51	87
Luxembourg	43	77
Slovenia	42	76
Denmark	30	56
Austria	28	48
Lithuania	28	48
Slovakia	22	32
Malta	3	4
Latvia	3	5
Total	4143	6902

Figure 5 – Estimate of Member States' proportionate ILUC impact – comparing the area of ILUC from conventional biofuels to the area of arable land available in each Member State.



## 7. Indirect Land Use Change – The GHG Consequences

GHG emissions associated with land use change are the consequence of a loss of carbon from soils and pre-existing biomass. They represent a one-off 'hit' of emissions associated with that land's change in status. It is these emissions that are estimated here, based on the anticipated level of ILUC calculated above. To convert land use change into consequent GHG emissions a conversion factor must be applied. The level of GHG emissions associated with land use change

will vary depending on prior land use; therefore, there is a wide range of possible conversion factors. To take this into account emission levels were calculated based on three different factors utilised in other similar assessments<sup>21</sup>.

Table 5 – The range of default values used to convert land use change in ha to GHG emissions

Default values for land conversion - GHG impact		
Lower (based on IPCC lower default value for conversion to cropland)	38	tC/ha
Central (adopted by JRC as a basis for its calculation)	40	tC/ha
Upper (based on IPCC upper default value for conversion to cropland)	95	tC/ha

For simplicity the figures presented within the rest of this section represent a mean of the values gained from applying all three conversion factors – in essence equivalent to 57 tC/ha<sup>22</sup>. This is justified given that in reality a number of different land types will be converted as a consequence of ILUC. Using this assumption, table 6 presents the average total GHG emissions resulting from ILUC as a consequence of the anticipated increase in biofuel use up to 2020. As this is a one off emission of GHGs associated with the change in land use it has been converted to annualised emissions, based on the 20 year time horizon specified in the RED. For total ILUC associated with biofuel use within the 23 Member States the **annualised emissions are between 44 and 73 Million tonnes of CO2 equivalent. At the upper end this is the equivalent to the total GHG emissions generated by either Bulgaria or Hungary in 2007. Put another way this would represent just under 16% of emissions from the EU's agricultural sector or just over 7% of total EU transport emissions in 2007.**

<sup>21</sup> It is noted that there are conversion factors that sit above and below the levels specified in table 6. The range proposed is considered the most appropriate for conversion to croplands.

<sup>22</sup> Using the figures set out in Decision 2010/335/EU on guidelines for the calculation of land carbon stocks for the purpose of Annex V to Directive 2009/28/EC - <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:151:0019:0041:EN:PDF> this mean would be broadly akin to the conversion of sustainably managed grassland to use for annual cropping under a normal system of tillage under a dry, temperate climate – with a level of 53.3tC/ha calculated for this conversion in worked examples by Ecofys [http://ec.europa.eu/energy/renewables/biofuels/doc/ecofys\\_report\\_annotated\\_example\\_carbon\\_stock\\_calculation.pdf](http://ec.europa.eu/energy/renewables/biofuels/doc/ecofys_report_annotated_example_carbon_stock_calculation.pdf)

Table 6 – Total ILUC related GHG emissions based on the mean values for land conversion – The table presents the totals per Member State in terms of ILUC emissions to deliver the additional volume of biofuels by 2020 specified in the 23 NREAPs and the annualised GHG emissions per year per Member State, based on a 20 year time horizon (as specified in the RED). @@@

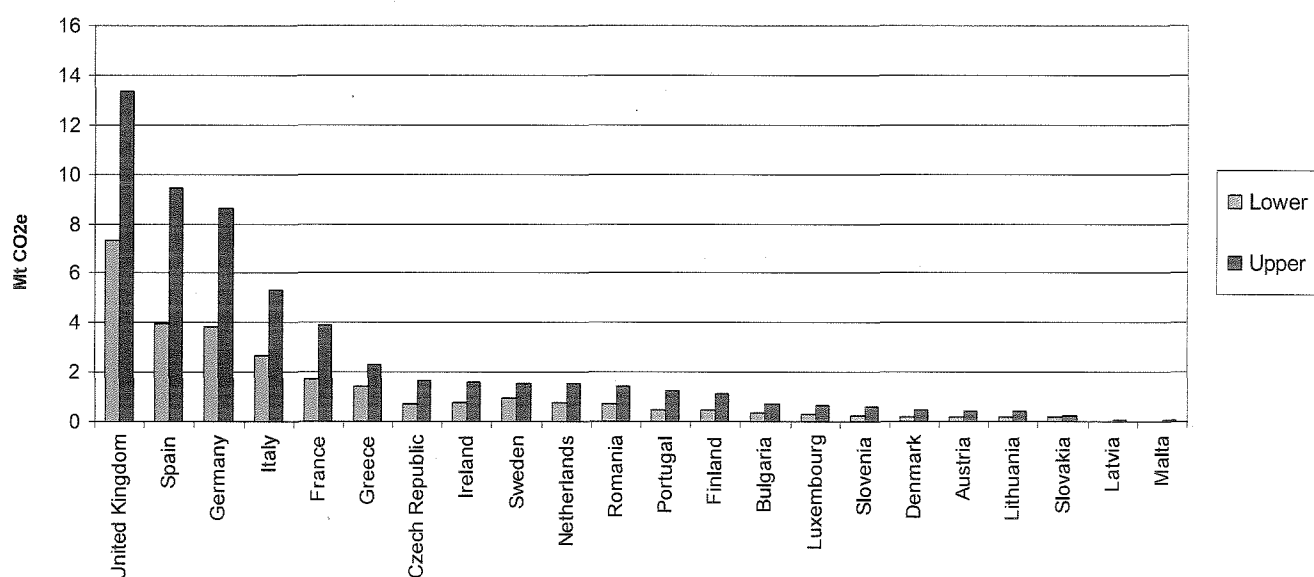
	Total GHG emissions associated with ILUC from additional biofuel use in 2020		Annualised emissions associated with total ILUC	
	Lower ILUC; Mt CO <sub>2</sub> e	Upper ILUC; Mt CO <sub>2</sub> e	Lower ILUC; Mt CO <sub>2</sub> e	Upper ILUC; Mt CO <sub>2</sub> e
United Kingdom	220.71	341.39	11.04	17.07
Spain	136.71	246.75	6.84	12.34
Germany	128.10	223.89	6.40	11.19
Italy	83.62	137.66	4.18	6.88
France	57.72	101.74	2.89	5.09
Greece	40.66	57.71	2.03	2.89
Czech Republic	24.69	43.64	1.23	2.18
Ireland	24.75	41.20	1.24	2.06
Netherlands	23.99	38.76	1.20	1.94
Sweden	26.56	38.64	1.33	1.93
Romania	22.61	36.27	1.13	1.81
Portugal	17.45	31.75	0.87	1.59
Finland	15.73	28.57	0.79	1.43
Bulgaria	10.76	18.41	0.54	0.92
Luxembourg	9.12	16.23	0.46	0.81
Slovenia	8.89	16.02	0.44	0.80
Denmark	6.31	11.93	0.32	0.60
Lithuania	5.82	10.07	0.29	0.50
Austria	5.93	10.05	0.30	0.50
Slovakia	4.61	6.72	0.23	0.34
Latvia	0.53	1.01	0.03	0.05
Malta	0.63	0.92	0.03	0.05
Total	876	1459	44	73

To qualify towards the delivery of the RED targets, biofuels must deliver a certain proportion of GHG savings, which rises from 35% in 2011 to 50% by 2017. For the purpose of this exercise, it is assumed that biofuels consumed in response to the RED conform to these criteria, aside from their ILUC impact. To understand the overall consequences for emissions associated with additional biofuel usage stimulated by the RED targets this GHG benefit must, therefore, be subtracted from the emissions associated with ILUC<sup>23</sup>.

<sup>23</sup> The GHG savings were calculated by assuming a linear increase from 2008 to 2020 in terms of the volume of biofuel usage per year per Member State. The volume of usage in 2008 was then subtracted from this to provide a figure of additional use associated with the RED comparable to the ILUC figure. The additional usage per year was then multiplied by the GHG emission reductions required under the RED for that given year, this reduction was based on the assumption of a linear increase in reductions from 2011 at 35% to 50% in 2017, additional savings were then assumed at the same rate up to 56% in 2020. The GHG emission reductions are based on the savings specified in the RED and the assumptions specified within the Annexes of the RED that fossil based petrol and diesel generate 43 MJ/kg of energy and that for each MJ 83.8gCO<sub>2</sub>e are released. As the RED only specifies reductions in emissions from 2011 onwards, meaning it is unclear the level of reduction in 2008-2010. As a consequence this calculation of additional emissions was only applied to 2011 to 2020.

When account is taken of biofuels anticipated GHG savings from switching from fossil fuels to biofuels between 2011 and 2020<sup>24</sup> (the dates specified in the RED) total additional emissions from ILUC associated with the increased use of biofuels are still anticipated to range from 273 and 565 MtCO<sub>2</sub>e or between 2.9 and 6 gCO<sub>2</sub>e/kgoe. This effectively represents emissions that would be additional to those arising were Europe to remain reliant on fossil fuels to provide for our transport needs up to 2020. This equates to additional GHG emissions of between 27.3 and 56.5 MtCO<sub>2</sub>e on an annualised basis<sup>25</sup>. At the upper end this is comparable to just over 12% of emissions from agriculture in the EU in 2007 or just under 6% of emissions from transport in the EU in 2007. Put another way, the additional GHG emissions associated with ILUC up to 2020 would amount to the equivalent of placing between 12.4 and 25.6 Million additional cars on the road across Europe in 2020<sup>26</sup>. Based on the assumptions set out in this study the additional emissions from ILUC, associated with the predicted increase in conventional biofuels use within the 23 Member States up to 2020, can be estimated to lead to between 80.5 and 166.5% more GHG emissions than if that same fuel need were met using fossil fuels ie diesel and petrol<sup>27</sup>.

Figure 6 – Additional GHG emissions anticipated as a consequence of ILUC associated with the expansion in biofuel demand up to 2020 – these represent emissions over and above what would be expected if fossil fuels were to continue to account for these quantities of transport fuels given that GHG savings associated with biofuel use have been subtracted.



<sup>24</sup> Both ILUC emissions and the emissions saved were based on the additional usage of biofuels above the 2008 baseline up to 2020.

<sup>25</sup> Annualised figures based on the 20 year discounting period specified in the RED for land use change were used in order to provide the 2011 to 2020 figures – see footnote 22. To provide the annualised data in this instance it is, therefore, appropriate to divide the total ILUC figure up to 2020 by the number of years between 2011 and 2020 to avoid double counting of this reduction.

<sup>26</sup> The number of additional cars on the road is calculated by dividing the additional GHG emissions from ILUC on an annualised basis by the estimated level of emissions per car in 2020. The latter is calculated based on the assumption that on average cars will produce 170gCO<sub>2</sub>e/km in 2020 and will travel on average 13,000km per year. This equates to 2.21tCO<sub>2</sub>e per car per year. These calculations are based on established scenarios for future car use in Europe.

<sup>27</sup> This calculation is based on the standard default values for fossil fuels in the RED, Annex III.



Table 7 – Comparing the additional annualised GHG emissions as a consequence of ILUC due to expanded use of biofuels up to 2020 by Member State and the number of additional cars on the road these figures would equate to in 2020.

