Regulatory Proposals on the Reduction of iLUC

Prof. Uwe Lahl

1 Introduction

Biomass currently accounts for the largest share of renewable energies in Germany and the rest of the world. It also plays an important role in international and European climate protection targets. At the same time several effects on the climate that may be associated with development of the use of biomass are being critically discussed. In particular this involves the use of agricultural space. The focus of the current discussion is placed on biofuels. Two regulatory proposals that can help to reduce and/or limit these effects are presented in the following.

The two regulatory proposals pursue different aims. The first proposal contains sanctions against the expansion of agricultural space attributable to the production of biofuels at the expense of climate protection. The second regulatory proposal incorporates estimated emissions from changes in land use into the greenhouse gas (GHG) reporting for biofuels. The proposals also take account of the use of liquid bioenergy which, for example, are employed in Germany for generating electricity within the scope of the German Renewable Energy Resources Act [EEG]. Both proposals interact and complement each other.

2 Climate Protection

The **IPCC** (Intergovernmental Panel on Climate Change) has developed sophisticated climate protection scenarios for policy advising. With the help of these scenarios emission forecasts for greenhouse gases can be calculated and the impact of these emissions on the climate be measured. These scenarios include how greenhouse gas emissions may be reduced through the use of renewable energies. These calculations show that it will not be easy to achieve the frequently cited target of two degrees. In these calculations the renewable energies required in future are mainly the intensified use of wind and solar energy, hydropower, geothermal energy and biomass [IPCC, 2011].

How will the situation develop in the future? **Figure 1** aggregates the result of an analysis of 164 climate protection scenarios. Accordingly, biomass will continue to represent the most important single source in the global power supply on the basis of renewable energies in the future; whereby the decidedly larger share will stem from newly industrialized and developing countries. Thus a regulatory success when it comes to reducing direct and indirect emissions through changes in land use is of great overall importance for climate protection policy.

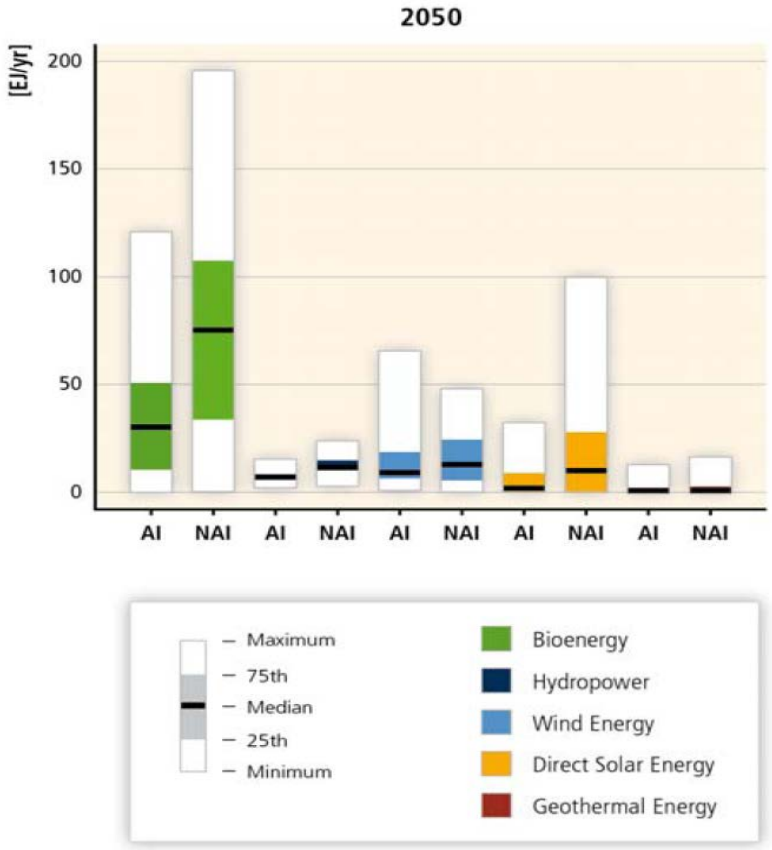

Figure 1: Forecast of the global power supply from renewable energies according to individual sources for 2050, in exajoule (1) per year; AI = industrialized countries (Annex I-countries (2), NAI = developing and newly industrialized countries (non-Annex I-countries) [IPCC, 2011].

3 Reduction of Greenhouse Gas Emissions by Using Biomass

When it comes to greenhouse gas emissions the scope of the saving that may be achieved through the use of bioenergy is just as great as the diverse fields of application. On the one hand, the amount of any possible reductions in emissions depends on which fossil sources of energy are replaced in the electricity, heating and fuel sectors. On the other hand, the saving potential is influenced by the emissions connected with the generation of bioenergy.

In the case of today's conventional calculations of greenhouse gas saving through the use of bioenergy, only emissions from direct changes in land use are generally taken into consideration, while indirect changes in land use are neglected. However, this aspect is certainly capable of changing actual greenhouse gas saving.

[1] One exajoule corresponds to 1 billion gigajoule.

[2] AI = Annex I-countries: "Annex I to the UN Framework Convention on Climate Change from 1992 contains a list of all of the countries that have committed to reduction of their greenhouse gas emissions to the level of 1990 by the year 2000. The list contains all of the OECD member countries (except for Korea and Mexico) as well as the Eastern European countries (except for former Yugoslavia and Albania). Thus the term "Annex I-countries" is often used as a synonym for "industrial countries", while the developing and newly industrialized countries are as a rule indicated by "non-Annex 1 countries." URL (in German) http://www.bmu.de/themen/klima-energie/klimaschutz/internationale-klimapolitik/glossar/#annex

Direct changes in land use may occur, for example, if grassland is broken up or forest cleared for the cultivation of energy crops. Thus greenhouse gas emissions may result, in particular, from the release of bound carbon.

Indirect effects are impacts on the environment that result particularly from displacement effects. Indirect changes in land use may occur, for example, if the cultivation of energy crops in Germany displaces the previous crop. If these products then have to be imported from other regions of the world, then this may result in expansion of agricultural production, for example, to cleared rain forest areas.

While direct impacts on the environment can usually be relatively well measured as a rule, the evaluation of **indirect effects** is quite difficult both in terms of content and methods. Thus today's methods of ecological auditing usually do not take account of indirect effects. Thus according to Finkbeiner [2013], none of the generally accepted ecological balance and/or carbon footprint standards and directives that he examined stipulate the consideration of iLUC values as imperative. According to Finkbeiner "iLUC should be regarded separately from the ecological balance – at least for a time."

The problem with evaluating indirect effects is described in greater detail in the following.

4. Measurement and Evaluation of Indirect Effects of Using Biomass for Energy

4.1 System boundaries of direct and indirect effects of bioenergy

In contrast to direct effects, indirect effects have no clear system boundaries and cannot be measured using the input-output analysis of existing life cycle assessment methods. Indirect effects can take place both in direct spatial and temporal proximity as well as at a great spatial and temporal distance. For example, intensified use of biofuels can preclude today's extraction of North Sea oil or prevent the future use of tar sands in Canada or "fracking" in Germany.

4.2 Complexity of indirect land use effects

Land use effects are at the front and center of the controversy with regard to the meaningfulness of biofuels. Indirect changes in land use (indirect Land Use Change, iLUC) as a result of bioenergy use can be diverse. An illustrative example is provided by the production of bioethanol as a biofuel in the USA. There the demand for corn is increasing as a result of bioethanol production based on the biofuel targets of the U.S. government. The increased demand for corn can result in [Dale, 2008]:

1. The farmers in the USA increase productivity.
2. The farmers in the USA change the crop rotations.
3. The farmers in the USA expand the cultivated areas.

4. The farmers in the USA cultivate more corn and less soy. As a result U.S. soy exports decline and soy prices on the world market increase. Consequently, the cultivated areas for soy are expanded in the Amazon region in Brazil.

