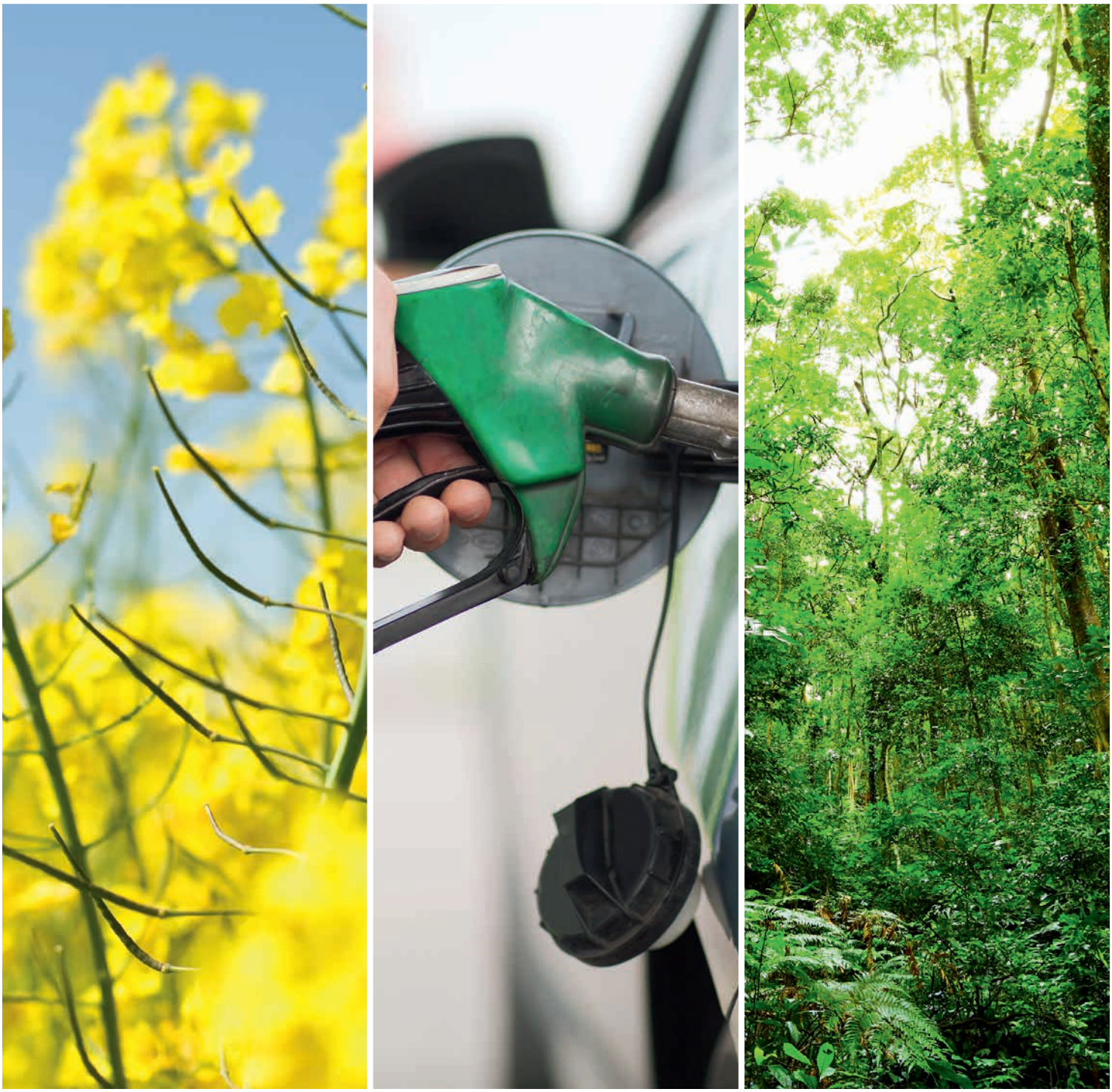

# "indirect Land Use Change" (iLUC)

## A critical inventory for objective political decision-making.

A contribution from Prof. Dr. habil. Uwe Lahl
– published in ReSource (4/2013) –

# Proposal rejected

## The EU Commission has failed in the first round with its biofuel legislation on "indirect Land Use Change" (iLUC)

By Uwe Lahl

**Prof. Dr. habil. Uwe Lahl**
at the Technical University of Darmstadt (Technische Universität Darmstadt), specialising in material-flow management and resource management, and at the Technical Faculty of the University of Indonesia, specialising in Environmental Engineering.

With this article, advice is offered for the second round of legislation on the complex of "Land Use Change" (LUC). It will be shown how the European Commission has derived factors for EU legislation for indirect land use change (so-called iLUC) using econometric model calculations. These factors do not possess adequate legal certainty and would make no contribution to solving the problem of world-wide land use change if they were to be introduced. Current legislation has not offered an adequate approach for providing a solution to the problem of land use change. It is therefore recommended that the Council and the European Parliament should task the Commission once again with developing a proposal for constructive regulations. This article will point out the aspects which must be fulfilled by any new regulatory proposals. In this respect, reference will be made to the fundamental principle of Good Governance. And it will be shown how, by means of regionally orientated regulations, the environmental policy pledges on "Nationally Appropriate Mitigation Actions" (NAMAs) and "Reduction of Emissions from Deforestation and Degradation" (REDD+) could be supported in the relevant countries.

