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Use of ILUC in EU Regulation: Fundamental challenges in science remain unresolved

EXECUTIVE SUMMARY

Pressures on land use and food prices have increased at the global level as world growth has taken off since the mid-1990s. Emerging economies have recorded surging rates of productivity growth while the world's population has also continued to expand. Thus, a fast growing global population needs more food, while a more wealthy population demands more meat products, which are more land intensive.

Furthermore, the very growth in global demand for scarce raw materials has increased the cost of producing food: indeed World Bank studies suggest that over half of the increase in food prices from the period 1997-2004 to 2005-12 is associated with higher oil prices which have boosted costs of production. So global economic and population growth increase costs of production as raw materials and available production land cannot be expanded at the rate of demand.

In Europe, the increased pressure on land has also been associated with the Euopean Union (EU) biofuels policy. As a result, the EU has proposed that estimated effects of land-use changes relating to its demand for biofuels should be taken into account when measuring the net CO_2 displacement effects of biofuels. The basic idea is that land used for biofuel production cannot simultaneously be used for producing food. Consequently, at the margin, growing demand for biofuels in EU could imply that more arable land will be developed somewhere else in the EU or rest of the globe to make up for the fall in production of food. This land development will release captured CO_2. For this purpose the concept of Indirect Land-use Change (ILUC) has been proposed, to capture this effect: what is the net displacement of CO2 if you add the CO_2 emissions associated with land conversion?

As ILUC is a concept that cannot be observed, the only way to estimate the effect is by applying complex economic modelling. Despite the increasing amount of research into this area to improve the basis for such estimates, our judgment in this paper is that the concept of ILUC, and certainly the currently proposed estimates, are and will remain unsuited as a regulatory tool for biofuels. Our arguments follow.

Current status of ILUC estimates in the context of EU regulation

Despite substantial efforts to measure emissions linked to ILUC, there is still a very wide range of estimates. Four studies commissioned by the European Commission (EC) rank the same type of biofuels very differently in terms of their ILUC factors. Bearing in mind the substantial challenges inherent in making such estimates, this should not come as a surprise: this study outlines a number of assumptions that modellers have to make, and considers how appropriate such an action is to address global food security and long-term economic and environmental sustainability. Essentially, the choices being considered by EU policy makers require arbitrary decisions about a massive number of parameters and modelling assumptions that are both likely to change over time and for which EU regulation is ill-suited to address.

Our reading is that models that attempt to capture ILUC effects are not suited for regulatory use – especially when it comes to forming the basis for implicit CO_2 content measurement on specific products, which would be the case if ILUC factors were to be counted towards the sustainability criteria of biofuels.

EC's proposed revision to Renewable Energy Directive

The unsuitability of proposed ILUC measurements for regulatory use has partly been recognised by the EC, which has refrained from proposing that ILUC factors be used to assess the sustainability of biofuels. However, the approach taken by the EC will nonetheless create two types of problems.

- Firstly, it has proposed that biofuel producers report the ILUC emissions associated with the production of biofuels, despite the significant shortcomings of the methodology underlying such reporting.

- Secondly, the Commission has based its proposal on a selective reading of the studies it reviewed. The proposal relies in particular on one study (IFPRI) that makes a set of assumptions that rank alternative biofuels very differently than the other key studies (to the disadvantage of palm-based biofuel).

The assumptions made in the IFPRI study and the resulting conclusions drawn about ILUC emissions are worth highlighting as an example of the inherent problems in estimating ILUC factors. IFPRI assumes that all expansion of oil-based biofuels leads to land expansion primarily in Indonesia and Malaysia; assumes that more land use in Indonesia and Malaysia takes place on peat land which is highly carbon rich (high level of CO_2 emissions when cleared/drained); and ignores developments to increase reliance on biomass feedstocks that would reduce pressure to expand production. The result is that any expansion of biofuels based on oil-crops in any country leads to land-use changes in Indonesia and Malaysia in the form of peat land draining and consequently, the release of a substantial amount of CO_2.