	Annualised emissions from additional ILUC		Additional million cars on the road in 2020	
	Lower ILUC; Mt CO <sub>2</sub> e	Upper ILUC; Mt CO <sub>2</sub> e	Lower	Upper
United Kingdom	7.31	13.34	3.31	6.04
Spain	3.95	9.45	1.79	4.28
Germany	3.82	8.61	1.73	3.90
Italy	2.63	5.34	1.19	2.41
France	1.71	3.91	0.77	1.77
Greece	1.43	2.28	0.65	1.03
Czech Republic	0.73	1.68	0.33	0.76
Ireland	0.77	1.59	0.35	0.72
Sweden	0.92	1.52	0.42	0.69
Netherlands	0.77	1.51	0.35	0.68
Romania	0.73	1.41	0.33	0.64
Portugal	0.50	1.22	0.23	0.55
Finland	0.45	1.09	0.20	0.49
Bulgaria	0.33	0.71	0.15	0.32
Luxembourg	0.27	0.62	0.12	0.28
Slovenia	0.26	0.61	0.12	0.28
Denmark	0.18	0.46	0.08	0.21
Austria	0.18	0.39	0.08	0.18
Lithuania	0.18	0.39	0.08	0.18
Slovakia	0.16	0.26	0.07	0.12
Latvia	0.01	0.04	0.01	0.02
Malta	0.02	0.04	0.01	0.02
Total	27	56	12	26

Figure 7 –The proportion of 2007 GHG emissions from transport that would be accounted for by the annualised, additional emissions from ILUC. The Member State figures are compared to the overall value for the 23 Member States reviewed to provide a basis for comparison. The position of a Member State will depend on both the level of ILUC associated emissions and the scale of transport emissions in 2007.

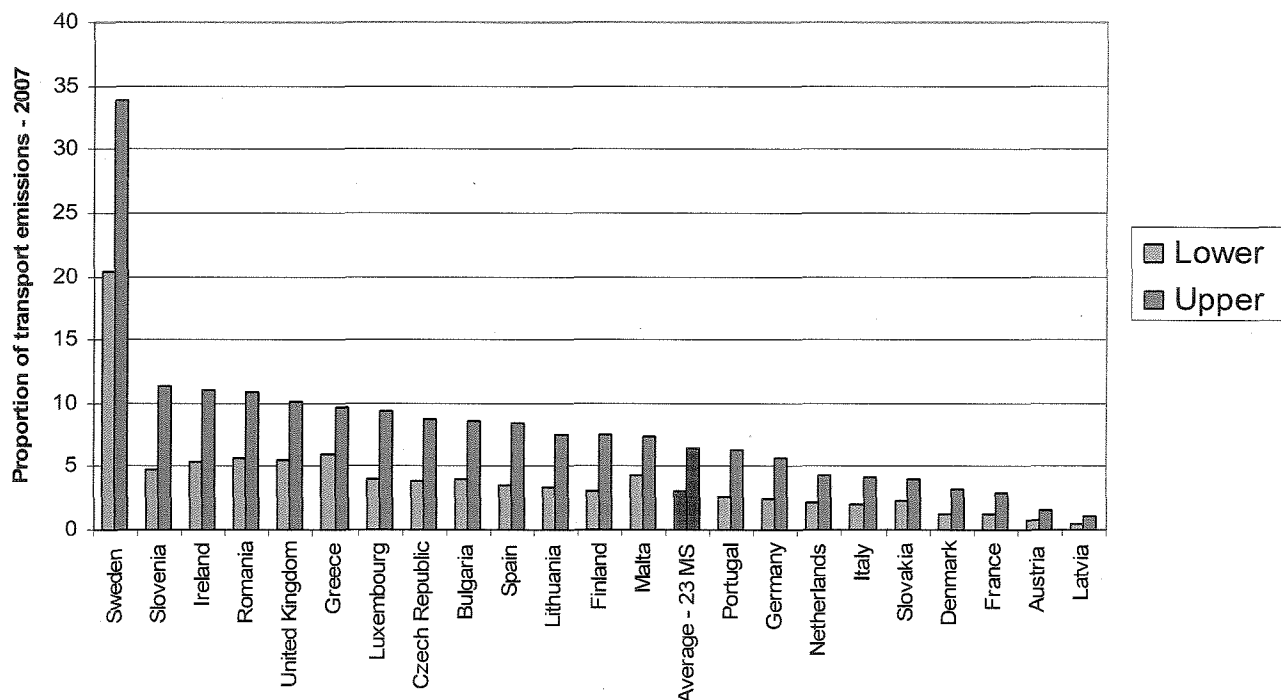
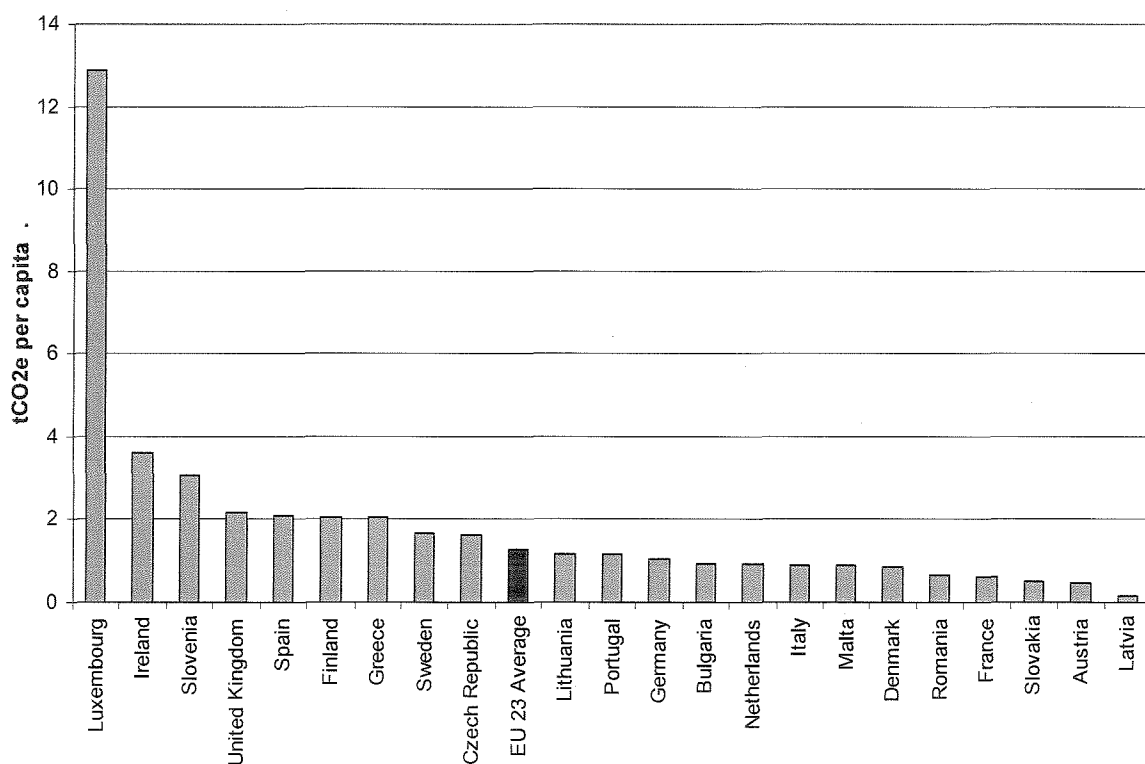


Figure 8 – The per capita CO2 emissions associated with additional ILUC emissions per Member State based on the upper estimates of additional ILUC emissions. This graph demonstrates which Member States are above and below the overall average for the 23 countries reviewed in terms of per capita impact. It demonstrates the intensity of a populations ILUC GHG impact.



## 8. Assessing the Total Impact including Bioliquids

Eight of the 23 NREAPs available specify that the relevant Member State will make use of bioliquids for heat and power as well as biofuels for transport in 2020 (additionally the UK specifies that it has yet to determine anticipated bioliquid usage). Given that bioliquids are in essence the same product as biofuels, albeit utilised in a different way, and that they are subject to the same rules under the RED the impact of their use alongside biofuels will have a cumulative impact in terms of land use change and more specifically ILUC. This section examines briefly the additional ILUC impact anticipated to be associated with bioliquid use in 2020.

***In total the additional use of conventionally produced bioliquids from the eight Member States is estimated to be 4350 Ktoe.*** Member States were not required to specify the split of bioliquid use between conventional and advanced biofuels, therefore, this figure was calculated using the same proportional usage of conventionally produced bioliquids as was reported for biofuels. This is appropriate given that the sourcing from biofuels and bioliquids is likely to be from the same material streams. ***In total the additional demand for bioliquids would be equivalent to 28% of the total demand for conventional biofuels in 2020.*** The majority of this material is anticipated to be made use of by Finland and Portugal. The usage of bioliquids in these Member States is anticipated to be far greater than for conventional biofuels in 2020 – see table 10.

Given the more limited data provided on bioliquid use in the NREAPs, compared to biofuel use, it was necessary to make two assumptions to enable ILUC to be calculated. These were: firstly that bioliquids would be made up entirely of biodiesel in 2020; and secondly that no bioliquids are in use at present for heating and electricity - as there is no comparable baseline data. Based on applying the same conversion factors as for biofuels the following estimates for the area of ILUC and GHG emissions associated with bioliquids were made.

***Bioliquids are anticipated to result in an additional area of ILUC between 1000 and 1892 thousand ha, contributing between 211 and 399 million tonnes of additional CO<sub>2</sub>e - see tables 11 and 12.*** In total biofuels are anticipated to lead to emissions between 875 and 1459 MtCO<sub>2</sub>e – based on figures unadjusted for GHG savings. ***Cumulatively, biofuels and bioliquids combined would lead to emission levels of between 1087 and 1858 MtCO<sub>2</sub>e by 2020.***

Table 10 - Calculating the usage of bioliquids from conventional feedstocks in 2020 based on the proportion of convention biofuel use in the relevant Member State and comparing the scale of usage of bioliquids to biofuels in 2020.

Member State	% conventional biofuel use in 2020	Use of conventional bioliquids in stationary sources in 2020; Ktoe	Additional use of conventional biofuels in 2020 compared to 2008 - Ktoe	Comparing the impact of bioliquids to biofuels; conventional bioliquid use as a percentage of conventional biofuels use in 2020.
Finland	68	2050	306	670%
Portugal	98	916	340	269%
Germany	97	812	2360	34%
Italy	84	478	1414	33%
Sweden	88	57	373	15%
Slovenia	100	28	171	16%

Denmark	50	4	125	3%
Austria	100	3	105	2%
Total		4350	15046	28%

Table 11 – The table sets out the total area of ILUC anticipated to be caused by the use of bioliquids as specified in the NREAPs

Member State	Kha land converted	
	Lower	Upper
Finland	472	892
Portugal	211	399
Germany	187	353
Italy	110	208
Sweden	13	25
Slovenia	6	12
Denmark	1	2
Austria	1	1
Total	1000	1892

Table 12 – Presents the additional GHG emissions anticipated as a consequence of ILUC associated with bioliquids, this is compared to the unadjusted levels of ILUC anticipated from biofuels with a revised total present as to the cumulative GHG impacts of both biofuels and bioliquids.