### Key words:

Arable land, biofuels, fallow land, crop area, climate protection measures, climate protection targets, Land Use Change, Renewable Energy Directive, pledges

## 1 Backround

In order to achieve the EU climate protection targets in the transport sector, the member states in accordance with the Renewable Energy Directive (2009/28/EC) (RED) must ensure that the renewable energy quota in each country's national transport sector increases in defined steps and that it represents at least 10 per cent of the final energy consumption by 2020.
Also, in accordance with the Fuel Quality Directive (98/70/EC) (FQD), the greenhouse gas contribution from fuels used in road traffic and for mobile machines and equipment must be reduced by 6 per cent by 2020 (GHG quota). "The addition of biofuels is one method available to member states to achieve these targets and will probably make the greatest contribution", according to the EU Commission [1].

As the existing legal situation stands, this growing demand, which will increase in defined steps until 2020, will be covered mainly by biofuels **of the 1st Generation**, i.e. biofuels from agricultural biomass. As a result, there will be an increasing demand for agricultural products. An increased demand for agricultural products can be covered by, for example, increasing the area of agricultural land. These agricultural land areas can again be acquired, for example, by the conversion of forests (Land Use Change, LUC). In this case, the conversion can come about as the **direct** consequence of the increased demand (dLUC) or the **indirect** consequence via a more or less long causal chain (iLUC). If the original land had a higher carbon stock than the resulting agricultural land – which is frequently the case when forest, for example, is con-

verted into arable land – then this loss of carbon stock must be understood as greenhouse gas emissions (GHG). These emissions would then need to be added in to the climate protection contribution of biofuels as a GHG mortgage, therefore subtracted from the GHG savings that result from the elimination of fossil fuels (to the extent that is to be attributed to the increased demand).

What appears obvious on a basic level is transformed into a conglomerate of difficult questions on the regulatory level. In 2008, as part of the most recent legislation on FQD and RED, the European Commission (the Commission) was given the task of developing a proposal of how this iLUC effect could be incorporated into EU legislation. Here it is necessary to quantify the effect. The general sense of the question which the Commission derived from its legal mandate was: What will be the level of GHG emissions from iLUC 2020 on the basis of the increased demand for biofuels in the EU? With this question, the Commission has burdened itself with a global prognosis, together with all the problems that such "futurology" brings with it. Furthermore, the Commission focussed at a very early stage on having this prognosis carried out with the help of econometric computer models. It has been a long-held tradition in agricultural research to calculate prognoses with the help of econometric computer models. These models have been adapted in the past few years to enable them to perform calculations relating to questions of iLUC [2]. As there is not only one model for such calculations, the Commission has tested several models and chosen the one model that in its opinion is best suited. The Commission then had the corresponding prognosis calculations performed using this model [3]. Table 1 shows the results of the iLUC effect thus found for 2020 for the various biofuels available on the market.

| | **No change in trade regime** | | | **Free trade in biofuels** | | |
|---|---|---|---|---|---|---|
| | Direct savings (improved technology in 2020) | LUC emissions | Net Savings | Direct savings (improved technology in 2020) | LUC emissions | Net Savings |
| **In grams of $CO_2$ equivalent** | | | | | | |
| **Additional mandate** | 57 | **38** | 19 | 59 | **40** | 19 |
| **Bioethanol** | | | | | | |
| Wheat | 57 | **14** | 43 | 57 | **13** | 44 |
| Maize | 58 | **10** | 48 | 58 | **10** | 48 |
| Sugar Beet | 63 | **7** | 56 | 63 | **4** | 59 |
| Sugar Cane | 70 | **13** | 57 | 70 | **17** | 53 |
| **Biodiesel** | | | | | | |
| Palm Fruit | 58 | **54** | 4 | 58 | **55** | 3 |
| Soybean | 45 | **56** | -11 | 45 | **57** | -12 |
| Sunflower | 58 | **52** | 6 | 58 | **53** | 5 |
| Rapeseed | 50 | **54** | -4 | 50 | **55** | -5 |
| **In percentage of GHG savings (with a 90.3 g $CO_2$eq/MJ reference for fossil fuel)** | | | | | | |
| **Additional mandate** | 63 | **42** | 21 | 65 | **44** | 21 |
| **Bioethanol** | | | | | | |
| Wheat | 63 | **16** | 47 | 63 | **14** | 49 |
| Maize | 64 | **11** | 53 | 64 | **11** | 53 |
| Sugar Beet | 70 | **8** | 62 | 70 | **4** | 66 |
| Sugar Cane | 78 | **14** | 64 | 78 | **19** | 59 |
| **Biodiesel** | | | | | | |
| Palm Fruit | 64 | **60** | 4 | 64 | **61** | 3 |
| Soybean | 50 | **62** | -12 | 50 | **63** | -13 |
| Sunflower | 64 | **58** | 6 | 64 | **59** | 5 |
| Rapeseed | 55 | **60** | -5 | 55 | **61** | -6 |

Table 1: Savings of THG from various biofuels (grams of CO2eq per megajoule) [3]

The original plan of the individual Directorate Generals of the Commission was to compulsorily introduce these factors and thus ensure that iLUC emissions would have to be compensated for. However, the Commission was not able to reach unanimous agreement on this plan. The main reason for this were the substantial scientific uncertainties inherent in these model calculations. The authors of the above investigation (Table 1) also explicitly pointed out this situation. However, it must be mentioned in addition that the factors for biodiesel shown in Table 1 would involve a vast loss for the whole industry, which would certainly not have been accepted without complaint by the industry concerned. The Commission could therefore have envisaged that these technical uncertainties would lead to a legal risk with subsequent political rows.

# 2 Introduction of iLUC factors

Finally the Commission agreed in 2012 to a bundle of amendment proposals to FQD and RED in order to reduce the iLUC effect [1]. One proposal in particular was to lower the energy quota [4] for first generation biofuels – although the effectiveness of this proposal is contested. It was furthermore decided to introduce the iLUC factors (i. e. LUC emission) derived from Table 1 for the annual report to the recipients of the regulations.