Which of the specified developments will occur? Chains of causation of various lengths, i.e. with many different effects that are interconnected with each other [Bauen et al., 2010], may occur. However, the complexity of iLUC processes should not only be attributed to the large spatial and temporal distance between a cause and effect and the long chains of causation. The degree of uncertainty is also determined by the number of possible effects that may alternatively occur and the number of possible causes which may trigger the effect (multiple causation). Thus the clearing of tropical rain forest is never the result of a single cause, but rather the interaction of many factors.

The comparison of tropical rain forest clearing with agricultural production in Brazil provides a further example for the fact that changes in land use – and thus also iLUC effects – are not to be attributed to mono-causal connections. While annual clearing of forests was reduced by nearly 80% compared with the year 2004, the production of soy, grain and sugar cane continued to increase). Thus a simplified connection between the demand for agricultural products and the clearing of forests in Brazil cannot be verified – because apart from land expansion, the system can also respond to an increased requirement for agricultural products and/or biomass with an increase in productivity and by growing higher yield plants. And if this should not be sufficient, then the system may respond – if the clearing of forest area is legally regulated (Brazil) – through expansion into other segments. This may include reuse of abandoned areas.

Figure 2: Forest clearing and agricultural production (grain, soy and sugar cane) in Brazil [Union of Concerned Scientists 2011; INPE (Instituto Nacional de Pesquisas Espaciais) 2013; FAOSTAT 2013)]

4.3 Evaluation of indirect land use changes (iLUC) using econometric agricultural models as an example

Existing econometric agricultural models have undergone further development in recent years. Among them are models such as the Global Trade Analysis Project (GTAP) of Purdue University (Indiana/USA), IMPACT from IFPRI (International Food Policy Research Institute, New York) or CAPRI (Common Agricultural Policy Regional Impact Analysis) of the University of Bonn [LCFS Workgroup, 2010]. The first iLUC study was published by Searchinger et al. [2008] who calculated global indirect land use effects of bioethanol production in the United States. In accordance with iLUC theory the effects are transferred through international trade. The econometric models calculate the iLUC effect at the global level. This results in great complexity and a large data requirement. Thus all of the possible reciprocal effects cannot be taken into consideration [Lahl, 2010].

The respective results depend on the boundary conditions assumed for the calculations in the models. Therefore it is not surprising that the results are widely scattered.

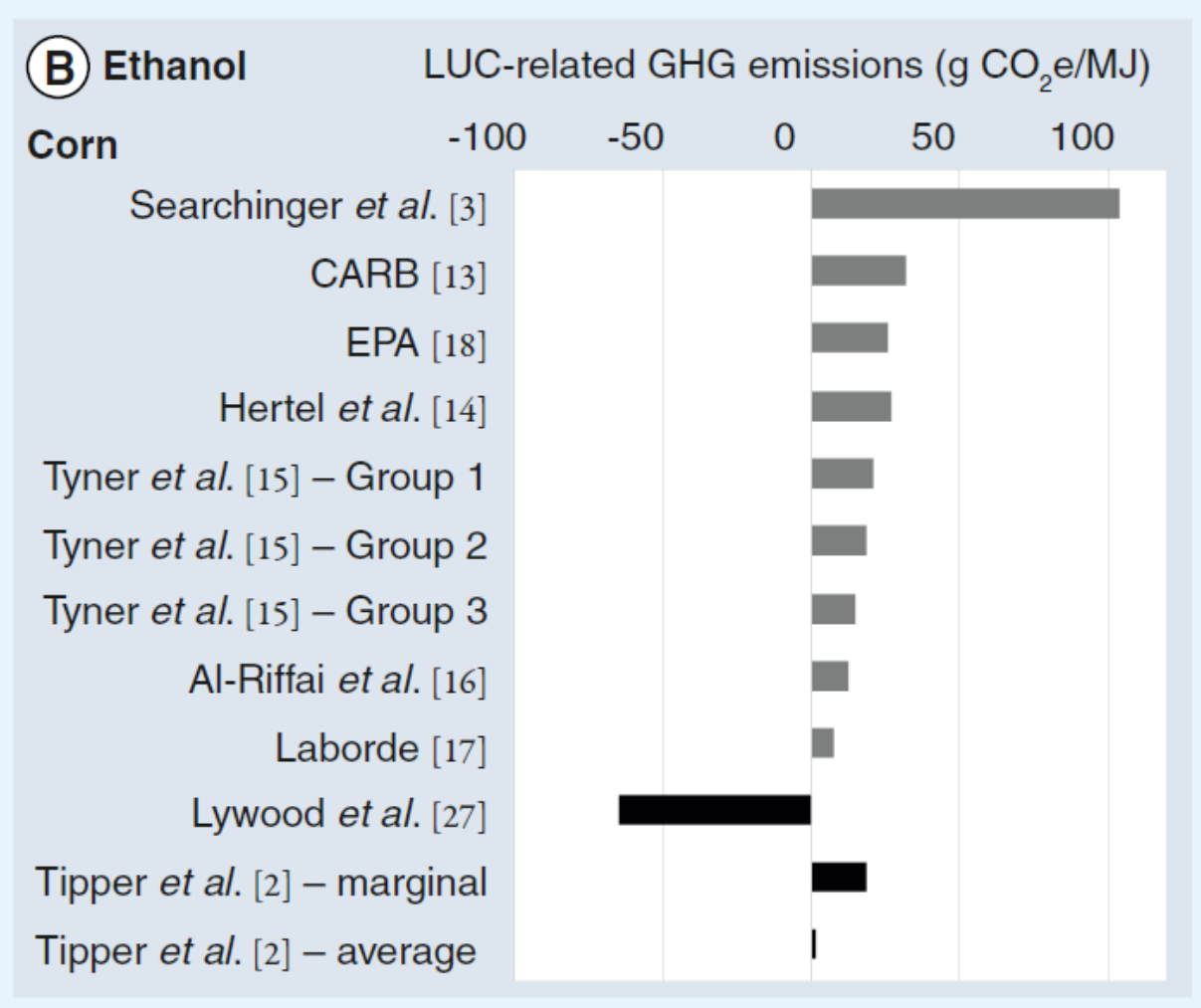

Figure 3: Overview of greenhouse gas emissions due to direct and indirect land use changes of biofuels of the first generation based on bibliographical references (allocation period: 30 years). Grey bars refer to market equilibrium models, black bars to allocation models [Wicke et al., 2012]

Figure 3 is taken from work carried out by Wicke et al. in 2012. Various authors have reproduced the original calculations of Searchinger et al. with their own models and arrived at comparable, yet very different results. Thus there is technical uncertainty with regard to the actual extent of the iLUC effect. And what makes things even more difficult is the fact that forecasts for the future are usually calculated by means of the models (**ex ante simulation**). However, the forecasting of future rain forest deforestation is faced with the question of how the governments of the relevant countries will regulate such land use expansion in the **future**. In all of the relevant countries there are efforts to prevent or at least to limit this deforestation. At the same time there are also economic interests in these countries that run counter to such efforts. At the global level the United Nations strive to provide for sustainable protection of these areas within the scope of the international climate protection negotiations under the abbreviation REDD+ (3). Thus at present there are different prospects for the future; the occurrence of which, however, cannot be forecasted by means of the specified models.

5. Regulatory options – ex ante or ex post

In the EU Fuel Quality Directive and the EU Renewable Energies Directive from the year 2009, the EU Commission was asked to examine the iLUC effects and, if necessary, to develop proposals in this regard.

5.1 Commission proposal – ex ante analysis

Since 2009 the Commission has had a whole set of studies and model calculations carried out with regard to the topic of iLUC with the aim of determining the possible extent of the iLUC effect in the year 2020 if the target of having biofuels provide for a 10% share of the overall fuel supply in the European Union is achieved. As expected, these investigations that were conducted using ex ante forecasts with econometric models resulted in varied findings. Figure 4 shows the result of a calculation of the iLUC effects of the EU biofuels regulation which was taken into consideration by the Commission in order to prepare regulatory proposals. In accordance therewith the overall result of direct emissions and iLUC emissions for biofuels on the basis of vegetable oil (biodiesel) is within the same range or even above the emissions from fossil fuels.