Member State	GHG emissions from ILUC associated with bioliquids – MtCO <sub>2</sub> e		GHG emissions from ILUC associated with biofuels – MtCO <sub>2</sub> e		Total GHG emissions from both biofuels and bioliquids - MtCO <sub>2</sub> e	
	Lower	Upper	Lower	Upper	Lower	Upper
Finland	100	188	16	29	115	217
Portugal	45	84	17	32	62	116
Germany	39	75	128	224	168	299
Italy	23	44	84	138	107	182
Sweden	3	5	27	39	29	44
Slovenia	1	3	9	16	10	19
Denmark	0	0	6	12	7	12
Austria	0	0	6	10	6	10
Total	211	400	876	1459	1087	1859
Annualised emissions (divided over 20 years)	11	20	44	73	54	93

## 9. Conclusions

This study shows that the 23 Member States examined are predominantly anticipating using conventional biofuels to deliver their 2020 renewable transport target under the RED, requiring an additional 15.1 Mtoe of supply compared to 2008 levels. As a consequence of this expanded use of conventional biofuel use ILUC could be estimated to account for between 4.1 and 6.9 million ha for biofuels alone.

Assuming there is no further action undertaken to address ILUC, the major increase in the use of conventional biofuels and the consequent change in land use has been calculated to lead to between 44 and 73 million tonnes of CO<sub>2</sub> equivalent being released on an annualised basis. Even when the GHG emission savings required under the RED sustainability requirements for biofuels are taken into account, rather than aiding climate change mitigation up to 2020, the use of these biofuels would lead to the production of additional GHG emissions. As a consequence the use of these additional conventional biofuels could not be considered to contribute to the achievement of EU climate change policy goals.

Not only does this study suggest that ILUC associated with the reported additional use of conventional biofuels up to 2020 would lead to additional GHG emissions in 2020, the additional quantities of emissions are substantial. Using the method adopted in this study these additional emissions are estimated to range from 27.3 to 56.4 MtCO<sub>2</sub>e on an annual basis up to 2020. Indeed, this estimate would represent emissions from ILUC 80.5 to 166.5% worse than would be delivered from continued reliance on fossil fuels in the transport sector. These results clearly depend upon the assumptions adopted within this study, primarily the level of ILUC associated with the use of conventional biofuels and the level of GHG emissions associated with land use change.

Given ongoing uncertainties about the location and consequences of ILUC, every effort was made to adopt the most appropriate assumptions based on the evidence available at the time of drafting. The key assumptions and the rationale for them are set out transparently throughout the report. These assumptions could be improved through better knowledge of the types of feedstock to be used for biofuel production and likely locations of supply, providing a better understanding of likely displacement effects. Hopefully this will become available in due course. It will also be important to seek greater consensus over the assumptions and parameters to be applied during modelling and application of the predicted levels of biofuel use up to 2020 and the ILUC impacts.

Nonetheless, the level of uncertainty is diminishing. ***Sensitivity analysis completed during the work demonstrates that the overarching message of failure to deliver GHG savings from conventional biofuel use remains the same even when far lower estimates of ILUC and GHG emissions from land use change are applied. This underlines the need to address the question of ILUC associated with biofuel use as a priority.*** The current evidence clearly points to ILUC emissions undermining the arguments for the use of conventional biofuels as an environmentally sustainable, renewable technology. Moreover, this analysis raises questions about the appropriateness of anticipated conventional biofuels use by the Member States up to 2020. In addition to action on ILUC the GHG consequences of biofuel use could be reduced substantially by focusing increased effort on alternative routes for delivery of the 2020 targets, for example by greater efficiency savings in the sector and increased emphasis on the use of advanced fuels.

Certain national governments are anticipating making use of a significant quantity of bioliquids to deliver renewable energy for heat and electricity up to 2020, in addition to biofuels. This will require an expansion in the same crops and resources as for biofuels. Eight Member States reported in their NREAPs that they will make use of bioliquids in 2020; amounting to an estimated 4.4 Mtoe of conventionally produced fuels. This would equate to an additional ILUC impact of between 1 and 1.9 million ha and GHG emissions of between 211 and 400 MtCO<sub>2</sub>e. When figures for bioliquids and biofuels are combined the total area of ILUC would rise to between 5.1 and 8.8 million ha. The total associated GHG emissions would also increase, leading to a combined figure of between 1087 and 1859 MtCO<sub>2</sub>e or between 54 and 93 MtCO<sub>2</sub>e on an annualised basis (before any emissions savings are discounted).

## 10. Annex

### Glossary of Terms and Abbreviations

- Advanced biofuels – Also known as second generation fuels, in the context of this study these are defined as the types of biofuels specified under Article 21.2 of the RED as counting as double towards the achievement of the 2020 targets. These include biofuels produced from wastes, residues, non-food cellulosic material, and ligno-cellulosic
- Arable land - defined by the Food and Agriculture Organization of the United Nations (FAO) as: land under temporary agricultural crops (multiple-cropped areas are counted only once), temporary meadows for mowing or pasture, land under market and kitchen gardens and land temporarily fallow (less than five years). The abandoned land resulting from shifting cultivation is not included in this category.
- Biofuels versus bioliquids – Within the RED bioliquids are defined as - liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass; where as biofuels are defined as liquid or gaseous fuel for transport produced from biomass.
- CO<sub>2</sub>e – Carbon Dioxide equivalent, used as a standardised metric for evaluating GHG impact
- Conventional biofuels - Also known as first generation fuels, in the context of this study these are in essence produced from primarily food crops. This commonly includes maize, sugar cane, sugar beet, wheat, palm oil, oil seeds such as rape and soy.
- Ha - Hectare
- Ktoe or Mtoe- Kilo Tonnes of Oil Equivalent or Mega Tonnes of Oil Equivalent, ie 1 thousand or 1 million tonnes – used as a standard metric for evaluating energy use
- MJ – Megajoules
- NREAP – National Renewable Energy Action Plan – dossier specified in the RED within which Member States must report on how they propose to meet the 2020 targets for renewable energy and renewable transport fuels
- RED – Renewable Energy Directive - Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources - <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:140:0016:0062:EN:PDF>

### Calculations - Conversion Methodology

The conversion factors used for calculating the scale of ILUC in hectares were divided into upper and lower factors for both bioethanol and biodiesel. These were then combined to provide the overall ILUC figures for biofuels up to 2020. The basis for determining the conversion factors within this study was the comparative study completed by JRC in which various models developed to assess ILUC were reviewed. This included outputs from key EU

based and international modelling teams who have developed economic models to determine the extent to which land use will change as a consequence of increased demand for biofuel feedstock commodities. JRC asked the modelling teams to run four standardised scenarios intended to imitate different types of increase in demand for biofuel feedstocks aimed at understanding the consequent scale of land use change. The models assessed by the JRC were AGLINK-COSIMO (from OECD), CARD (from FAPRI-ISU), IMPACT (from IFPRI), G-TAP (from Purdue University), LEI-TAP (from LEI) and CAPRI (from LEI). In addition there is also the IFPRI – MIRAGE model considered separately from the JRC analysis. At the time of drafting, however, concerns regarding the assumptions adopted in this particular model combined with the fact that the results are very substantially lower than for all other studies meant that it was not adopted as a basis for this analysis. It should, however, be noted that the results were used in order to help inform the sensitivity analysis.

Despite attempts to standardise the scenarios the models assessed by JRC produced a variety of results and as a consequence a potential range of ILUC conversion factors that could be applied. This is a result of the variable assumptions applied within the models assessed. To determine the most appropriate ILUC conversion factors for use in this study IEEP evaluated the different model assumptions and likely reliability in consultation with experts from the JRC and with reference to other studies completed on this issue (ie work by Ecofys). Based on this assessment the following judgements were made in order to determine the most appropriate conversion factors for both biodiesel and bioethanol fuels, which were then applied within this exercise.

It should be noted that while the modellers were asked to run certain scenarios for biofuel usage in 2020 none of these fully represented the likely mix of feedstocks used in the EU in 2020. Instead the only way to enable comparison was to shock the models to specify increased demand for specific commodities rather than the whole range likely to be used to produce additional biofuels. As a consequence separate ILUC factors emerged primarily for EU produced biodiesel from oil seeds, palm oil from Indonesia, wheat bioethanol from the EU and corn ethanol for the US. These were taken into account when determining the most appropriate conversion factors for use in this work.

- **Biodiesel** – for biodiesel the conversion factor selected as the lower bound was the AGLINK factor for EU production of biodiesel from oil seeds, while the upper bound was selected as the CARD/FAPRI factor for EU production of biodiesel from oil seeds. Other higher estimates, for example from LEI-TAP for EU produced biodiesel, were discounted, in this case as a consequence of concerns regarding the appropriateness of oil seed elements within the model.

These upper and lower factors selected were applied to all biodiesel, both imported and domestic production. This was justified on the basis of these appearing, within model results identified for JRC and within other exercises, to be largely similar to the anticipated ILUC impact of palm oil production, based on the change in production area. It should be noted that the output from the G-TAP model for palm oil was much lower than for other estimates, this is considered to be a consequence of over estimates in likely yield increases and this figure was, therefore, discounted.

- **Bioethanol** – For domestic EU production of bioethanol the lower bound selected was based on the figures for EU produced wheat based ethanol from the AG LINK model. The upper bound selected was the equivalent scenario from the G-TAP model. Other estimates

from IMPACT, for example, were discounted because of concerns regarding elasticities and assumptions relating to reductions in food consumption leading to a low ILUC estimate. It should be noted that the JRC consider outputs from G-TAP to be more accurate than for other models in terms of bioethanol impacts, this is because of the differentiated way this model takes into account yields on converted land by factoring in a frontier yield effect.

Unlike biodiesel for bioethanol there is likely to be a significant difference between the ILUC impact of domestically produced and imported bioethanol. This is because large proportions of ethanol imports are anticipated to be produced from sugar cane and in a number of studies sugar cane's ILUC impact has proved to be lower than for other crops. Therefore, while the wheat based ethanol figures were used as a proxy for domestic bioethanol production the AG LINK value for sugar cane was applied to imports. Given the wide variety of anticipated imports into Member States an average rate of imports was applied to provide two consistent upper and lower factors for bioethanol. The level of imports was assumed to be 43%.



# DRIVING TO DESTRUCTION

## The impacts of Europe's biofuel plans on carbon emissions and land

### Summary

A new study analyses the likely impacts on land use and greenhouse gas (GHG) emissions of biofuel use by 2020, as projected in recently published National Renewable Energy Action Plans (NREAPs) in 23 EU member states <sup>[1]</sup>. The analysis includes evidence on size and impacts of 'indirect land use change' (ILUC) resulting from biofuel use.

It is the most comprehensive study to date to quantify these effects. Previous attempts were not based on projections from NREAPs and in most cases excluded the effects of indirect land use change. The assessment comes at a key time for EU biofuel policy, with the European Commission due to

report on how to address and minimise these emissions by the end of this year <sup>[2]</sup>.

The study reveals that the EU's plans for biofuels will result in the conversion of up to 69 000 square kilometres (km<sup>2</sup>) of land to agricultural use due to ILUC. This will potentially put forests, other natural ecosystems, and poor communities at risk. Land conversion on such a scale will lead to the release of carbon emissions from vegetation and soil, making biofuels more damaging to the climate than the fossil fuels they are designed to replace.