Our study questions these modelling steps for a number of reasons, and draws attention to the significant uncertainties also highlighted by the IFPRI authors themselves.

Conclusion

We advise against using ILUC as basis for regulation of specific products, such as biofuels. The EU's attempt to regulate biofuels by imposing ILUC calculations is not supported by solid scientific evidence or careful use of the range of available methodologies.

Moreover, determining the size of potential ILUC emissions cannot be modelled or calculated with the degree of certainty and accuracy required to make it suitable for regulatory action. As a consequence, using such uncertain ILUC factors as a basis for regulation could weaken the credibility of EU biofuels policy.

CHAPTER 1: ROBUSTNESS OF ILUC SCIENCE

The increasing pressure on land as a resource is driven by several elements, including:

- Rapid growth in the global population, which implies a need for more food production, but also room for dwelling and other economic activity

- Increasing wealth of the global population, which generally fosters a shift in consumption towards meat products, which take up more land per energy unit than vegetable products

- Alternative uses for food crops, such as for producing biofuels and consumer goods

Evidence suggests that the first two elements are responsible for the majority of the current expansion of agricultural production and will continue to be so for the foreseeable future. In addition, food price increases over the past two decades seem primarily to be driven by increases in the price of crude oil, and not expansion of biofuel production.

Following the expansion of biofuel mandates, there is a strong focus on the effects on demand for land. In this respect, a distinction is typically made between direct land-use change (DLUC) and indirect land-use change (ILUC).

- DLUC: When demand for biofuels increases, farmers have an incentive to meet this demand by producing more feedstock, as is also the case when demand for food production increases. An increase in production through cropland expansion will be at the expense of the natural vegetation in the specific location. Expanding cropland for biofuel feedstock production is known as the 'DLUC effect'.

- ILUC: When feedstock used for biofuels is produced on existing cropland there is no DLUC effect. But when agricultural production is displaced, the price of the displaced products is likely to increase. A price increase then creates an incentive to expand cropland for agricultural production. The expansion of cropland for production of displaced agricultural products has been described as the 'ILUC effect'.

This simple explanation suggests that the distinction is arbitrary as the final result is the same. While the difference between DLUC and ILUC may be arbitrary, the distinction holds important implications for regulators who want to effect land-use change. DLUC is observable and can be monitored and enforced. ILUC cannot be observed and instead can only be estimated based on complex economic models.

From a first principle, the regulation of use of land in any part of the globe should be based on the role of that particular plot in terms of local, regional and national objectives. This calls for more standard locally-oriented cost-benefit analysis in that perspective including, where relevant, local environmental objectives. If the economic value of using the particular plot is high enough, economics suggest that this should take place irrespective of whether it is for urban development, industrial plants or agricultural use, including production of biomass for biofuels. The use of regulatory ILUC factors in EU biofuel policies is not a targeted way to compensate for perceived lack of such cost-benefit policies in regions across the globe.

Large variation between ILUC results

As ILUC is not observable, attempts to quantify it must rely on complicated economic models. It will be a central tenet of this note that such models inherently include assumptions about the key relationships that, fundamentally, are somewhat arbitrary, making them poorly suited as an instrument for regulation.

There is no consensus on ILUC modelling, as it is a relatively new scientific field. Due to wide interest in the subject, several researchers with different approaches have attempted to predict the ILUC effect of increasing biofuel

Table 1: No Consensus on ILUC Predictions

Feedstock	ILUC emission factor Minimum values (g CO_2 eq/MJ biofuel)	ILUC emission factor Maximum values (g Co_2 eq/ MJ biofuel)
Sugarcane	-1-48	19-195
Palm oil	-55-45	34-214
Sugar beet	13-33	65-181
Wheat	-79-79	-8-329
Maize	5-104	44-358
Soybean	0-92	63-293
Rapeseed	-33-80	52-800
Fossil fuel comperator	83.8	

Sources: Copenhagen Economics (2011), based on Ros et al (2010), IFPRI (2011), JRC (2010), E4tech (2010), Searchinger et al (2008), European Parliament (2011)

production. In 2010, the EC reviewed 22 different modelling approaches.