[3] UN-REDD Programme: "*Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks."* URL: http://www.un-redd.org/aboutredd/tabid/582/default.aspx [Version: May 29, 2013]

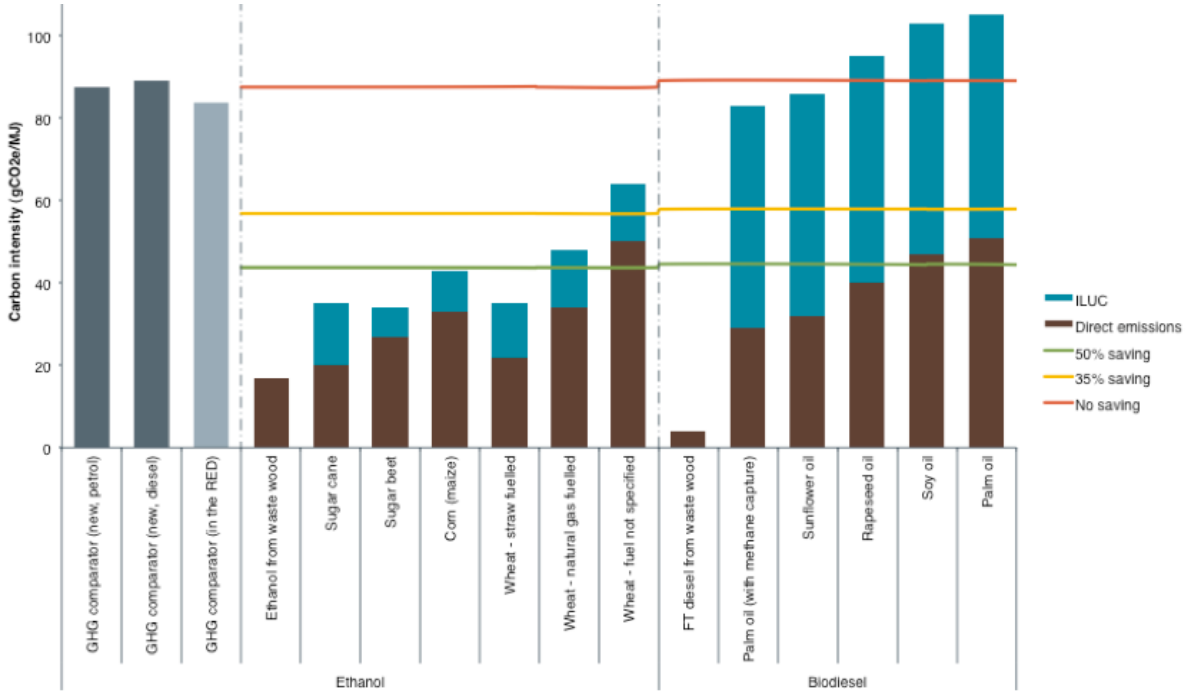

Figure 4: Calculation of the iLUC effect (blue bar) using the MIRAGE model [Laborde (IFPRI), 2011]

However, the Commission refrained from proposing the values determined in this calculation as binding for the greenhouse gas balance of biofuels in Europe. An essential reason for this probably consisted in doubts with regard to the legal viability of this calculation. Actually these values would have meant that biodiesel produced from vegetable oil would no longer be recognized since the required 35% and/or 50% in the future in terms of greenhouse gas emission saving would no longer be achieved. The Commission proposed introducing these iLUC values “only” for annual reporting on the part of fuel companies and the Member States with regard to fulfillment of quota obligations.

5.2 Alternative proposal – ex post analysis

The IPCC also identifies uncertainty, complexity and multiple causations as essential problems for measuring indirect changes in land use in forecast models. This also includes assessment of the effectiveness of land use policies based on the criterion of “good governance”. However, the effectiveness of land use policy action on the part of governments can be reliably measured, if the figures of real land use changes in the past are employed (ex post approach). On the one hand the regulatory aim should be to make a contribution toward combating the deforestation of rain forests. On the other hand, a regulatory aim should be to actually document the climate protection targets – that is, the required saving in terms of greenhouse gas emissions – and to monitor whether the prevention of deforestation is successful. Therefore two proposed changes to the Commission proposal from October 2012 that are based on an ex post approach will be described.

5.2.1 Regional LUC regulation: A contribution to rain forest conservation

At the regional level – that is, at the level of a state or a constituent part – past land use changes could be documented with comparatively high precision in a manner that was both comprehensive and legally secure. Land use changes (LUC) can result in increased greenhouse gas emissions that likewise are capable of being calculated in a precise and legally secure manner. On the other hand by using a specified method these emissions can be proportionately allocated to the regionally produced biofuels and liquid bioenergy. These values can then be converted to the energy unit megajoule and be compared with the minimum requirements to be met by GHG-saving in accordance with the existing EU legislation.

Biofuels and liquid bioenergy from countries in which these minimum requirements are exceeded in the year under review should not be regarded as produced with sustainable means. Therefore they should no longer be recognized for fulfillment of quota obligations in the future.

It is proposed that the Commission be obliged to update the regional values on an annual basis.

Annex A documents an application for amendment prepared on this basis.

Calculations with the described method result in a regional LUC value of approximately 45 g CO_{2eq} / MJ for biofuels for Brazil in the year 2011. A value of approximately 65 g CO_{2eq} / MJ would be obtained for Indonesia.

Limit values, as represented in Annex A, must be exceeded in order to deny sustainable development. Thus biofuels stemming from a country in which LUC emissions are so high that compliance with the minimum requirement to be met by greenhouse gas prevention (35%, which would correspond to approximately 30 CO_{2eq} / MJ) is ruled out would no longer be regarded as having been obtained through sustainable means. In order to rule out that this regulation is circumvented by concentrating forest clearing on just one year, a mode of calculation over 20 years that records a twentieth of the respective annual rate of deforestation was introduced with this proposal. The initial year would be 2008. Years that are missing, because they lie in the future, are evaluated with the value of the respective most current year (previous year or, if unavailable, the year before last as a substitute). The year 2015, for example, is included in the calculation with the LUC value from 2014 and a factor of 14 since data are only available for a further six years (2008 to 2013). However, since the previous year is included several times, there is great pressure to keep current deforestation and/or land conversion to a minimum.

For countries like Brazil the calculations show that a reduction in rain forest conversion of more than 90% would be required in the current year of 2013 in order for it to be recognized as a producer of biofuels through sustainable means. The requirements for Indonesia are even greater (Figure 5).