### KEY FINDINGS

- National plans for energy and transport show Europe is set to increase significantly biofuel use. By 2020, biofuels will provide 9.5% of total energy in transport; 92% of these fuels will come from food crops (such as oil seeds, palm oil, sugar cane, sugar beet, wheat).
- This will require an expansion of cultivated agricultural land globally, converting forests, grasslands and peat lands into crop fields. Up to 69 000 km<sup>2</sup> will be affected – an area over twice the size of Belgium.
- Total net GHG emissions from biofuels could be as much as 56 million tonnes of extra CO<sub>2</sub> per year, the equivalent of an extra 12 to 26 million cars on Europe's roads by 2020. This means that instead of being 35 to 50% less polluting than fossil fuels (as required by the Renewable Energy Directive (RED)), once land use impacts are included, the extra biofuels that will come to the EU market will be on average 81% to 167% worse for the climate than fossil fuels.

## Methodology

The report bases its calculations on:

- The plans for biofuels in transport and bioliquids (for electricity generation and heating) given in recently submitted NREAPs for 23 member states;
- Recently released European Commission studies of ILUC – specifically European Commission Joint Research Centre (JRC) modelling to project ILUC and GHG emission consequences associated with expanded biofuel use;
- Data from the Intergovernmental Panel on Climate Change regarding GHG emissions from land use change.

It does not include waste or other biofuels produced from non-food crops (which can also lead to land use change). The report is likely a conservative estimate of resulting emissions.

## Biofuels and EU climate policy

Biofuels form an important pillar of the EU's climate policy. Under the EU's RED, member states are required to source 10% of transport energy from renewable sources, including from biofuels, by 2020. Member states were required to submit NREAPs setting out how they would achieve this by the end of June 2010<sup>[3]</sup>.

RED includes 'sustainability criteria' that account for emissions from direct land use change associated with growing biofuels, stipulating that member states only actively encourage biofuels which save significant GHG emissions. However it does not currently contain measures to calculate indirect land use change. Under the RED, the European Commission must report on the effects of ILUC and how to minimise them by 31 December 2010.

## What is indirect land use change?

The production of biofuels can indirectly cause additional deforestation and land conversion, including of fragile ecosystems. When existing agricultural land is turned over to biofuel production, agriculture has to expand elsewhere to meet the previous and ever-growing demand for crops for food and feed – often at the expense of forests, grasslands, peat lands, wetlands, and other carbon rich ecosystems. This results in substantial increases in GHG emissions from the soil and removed vegetation.

*“Indirect land use change could potentially release enough greenhouse gas to negate the savings from conventional EU biofuels”*

(Joint Research Centre of the European Commission (JRC), 2008)

As well as significantly increasing levels of GHG emissions, ILUC has devastating impacts on food security, land rights and people dependent on this land, and biodiversity worldwide. These effects were not quantified in this study.<sup>[4]</sup>

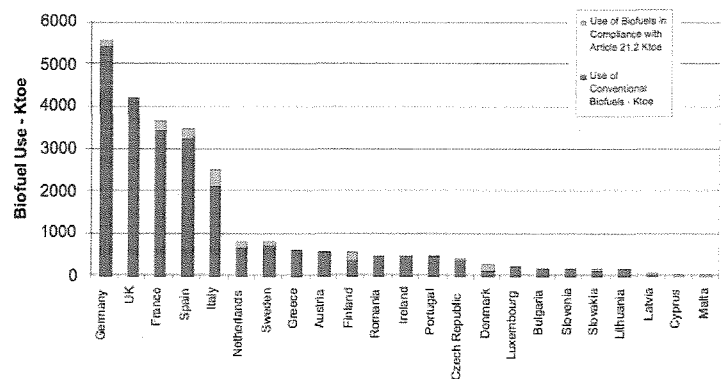
## The findings

IEEP's analysis of EU member states' plans for biofuel use found that:

### Use of biofuel:

- Crop-based biofuels are anticipated to account for 24.3 million tonnes of oil equivalent (Mtoe), with a split of 72% biodiesel and 28% bioethanol.
- 9.5% of transport energy will come from biofuels in 2020. 92% of these will be from crop-based feedstocks.
- Germany will be the biggest overall user of biofuels in 2020; the UK will be responsible for the biggest increase in biofuel use between now and 2020.
- The UK, Spain, Germany, Italy and France account for 72% of the expected additional biofuel demand between 2008-2020.
- In addition to biofuels for transport, 8 of the 23 member states anticipate using bioliquids for heating and electricity production. This will require an expansion in the same crops and resources as for biofuels – with a total additional 4.4 Mtoe of conventionally produced fuels.

Member state usage of Biofuels in 2020 based on NREAP figures – comparing total volume usage of conventional and advanced fuels (Ktoe = kilo tonnes of oil equivalent):



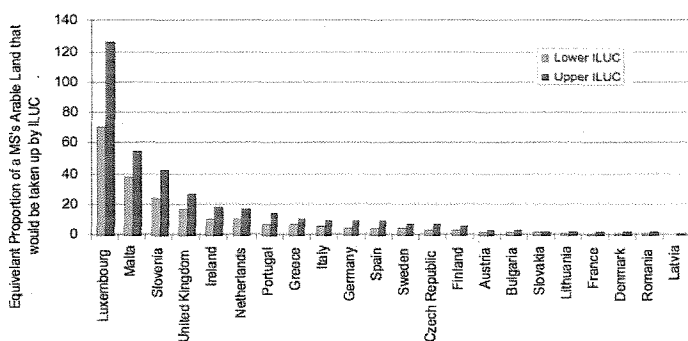
### The dependence on imports:

- On average the 23 member states are anticipating importing 50% of bioethanol and 41% of biodiesel in 2020, equating to imports of 3.1 and 7.7 Mtoe respectively.
- In total the UK will be by far the highest importer of biofuels by volume with a target of 3.7 Mtoe of imported fuels in 2020.

### The impacts on ILUC:

- For the 23 countries analysed, the ILUC impacts of these new biofuels by 2020 will be between 41 000 to 69 000 km<sup>2</sup> of natural ecosystems that will be converted to cropland.
- At the upper end of the estimates, this is equivalent to an area over twice the size of Belgium, or approximately the size of the Republic of Ireland or Latvia, or equivalent to the total area of arable land in the UK or half the arable land in Spain.
- For comparison, this would be equivalent to 82% to 138% of the land used for palm oil production in Indonesia in 2008.
- When bioliquids for electricity and heat production are included, an additional 18 900 km<sup>2</sup> of land is required.

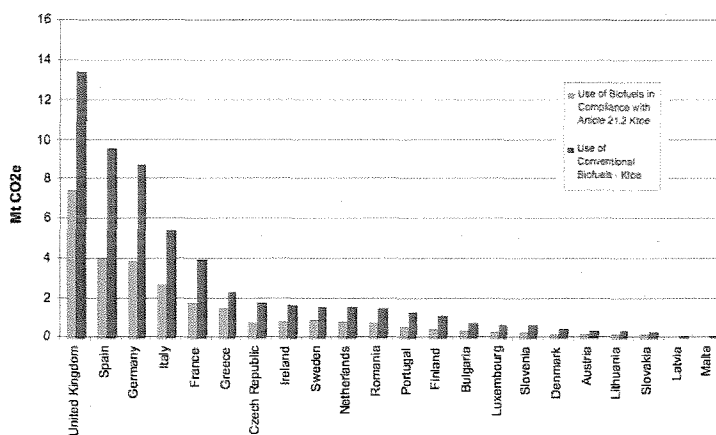
Member states' proportionate ILUC impact – comparing the area of ILUC from conventional biofuels to the area of arable land available in each Member State:



### The GHG emissions from converting this land to agricultural uses:

- Converting this area of land will mean a one-off release of 876 to 1459 million tonnes of CO<sub>2</sub> equivalent from vegetation and soil (this rises to up to 400 million tonnes extra for bioliquids).
- This means Europe's biofuels alone will be responsible for an extra 27 to 56 million tonnes of CO<sub>2</sub> equivalent per year (based on the 20 year time horizon specified in the RED, and taking into account the anticipated GHG savings of biofuels).
- At the upper end this is the equivalent to approximately 6% of total EU transport emissions in 2007, or around 12% of EU emissions from agriculture.
- This is equivalent to adding an extra 12 to 26 million cars on Europe's roads by 2020.
- These additional emissions associated with ILUC would mean that instead of being 35 to 50% less polluting than fossil fuels (as required by the RED), once land use impacts are included, the extra biofuels that will come to the EU market will be on average 81% to 167% worse for the climate than fossil fuels.

Total extra GHG emissions anticipated from EU countries' 2020 plans (MtCO<sub>2</sub>e = million tonnes of carbon dioxide equivalent):



### Comparing member states:

- Through their consumption of biofuels to 2020, the UK, Slovenia, Malta and Luxembourg would all be responsible for ILUC equivalent to more than 20% of their own arable land area (though the impacts will be located elsewhere in the world).
- Five countries will be responsible for over two thirds of the increase in emissions. The UK, Spain, Germany, Italy and France are projected to produce the most extra GHG emissions from biofuels – with up to 13.3, 9.5, 8.6, 5.3 and 3.9 extra million tonnes of CO<sub>2</sub> per year respectively (taking into account the anticipated GHG savings of biofuels).
- As a proportion of their annual transport emissions in 2007 Ireland, Sweden, Romania, the UK and Slovenia, will all increase their annual carbon emissions from transport by more than 10% if they fulfil their 2020 targets for renewable in transport (based on upper estimates).





## The solutions

In light of this research the coalition of NGOs calls on European Union and member states to:

- ➔ **Support legislative proposals counting for the full climate impact of biofuels** – The EU must factor in known sources of unaccounted GHG emissions for biofuels. Current renewable policies in the transport sector are inadequate because they encourage biofuels that increase GHG compared to fossil fuels. The policy should be fixed by including robust and precautionary 'factors' that reflect emissions from ILUC for different biofuel crops.
- ➔ **Revisit and amend biofuel policies** – The sustainability of national and European biofuel targets must be reviewed to reflect the reality of biofuel expansion on total emissions, biodiversity and communities. Member states must immediately revisit their NREAP and eliminate support for biofuels that increase GHG emissions, threaten land rights and cause food insecurity. Priority must be given to energy efficiency and renewable electricity in trains and cars to contribute to the EU's renewable target in transport.