As these reports are then aggregated into country reports by the member states, the factors would only have an informational significance, which would reduce the legal risks. However, the dispute around compulsory iLUC factors did not end with the Commission's proposal. It continued in the sessions of the European Parliament (EP) [5] and of the Council. The decision process finally collapsed in the December session of the Energy Council, as there was no majority in favour of any regulatory proposal. It will probably not be possible to bring the process to a close until after the European elections in 2015.

The debate on the Commission's proposal (and the EP decision)

has not closed in Germany either and it will be discussed further in the coming two years. It therefore makes sense to look more closely at the preparative work and the premises of the Commission in order to derive solution strategies for the problem of world-wide land use changes.

## 2.1 Premise 1: iLUC can only be reliably assessed using econometric models

The Commission's proposal was based on the assumption that an additional demand for raw materials for biofuel production would be mainly covered by rededicating land areas which had not been used previously for agriculture (LUC). The Commission justifies this premise with past developments [6]. For example, the world-wide area harvested is said to have been considerably expanded [7].

This assumption is unfounded. Correct is that
**a)** the FAO statistics on the world-wide area harvested does not represent the actual land area used for agriculture, and fallow land and abandoned agricultural land are to a large extent **not** taken into consideration for the production of raw material, and
**b)** the increases in yield through increased efficiency are **underestimated.**

**World: Crop land and area harvested**

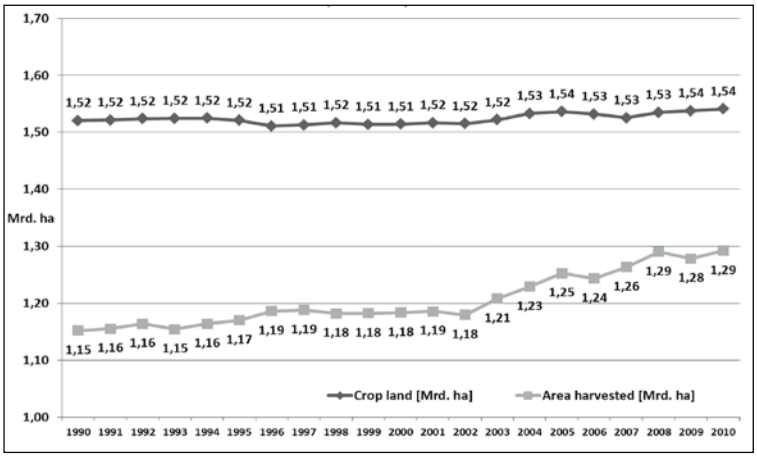


Figure 1: Comparison of the development of the area harvested ("Area Harvested") [11] and the production area ("Crop Land") [12] according to FAO statistics.

**World: Area harvested and crop production**

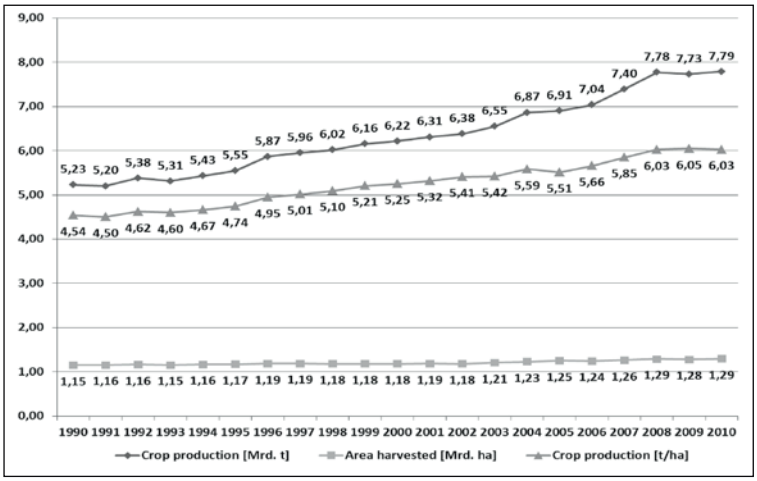


Figure 2: Development of total agricultural production, crop land and yield per hectare according to FAO statistics.

**With regard to a): Area Harvested**

The FAO category "**Area Harvested**" describes the amount of agricultural land calculated as having been harvested in one year. What is estimated is the intensity of land area usage. For example

- a hectare that has been harvested numerous times is counted numerous times (1 physical hectare = 2 or more hectares of "Area Harvested")
- fallow land is not taken into account (1 physical hectare = 0 hectares of "Area Harvested").

The fact that the area harvested has increased in size by 140 million hectares in the past 20 years does **not** mean that the agricultural area has been expanded. But rather, increases in "Area Harvested" are possible through, for example, every repeatedly harvested hectare and through every reactivated hectare of fallow land, without the need to rededicate one additional physical hectare of non-agricultural land [8].

In order to record rededicated land areas not used previously for agriculture (LUC), it would have been appropriate for the Commission to examine the "**Crop Area**" (or also "Crop Land") in the FAO statistics [9]. "Crop Land" includes both "Arable Land" – this is actually used arable land ("multiple-cropped areas are counted only once") and abandoned land ("less than five years") – and so-called "Permanent Crops" [10]. A comparison of these two categories for 2010 shows that the production areas of crop land, at around 1.54 billion hectares, considerably exceed the area harvested, at around 1.29 billion

hectares (Fig. 1). While the expansion of the area harvested amounts to 140 million hectares (19 per cent), the crop land area has remained almost constant over the past 20 years, showing a marginal increase of 20 million hectares (1.3 per cent).
A further 66 million hectares of abandoned land are shown in the FAO statistics [13]. This information is moreover not exhaustive, as abandoned land has not been recorded in all countries. Added to this, the FAO no longer considers land that has been abandoned for more than five years to be "Crop Area". This applies to a large extent, for example, to land in eastern European countries, such as Russia and other countries belonging to the former USSR [14].