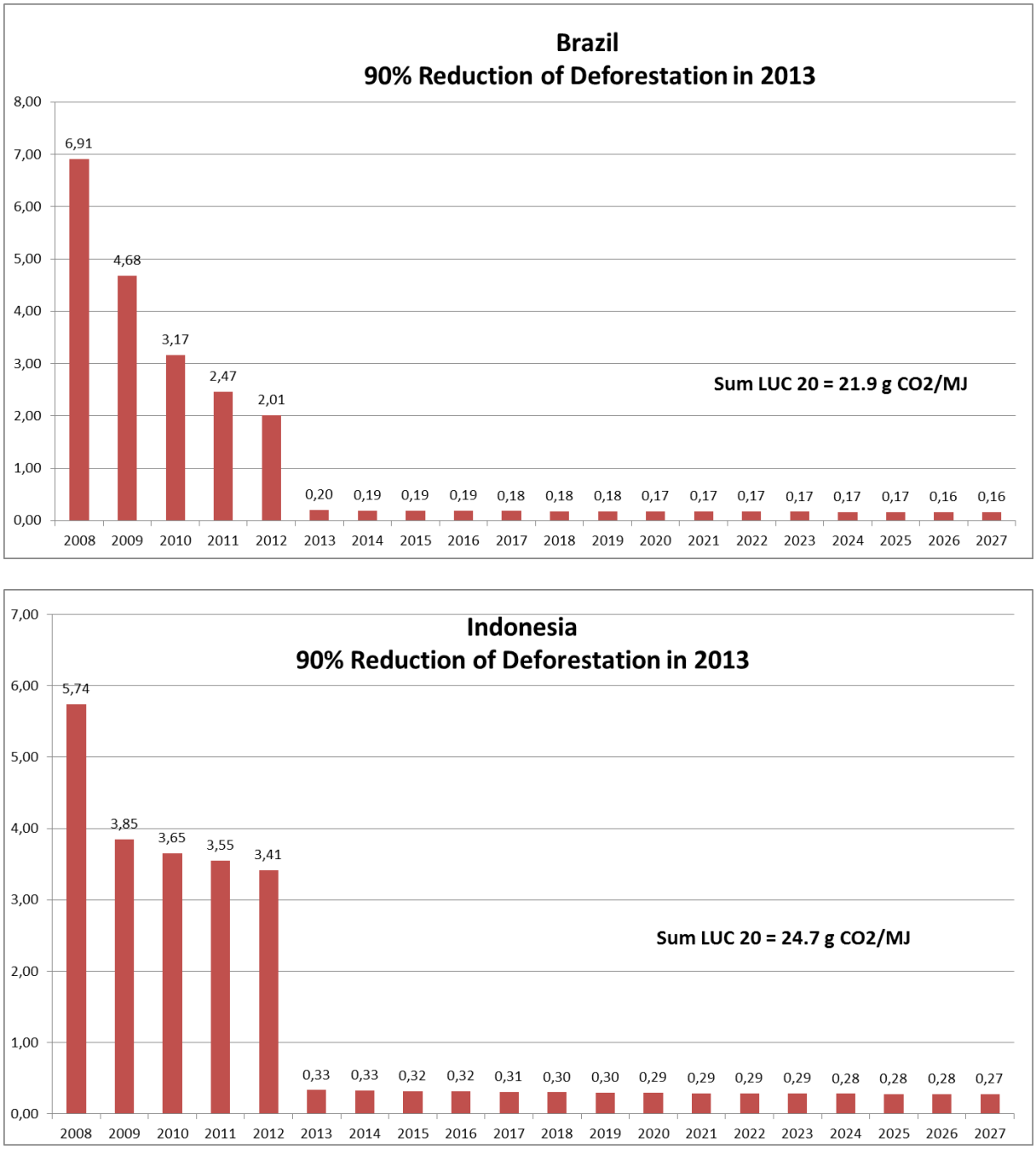

Figure 5: LUC values for Brazil (above) and Indonesia (below) given a 90% reduction in the clearing of rain forests in the year 2013

5.2.2 ILUC methodology: A contribution to the climate protection monitoring

With regard to past global changes in land use – for example, the loss of forest areas – reliable figures are available from the Food and Agriculture Organization of the United Nations (FAO). These figures can be used in order to perform a **global** estimate of the iLUC effect. To this end the GHG emissions caused as a result of overall changes in land use are calculated first (LUC emissions).

Since ex post data for direct land use changes (dLUC emissions) are available in the EU (through evaluation of the certification documents in the respective Member States), dLUC can be subtracted from LUC and iLUC thus determined. If the dLUC data cannot be made available at short notice, then as a first-order approximation one may proceed on the basis that LUC = iLUC because it may be assumed that the dLUC share in the emissions from changes in land use will instead be low.

Consequently, a global value for the emissions from changes in land use is thus determined which, in accordance with iLUC theory, is attributable in its cause to global agricultural production in the respectively examined year. An iLUC value for biofuels for the respective year is then estimated through proportionate allocation of this value to the biofuels sector and conversion to the energy unit megajoule, less a margin for uncertainties from the estimate. This value can be assigned to the subsequent year and be incorporated into reporting on the climatic effect of biofuels.

It is proposed that the Commission be obliged to update this value on an annual basis and to prescribe it to companies and the Member States for reporting purposes.

Annex B documents an application for amendment prepared on this basis.

Calculations of the global iLUC value for biofuels result in 16 g CO_{2eq} / MJ for the year 2011.

Contrary to iLUC values derived from ex ante forecasts and/or model calculations, here the iLUC values determined from valid ex post data are calculated from the actual past. The data uncertainties that remain here as well are taken into consideration with a standard abatement of 20%. The data determined by the FAO on deforestation or carbon release through changes in land use are example of data uncertainty. For example, according to a current scientific study [Harris et al., 2011] the carbon losses caused by clearing tropical rain forests and the concomitant GHG emissions have been overestimated up to now by 25 to 50 percent. On the other hand other studies indicate that the carbon released in the case of peat conversion is underestimated. Figure 6 shows the iLUC values calculated for global biofuels production on the basis of the data from the year 2011.

Allocation of the emissions from the previous year (or two years prior to the year under review if no more current values are available) to the subsequent year does not record higher (or lower) emissions in the period under review. However, these are recorded in the subsequent year.

All of the changes in land use worldwide cannot be documented in a precise manner. In addition, it should be taken into consideration that land use changes may have quite varying relevance. The range of changes in carbon stocks spans from gains, as for example with the use of savannahs for palm oil production, to significant losses when it comes to the use of peat bogs for palm oil production as well. It may be assumed that in quantitative terms deforestation by far causes the most extensive changes in the carbon stocks and thus approximately 70% to 80% of the GHG emissions caused by LUC altogether. Against this backdrop it is meanwhile appropriate to focus on deforestation for an estimate of iLUC emissions.

Global biofuel production 2011	
Parameter	
LUC[1] [ha]	5.656.180
dLUC[1] [ha]	0
ΔCS_R - CS_A[2] [t/ha]	127
Global crops[1] [t]	7.847.111.733
Bioethanol[3] [t]	56.169.959
Biodiesel[3] [t]	15.654.811
[1] Value 2010 [2] Ø-value [3] Value 2011	
iLUC-value [gCO_{2eq}/MJ]	
e_{iLUC}	**16**

Citations:
LUC: FAOSTAT
$\Delta CS_R/CS_A$: FAOSTAT
Global crops: FAOSTAT
Bioethanol/Biodiesel: OECD, FAO, USDE

Figure 6: Calculation of the global iLUC value for the year 2011

The by-products created in the production of biofuels shall not be taken into consideration. Since the proposal relies on the sum of the substrates used for biofuels production (sugar, starch, vegetable fatty acids), it is not necessary to deal with the by-products. This approach was chosen in order to ensure the legal certainty and plausibility of this proposal. Of course it is theoretically possible to scientifically determine the GHG effects – be they positive or negative – that are attributable to by-products. However, since the situation is very different throughout the world, this calculation can only be performed by means of a whole set of simplifications and assumptions. For example, the substitutability between fodder crops and the individual feedstuff components that have to be considered is so complex and for economic reasons so dynamic, that any measurement is ruled out and can only be derived from models. And even the decision to evaluate the by-products by means of the calorific value can lead to incorrect results in individual cases.

For both regulation proposals described here only internationally raised data of the FAO and the OECD are used. This applies equally to the surface transformations, to the agricultural produce, the yields or the assigned substrate quantities.

6. Evaluation of the two Proposals

This explanation is intended to contribute to an evaluation of the merits and demerits of these proposals. The proposals have distinctive advantages. However, there are also possible points of criticism that have to be openly addressed. None of the proposals under discussion are capable of completely solving the problem of emissions through changes in land use.

What is proposed is the combination of a regulation that starts with the causes of the iLUC effect on the one hand and, on the other hand, determines the reduced greenhouse gases saving caused by iLUC. In the following this combination will be examined from various aspects of “good governance.”