It is safe to say that the results of predicted ILUC emission factors were inconclusive and showed a striking variation in results. For example: the predicted ILUC factor across models for wheat-based bio-ethanol varies from -79 to 329 g CO2 eq/MJ; and for rapeseed, the predictions vary from -33 to 800 g CO2 eq. /MJ (Table 1). Even within models the variance is substantial. One study predicts that ILUC of palm oil is between -55 and 213.6; another that ILUC of maize is between 38 and 358.7; and yet another that the ILUC of wheat is between 25 and 238.8.

When digging deeper into the modelling exercises conducted, it is of no surprise that the predictions vary so considerably. The required modelling exercise is extremely complex, and a number of highly uncertain relationships and global interactions need to be stipulated. To illustrate some of the inherent complexity, consider the following steps, which present just a small fraction of a complete modelling exercise used to provide ILUC estimates:

Step 1: Establish which types of biofuels are likely to meet the increased demand in EU. This, among others, includes determining the degree of substitutability between the different fuels. This is a technical question and to a large extent depends on whether engines can run equally well on, say, rapeseed diesel and palm-based diesel.

Step 2: Establish the likely increase in production of the biofuel crop, and where on the planet this will take place. This depends crucially on the flexibility of production of the different fuel types. In economic terms: what do the different supply curves look like? The more difficult or expensive it is to expand production of, say, rapeseed biofuel (the supply curve is steep), the more of the new demand will be met by other fuel types where the supply curve is less steep.

This exercise is complex. The supply curves depend on characteristics of the production facilities (is it easy to scale up existing plants and/or build new plants?) and agricultural conditions (is it easy to grow more soybean, or is it limited by lack of available land, access to water, climatic conditions, etc?). In most models these supply curves are estimated from historic data; however, this is not likely to be accurate in the future as these relationships are highly dynamic over time, and long-run supply curves tend to more elastic than short-run supply curves. In other models, the modellers simply stipulate where they think land-use change will take place based on historic patterns. Needless to say, this may not necessarily reflect current or near-term developments including local forest preservation policies.

Step 3: Establish the carbon content of the newly converted land. This is very difficult as land characteristics and vegetation can be very different between countries within a region; between different areas within a country; and even within the same carbon sink in an area. Moreover, there is significant disagreement about the average carbon content of different forest types such as tropical, boreal or temperate forests.

Step 4: Establish the response in the market for food products. If, say, palm oil is being used to satisfy the demand for

Table 2: Sources of Uncertainty in the Predictions

Source for Variation	Examples of Impact
Productivity of marginal land	If marginal land productivity is 25% instead of 75% of existing land productivity, GHG emission predictions would increase by about 77%.
Including co-products and their substitution rate	If co-products are taken into account, it may reduce the estimated land requirements by 23-94%.
Are expected yield increases determined exogenously or endogenously?	An increase in yield productivity by 0.1% per annum can reduce estimated GHG emissions by 72%.
Location of land expansion and land type cultivated	Determining in the model where new crop land expansion takes place is to a very large degree determined by the modeller's assumptions typically based on historic experiences.
Substitutability between different crops in the food market	If substitutability between crops is high, the increase in crop demand is more likely to be spread out on different crops and vice versa if substitutability is low. The actual effect on land-use change will depend on the steepness of the supply curve, which is very difficult to predict.
Response of food consumption to increases in price of food	If food consumption is very elastic, food price increases will be limited and there will no crop land expansion. Getting the food consumption elasticity right (or wrong) will have a large impact on estimated ILUC emissions.
Estimated carbon stock of different land varies significantly	Some models use estimated carbon stock values seven times larger than other models. This implies a seven times larger ILUC. Moreover, the carbon stock may be very different even within the same forest areas.