**With regard to b): Increased efficiency**

Global plant production has increased by about 50 per cent in the past 20 years. This can be seen in Appendix 2 in the increase of "Crop Production" and the increase in production per hectare "Crop Production [t/ha]" derived from this. The area harvested increased by 12 per cent, while the yield per hectare increased by 33 per cent and the total production in the same period increased by 50 per cent. Consequently, the increased demand was mainly covered by the fact that plant production has been intensified. The fallow land potential was not used for this and is still high.
If one follows the premises as explained by the Commission [6, 9], it is to be understood that the factors for production increase through increased efficiency, including "multiple cropping", have been set at a relatively low level (0.15 to 0.20) in many models. And if one includes the fact that frequently the option "Use of Fallow Land" in a few models is not, or not adequately taken into consideration, this explains the comparatively high iLUC values in some studies and the uncertainty associated with the model calculations. Fig. 3 shows the extent to which the investigation results vary between the different model calculations. Authors who allow for production increases in their models only through the expansion of land area achieve iLUC values that are so high that biofuels cause higher emissions than do fossil fuels. In the investigations that were drawn upon for the comparison in Fig. 3, the iLUC effect for ethanol was forecast by the legislature in the USA. Similarly high variations were found for the EU biofuel policies [15]. And calculation results have very recently been published under the leadership of the Potsdam Institute for Climate Research (PIK). The ten leading econometric agricultural models were compared with one another. The LUC results for scenarios with and without climate protection policies were calculated (RCP 2.6, RCP 8.5). The range of the results (with harmonised data input) was around -50 to more than +400 and, without climate protection policies, around +50 to more than +600 million hectares. The authors come to the conclusion that there is an apparent need for validation of the results [16].
The interim conclusion is that the models forecast the various options for covering the demand on the biofuels industry for 2020 very differently. Out of this, there are basic scientific doubts in this respect as to whether calculations for the future can be made

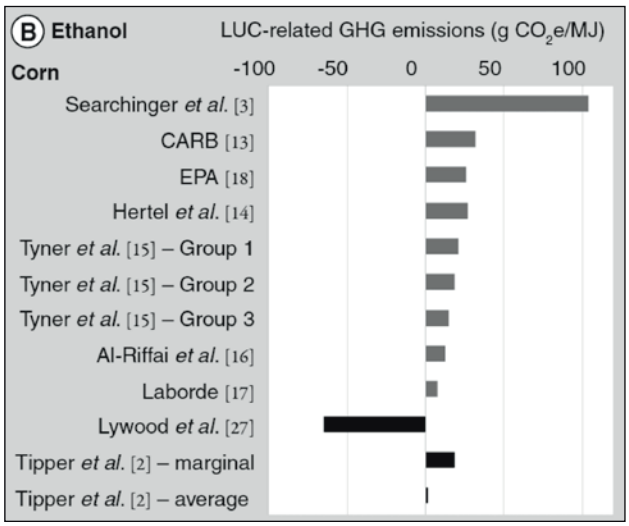


Figure 3: Overview of greenhouse gas emissions due to direct and indirect land-use changes for first-generation biofuels, based on literature and references of an allocation period of 30 years. The grey bars refer to theoretical market equilibrium models, and the black bars refer to allocation models [16].

with sufficient legal certainty regarding the extent to which an increasing demand can be covered by expanding agricultural areas, increasing agricultural efficiency or by making fallow land usable again. Thus, more than 50 million hectares of agricultural land lie fallow in eastern Europe. The most important obstacles to making these land areas usable are generally to be found in the governance (control and management structures) of the respective countries which discourage or prevent investors from getting involved. Political changes, as have been negotiated between the EU and the Ukraine (free trade and association agreements [17]), are able to change this situation in a relatively short time. With this agreement, the legal situation in the Ukraine would be brought closer to that in Europe, for example. Thus, after signing the agreement, up to 80 per cent of the "Acquis Communautaire" of the EU, i.e. the EU legislation, would be adopted within ten years. With this, the situation in agriculture in the Ukraine, for example, would change considerably. If the agreement is not signed, then the country will develop further, but probably less dynamically. Which model can be used to calculate which forces will prevail in the Ukraine? For predicting such political decisions, all models will fail, unless one were to calculate different political scenarios.

## 2.2 Premise 2: LUC = iLUC

**Most models are not able to calculate iLUC.** This surprising statement also explicitly applies to the investigation which the Commission drew upon as being the most powerful model for its legislation proposal [3]. The models are only able to calculate results for LUC (i.e. dLUC + iLUC). But can this summed value be equated to iLUC?

In discussions with the Commission, this equation is justified by the assumption that dLUC will approach zero by 2020. This premise could be correct, but it is not certain. It is therefore unclear as to whether certification systems such as RSPO [18], or the country-specific systems such as ISPO [19] and MSPO [20], will lead to the necessity to include direct land use change in the certificates.