6.1 Legal certainty

While an introduction of ex ante iLUC values would not be legally secure due to the outlined uncertainties and scattering of the model results, a calculation on the basis of real historical data (ex post) cannot be challenged as being arbitrary. The approach chosen by the Commission – to avert criticism of the model calculations through a “best science approach” – will presumably be difficult to defend within the scope of judicial adversary proceedings. This becomes clear simply by the fact that the authors of the modeling consulted for this “best science approach” draw extensive reference to the weaknesses of their investigation and advise against introduction of the results as iLUC values.

6.2 WTO Compatibility

Can the biofuels production of a whole country be “excluded”? What is important is that exclusion of a country is not the issue, but rather the eligibility of biofuels from a country with high LUC when it comes to satisfying the quota obligations required by the EU targets. In the case of liquid biofuels what is involved in Germany, for example, is acceptance of a special feed-in tariff within the scope of the German Renewable Energy Resources Act [EEG].

Exclusion of biofuels from regions with high LUC emissions (above a defined limit value) is justified and permissible in accordance with Articles 2.1 and 2.2 of the World Trade Organization Agreement on Technical Barriers to Trade (TBT Agreement) due to the great importance of avoiding greenhouse gas emissions from the release of large carbon stocks through changes in land use, in particular natural forests or peat bogs with high carbon stocks.

Nevertheless a proposal that may entail sales restrictions for individual countries such as Indonesia or Brazil may lead to disputes involving world trade legislation. From the perspective of protection of valuable natural areas it should be noted that successes cannot be attained without clear incentives. The example of Brazil demonstrates that the arguments for protection of the Amazon basin are substantial even within the country. The regulation proposed here would provide support to those forces in Brazil that are working toward the same goal.

6.3 Steering effect

The proclaimed regulatory target of “rain forest protection” (more precisely: the protection of areas rich in carbon) can only be achieved with limited success because the proposal only applies to biofuels. This is primarily due to the fact that only these two sectors (biofuels, liquid bioenergy) have been addressed within the scope of current political consultations. Thus any other applications for amendment have the same “flaw.”

It is also true that in quantitative terms biofuels and liquid bioenergy have been less important up to now. Thus a regulation that only relies on these sectors would have less direct effect. However, can this argument be used to forego a regulation that addresses deforestation of the rain forest? Clearly, this cannot be the appropriate argument. However, promises that cannot be kept should not be

made. Thus the proposed denial of sustainable production would be a contribution toward improving protection of the rain forests. And indirectly it would result in pressure for action in the respective regions through public discussion and the blamed image of products from this country.

6.4 Risk of circumvention

The question is open as to whether the country-specific regulation proposed here can be circumvented in reality. If country X is excluded from the quota due to high LUC emissions, then in this case the biofuels could be routed to Europe via another country Y.

Apart from the fact that such a "business model" could only function through price discounts and thus losses on the part of the market participants in country X, the rerouting problem described is capable of being solved. After all, this is a frequently occurring problem in practice. Thus for several years now a certain group of developing countries (the so-called least developed countries – LDC) has been allowed to supply agricultural products to the EU both duty-free and without any limitation in quantity. Here too resourceful third-party countries could use these countries in order to save on customs duties. Such activities are determined by means of trade statistics and in individual cases by the competent authorities such as customs. However, this too belongs to evaluation of the proposal, every individual case of illegal practices cannot be ruled out.

6.5 Forecasts

Future developments cannot be forecast using the selected ex post approach. Here it should be taken into consideration that such a question, which is important for research, cannot have the same relevance for a regulatory approach. For government regulation other requirements such as the achievement of objectives, impact, legal certainty or plausibility have a higher priority. Ex post determination of a global iLUC value for the entire biofuels production of a particular year represents a conservative approach in any case, since the iLUC values for all countries are cumulated and the entire global land use change is attributed to the agricultural sector.

Insofar as deforestation might decline or increase in the future as a result of country-specific regulations, then this would naturally have a positive or negative impact on the global iLUC value in the subsequent years. In this manner the two regulatory proposals communicate, as it were, with one another.

And should a model-based simulation actually correctly forecast reality – assuming that this would once be the case – then the iLUC results of the ex post calculation and the ex ante forecast would be more or less identical.

6.6 Reporting

As in the case of the Commission proposal the iLUC value determined here should "only" be used for reporting. Legal concerns stand in opposition to an obligation on the part of biofuels manufacturers to use the iLUC value for carbon accounting of biofuels and liquid bioenergy. One reason for these legal concerns is that the iLUC value represents an estimate. The iLUC value determined ex post, as represented, is in fact more realistic and offers significantly greater legal certainty than the Commission proposal. However, this does not suffice in our opinion. Nevertheless, the value is

reliable enough in order to use it as an estimated value in reporting; in particular if it is specified again each year in accordance with actual developments.

What is important is that this proposal obliges the Commission to work on further development of the process of value determination. Among other things, this includes improvement of the databases as well as extension of the investigation framework. Up to now data are available with regard to global deforestation. However, the conversion of savannahs or scrubland to grassland or arable land leads to greenhouse gas emissions; though not to the extent that this applies to the conversion of rain forest or peat areas, but relevant scales may in fact be reached in individual cases.

Moreover, the introduction of an iLUC value based on real deforestation in particular in the past year will direct attention on this distorted development. Interaction with the correspondingly proposed country-specific regulation which clearly reveals the causes of LUC must be viewed against this backdrop. In addition, pressure will be put on companies in the biofuels industry to compensate this value in the reporting and to take measures in order to improve their carbon accounting, for example through greater efficiency. If secured bases are created by the Commission for the determination of values through measurements in the next years, then such values can be used beyond the scope of reporting. In this sense the regulation proposed here should be evaluated as a preliminary stage of an iLUC regulation and a contribution toward improvement of the carbon footprint of biofuels.

The presumably most important objective toward introduction of an iLUC value into annual reporting is to maintain receptiveness for the topic of “land use change” at a high level. However, this combats iLUC only indirectly. The regional LUC regulation at the level of the individual countries works directly. Thus the annual iLUC value makes it possible to monitor successful application of the regional LUC regulation.

6.7 Global iLUC value

As a result of the iLUC theory which develops the indirect effects in the entire complexity outlined above with long causal chains which may span whole continents, every change in agricultural production – from the decision of a farmer in the German land Schleswig-Holstein to cultivate one of his plots in the coming year with sugar beet and no longer with rye, to the reclamation of an area in the Sahel – has a negative or vice versa positive iLUC effect, even if it is very small in individual cases. Such complexity can only be illustrated with models which in turn can only be designed if the developer of the respective model makes very many assumptions and simplifications. If such a model is used for regulatory purposes, then legal uncertainties described above are to be seen. Furthermore, there is the political problem that the assumptions and simplifications of the models are often not transparent because the models are not revealed.

Since land use changes take place in reality and are not an invention of model developers, there is a dilemma. From the perspective of good governance one should refrain from the use of such models as a basis for regulations. A regulation with drastic consequences for those affected must have a sound legal basis. Thus an iLUC regulation would not be feasible, because iLUC can only be measured via models. However, there is an exception for how iLUC may nevertheless be measured without having to resort to models: at the global level for the sum of all vegetable agricultural products

produced. The land use changes at the global level, which essentially take place indirectly, are due to the global vegetable agricultural production as a whole. Thus these figures are employed together with the iLUC proposal described here.

However, the proposal also requires simplification in order to be able to allocate this global change in land use and the resultant GHG emissions to the causal agent, the “biofuels sector”, on a **proportionate** basis – but only in this single instance. This simplification consists in the assumption that the biofuels sector plays a proportionate causal role in annual production of the substrates used in the global GHG emissions in the agricultural sector. In simplified terms, if the biofuels sector should constitute 10% of the world agricultural production, then it would be responsible for 10% of global iLUC emissions. This simplification neglects the fact that the different agricultural products probably contribute to the occurrence of iLUC to varying degrees. Here again these differences can be only illustrated, as shown above, with the aid of models based on numerous assumptions and simplifications.