*The EU must only accept biofuels that demonstrably reduce GHG emissions, pose no significant land use issues, do not threaten people's food security, and do not risk conservation conflicts. For this reason, the EU should introduce ILUC factors to fully acknowledge all GHG emissions from its policies and bring forward an urgent review of the sustainability impacts of expanding biofuel use.*

### Notes

- [1] Institute for European Environmental Policy (IEEP). November 2010. 'Anticipated Indirect Land Use Change Associated with Expanded Use of Biofuels in the EU – An Analysis of Member State Performance'. Author: Catherine Bowyer, Senior Policy Analyst. IEEP is a leading independent centre for the analysis of European policy. ([www.ieep.eu](http://www.ieep.eu)). Report commissioned by ActionAid, BirdLife International, ClientEarth, European Environmental Bureau, FERN, Friends of the Earth Europe, Greenpeace, Transport & Environment, Wetlands International. [www.goo.gl/8XA8](http://www.goo.gl/8XA8)
- [2] For more information on the political context please see:
- 'Biofuels: Handle with care – an analysis of EU biofuel policy with recommendations for action' [www.goo.gl/pOV8](http://www.goo.gl/pOV8)
  - ClientEarth – 'Legal Briefing: Legislative mandate to the Commission on Indirect Land-Use Change' [www.goo.gl/5U3u](http://www.goo.gl/5U3u)
- [3] NREAPs were submitted to the European Commission on 30 June 2010 (though many were submitted late) [www.goo.gl/qEmi](http://www.goo.gl/qEmi). The study analyses the 23 plans that had been submitted by October 2010 (AT, BG, CY, CZ, DE, DK, EL, ES, FI, FR, IE, IT, LT, LU, LV, MT, NL, PT, RO, SE, SI, SK, UK).
- [4] For more information about Indirect Land Use Change, please see:
- BirdLife International, European Environmental Bureau, Transport & Environment – 'Bioenergy: a carbon accounting time bomb' – [www.goo.gl/SV5J](http://www.goo.gl/SV5J)
  - Transport & Environment – 'Biofuels and Land Use Change: Review of independent studies' – [www.goo.gl/yowf](http://www.goo.gl/yowf)
  - Friends of the Earth Europe – Three case studies on indirect land use change and emissions from biofuel crops – palm oil, soy and sugar cane – [www.goo.gl/HKoU](http://www.goo.gl/HKoU)
  - ActionAid – Meals Per Gallon: the impact of industrial biofuels on people and global hunger [www.goo.gl/rc5X](http://www.goo.gl/rc5X)

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 **EUROPEAN ENVIRONMENTAL BUREAU**

## Legal Briefing: Legislative Mandate to the Commission on Indirect Land-Use Change

The Renewable Energy Directive (RED) and Fuel Quality Directive (FQD) contain a legislative mandate to the Commission on indirect land-use change (ILUC). Several questions have arisen regarding the obligations on the Commission in fulfilling this mandate, specifically on requirements related to scientific evidence, methodology, form of the proposal, and timeframe. In this briefing, ClientEarth provides a legal analysis of the mandate to assist policy makers and civil society in ensuring compliance with the text and spirit of the law.

### *Summary of Findings*

- The Renewable Energy Directive and Fuel Quality Directive contain a legislative mandate to the Commission to produce a proposal on ILUC where, as here, it is necessary to address known sources of unaccounted greenhouse-gas (GHG) emissions.
- The proposal must be based on the “best available scientific evidence,” indicating that the unavailability of additional scientific evidence should not be used to justify Commission inaction or delay.
- The Lisbon Treaty and international law contain methods for resolving scientific disputes or uncertainties in the environmental sector—the precautionary principle—which settles these issues in favour of protecting the environment against irreversible damage and providing periodic review and update.
- The proposal must ensure compliance with the GHG-saving criterion by introducing a methodology to account for carbon stock changes caused by ILUC, which the European Union (EU) legislature proposes to achieve by introducing an ILUC factor.

### BACKGROUND

In April 2009, on the same day, the EU legislature adopted RED and FQD to reduce GHG emissions and promote renewable energy.<sup>1</sup> RED requires Member States to use renewable energy sources to meet 10% of their transport needs by 2020.<sup>2</sup> FQD requires a 6% reduction in lifecycle GHG emissions from fuels consumed in the EU by 2020.<sup>3</sup> These targets will be met, in large part, through the increased use of biofuels.<sup>4</sup> In recognition of the potentially detrimental effect of biofuel policies on climate and biodiversity—and certain biofuels more so than others—the EU legislature reaffirmed that it is “essential to develop and fulfil effective sustainability criteria for biofuels and ensure the commercial availability of second-generation biofuels.”<sup>5</sup> To do so, the Commission must “lay down clear rules for the calculation of greenhouse gas emissions from biofuels and bioliquids and their fossil fuel comparators.”<sup>6</sup>

The EU legislature recognises the systemic miscalculation of GHG emissions from land-use changes resulting from its biofuel policies.<sup>7</sup> Existing biofuel policies include safeguards—in the form of

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\* ClientEarth is a public-interest organisation of environmental lawyers fusing law, policy, and science to create strategic solutions to key environmental challenges. For more information, please visit our website at [www.clientearth.org](http://www.clientearth.org).

"sustainability criteria"—preventing conversion of forests and other natural areas for the sole purpose of producing biofuels on the converted land. This phenomenon is called *direct* land-use change. Its practice is discouraged. But existing safeguards that prevent direct land-use change encourage another harmful practice whereby biofuel production occurs on existing agricultural croplands, rather than on newly deforested or converted natural areas, and those agricultural croplands lost to biofuel production then move into forests and other natural areas. This phenomenon is called *indirect* land-use change or simply ILUC. Existing laws actually encourage this practice because no safeguards are in place. Moreover, public policies increasing biofuel consumption create demand where little previously existed and, in the process, create an artificial market worth billions, providing significant financial incentives for economic operators to produce biofuels on existing agricultural lands.

There is a lot at stake. Accurate accounting of ILUC shows that many biofuels are less effective at reducing GHG emissions than envisioned and, more often, worse than conventional fossil fuels. This is because biofuels contribute to deforestation, which releases as much as 20% of global carbon dioxide (CO<sub>2</sub>) emissions.<sup>8</sup> In addition to these climate consequences, ILUC holds implications for other sustainability values, namely biodiversity, ecosystem services, and sustainable development.<sup>9</sup> For these reasons, both RED and FQD contain an ILUC mandate with detailed provisions requiring the Commission to report by 31 December 2010 on ILUC impacts and, if appropriate, make proposals to incorporate those GHG emissions into the statutory framework.

The ILUC mandate envisions amendments to the Directives themselves.<sup>10</sup> The EU legislature strives to take legislative action to incorporate ILUC by 31 December 2012—to be followed by an implementation period—underscoring the urgency to find solutions that ensure consistency between 2020 targets and climate objectives.<sup>11</sup> In the final analysis, the ILUC mandate is intended to correct perverse market incentives currently on the books that undermine proliferation of next-generation biofuels and drive EU consumption toward biofuels with higher GHG emissions.<sup>12</sup> At present, the Commission is drafting the report and considering the form of a legislative proposal to fix the accounting system.

## **MANDATE TO THE COMMISSION ON INDIRECT LAND-USE CHANGE**

It is bedrock EU law that policies on the environment must be designed to contribute to the objectives of "preserving, protecting and improving the quality of the environment" and a "prudent and rational utilisation of natural resources."<sup>13</sup> The Lisbon Treaty states that EU policies "shall aim at a high level of protection" and be based on "the precautionary principle and on the principles that preventive action should be taken."<sup>14</sup> In preparing environmental policies, the Union shall take account of "available scientific and technical data."<sup>15</sup>

Upon adopting RED and FQD, the EU legislature omitted an ILUC factor, postponing its inclusion to a later date after additional analysis. This was largely justified on the need to clarify ILUC impacts further, especially the relative contributions from various feedstocks.<sup>16</sup> The EU legislature made clear, however, the foreseeable need for a concrete methodology to calculate GHG emissions from ILUC.<sup>17</sup> As a result, RED and FQD contain a two-fold mandate to the Commission: first submit a report on ILUC and, if appropriate, a proposal. The report will review the carbon stock changes attributable to ILUC—meaning the amount of unaccounted GHG emissions—and address ways to minimise this impact. As noted above, the Commission has until 31 December 2010 to submit the report.<sup>18</sup> For ILUC impacts above negligible levels, it will be appropriate for the Commission to submit a proposal to fix the accounting error. RED provides the methodological framework for discharging those duties and outlines the statutory requirements on any proposal.

The EU legislature makes clear that accurate accounting of GHG savings is paramount. The alternative is unacceptable: GHG reductions attributed to biofuels do not correspond to reality. This would undermine EU authority and credibility on the issue. Renewables in transport are premised on accurate GHG accounting. Recital 85 summarises the causal relationship between biofuel policies, stress on finite land resources, conversion of forests and other natural areas, and GHG implications:

“Global demand for agricultural commodities is growing. Part of that increased demand will be met through an increase in the amount of land devoted to agriculture... Even if biofuels themselves are made using raw materials from land already in arable use, the net increase in demand for crops caused by the promotion of biofuels could lead to a net increase in the cropped area. This could affect high carbon stock land, which would result in damaging carbon stock losses... The Commission should develop a concrete methodology to minimise greenhouse gas emissions caused by indirect land-use changes. To this end, the Commission should analyse, on the basis of best available scientific evidence, in particular, the inclusion of a factor for indirect land-use changes in the calculation of greenhouse gas emissions and the need to incentivise sustainable biofuels which minimise the impacts of land-use change and improve biofuel sustainability with respect to indirect land-use change...”<sup>19</sup>

The EU legislature charges the Commission with developing a concrete methodology to minimise GHG emissions caused by ILUC on the basis of the best available scientific evidence. It further requests that the Commission analyze “the inclusion of a factor for [ILUC] in the calculation of [GHG] emissions.” Recital 85 sets the context for the ILUC mandate as it later appears in Article 19(6).

In Article 19(6), the EU legislature sets forth in explicit terms its ILUC mandate to the Commission. In addition to reporting and submitting a proposal, if appropriate, the EU legislature stipulates statutory requirements on any proposal. A proposal that fails to meet these requirements should be considered inadequate as a matter of law:

The Commission shall, by 31 December 2010, submit a report to the European Parliament and to the Council reviewing the impact of indirect land-use change on greenhouse gas emissions and addressing ways to minimise that impact. The report shall, if appropriate, be accompanied by a proposal, based on the best available scientific evidence, containing a concrete methodology for emissions from carbon stock changes caused by indirect land-use changes, ensuring compliance with this Directive, in particular Article 17(2).

Such a proposal shall include the necessary safeguards to provide certainty for investment undertaken before that methodology is applied. With respect to installations that produced biofuels before the end of 2013, the application of the measures referred to in the first subparagraph shall not, until 31 December 2017, lead to biofuels produced by those installations being deemed to have failed to comply with the sustainability requirements of this Directive if they would otherwise have done so, provided that those biofuels achieve a greenhouse gas emission saving of at least 45%. This shall apply to the capacities of the installations of biofuels at the end of 2012.

The European Parliament and the Council shall endeavour to decide, by 31 December 2012, on any such proposals submitted by the Commission.<sup>20</sup>

Article 19(6) presents only two possible options: do nothing or develop a methodology to account for emissions from carbon stock changes caused by ILUC. There is no other option. It further requires that the methodology ensure compliance with the GHG-saving criterion in Article 17(2). This provision renders other actions, such as extending the use of bonuses, tangential to the core legislative mandate.<sup>21</sup> Together, Recital 85 and Article 19(6) make clear that the EU legislature envisioned the Commission developing a methodology with the primary objective of introducing an ILUC factor, as discussed below.

The threshold question is therefore whether a proposal is appropriate. If answered in the affirmative, RED stipulates four statutory requirements on the Commission in fulfilling its legislative mandate: (i) 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 certainty of investment. Each requirement is addressed in turn.