Legally it would therefore appear to be unjustifiable to continue to speak of **iLUC factors**. The Commission's approach of using LUC factors as iLUC factors could be challenged in the event of legal proceedings. It can thus be pointed out that the Commission itself, based on the recently established waiver of its iLUC regulation in the case of a reported dLUC emission (Appendix V and Appendix VII [1]), would assume a case of dLUC. As availing oneself of this regulation certainly brings advantages in a large number of cases – for example, the conversion of degraded land or pasture land into plantations, as the dLUC value is negative (carbon sink) – the argument that these cases can theoretically occur but will be insignificant in terms of numbers also seems questionable.

If one were to lower the bar here, then one could subscribe to the second premise of the Commission with the argument that iLUC will probably occupy a higher proportion of LUC than dLUC in 2020. It is even not unlikely that this proportion will be considerably higher. In this way, one comes very close to the premise iLUC = LUC; but this has nothing to do with exact science. And one would also have to permit the question: why go to the great effort of employing econometric models, justified by the iLUC theory (premise 1), to then finally land at the relatively trivial LUC?

And if in the end one accepts LUC values as the basis for iLUC legislation, why must these values be generated using econometric models? As, if the Commission's factors are not iLUC, but strictly speaking LUC factors, then other methods could also be drawn upon to determine the LUC factors! LUC is a phenomenon that can be "measured" quickly and directly in every country in the world without complex mathematical models. If premise 1 ceases to apply, a door would be opened for other regulatory approaches at the LUC level which would start with the practices in the respective countries and use in each case the current land use data of the relevant agricultural countries on the biofuel market. Do these numbers exist? Yes! Within the framework of the UNFCC, annual reports on GHG emissions are produced and published promptly for all Annex I states, and lately also independently checked. The net LUC numbers are contained in these reports. If there are shortcomings or deficits, further sources of information are available, also for the non-Annex I countries (FAO, US DoA, satellite image analyses).

## 2.3 Premise 3: No success with climate protection policies

Around 70 per cent of the LUC effect in Table 1 is attributable to land use changes in Brazil, Malaysia and Indonesia; one third of the LUC effect through land expansion in peatlands in Indonesia alone. This estimate, which was carried out by the author in 2010 [3], was theoretically possible at that time, however the legal and actual situation in these countries has changed in the meanwhile – essentially because of international climate protection policies. Thus, in Indonesia, the conversion of peatlands into palm oil plantations is today no longer allowed, and expansion in rain forests is now also no longer possible. In Indonesia in 2011, a moratorium on the issue of new permits for the conversion of rain forest for, among other things, palm oil production was enacted [21]. And the government, following recent resolutions regarding their NAMAs [22] and REDD+ [23], has entered into a far-reaching commitment towards the international community to reduce greenhouse gas emissions (minus 26 per cent by 2020 [24]. This pledge, which lines up with the pledges of other nations, can only be achieved if the pledges determined in the moratorium are also permanently adhered to. Thus, the changed land use policies alone will need to contribute 88 per cent of the stated reduction of the country's NAMAs (672 million tons of CO2equ.)

Ambitious climate and LUC decisions have been taken also in Malaysia, and the situation in Brazil has also improved over the past years. This is demonstrated in Fig. 4 based on the example of the clearing of rain forests in the various federal states of the Amazon region.

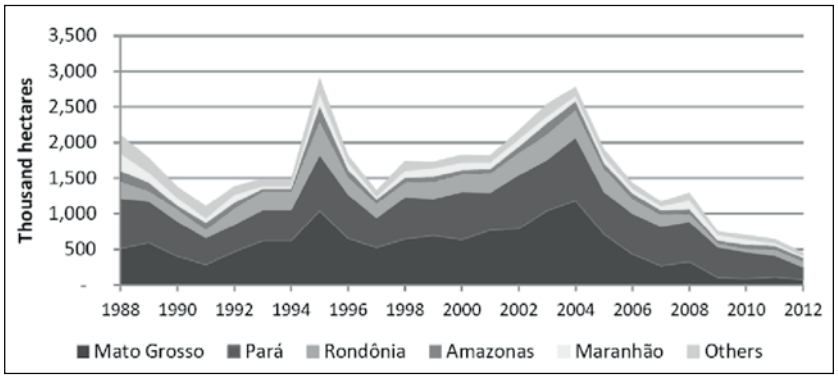


Figure 4: Annual deforestation within the Brazilian Amazon region (Amazônia Legal) by federal states. Diagram from [25], according to data from INPE 2013 [26].

This route of climate policy pledges, which has also been taken by other countries, and the associated improvements in the protection of carbon-rich areas, are not free from contradiction. Protests in these countries are directed against the climate protection policies that have been chosen, not only by the big landowners and palm-oil barons. And the fundamentally positive regulations in Brazil,

Malaysia and Indonesia are still in the process of implementation, and in addition contain a large number of exceptions, inadequacies and loopholes. And it is particularly open as to whether these countries will have the strength to continue permanently on this route. Although it currently looks on the whole positive on paper in the countries mentioned, but elections, for example, can change the situation, and not always for the better. And only when these programmes have been implemented at the various levels of state will the proverbial vow be taken.

So there are certainly good reasons to also consider a negative scenario possible. Does this justify ignoring the positive approaches that have been described when calculating LUC factors? The factors presented by the Commission do not take a possible positive development into consideration in the countries mentioned [24]. If the LUC calculations were to be performed again with the same model, but with **today's** political decisions, then other iLUC-factors would emerge. Is it serious to acknowledge the pledges made at international climate protection conferences by, for example, Indonesia as being outstanding, to stabilise the development with large sums of money from Germany, and at the same time wanting to enact regulations for biofuels that do **not** take these developments into account?