With each further differentiation based on regions, groups of biofuels or even according to “types of fruit” – which would be desirable from a regulatory perspective – further assumptions have to be made and the uncertainty of the results clearly increases. For these reasons only one iLUC value for biofuels will be calculated altogether.

7. Conclusion

That biomass represents one of the most important components for climate protection policy in Europe and the rest of the world is documented. Thus the discussion of iLUC is of importance far beyond the biofuels sector. For this reason regulations with regard to iLUC should start with the causes of the problem of land use changes. Therefore two applications for amendment of the Fuel Quality Directive and the EU Renewable Energies Directive are described that have this aim.

The proposals described here contain both sanctions against the expansion of agricultural areas attributable to biofuels as well as the inclusion of estimated emissions from land use changes into the GHG reporting for monitoring and prevention of iLUC through biofuels. The two interacting proposals make it possible to improve the sustainability of biofuels and liquid bioenergy both directly and indirectly. On the one hand, a contribution is made toward better regional protection of areas high in carbon (such as rain forests) and, on the other hand, better documentation of greenhouse gas saving through including emissions from indirect changes in land use.

The proposals are meanwhile the subject of consultation in the European Parliament. This paper presents the merits and demerits of the proposals and justifies them as an alternative to the proposals introduced by the Commission.

In terms of any assessment employing the past iLUC models it becomes clear that a legally tenable regulatory approach is represented by the combination of a regulation that links quota acceptance to minimum LUC standards in the respective manufacturing countries and a regulation that incorporates a global ex post iLUC value into the reporting of the Member States with regard to biofuels.

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Annex A

Amendment
Proposal for a directive
Recital 6 a (new)

Text proposed by the Commission	*Amendment*
	(6 a new) It cannot be ruled out that after the change of land use the obligation for the inclusion of emissions from carbon stock changes into the calculation of greenhouse gas emissions of biofuels can be circumvented: the resources used for biofuel production could be produced on land which was formerly used for purposes such as food production, while the latter raw materials are now produced on new land with high carbon stock. Regionally (country or region), it is possible to completely cover past land use changes (LUC) legally compliant with comparably high precision. LUC can lead to increased greenhouse gas emissions, which can be precisely calculated in a legally compliant manner as well. Through a defined method, these emissions can again be proportionally assigned to the regionally produced biofuel types. Such calculations demonstrate that biofuels from Indonesia, Malaysia or Brazil feature very high LUC emissions, which partially even clearly exceed the emissions of fossil fuels. Therefore, biofuels from these countries cannot be regarded as sustainably produced. For this reason they should not be recognized for the fulfillment of quotas anymore in the future. Because more than 50% of the LUC emissions (IFPRI) originate from the mentioned

countries (according to a more recent study even almost 75% [JRC]), the regulatory goal pursued by the Commission could be reached by comparably simple measures via using this regulatory approach. A limitation of regional LUC emissions starting with 35% of fossil fuels (30 g CO2eq / MJ) and 2018 further reduced to 20% (17 g CO2eq / MJ) would reduce the LUC emissions by even far more than 75%. Because of its high importance concerning the avoidance of greenhouse gas emission from the release of big carbon stocks through land use changes (in particular carbon-rich natural forests and peat lands), an exclusion of biofuels from regions with LUC emissions above the mentioned limit is justified and valid in accordance with articles 2.1 and 2.2 of the WTO Agreement on Technical Barriers to Trade (TBT- Agreement).

Amendment
Proposal for a directive
Article 1 – point 2 – point c (new)
Directive 98/70/EC
Article 7b – paragraph 4 (new)

Text proposed by the Commission	*Amendment*
	(c) the following subparagraph is inserted after the first subparagraph:
	"Biofuels from countries or regions in which emissions from land-use changes amount to more than 35% of the emissions of fossil fuels (30 g CO2eq / MJ) calculated for the whole country or region in accordance with point 7 a of

part C of Annex IV shall not be taken into account for the purposes referred to in paragraph 1, (from January 1st 2018 onwards a 20% greenhouse gas saving is binding). The Commission determines annually the country or regional greenhouse gas emissions in accordance with annex IV part C paragraph 7a."

Justification

In the future, biofuels should not be counted into the quota anymore if in their country of origin the emissions solely from land use changes are higher than 35% (from January 1st 2018 on lowered to 20%) of the emissions of fossil fuels (more than 30 or 17 g CO2eq / MJ). In this way the sustainability of the biofuels used in Europe is secured and important stimuli to improve the protection of precious carbon-rich land are provided.

Amendment
Proposal for a directive
Annex 1 – point 1 – point c (new)
Directive 98/70/EC
Annex IV part C – point 7 a (new)

Text proposed by the Commission	*Amendment*
	(ca) the following point 7 a is inserted after point 7:
	"7a. The annualized emissions through carbon stock changes as a result of land use changes (LUC) of a region (El(r)) are calculated as follows:
	$E_{l(r)}$ = regional emissions caused by carbon stock changes:
	$E_{l(r)} = (CS_{Rr} – CS_{Ar}) \times LUC_{regional} \times 3{,}664 \times 1/20$,
	here are:
	CS_{Rr} = The former carbon stock per unit of area (measured as mass of carbon per unit of area, including soil and

vegetation) of the entire region's newly used area in the year preceding the year of biofuel production.

CS_{Ar} = The carbon stock per unit of area connected to the new land use (measured as mass of carbon per unit of area, including soil and vegetation). If the carbon stock accumulates for more than a year, CS_{Ar} will be regarded as the estimated carbon stock per unit of area after 20 years or on the date of the plants' maturity, depending on which point in time is earlier.

$LUC_{regional}$ = Regional land use change in the year preceding the year of biofuel production (reference year) (estimated as area units (ha))

The assignment of the emissions to the produced biofuels is calculated as follows:

e_{lr} = regional emissions through carbon stock changes for produced biofuels:

$e_{lr} = E_{l(r)} / A \times 1 / P$

here are:

A= arable land and permanent crop land of the region in the reference year

P= Crop productivity (specified as energy of biofuel per unit of area and year)

The limit of 35% (or 20%) of the comparable value for fossil fuels (30 or 17 g CO2eq / MJ) is complied if the sum of the last 20 years' e_{lr} does not exceed this value. In the case of incomplete time series, the most recent e_{lr} value is counted repeatedly until 20 is reached. The starting year of the time series is 2008.

From 2014 onwards, the time series is allowed to be started with 2009, from 2015 on with 2010 and from 2016 on with 2011."

Justification

The method for the calculation of regional greenhouse gas emissions (7a) is following the method for the calculation of emissions from carbon stock changes in accordance with annex IV part C no. 7.

Amendment
Proposal for a directive
Article 2 – point 5 – point a c (new)
Directive 2009/28/EC
Article 17 – paragraph 4 (new)

Text proposed by the Commission	*Amendment*
	(ac) the following subparagraph is inserted after the first subparagraph:
	"Biofuels and bioliquids from countries or regions in which emissions from land-use changes amount to more than 35% of the emissions of fossil fuels (30 g CO2eq / MJ) calculated for the whole country or region in accordance with point 7 a of part C of Annex V shall not be taken into account for the purposes referred to in paragraph 1, (from January 1st 2018 onwards a 20% greenhouse gas saving is binding). The Commission determines annually the country or regional greenhouse gas emissions in accordance with annex V part C paragraph 7a."

Justification

In the future, biofuels and bioliquids should not be counted into the quota anymore if in their country of origin the emissions solely from land use changes are higher than 35% (from January 1st 2018 on lowered to 20%) of the emissions of fossil fuels (more than 30 or 17 g CO2eq / MJ). In this way the sustainability of the biofuels used in Europe is secured and important stimuli to improve the protection of precious carbon-rich land are provided.