### **I. Appropriateness of an Accompanying Proposal**

In respect to Union matters, the European Parliament and Council may take decisions on environmental matters on a proposal from the Commission.<sup>22</sup> The justification for Commission initiative is to ensure a coherent framework for all initiatives.<sup>23</sup> The Council and the European Parliament may also ask the Commission to put forward a proposal when considered necessary. The text and broad logic of RED and FQD reveal the considerations relevant to the appropriateness determination. The recitals provide the starting point for any analysis. In them, the EU legislature finds that a “net increase in demand for crops caused by the promotion of biofuels could lead to a net increase in the cropped area.”<sup>24</sup> Net increases in cropped areas threaten forests and other natural areas, “which would result in damaging carbon stock losses.”<sup>25</sup> Under those circumstances, the “Commission should develop a concrete methodology to minimise greenhouse gas emissions caused by indirect land-use changes.”<sup>26</sup>

Here, appropriateness relates to addressing unintended consequences of climate policies that would convert forests and other natural areas into agricultural lands. This occurs as a result of miscalculating GHG emissions because, fundamentally, the GHG-saving criterion is premised on accurate accounting. For these reasons, appropriateness centres on whether there are increases to cropped area that would undermine the accounting scheme in RED and FQD. If these increases to cropped areas—and their associated GHG emissions—are negligible then a do-nothing approach is justified. If those impacts rise above negligible levels, however, the EU legislature considers it appropriate to address these carbon stock changes with a methodology that accounts for GHG emissions from ILUC. This conforms to the purpose of Article 19, which is to calculate GHG emissions from biofuels to verify compliance with the sustainability criteria, namely the GHG-saving criterion in Article 17(2).<sup>27</sup>

This emphasis on sustainability criteria is pervasive throughout RED and FQD. Not only does the GHG-saving criterion protect forests and other natural areas, but it ensures GHG reductions and drives next-generation biofuels:

Biofuel production should be sustainable. Biofuels used for compliance with the [GHG reduction] targets laid down in this Directive, and those that benefit from national support schemes, should therefore be required to fulfil sustainability criteria.<sup>28</sup>



The Community should take appropriate steps in the context of this Directive, including the promotion of sustainability criteria for biofuels and the development of second and third-generation biofuels in the Community and worldwide...<sup>29</sup>

Compliance with sustainability criteria is a biofuel-specific inquiry. Sustainability is determined by analysing the land the feedstock is produced on or, in the case of ILUC, the feedstock itself. Therefore, focusing on whether the 10% target as a whole results in any GHG reductions is misplaced. Various feedstocks yield varying degrees of ILUC and each biofuel must meet the GHG-saving criterion, not the policy as a whole. If certain feedstocks lead to exceedances of the GHG-saving criterion, then it is appropriate to introduce a methodology for emission from ILUC.

In drafting the report, the Commission launched four studies.<sup>30</sup> Those studies reveal, to varying degrees of significance, that it is inappropriate for the Union to ignore ILUC. For example, the recently released study by the International Food Policy Research Institute (IFPRI) found potential for *significant* ILUC impacts.<sup>31</sup> The IFPRI study uses a global computable general equilibrium (CGE) model to estimate the impact of EU biofuel policies, acknowledging several conservative inputs and assumptions that influence the conclusions.<sup>32</sup> For example, first, the IFPRI study assumes that biofuel consumption comprises only a 5.6% share of the mix of biofuels and fossil fuels despite the 10% target.<sup>33</sup> The authors note, however, that “[s]timulations for EU biofuels consumption above 5.6% of road transport fuels show that ILUC emissions can rapidly increase and erode the environmental sustainability of biofuels.”<sup>34</sup> Second, it assumes a 55/45 ratio between biodiesel and bioethanol, which makes the overall biofuel policy targets appear more attractive by relying on bioethanol over biodiesel.<sup>35</sup> The authors promote investigating the assumption behind the ratio, noting that it “strongly influences the results.”<sup>36</sup> In addition, the National Renewable Energy Action Plans, which outline how Member States intend to comply with renewable targets, show much higher reliance on biodiesel across the European Union.<sup>37</sup> Third, the IFPRI study only counts CO<sub>2</sub> emissions, not all GHGs such as nitrous oxides from fertilizers and pesticides.<sup>38</sup> Despite these limitations, the IFPRI study concludes that there “is indeed indirect land use change associated with the EU biofuels mandate.”<sup>39</sup> The IFPRI study further finds that “[i]t is clear... that increased demand for biofuels will have impact on the demand for land and will result in potentially significant land use changes.”<sup>40</sup>

Other studies confirm these conclusions.<sup>41</sup> This includes a comparative model analysis by the Commission’s Joint Research Centre (JRC), which analysed three models considered “scientifically acknowledged and robust tools for policy simulations.” The JRC study concluded that EU biofuel policies are “likely to trigger indirect land use changes worldwide.”<sup>42</sup> It further found that current and future support for biofuels “is likely to accelerate the expansion of land under crops particularly in Latin America and Asia... [which] carries the risk of significant and hardly reversible environmental damages.”<sup>43</sup> Both the IFPRI and JRC studies break down ILUC to the feedstock level.

It is clear from the studies that certain feedstocks have higher impacts over others. These studies further dispel with the notion that ILUC impacts are negligible, which should eliminate the do-nothing option from consideration. For these reasons, under the standard outlined by the EU legislature, it is appropriate to address the under-accounting of GHG emissions that currently beleaguers RED and FQD.

## II. Based on the Best Available Scientific Evidence

The proposal must be “based on the best available scientific evidence.”<sup>44</sup> The operative word is “available.” Any unavailable science or analysis should not preclude a proposal on the matter. The EU legislature requires the Commission to bring together the best available science in a report and, based on the scientific evidence therein, submit a proposal.<sup>45</sup> That proposal may contain mechanisms for periodic review as more science becomes available, as discussed further below.

There are several policy justifications for basing the proposal on the best available scientific evidence. First, it allows for prompt decision making on an issue of importance to the EU legislature and the EU’s renewable energy policies: carbon stock changes from ILUC. At the present, the admitted omission of this source of GHG emissions threatens to undermine RED and FQD – actual GHG reductions will not correspond to reality and deforestation will work at cross purposes with ongoing EU policies to protect forests, such as the Forest Law Enforcement Governance and Trade (FLEGT) programme,<sup>46</sup> the Timber Regulation,<sup>47</sup> and timber procurement policies.<sup>48</sup> Second, it prevents paralysis by analysis, which leads to business as usual and drives EU consumption toward GHG-intensive biofuels. The focus on the best available scientific evidence sidelines inaction based on the unavailability of additional scientific evidence or uncertainty. On the contrary, the Commission must gather the best scientific evidence available and base the proposal on that. Third, it de-politicises the decision on ILUC, empowering the Commission to establish a level playing field as soon as possible. Only those biofuels actually achieving the GHG-saving thresholds will qualify for the 10% target and associated subsidies. As it stands now, however, this is not the case.

To the extent uncertainty exists, the Lisbon Treaty and governing law provide a method for resolving these uncertainties in the environmental sector: the precautionary principle. For any given range of impacts or uncertainty, the Union shall resolve the issue in favour of the environment, selecting the higher range so as to ensure a high level of protection:

Union policy on the environment shall aim at a high level of protection ... It shall be based on the precautionary principle and on the principles that preventive action should be taken, that environmental damage should as a priority be rectified at source and that the polluter should pay.<sup>49</sup>

The precautionary principle is a fundamental principle of EU law. The European Court of Justice has repeatedly affirmed its application. In *The Queen v. Ministry of Agriculture, Fisheries and Food*, the European Court of Justice upheld the Commission's decision banning the exportation of beef from the United Kingdom to reduce the risk of BSE transmission, holding that “[w]here there is uncertainty as to the existence or extent of risks to human health, the institutions may take protective measures without having to wait until the reality and seriousness of those risks become fully apparent.”<sup>50</sup> In *Afton Chemical Limited v. Secretary of State for Transport*, the European Court of Justice found that “where it proves to be impossible to determine with certainty the existence or extent of the alleged risk because of the insufficiency, inconclusiveness or imprecision of the results of studies conducted... the precautionary principle justifies the adoption of restrictive measures.”<sup>51</sup> The Court reaffirmed that “[i]n those circumstances [where studies reveal uncertain risks], it must be acknowledged that the European Union legislature may, under the precautionary principle, take protective measures without having to wait for the reality and the seriousness of those risks to be fully demonstrated.”<sup>52</sup> This is particularly relevant here since the impacts are irreversible. EU biofuel policies are expected to result in the conversion of approximately 5.8 to 28.6 million hectares by 2020 under a 30 million tonnes of oil equivalent (Mtoe) scenario.<sup>53</sup> Deforestation and conversion of natural areas result in permanent losses of biodiversity and ecosystem services, and the CO<sub>2</sub>

released remains in the atmosphere for centuries.<sup>54</sup> The sustainability criteria underlying the biofuel policies are intended to prevent this, not promote it.

The Commission has also released a communication on the precautionary principle.<sup>55</sup> In it, the Commission cites scientific uncertainty as a trigger to invoke precautionary action, speaking to situations nearly identical to those presented by ILUC:

Once the scientific evaluation has been performed as best as possible, it may provide a basis for triggering a decision to invoke the precautionary principle. The conclusions of this evaluation should show that the desired level of protection for the environment... could be jeopardised. The conclusions should also include an assessment of the scientific uncertainties and a description of the hypotheses used to compensate for the lack of the scientific or statistical data. An assessment of the potential consequences of inaction should be considered and may be used as a trigger by the decision-makers... The absence of scientific proof of the existence of a cause-effect relationship... or a quantitative evaluation of the probability of the emergence of adverse effects following exposure should not be used to justify inaction.<sup>56</sup>

Another highly relevant inquiry, therefore, is on the nature of the uncertainty on ILUC. There is no uncertainty about the significance of the impacts. Biofuels cause land-use changes that result in the release of large quantities of GHG emissions into the atmosphere.<sup>57</sup> Nor is there uncertainty that certain biofuels have better GHG performance than others.<sup>58</sup> The studies consistently show this to be the case. Nor is there uncertainty regarding the relevant impacts of different feedstocks.<sup>59</sup> Some feedstocks perform better than others. While it is true that different studies modelling ILUC have produced different results for different feedstocks, construing this as uncertainty compelling inaction is misleading. Even at the conservative end of this range, the ILUC impacts cannot be considered negligible and, as a result, would make it appropriate for the Commission to submit a proposal to account for ILUC. It is the only way to create a level playing field. Arguments for absolute certainty in models are red herrings.<sup>60</sup>

It is also significant that uncertainty did not prevent the EU legislature from taking action in other parts of RED and FQD. For example, “default values” for GHG emissions for various biofuels are chosen at indicative levels, to be updated periodically as further reliable data becomes available:

In order to avoid a disproportionate administrative burden, a list of default values should be laid down for common biofuel production pathways and that list should be updated and expanded when further reliable data is available. Economic operators should always be entitled to claim the level of greenhouse gas emission saving for biofuels and bioliquids established by that list. Where the default value for greenhouse gas emission saving from a production pathway lies below the required minimum level of greenhouse gas emission saving, producers wishing to demonstrate their compliance with this minimum level should be required to show that actual emissions from their production process are lower than those that were assumed in the calculation of the default values.

This legislate-and-update approach is applied to the “fossil fuel comparator,” which represents the latest available actual average emissions from the fossil part of petrol and diesel consumed in the Union despite little data on which to base this figure.<sup>61</sup> The EU legislature requires regular revision of the fossil fuel comparator as data becomes available in 2011 and beyond, but the lack of precision did not prevent it from taking action in 2009.<sup>62</sup> Allowing for periodic review and revision is a typical

method to address uncertainty and evolving scientific evidence. In the United States, California took this approach for ILUC in its Low-Carbon Fuel Standard.<sup>63</sup>

As it stands now, the best available scientific evidence reframes the ILUC debate: it is no longer a question of whether to address ILUC, but how. Claims regarding uncertainty should be dismissed. The starting values for an ILUC factor can be determined using the best available scientific evidence. As to the form of an ILUC proposal, the answer lies in the remaining statutory requirements.