One argument for justifying the premise (of no political success) runs: if LUC in Country A is no longer possible, then it will just happen in Country B; this is forced by the market or the model. But with this argument, the Commission's proposal is wholly discredited. For an exact result, it cannot be unimportant where LUC takes place. And in what other country should peatlands be converted on such a large scale (30 per cent of the increased land requirement used for palm oil plantations) if Indonesia no longer allows this?

The only conclusion that can be drawn from this new development in Malaysia, Indonesia and Brazil is to consider the above calculations in Table 1 in reality to be out of date and to replace them with new calculations. However, this then opens up a dilemma: Which developments in the countries mentioned should be assumed with regard to LUC? It would be equally wrong to replace the negative premises in today's models with a positive premise (all pledges are fulfilled). For this, the risks are too great as to whether the climate protection policies described are really sustainable and can be pushed through and implemented by 2020.

At this point there is one further argument that needs to be analysed: "The negative premise (premise 3) in today's models lies on the safe side from a climate protection viewpoint (conservative approach), and if things improve in the future, that will please us". One can make this argument from the viewpoint of non-governmental organisations (NGOs). A legislator will not be able to do this. A legislator will or should not support a regulation which puts a whole industry at risk and which is conservative only because it based on the worst-possible future (premise 3). The legislator has an obligation to record and calculate the LUC reality as best as possible.

But how? Will the legal situation in Indonesia, for example, be improved or weakened by 2020? Will the regulations introduced in Malaysia and Brazil be kept in place? Will an association agreement be entered into with the Ukraine? Allowing various scenarios will most likely be unavoidable, which will then not result in just one LUC factor. This procedure would provide the most serious prognosis scientifically but is unsuitable for achieving practical regulations, as legislation with various factors would not be possible.

## 2.4 Conclusion on iLUC factors

The above remarks concerning the models make it clear that the increased demand for agricultural products in the past has been achieved substantially through an increase in efficiency of agricultural production. If one compares the increases in potential achieved in the various regions of the world, then the efficiency potential is nowhere near exhausted. And then there are also large areas of fallow land available which can be returned to agricultural use. LUC at the expense of carbon-rich land is therefore not an inevitable consequence in the sense of a mathematical operation in an econometric model, but just one of several possible options.

What will the future for EU biofuel demand look like by 2020? Will the efficiency path remain the dominating path or will a substantial expansion of world agricultural land also take place? And if so, will it be more to the disadvantage of the tropical rain forests, or will fallow land in eastern Europe be put to use once again?

What we can say with certainty is: The econometric models existing today will not be able to calculate prognoses with sufficient certainty in these contexts. Must we therefore forego a regulation [27]? No. One simply needs to take a step back and allow the question as to whether the Commission's self-imposed task of wanting to establish in the mid term a legally secure prognosis (globally, over a period of ten years) was the right way, and whether it is possible to find a better solution using more "modest" approaches.

# 3 Further suggested solutions

Alongside the introduction of iLUC factors, the Commission also suggests lowering the energy quotas and subsidising iLUC-free biofuels. In meetings of the European Parliament, it was further suggested to introduce regionally orientated regulations based on real data.

## 3.1 Lowering of the energy quota

The suggestion to reduce the minimum proportion of biofuels in the total annual sales of fuels (in relation to the energy content) can be used in order to argue that lowering the demand would reduce the iLUC effect. But one must regard this proposal as an emergency solution by the Commission. If one had been able to agree on a functioning iLUC regulation, it would on closer analysis not have been necessary to lower the quota. Once detached from the question as to whether this reduction would actually reduce the demand, the logic of this suggestion would imply that every further reduction in the demand would further improve the solution to the problem.

How will this approach of the Commission to climate protection policy continue? A proposal was recently presented for sustainability criteria of solid and gaseous biomass which is to be used for the production of electricity and/or heat and cold [28]. Here the subject of iLUC was missing entirely, which triggered a certain amount of amazement [29]. If an iLUC regulation had been adopted, would then the Commission's proposal be "iLUC reduction through demand reduction"? With this strategy, the Commission is ultimately endangering the climate protection policy of the EU. At least in the transport sector, it will no longer be possible to achieve the targets for 2020. And political discussions are currently starting on increasing the targets even further. This was perhaps also known to one minister or the other, when in December 2013 they did not follow the Commission's proposal (as well as the compromise suggested by the presidency).

## 3.2 iLUC-free biofuels

Using the argument of being iLUC-free, preferential regulations for biofuels from various biomasses – from algae, for example, or from waste – were introduced into the Commission's proposal [1]. After all, the double recognition for certain waste materials (for example, used cooking oil) was already present in the existing RED. New in the draft regulations of the Commission was the proposal of a quadruple recognition for certain residual and waste materials (the biomass fraction of mixed municipal waste and industrial waste, straw, animal manure and sewage sludge, cobs, sawdust and cutter shavings, among other things).

LUC-free biomass and biofuels are frequently fiction. It is possible to obtain biofuels from raw materials containing a small amount of substances suitable for human consumption, or none at all. But this has nothing to do with LUC or the emissions associated with it. If one follows the iLUC theory, then an additional land area for short-rotation plantations of acacia for second-generation biofuels would displace another agricultural area which in turn would possibly need to be compensated by a carbon-rich land area.

Also, the use of waste biomass is free from iLUC effects only at first glance, as today there is hardly any waste biomass that is not already being used if its use is profitable. By entering this market with a specific biofuel regulation, the market conditions are changed, as a higher profitability can be achieved with biofuel production. As profitability is not always synonymous with carbon efficiency, it would be necessary to determine which of the current areas of use for waste biomass would be displaced (indirect effects). It could be that the use of second-generation biofuels often (not always) achieves efficiency advantages for the sole reason that there is a larger financial scope. It would therefore be better if subsidy regulations were not linked wholesale to the origin of the biomass, but rather to the net GHG reductions including LUC that the biofuel actually achieves.