Amendment
Proposal for a directive
Annex 2 – point 1 – point c (new)
Directive 2009/28/EC
Annex V part C – point 7 a (new)

Text proposed by the Commission	*Amendment*
	(ca) the following point 7 a is inserted after point 7:
	"7a. The annualized emissions through carbon stock changes as a result of land use changes (LUC) of a region (El(r)) are calculated as follows:
	$E_{l(r)}$ = regional emissions caused by carbon stock changes:
	$E_{l(r)} = (CS_{Rr} – CS_{Ar}) \times LUC_{regiona} \times 3{,}664 \times 1/20$,
	where
	CS_{Rr} = The former carbon stock per unit of area (measured as mass of carbon per unit of area, including soil and vegetation) of the entire region's newly used area in the year preceding the year of biofuel production.
	CS_{Ar} = The carbon stock per unit of area connected to the new land use (measured as mass of carbon per unit of area,

including soil and vegetation). If the carbon stock accumulates for more than a year, CS_{Ar} will be regarded as the estimated carbon stock per unit of area after 20 years or on the date of the plants' maturity, depending on which point in time is earlier.

$LUC_{regional}$ = Regional land use change in the year preceding the year of biofuel production (reference year) (estimated as area units (ha))

The assignment of the emissions to the produced biofuels is calculated as follows:

e_{lr} = regional emissions through carbon stock changes for produced biofuels:

$e_{lr} = E_{l(r)} / A \times 1 / P$

where

A= arable and permanent crop land of the region in the reference year

P= Crop productivity (specified as energy of biofuel per unit of area and year)

The limit of 35% (or 20%) of the comparable value for fossil fuels (30 or 17 g CO2eq / MJ) is complied if the sum of the last 20 years' e_{lr} does not exceed this value. In the case of incomplete time series, the most recent e_{lr} value is counted repeatedly until 20 is reached. The starting year of the time series is 2008. From 2014 onwards, the time series is allowed to be started with 2009, from 2015 on with 2010 and from 2016 on with 2011."

Justification

The method for the calculation of regional greenhouse gas emissions (7a) is following the method for the calculation of emissions from carbon stock changes in accordance with annex V part C no. 7.

Annex B

Amendment

Proposal for a directive
Article 1- point 3 – point a
Directive 98/70/EC
Article 7d

Text proposed by the commission	*Amendment*
3. Article 7d is amended as follows:	**3. Article 7d is amended as follows:**
(a) paragraphs 3 to 6 are replaced by the following:	**(a) paragraphs 3 to 6 are replaced by the following:**
'3. The typical greenhouse gas emissions from cultivation of agricultural raw materials in the reports referred to in Article 7d(2) in the case of Member States, and in reports equivalent to those in the case of territories outside the Union, may be submitted to the Commission.'	**'3. The typical greenhouse gas emissions from cultivation of agricultural raw materials in the reports referred to in Article 7d(2) in the case of Member States, and in reports equivalent to those in the case of territories outside the Union, may be submitted to the Commission.'**
'4. The Commission may decide, by means of an implementing act adopted in accordance with advisory procedure referred to in Article 11(3), that the reports referred to in paragraph 3 contain accurate data for the purposes of measuring the greenhouse gas emissions associated with the cultivation of biofuel feedstocks typically produced in those areas for the purposes of Article 7b(2). '	**'4. The Commission may decide, by means of an implementing act adopted in accordance with advisory procedure referred to in Article 11(3), that the reports referred to in paragraph 3 contain accurate data for the purposes of measuring the greenhouse gas emissions associated with the cultivation of biofuel feed stocks typically produced in those areas for the purposes of Article 7b(2). '**
'5. By 31 December 2012 at the latest and every two years thereafter, the Commission shall draw up a report on the estimated typical and default values in Parts B and E of Annex IV, paying special attention to greenhouse gas emissions from transport and processing. **The Commission shall be empowered to adopt delegated acts pursuant to Article 10a concerning the correction of the estimated typical and default values in Parts B and E of Annex IV.'**	**'5. By 31 December 2012 at the latest and every two years thereafter, the Commission shall draw up a report on the estimated typical and default values in Parts B and E of Annex IV, paying special attention to greenhouse gas emissions from transport and processing.** **The Commission shall be empowered to adopt delegated acts pursuant to Article 10a concerning the correction of the estimated typical and default values in Parts B and E of Annex IV.'**

'6. The Commission shall be empowered to adopt delegated acts pursuant to Article 10a concerning the adaptation to technical and scientific progress of Annex V, including by the revision of the proposed crop group indirect land-use change values; the introduction of new values at further levels of disaggregation; the inclusion of additional values should new biofuel feedstocks come to market as appropriate, review the categories of which biofuels are assigned zero indirect land-use change emissions; and the development of factors for feedstocks from non-food cellulosic and ligno-cellulosic materials.'	**'6. The Commission shall be empowered to adopt delegated acts pursuant to Article 10(a) concerning the adaptation to technical and scientific progress of Annex V, the *establishment* of indirect land-use change values *for each legal year according to Annex V*; the introduction of new values at further levels of disaggregation (i.e. at a feedstock level); the inclusion of additional values should new biofuel feedstock come to market as appropriate; and the development of factors for feed stocks from non-food cellulosic and ligno-cellulosic materials.'**

Justification

Annual establishment of the indirect land-use change emissions values.

Amendment

Proposal for a directive
Article 2- point 7 – point c
Directive 2009/28/EC
Article 19 – paragraph 6

Text proposed by the commission	*Amendment*
(c) paragraph 6 is replaced by the following:	**(c) paragraph 6 is replaced by the following:**
'The Commission shall be empowered to adopt delegated acts pursuant to Article 25(b) concerning the adaptation to technical and scientific progress of Annex VIII, including the revision of the proposed crop group indirect land-use change values; the introduction of new values at further levels of disaggregation (i.e. at a feedstock level); the inclusion of additional values should new biofuel feedstocks come to market as appropriate; and the development of factors for feedstocks from non-food cellulosic and ligno-cellulosic materials.'	**'The Commission shall be empowered to adopt delegated acts pursuant to Article 25(b) concerning the adaptation to technical and scientific progress of Annex VIII, the *establishment* of the indirect land-use change values *for each legal year according to Annex VIII*; the introduction of new values at further levels of disaggregation (i.e. at a feedstock level); the inclusion of additional values should new biofuel feed stocks come to market as appropriate; and the development of factors for feed stocks from non-food cellulosic and ligno-cellulosic materials.'**

Justification

Annual establishment of the indirect land-use change values.

Amendment

Proposal for a directive
Annex I point 2
Directive 98/70/EC
Annex V

Text proposed by the commission	*Amendment*
(2) The following Annex V is added:	**(2) The following Annex V is added:**
"Annex V	**"Annex V**
Part A. Estimated indirect land-use change emissions from biofuels and bioliquid feedstocks	**Part A. Estimated indirect land-use change emissions from biofuels and bioliquid feedstocks**

Feedstock group	**Estimated indirect land-use change emissions (gCO_{2eq}/MJ)**
Cereals and other starch rich crops	**12**
Sugars	**13**
Oil crops	**55**

Biofuels produced by conversion of vegetable starches, sugars and/or fatty acids from cultivation will be considered to have estimated indirect land-use change emissions which shall be established by the Commission for each legal year.

For the estimation of indirect land-use change emissions the following rules shall be applied:

For the estimation of gross annual emissions from carbon stock changes caused by indirect land-use change, $E_{gross\ iluc\ global}$, the following rule shall be applied:

$$E_{gross\ iluc\ global} = (LUC_{global} - \sum dLUC) \times ((CS_{RW} - CS_{AW}) \times 3{,}664)$$

where

LUC_{global} = Global land use change in the year preceding the year of biofuel production (reference year) (estimated as area units (ha));

$\sum dLUC_{global}$ = Accumulated global direct land use changes for biofuel production in the preceding year (estimated as area units (ha));

CS_{RW} = the previous carbon stock (estimated as mass (tons)) of carbon, including both soil and vegetation) of in the preceding year new cultivated areas in the world.