### **III. Compliance with RED and Article 17(2)**

Any proposal must also “ensure compliance with this Directive, in particular Article 17(2).” Article 17(2) outlines the GHG-saving thresholds under the GHG-saving criterion, which is a sustainability criterion requiring biofuels to meet certain GHG savings compared to fossil fuels. The GHG-saving criterion serves as a filter, promoting biofuels that achieve greater GHG savings over those that achieve less or none. Under RED, the required GHG-saving threshold increases over time, starting at 35% in 2009 before ratcheting up to 50% in 2017 and 60% in 2018 for new installations:

#### **Article 17**

#### **Sustainability criteria for biofuels and bioliquids**

\* \* \*

2. The greenhouse gas emission saving from the use of biofuels and bioliquids... shall be at least 35%.

With effect from 1 January 2017, the greenhouse gas emission saving from the use of biofuels and bioliquids... shall be at least 50%. From 1 January 2018 that greenhouse gas emission saving shall be at least 60% for biofuels and bioliquids produced in installations in which production started on or after 1 January 2017.

The greenhouse gas emission saving from the use of biofuels and bioliquids shall be calculated in accordance with Article 19(1).<sup>64</sup>

Article 17(2) calculates GHG savings in accordance with Article 19(1), which is based on and incorporates by reference Annex V. Those two sections contain the methodologies for calculating total emissions from biofuel use.<sup>65</sup> The overall approach compares total emissions from biofuel use against the average emissions from fossil fuels—the fossil fuel comparator—to determine GHG savings. Unless ILUC emissions are accounted for, a gaping loophole exists that misleads consumers and investors to believe that biofuels achieve certain GHG savings where, often, those biofuels do not. Further, meeting the GHG-saving criterion qualifies biofuel producers for subsidies, such as financial support for their consumption under a national support scheme<sup>66</sup> and investment or operating aid under Community guidelines on state aid for environmental protection.<sup>67</sup> Where the GHG emissions from biofuels are not fully accounted, this leads to the misappropriation and maladministration of public funds. “Ensuring compliance with [RED], in particular Article 17(2)” really means calculating GHG emissions accurately so as to ensure compliance with the GHG-saving requirement.

#### IV. Concrete Methodology for Emissions from ILUC-Induced Carbon Stock Changes

The EU legislature further requires any proposal to contain “a concrete methodology for emissions from carbon stock changes caused by indirect land-use changes.”<sup>68</sup> This is significant. Article 19(1) and Annex V—specifically referenced in Article 17(2)—contain the overall methodological framework whereby nine different “factors” covering lifecycle GHG emissions are summed to yield “total emission from the use of the biofuel” or  $E_B$ .<sup>69</sup>

$$E_{[B]} = e_{ec} + e_{[d]} + e_p + e_{td} + e_u - e_{sca} - e_{ccs} - e_{ccr} - e_{ee},$$

where

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

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

$e_{[d]}$  = annualised emissions from carbon stock changes caused by [direct] 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.<sup>70</sup>

The total emissions from the use of the biofuel are determined by adding lifecycle GHG emissions from cultivation through use—i.e., extraction, cultivation, processing, direct land-use changes, transport and distribution, and fuel use—and then subtracting any GHG savings from soil carbon accumulation, carbon capture and geographical storage, carbon capture and replacement, and excess electricity from cogeneration.

Once total emissions for the biofuel are calculated,  $E_B$ , it can be plugged into another formula that compares it against the fossil fuel comparator,  $E_F$ , to determine GHG savings. This will determine whether the biofuel fulfils the GHG-savings criterion:

$$GHG\ SAVING = (E_F - E_B)/E_F,$$

where

$E_B$  = total emissions from the biofuel or bioliquid; and

$E_F$  = total emissions from the fossil fuel comparator.<sup>71</sup>

The fossil fuel comparator is reported under FQD and has a starting value of 83,8 gCO<sub>2eq</sub>/MJ.<sup>72</sup> This value will be superseded by the “latest actual average emissions from the fossil part of petrol and diesel in the Community” when that information becomes available in annual reports submitted under FQD. The first reporting will take place in 2011.<sup>73</sup> Under the starting value for the fossil fuel comparator of 83,8 gCO<sub>2eq</sub>/MJ, a biofuel would have to emit 54,47 gCO<sub>2eq</sub>/MJ or less in order to

meet the GHG-saving threshold of 35%. The key variable affecting the GHG savings for any given biofuel is its total emissions from use or  $E_B$ .

Therefore, in order to conform to the methodological framework in RED, the Commission would need to introduce an ILUC factor,  $e_{iluc}$ , into the formula for calculating total emissions:

$$e_{iluc} = \frac{\text{annualised emissions from carbon stock losses from indirect land-use change}}{\text{use change}}$$

The EU legislature foreshadowed the inclusion of an ILUC factor in Recital 85.<sup>74</sup> The ILUC factor would represent “annualised emissions from carbon stock losses from indirect land-use change” and would be based on a methodology similar to the approach taken for the other factors. Modelling produces reliable—if not conservative—values down to the feedstock level, as demonstrated in the IFPRI and JRC studies.<sup>75</sup> In certain instances, such as biofuels produced from waste and residues, there may be no ILUC-induced emissions. In other instances, the inclusion of an ILUC factor will drive innovation toward next-generation biofuels with lesser land-use impacts, such as algae. The Union has made a commitment to combat climate change by encouraging renewables in transport. The Commission must now advance a methodology that ensures EU biofuel policies reduce GHG emissions to statutory levels.

#### **V. Safeguards to Provide Certainty for Investment**

The final requirement provides that the proposal must “include the necessary safeguards to provide certainty for investment undertaken before that methodology is applied.”<sup>76</sup> These safeguards, however, only apply to a methodology to account for carbon stock changes from ILUC. The safeguards do not apply to any other alternative action. Installations producing biofuels before a certain date will be allowed a multi-year window to come into compliance with the GHG-saving criterion—despite the introduction of a methodology for accounting for ILUC emissions—as long as a GHG-saving threshold of 45% is achieved:

Such a proposal shall include the necessary safeguards to provide certainty for investment undertaken before that methodology is applied. With respect to installations that produced biofuels before the end of 2013, the application of the measures referred to in the first subparagraph shall not, until 31 December 2017, lead to biofuels produced by those installations being deemed to have failed to comply with the sustainability requirements of this Directive if they would otherwise have done so, provided that those biofuels achieve a greenhouse gas emission saving of at least 45%. This shall apply to the capacities of the installations of biofuels at the end of 2012.<sup>77</sup>

The closing of the multi-year window corresponds to the timing that the EU legislature set out for itself to act on any proposal from the Commission: “[t]he European Parliament and the Council shall endeavour to decide, by 31 December 2012, on any such proposals submitted by the Commission.”<sup>78</sup> The Lisbon Treaty states that the European Parliament and the Council “shall decide what action is to be taken by the Union in order to achieve [its] objectives.”<sup>79</sup> To date, however, Parliament and the Council are waiting for the Commission to initiate the legislative process to decide on the actions to be taken to achieve RED and FQD’s climate and sustainability objectives. To avoid frustrating the timeline for legislative action, the Commission should submit its proposal as soon as possible, but no later than 31 December 2010.

## CONCLUSION

The reduction in GHG emissions is at the core of 10% target for renewable energy in transport.<sup>80</sup> The statutory requirements in Article 19(6) impose clear requirements on the Commission, providing a roadmap for addressing inaccurate accounting through the introduction of a methodology to account for carbon stock changes caused by ILUC. Studies show significant ILUC emissions resulting from increased demand for biofuels, compelling Commission action as a flagship EU climate policy rests in the balance.

**ClientEarth**

October 2010

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<sup>1</sup> Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 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), Recitals 1-2; 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), Recitals 1-4.

<sup>2</sup> RED, Article 3(4).

<sup>3</sup> 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).

<sup>4</sup> COD/2008/0016.

<sup>5</sup> RED, Recital 9.

<sup>6</sup> RED, Recital 80.

<sup>7</sup> RED, Recital 69; FQD, Recital 22.

<sup>8</sup> IPCC, 2007 Mitigation of Climate Change, p. 544.

<sup>9</sup> RED, Recital 85.

<sup>10</sup> See, e.g., RED, Recital 85; RED, Article 19(6).

<sup>11</sup> RED, Article 19(6).

<sup>12</sup> RED, Recital 9.

<sup>13</sup> Lisbon Treaty, Article 191(1).

<sup>14</sup> Lisbon Treaty, Article 191(2).

<sup>15</sup> Lisbon Treaty, Article 191(3).

<sup>16</sup> RED, Recital 85.

<sup>17</sup> RED, Recital 85.

<sup>18</sup> RED, Article 19(6).

<sup>19</sup> RED, Recital 85 (emphasis added).

<sup>20</sup> RED, Article 19(6); FQD, Article 7d(6).

<sup>21</sup> European Commission, Pre-consultation on Indirect Land-Use Change – Possible Elements of a Policy Approach – Preparatory Draft for Stakeholder/Expert Comments (Summer, 2009).

<sup>22</sup> Lisbon Treaty, Articles 191-192.

<sup>23</sup> Europa Glossary, Right of Initiative, at [http://europa.eu/scadplus/glossary/initiative\\_right\\_en.htm](http://europa.eu/scadplus/glossary/initiative_right_en.htm) (last visited 6 July 2010).

<sup>24</sup> RED, Recital 85.

<sup>25</sup> RED, Recital 85.

<sup>26</sup> RED, Recital 85.

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<sup>27</sup> See RED, Articles 17 and 19.

<sup>28</sup> RED, Recital 65; FQD, Recital 10.

<sup>29</sup> RED, Recital 66.

<sup>30</sup> European Commission, Directorate-General for Agriculture and Rural Development, Communication Denial Request for Access to Documents (27 November 2009), p. 2.

<sup>31</sup> International Food Policy Research Institute, *Global Trade and Environmental Impact Study of the EU Biofuels Mandate*, Final Draft Report (March 2010) [hereinafter "IFPRI Study"].

<sup>32</sup> IFPRI Study, p. 9.

<sup>33</sup> IFPRI Study, p. 10.

<sup>34</sup> IFPRI Study, p. 11.

<sup>35</sup> IFPRI Study, p. 12.

<sup>36</sup> IFPRI Study, p. 12.

<sup>37</sup> European Commission, Renewable Energy: National Renewable Energy Action Plans, at [http://ec.europa.eu/energy/renewables/transparency\\_platform/action\\_plan\\_en.htm](http://ec.europa.eu/energy/renewables/transparency_platform/action_plan_en.htm) (last visited 15 September 2010); see also European Environment Agency, National Renewable Energy Action Plan (NREAP) data from Member States, at <http://www.eea.europa.eu/data-and-maps/figures/national-renewable-energy-action-plan> (last visited 15 September 2010).

<sup>38</sup> IFPRI Study, p. 23.

<sup>39</sup> IFPRI Study, p. 11.

<sup>40</sup> IFPRI Study, p. 20.

<sup>41</sup> European Commission, Joint Research Centre, *Impacts of the EU Biofuel Target on Agricultural Markets and Land Use: a Comparative Modelling Assessment* (2010) [hereinafter "JRC Study"]; see also IFPRI Study, pp. 16-25 (review of recent studies).

<sup>42</sup> JRC Study, pp. vi and 2.

<sup>43</sup> JRC Study, p. 12.

<sup>44</sup> RED, Article 19(6).

<sup>45</sup> RED, Article 19(6); FQD, Article 7d(6).

<sup>46</sup> Council of the European Union, *Council Conclusions, Forest Law Enforcement, Governance and Trade (FLEGT)* (2003/C 268/01).