These brief explanations make it clear how questionable this multiple recognition would have been, not to mention the other distortions in the established markets. Besides, there is no need for a regulation of this kind. As far as the aspect of efficiency is concerned, with the net GHG quota in the FQD an adequate control instrument for future development is already available. The Commission must merely ensure that this regulation is sufficiently observed, as is already the case in Germany, also in other member states. **At best, double recognition could be established for a fixed term for those biofuels that with regard to their GHG reduction lie above a limit value compared with fossil fuels, for example 100 % (save more than the whole GHG-emission of fossil fuel [30]).**

### 3.3 Regional regulations for recording LUC

Regionally – at the level of a state or a federated state – it is possible to record changes in land use that happened in the past completely and legally secure with a comparatively high degree of precision (see above). Land use changes (LUC) can lead to increased greenhouse gas emissions which can also be calculated precisely and legally secure. In turn, these emissions can be assigned proportionally to the regionally produced biofuels via an established method. These values should be included in the GHG balance of the individual biofuels from the region. In this way, biofuels which come from the regions where the carbon-rich land areas are protected are given competitive advantages in the market for fulfilling the GHG quota.

A very frequently stated objection to this approach to regulation is the conflict that must be feared with the affected countries, culminating in a possible trade war. But this conflict is presently not to be feared for Indonesia, Brazil or Malaysia, for example, as in the past few years the political course has been set to considerably reduce LUC within the framework of national climate protection efforts. These political decisions will in the coming years be reflected in the form of a significant reduction of LUC. A regional regulation will give positive support to and strengthen this process.

In the event of failure or weakening of the national climate protection policies, this proposed EU regulation would lead to conflicts with the respective country. These conflicts are then the consequence of non-sustainable agriculture in the respective country. Thus, a political change in Indonesia could lead to a desire to weaken the moratorium for the protection of peatlands and rain forests. In the run-up to such a decision, the possible effects for exports to Europe would be of considerable significance for domestic policy discussions in Indonesia, and could help to prevent such a decision being taken.

# 4 Recommendations for the final decision-making in the EP and in the Council

**It is advisable not to introduce iLUC factors.** The arguments for this have been presented. In particular, these factors make no contribution to the solution of iLUC- or better LUC-problems, that is, the reduction of land-related emissions.

**The Commission's attempts to calculate iLUC prognoses using econometric models and to introduce these into the legislation as factors can be viewed to a large extent as having failed.** It is possible that the Commission will be given a new remit to elaborate the scientific basis for a final regulation. The Council would therefore be well advised to give the Commission a few guidelines on content for this new assignment.

- Also against the background of experience from the Commission's first iLUC rounds, it would make sense in the coming work phase to develop a **wider approach to regulation.** It will probably not be possible to talk the Commission out of attempting to develop better econometric models. This work also makes sense from a scientific viewpoint, as it brings new insights. Whether in the end it will also deliver results that are suitable for legislation is doubtful. For this reason, other approaches to regulation on the basis of real data from the past, as are currently being closely examined by the JRC [32], should play a role. Regionally orientated approaches should also be included, as outlined above.
- In order to derive regulatory proposals, explicit reference should be made to the criteria of "Good Governance" of the EU [33]. Accordingly, a regulation should meet the following criteria: **Openness, Participation, Responsibility, Effectiveness, Transparency** and **Coherence**. Particularly the latter two criteria are breached in the Commission's failed proposal.
- It would therefore appear necessary that the approaches developed for regulation, including details of the calculations, are completely **transparent and accessible to the public**. This would also have to apply to any econometric models used. Reasonable **participation** can then only take place if the models have been fully disclosed. In addition, the responsibility for deciding whether a biofuel is judged to be good or inadequate based on the results of a calculation can only be assumed by the legislator itself. Also this makes it necessary for the models to be accessible to the legislator. The scientific community cannot take on the responsibility for legislation. But as assumptions, judgement and future prognoses are integrated in the models, therefore not only pure scientific facts are computed, the model itself is a "political issue" that needs to be understood and shared. Investigations based on planned regulations which rely on a model which is not completely laid open do not allow reasonable participation and assumption of responsibility and **should not be commissioned.**
- On the subject of **coherence**, there needs to be an understandable causal chain for the European recipients of the regulations. It would therefore appear necessary that, for the Commission's second iLUC/LUC round, the coherence of the different variants of the regulation be explicitly compared with one another.

– After all, a regulation in terms of **effectiveness** should be constructed such that it makes the greatest possible contribution to solving the problem. If the problem is that of the LUC effects associated with the increasing demand of biomass, then the different approaches to regulation should especially be evaluated according to this criterion **(LUC Mitigation)**.

## Literature and remarks


[1] Proposal for a DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources. COM(2012) 595 final. Brussels, 17 October 2012
http://ec.europa.eu/clima/policies/transport/fuel/docs/com_2012_595_en.pdf

[2] Partial equilibrium models (PE) such as: FAPRI (and the Brazilian module BLUM), GLOBIOM, FASOM, CAPRI, IMPACT and AGLINK-COSIMO and the complete equilibrium models (GE) such as: GTAP, MAGNET (previously LEITAP), MIRAGE, EPPA and ENVISAGE

[3] Laborde, D. (2011): Modelling Land Use Changes in a Global CGE?: Assessing the EU biofuel mandates with the MIRAGE-BioF model, Washington DC

[4] Total quota of biofuels in fuel consumption in relation to the energy content [MJ], not to volume. From 2015 the quota will relate to the greenhouse gases avoided through biofuels.