CS_{AW} = the actual carbon stock (measured as mass (tons) of carbon, including both soil and vegetation) of in the preceding year new cultivated areas in the world. In cases where the carbon stock accumulates over more than one year, the value attributed to CS_{AW} shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier;

For the calculation of net annual emissions from carbon stock changes caused by indirect land-use change, $E_{net\ iluc\ global}$, the following rule shall be applied:

$$E_{net\ iluc\ global} = E_{gross\ iluc\ global} - (20\% \times E_{gross\ iluc\ global})$$

where

$E_{net\ iluc\ global}$ = annual greenhouse gas emissions from carbon stock change due to indirect land-use change (estimated as mass (tons) of CO_2-equivalent), reduced by 20% discount compensating uncertainties of estimates;

For the estimation of the indirect land-use change emissions per unit biofuel energy the following rule shall be applied:

$$e_{iluc} = ((FS_{biofuels} \times E_{net\ iluc\ global}) / En_{biofuel\ global}) \times 1000$$

where

$FS_{biofuels}$ = Share of feed stocks (vegetable starches, sugars and/or fatty acids from cultivation estimated as mass (tons)) converted to biofuels in the preceding year

	divided by global vegetable crops from cultivation (estimated as mass (tons)) produced in the year preceding the reference year;
	$En_{biofuels}$ = Energy content (estimated as energy content (gigajoule) determined by lower heating value) of global biofuel production in the preceding year.
	1000 = conversion factor t/GJ to g/MJ
Part B. Biofuels for which the estimated indirect land-use change emissions are considered to be zero	**Part B. Biofuels for which the estimated indirect land-use change emissions are considered to be zero**
Biofuels produced from the following feedstock categories will be considered to have estimated indirect land-use change emissions of zero:	**Biofuels produced from the following feedstock categories will be considered to have estimated indirect land-use change emissions of zero:**
a) feedstocks which are not included under Part A of this Annex.	**a) feed stocks which are not included under Part A of this Annex *and feed stocks included under Part A of this Annex for which estimated indirect land-use change emissions are not established for the reference year*.**
b) feedstocks whose production has led to direct land-use change, i.e. a change from one of the following IPCC land cover categories; forest land, grassland, wetlands, settlements, or other land, to cropland or perennial cropland[1]. In such a case a "direct land-use change emission value (el) should have been calculated in accordance to Part C, paragraph 7 of Annex IV."	**b) feed stocks whose production has led to direct land-use change, i.e. a change from one of the following IPCC land cover categories; forest land, grassland, wetlands, settlements, or other land, to cropland or perennial cropland[1]. In such a case a "direct land-use change emission value (el) should have been calculated in accordance to Part C, paragraph 7 of Annex IV."**
OJ L 273, 10.10.2002, p. 1	**OJ L 273, 10.10.2002, p. 1**

Justification

Introduction of a methodology corresponding to the methodology included in Annex IV part C paragraph 7 for estimating emissions caused by indirect land-use change on the basis of feed stocks consumed for production of biofuels.

Amendment

Proposal for a directive
Annex II point 2
Directive 2009/28/EC
Annex VIII

Text proposed by the commission	*Amendment*
(2) The following Annex VIII is added:	**(2) The following Annex VIII is added:**
"Annex VIII	**"Annex VIII**
Part A. Estimated indirect land-use change emissions from biofuels and bioliquid feedstocks	**Part A. Estimated indirect land-use change emissions from biofuels and bioliquid feedstocks**

Feedstock group	**Estimated indirect land-use change emissions (gCO2eq/MJ)**
Cereals and other starch rich crops	**12**
Sugars	**13**
Oil crops	**55**

Biofuels and bioliquids produced by conversion of vegetable starches, sugars and/or fatty acids from cultivation will be considered to have estimated indirect land-use change emissions which shall be established by the Commission for each legal year.

For the estimation of indirect land-use change emissions the following rules shall be applied:

For the estimation of gross annual emissions from carbon stock changes caused by indirect land-use change, $E_{gross\ iluc\ global}$, the following rule shall be applied:

$$E_{gross\ iluc\ global} = (LUC_{global} - \sum dLUC) \times ((CS_{RW} - CS_{AW}) \times 3{,}664)$$

where

LUC_{global} = Global land use change in the year preceding the year of biofuel production (reference year) (estimated as area units (ha));

$\sum dLUC_{global}$ = Accumulated global direct land use changes for biofuel production in the preceding year (estimated as area units

(ha));

CS_{RW} = the previous carbon stock (estimated as mass (tons)) of carbon, including both soil and vegetation) of in the preceding year new cultivated areas in the world.

CS_{AW} = the actual carbon stock (measured as mass (tons) of carbon, including both soil and vegetation) of in the preceding year new cultivated areas in the world. In cases where the carbon stock accumulates over more than one year, the value attributed to CS_{AW} shall be the estimated stock per unit area after 20 years or when the crop reaches maturity, whichever the earlier;

For the calculation of net annual emissions from carbon stock changes caused by indirect land-use change, $E_{net\ iluc\ global}$, the following rule shall be applied:

$$E_{net\ iluc\ global} = E_{gross\ iluc\ global} - (20\% \times E_{gross\ iluc\ global})$$

where

$E_{net\ iluc\ global}$ = annual greenhouse gas emissions from carbon stock change due to indirect land-use change (estimated as mass (tons) of CO_2-equivalent), reduced by 20% discount compensating uncertainties of estimates;

For the estimation of the indirect land-use change emissions per unit biofuel energy the following rule shall be applied:

$$e_{iluc} = ((FS_{biofuels} \times E_{net\ iluc\ global}) / En_{biofuel\ global}) \times 1000$$

where

$FS_{biofuels}$ = Share of feed stocks (vegetable starches, sugars and/or fatty acids from cultivation estimated as mass (tons))

	converted to biofuels in the preceding year divided by global vegetable crops from cultivation (estimated as mass (tons)) produced in the year preceding the reference year;
	$En_{biofuels}$ = Energy content (estimated as energy content (gigajoule) determined by lower heating value) of global biofuel production in the preceding year.
	1000 = conversion factor t/GJ to g/MJ
Part B. Biofuels and bioliquids for which the estimated indirect land-use change emissions are considered to be zero	**Part B. Biofuels and bioliqiuds for which the estimated indirect land-use change emissions are considered to be zero**
Biofuels produced from the following feedstock categories will be considered to have estimated indirect land-use change emissions of zero:	**Biofuels and bioliquids produced from the following feedstock categories will be considered to have estimated indirect land-use change emissions of zero:**
a) feedstocks which are not included under Part A of this Annex.	**a) feed stocks which are not included under Part A of this Annex *and feed stocks included under Part A of this Annex for which estimated indirect land-use change emissions are not established for the reference year*.**
b) feedstocks whose production has led to direct land-use change, i.e. a change from one of the following IPCC land cover categories; forest land, grassland, wetlands, settlements, or other land, to cropland or perennial cropland[1]. In such a case a "direct land-use change emission value (el) should have been calculated in accordance to Part C, paragraph 7 of Annex V."	**b) feed stocks whose production has led to direct land-use change, i.e. a change from one of the following IPCC land cover categories; forest land, grassland, wetlands, settlements, or other land, to cropland or perennial cropland[1]. In such a case a "direct land-use change emission value (el) should have been calculated in accordance to Part C, paragraph 7 of Annex V."**
_____	**_____**
OJ L 273, 10.10.2002, p. 1	**OJ L 273, 10.10.2002, p. 1**

Justification

Introduction of a methodology corresponding to the methodology included in Annex V paragraph 7 for estimating emissions caused by indirect land-use change on the basis of feed stocks consumed for production of biofuels.