<sup>47</sup> Regulation (EU) No .../2010 of the European Parliament and of the Council laying down the obligations of operators who place timber and timber products on the market (political agreement pending Council adoption in September 2010).

<sup>48</sup> Directive 2004/18/EC of the European Parliament and of the Council on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts, OJ 2004 No. L134/114; see also European Commission, Communication from the Commission to the European Parliament, the Council, and the European Economic and Social Committee of the Regions on the Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan, COM(2008) 397 final (Brussels, 16 July 2008); European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Mainstreaming Sustainable Development into EU policies: 2009 Review of the European Union Strategy for Sustainable Development, COM(2009) 400 final (Brussels, 24 July 2009).

<sup>49</sup> Lisbon Treaty, Article 191(2).

<sup>50</sup> C-157/96, *The Queen v Ministry of Agriculture, Fisheries and Food*, Grounds 99.

<sup>51</sup> Case C-343/09, *Afton Chemical Limited v. Secretary of State for Transport* (2010) para. 61; Case C-333/08, *Commission v France* (2010), para. 92.

<sup>52</sup> Case C-343/09, *Afton Chemical Limited v. Secretary of State for Transport* (2010) para. 62; Case C-333/08, *Commission v France* (2010), para. 91.

<sup>53</sup> Literature review-DG TREN internal work-Version 31/10/2010, pp. 36-38.

<sup>54</sup> Susan Solomon *et al.*, *Irreversible climate change due to carbon dioxide emissions*, 106 PROC. NAT'L ACAD. SCI. USA 1704 (2009); see also V. Ramanathan & Y. Feng, *On avoiding dangerous anthropogenic interference with the climate system: Formidable challenges ahead*, 105 PROC. NAT'L ACAD. SCI. USA 14245, 14245 (2008).

<sup>55</sup> Commission of the European Communities, Communication from the Commission on the precautionary principle, COM(2000).

<sup>56</sup> Commission of the European Communities, Communication from the Commission on the precautionary principle, COM(2000), p. 17.

<sup>57</sup> See, e.g., IFPRI Study.

<sup>58</sup> See, e.g., IFPRI Study, pp. 60-65.

<sup>59</sup> See, e.g., IFPRI Study, pp. 60-65.

<sup>60</sup> Fritzsche, Uwe R. *et al.* 2008: *The "iLUC Factor" as a Means to Hedge Risks of GHG Emissions from Indirect Land-Use Change Associated with Bioenergy Feedstock Provision*; Oeko-Institut; Darmstadt, p. 6 (emphasis in original removed); see also Searchinger, Timothy 2010: Biofuels and the need for additional carbon; in: Environ. Res. Lett. 5 (2010) 024007, <http://dx.doi.org/10.1088/1748-9326/5/2/024007>.

<sup>61</sup> FQD, Annex IX(C)(19).

<sup>62</sup> FQD, Article 7a.



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<sup>63</sup> See, e.g., Fritsche, Uwe R. et al. 2008: *The “iLUC Factor” as a Means to Hedge Risks of GHG Emissions from Indirect Land-Use Change Associated with Bioenergy Feedstock Provision*; Oeko-Institut; Darmstadt, p. 19.

<sup>64</sup> RED, Article 17(2).

<sup>65</sup> See RED, Annex V(C).

<sup>66</sup> RED, Article 17(1)(c).

<sup>67</sup> Notice OJ 2008/C 82/01.

<sup>68</sup> RED, Article 19(6).

<sup>69</sup> RED, Article 17(2).

<sup>70</sup> See RED, Annex V(C)(1) (includes clarification on *direct* land-use change factor,  $e_{[d]}$ , the methodology for which is outlined in Annex V(C)(7) of RED, and the missing *indirect* land-use change factor,  $e_{[iluc]}$ , referenced in Recital 85 of RED).

<sup>71</sup> RED, Annex V(C)(4).

<sup>72</sup> FQD, Annex IV(C)(19); see also RED, Annex V(C)(19).

<sup>73</sup> FQD, Article 7a.

<sup>74</sup> See RED, Recital 85.

<sup>75</sup> See, e.g., IFPRI Study.

<sup>76</sup> RED, Article 19(6).

<sup>77</sup> RED, Article 19(6).

<sup>78</sup> RED, Article 19(6).

<sup>79</sup> Lisbon Treaty, Article 192.

<sup>80</sup> RED, Recital 1.



October 2010

## EU CIVIL SOCIETY STATEMENT: EU climate policy in transport must not cause irreversible environmental and social damage

*To all EU Heads of State, EU Commissioners and members of Parliament*

Biofuels were initially introduced as a green and climate-friendly alternative to fossil fuels in the transport sector. Since then, an accumulation of scientific evidence has shown that expanding biofuel production to meet the EU's renewable energy target will cause substantial greenhouse-gas emissions, damage biodiversity, exacerbate rural conflict and land grabbing in developing countries, and impact food prices globally.

In particular, the increased demand for biofuel crops is pushing agriculture into previously unfarmed land – often at the expense of forests, carbon rich peat-lands, and local communities – causing the phenomenon known as 'indirect land use change'. Converting this land into fields and plantations is emitting millions of tonnes of carbon into the atmosphere. Many scientific studies show that when these emissions are factored in, most biofuels actually increase emissions compared to fossil fuels.

Expansion of biofuels also contradicts other EU objectives, such as decreasing deforestation, reducing hunger, and promoting human rights. New plantations often lead to disputes over land rights in producer countries, destruction of habitats, and impacts on the availability and price of food for the world's most vulnerable societies.

Climate policies and national renewable energy action plans should be part of the solution – not the problem, which is currently the case with biofuels.

There is an urgent obligation to amend EU laws and national plans to take into account the full greenhouse-gas impacts of biofuels. We need an energy revolution in Europe that contributes to real and substantial reductions in greenhouse-gas emissions without accelerating deforestation and biodiversity loss or exacerbating social and resource conflicts in developing countries.

To this end, we call on the European Union and its Member States to:

**Support legislative proposals counting for the full climate impact of biofuels** – The European Union must factor in known sources of unaccounted greenhouse-gas emissions for biofuels. The current policy is inadequate, because it encourages biofuels that increase greenhouse-gas emissions compared to fossil fuels. This can be done by including robust and precautionary 'factors' that reflect emissions from indirect land use change.

**Revisit and amend biofuel policies** – Member states must eliminate support for biofuels that increase greenhouse-gas emissions. Priority must be given to energy efficiency and renewable electricity in trains and cars to contribute to the renewable target in transport. The sustainability of national and European biofuel targets must be reviewed to reflect the reality of biofuel expansion on total emissions, biodiversity and communities.

***The EU must only accept biofuels that demonstrably reduce greenhouse-gas emissions, pose no significant land-use issues, and do not risk social or conservation conflicts. For this reason, the EU should introduce indirect land use change factors to fully acknowledge all greenhouse gas emissions from its policies and bring forward an urgent review of the sustainability impacts of expanding biofuel use.***

Signed:

## International

ActionAid



Environmental Investigation Agency



Greenpeace



Naturefriends International



Oxfam International



Peace Brigades International



## EU

Association 2Celsius



CDM Watch



ClientEarth



European Environment Bureau



FERN



Friends of the Earth Europe



PAN Europe



Stichting BirdLife Europe



Transport & Environment



## Austria

BirdLife Austria

Klimabündnis - Climate Alliance Austria

Global 2000



VCÖ Mobilität mit Zukunft



## Belgium

Associations 21



Bond Beter Leefmilieu Vlaanderen

Broederlijk Delen

Duurzame Landbouwwerkgroep JNM (Jeugdbond Voor Natuur En Milieu)



Justitia et Pax Belgium

Natagora



Natuurpunt



VODO Vlaams Overleg Duurzame Ontwikkeling



Vredeseilanden

## Bulgaria

National Movement Friends of the Earth



Българско дружество за защита на птиците (BSPB)



## Cyprus

Friends of the Earth Cyprus



## Denmark

Society for the Conservation of Marine Mammals

## Finland

BirdLife Finland

Maan Ystävät Ry



## France

CCFD-Terre Solidaire



Les Amis de la Terre - France



Réseau Action Climat-France



## Germany

Adivasi-Koordination

Arbeitsgemeinschaft Regenwald und Artenschutz



Brot für die Welt



Bund für Umwelt und Naturschutz Deutschland (BUND)



Bundesverband für Umweltberatung

Deutscher Naturschutzring



ecodevelop - Action for Ecological Development



INKOTA-netzwerk



Naturfreunde Deutschlands



OroVerde - Tropical Forest Foundation



Pro REGENWALD



Pro Wildlife



Robin Wood

Watch Indonesia!

Zoologische Gesellschaft fuer Arten- u. Populationsschutz

## Greece

Hellenic Ornithological Society

Κάριτας Αθήνας - Caritas Athens



## Italy

Legambiente



## Luxembourg

Action Solidarité Tiers Monde (ASTM)



Archevêché de Luxembourg

bioLABEL



Caritas Luxembourg



Commission Luxembourgeoise "Justice et Paix"

Demeter-Bond



Der Cercle de Coopération



Eurosolar Lëtzebuerg



Fondation Bridderlech Deelen

Frères des Hommes



Mouvement Ecologique Luxembourg



natur&ëmwelt



SOS FAIM Luxembourg -  
Action pour le  
développement



TransFair Minka

**Netherlands**

ICCO

Milieu Defensie



Natuur&Milieu



Netherlands Centre for  
Indigenous Peoples (NCIV)



**Poland**

SALAMANDRA - Polish  
Society for Nature  
Conservation



**Portugal**

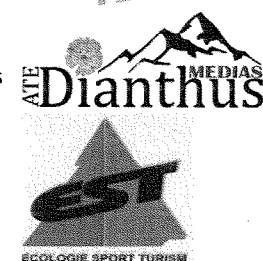
Quercus - Associação Nacional de Conservação  
da Natureza

**Romania**

ALMA-RO Association



Asociatia Brasovul Verde



Asociatia de Turism si  
Ecologie DIANTHUS Medias



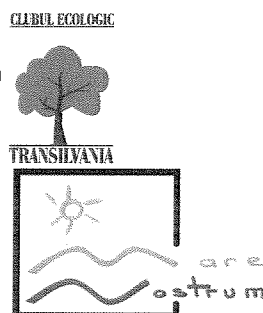
Asociatia Ecologie-Sport-  
Turism



Asociatia Ecouri Verzi



Clubul Ecologic Transilvania  
(Transylvania Eco Center)



Mare Nostrum NGO



Re.Generation Association



Romanian Ornithological  
Society



TERRA Mileniul III  
Foundation



## Slovakia

Cepta - Centre for sustainable alternatives



Občianske združenie TATRY

Slovak Ornithological Society - BirdLife Slovakia

Slovakia-Southern Africa Society



Society for Sustainable Living in the Slovak Republic

SOSNA. Oz



ŽIVICA Centrum environmentálnej a etickej výchovy

## Slovenia

Focus društvo za sonaraven razvoj - Focus association for sustainable development



Institute for Sustainable Development

## Spain

ALBA SUD

Ecologistas en Acción

SEO/BirdLife



## UK

Global Witness



global witness

Orangutan Foundation



Permaculture Association



Pesticide Action Network



RSPB



a million voices for nature

Sumatran Orangutan Society



The Real Bread Campaign



Friends of the Earth (England, Wales, Northern Ireland)



Friends of the Earth Scotland