[5] European Parliament backs switchover to advanced biofuels. Plenary Session, Press release - Environment – 11. September 2013 – 14:21.
http://www.europarl.europa.eu/news/en/news-room/content/20130906IPR18831/html/European-Parliament-backs-switchover-to-advanced-biofuels

[6] Report on indirect land-use change related to biofuels and bioliquids dated 22 December 2010 (COM(2010) 811 final); Impact Assessment dated 17.10.2012 SWD(2012) 343 final
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0811:FIN:EN:PDF

[7] COM(2010) 811 final p. 4, para 2: "The basic driver for indirect land-use change is the increased demand for agricultural crops in a situation where both suitable agricultural land availability and potential yield increases are limited."

[8] Increases in production are possible among other things by introducing multiple harvests, changing from low-yield cultures to high-yield cultures (e.g. sugar beet/sugar cane instead of soya) and putting fallow land to use.

[9] FAOSTAT: Glossary.
http://faostat.fao.org/site/375/default.aspx
(old FAOSTAT website)

[10] According to Article 2 Letter c Regulation (EC) No. 795/2004, permanent crops are "non-rotational crops other than permanent pasture that occupy the land for five years or longer and yield repeated harvests including nurseries as defined in Annex I point (G/05) of Commission Decision 2000/115/EC [...], with the exception of multiannual crops and the nurseries of such multiannual crops", such as short rotation coppice, elephant grass (Miscanthus) and reed canarygrass (Phalaris arundinacea L.).
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32004R0795:EN:PDF

[11] FAOSTAT Domains > Production > Crops
http://faostat3.fao.org/faostat-gateway/go/to/download/Q/QC/E

[12] FAOSTAT Domains > Resources > Land
http://faostat3.fao.org/faostat-gateway/go/to/download/R/RL/E

[13] FAOSTAT > Resources > Land
http://faostat.fao.org/site/377/default.aspx#ancor
(old FAOSTAT-website)

[14] Schierhorn F., Müller D. (2011): Russlands Beitrag zur Welternährung. Forschungsreport 2/2011, Leibniz-Institut für Agrarentwicklung in Mittel- und Osteuropa (IAMO); see also: Schierhorn F., Hahlbrock K., Müller D. (2011): Agrarpotenziale des europäischen Russlands. Leibniz-Institut für Agrarentwicklung in Mittel- und Osteuropa (IAMO)

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[16] Christoph Schmitz et. al.: Land-use change trajectories up to 2050: insights from a global agro-economic model comparison. Agricultural Economics 45 (2014) 1–16

[17] Kirsch van der Water, I. (2011): Das Freihandelsabkommen mit der Europäischen Union (DCFTA). Potential für Reformen der ukrainischen Gesellschaft und die Modernisierung der ukrainischen Wirtschaft. Friedrich Ebert Stiftung, August 2011.
http://library.fes.de/pdf-files/id/08359.pdf

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[19] Indonesian Sustainable Palm Oil Foundation (ISPO)

[20] Malaysian Sustainable Palm Oil

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http://www.wri.org/publication/indonesias-moratorium-new-forest-concessions. Oder:
www.wri.org/sites/default/files/indonesia_moratorium_on_new_forest_concessions.pdf
See also: Yuliana Cahya Wulan: NAMAs and REDD+: COUNTRY STUDY INDONESIA. GIZ 2013

[22] "Nationally Appropriate Mitigation Actions (NAMAs) were introduced at the end of 2007 at the UN Climate

Conference in Bali as voluntary contributions to climate protection in developing and emerging countries. They are to be supported by industrial countries by making finance and technology available and by building up capacity."
https://www.kfw-entwicklungsbank.de/Internationale-Finanzierung/KfW-Entwicklungsbank/Umwelt-und-Klima/F%C3%B6rderinstrumente/NAMA-National-Appropriate-Mitigation-Action/

[23] "At the 11th UN Climate Change Conference (2005) in Montreal a mechanism ... was suggested which offered financial incentives to developing countries to avoid deforestation and thus reduce carbon dioxide emissions harmful to the climate. It was resolved at the following conference on Bali (2007) to consolidate these measures under the name REDD (Reducing Emissions from Deforestation and Forest Degradation). In the following years, the REDD mechanism was developed further and measures were included which serve the purpose of reforestation of forests and sustainable forest management. These extended measures go under the name REDD+."
http://www.bmz.de/de/service/glossar/R/redd.html

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http://www.paklim.org/wp-content/uploads/downloads/2012/05/Guideline-for-the-implementation-of-GHG-emission-reduction-action-plan.pdf

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http://www.europeanvoice.com/article/2013/august/commission-floats-less-stringent-sustainability-criteria-for-biomass/78049.aspx

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**Contact**
Prof. Dr. Uwe Lahl
BZL Kommunikation und Projektsteuerung GmbH
Lindenstr. 33 · D-28876 Oyten
Tel. +49 4207-699 837/838
Email: ul@bzl-gmbh.de · Internet: www.bzl-gmbh.de

Darmstadt Technical University,
IWAR Institute Department of material flow management and resource economics
Franziska-Braun-Straße 7 · D-64287 Darmstadt
Tel. +49 6151-163 748
Email: U.Lahl@iwar.tu-darmstadt.de
Internet: www.iwar.tu-darmstadt.de/abfalltechnik

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**Presented by:**

UNION ZUR FÖRDERUNG VON
OEL- UND PROTEINPFLANZEN E. V. (UFOP)
Claire-Waldoff-Straße 7 · 10117 Berlin
info@ufop.de · www.ufop.de

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