Sources: Copenhagen Economics (2011), based on DG Energy (2010), JRC (2010), Prins et al (2010), Ros et al (2010), CARB (2009a), CARB (2009b), Dumortier et al (2009), McDaniel & Balistreri (2002), Keith et al (2005)

biofuels, the price will increase and it is likely to lose market share for food products (vegetable oils). What the response will look like depends on the substitutability between products in the market for vegetable oils. This substitutability does not depend on the absolute price of the different products, but on the relative price. Even though one crop is consistently cheaper than other crops (e.g. palm oil may be cheaper than rapeseed) it does not necessarily mean that this crop will take up the majority of the expansion.

Step 5: Go back to Step 2. What will the supply response be to the changed pricing signals from the food market? Where on the planet will the response take place?

Step 6: Go back to Step 3.

For each of the Steps 1 to 5 there is a range of equally plausible guestimates of effects, suggesting that the overall result has limited meaning from a scientific perspective (Table 2). The examples illustrate how much the ILUC predictions can change by variations in very few key assumptions. For example, if modellers assume that the productivity of new agriculture land is 25% instead of 75%, the predicted ILUC emissions can increase by 77% (researchers widely contest which value for productivity of marginal land is correct, and must inevitably depend crucially on the exact plot of land actually converted into agriculture land). To restate: changes in one uncertain parameter value are capable of increasing ILUC predictions by 77%!

Based on our review of the uncertainties related to ILUC modelling, we advise against the use of ILUC factors to define regulatory instruments. ILUC models are often a combination of very complex modelling structures; large amounts of parameters that need to be specified; and a range of assumptions that basically can circumvent the entire model structure. Advanced economic models are typically used to illustrate the impact of applying a certain regulatory instrument; not to determine concrete levels of excise duties, which essentially is what the EC is attempting to do, by applying ILUC factors to sustainability criteria.

CHAPTER 2: RISK OF DISCRIMINATION AND INCOHERENCE OF ILUC POLICY

In October 2012, the EC proposed a directive amending the Renewable Energy Directive (RED) and the Fuel Quality Directive (FQD). The proposed directive contains concrete values for fuel-specific ILUC emissions. The fuels are divided into three sub-groups with corresponding emission factors between 12 and 55 g CO_2 eq/MJ (Table 3).

Table 3: EC's Proposed ILUC Factors

Feedstock group	Estimated ILUC emissions (g Co_2 eq/MJ)
Cereals and other starch-rich crops (wheat, maize)	12
Sugars (sugarcane, sugar beet)	13
Oil crops (sunflower, rapeseed, oil palm, soybean)	55

Source: Annex VIII in European Commission (2012)

While not counting towards the sustainability requirement of a specific fuel, the EC proposes that ILUC factors should be included in national reporting of GHG emissions. We argue that this approach is inadequate on three counts: subjective determination of ILUC factors; inadequate recognition of national land conservation efforts; and incoherent reporting requirement.

Subjective determination of ILUC factors

As there is no consensus on ILUC predictions, we argue that any choice of ILUC emission factors will to a large extent be based on subjective decisions, even when there are attempts to be objective. We give a few examples.

Prior to the EC's proposal, it organised a thorough literature review, which reviewed at least 22 different land-use change modelling exercises; four studies were commissioned by the EC itself. The results varied significantly, as described in Chapter 1. In its proposal, the EC chose to rely on only one study. This choice has basically bypassed the enormous uncertainties depicted in Chapter 1, and endorsed three estimates down to almost decimal precision (Table 3).

Table 4: Highly Diverse Ranking of Crops in Key Studies

Feedstock	Type	IFPRI	AGLINK-COSIMO	ESIM	CAPRI	ADEME	Öko Institut	CARD
Wheat	Cereal	4	5	3	3	-	4	1
Maize	Cereal	2	4	4	2	-	-	-
Sugarcane	Sugar	3	1	2	-	5	2	-
Sugar beet	Sugar	1	-	-	1	3	-	-
Rapeseed	Oil crop	6	3	6	5	4	5	2
Soybean	Oil crop	8	-	1	-	2	1	-
Oil palm	Oil crop	6	2	-	-	1	3	-
Sunflower	Oil crop	5	-	5	4	-	-	-

Sources: The models in the table

Note: In ESIM and CAPRI, the final result is the total land-use change and not emission factors stemming from the land-use change.

The EC's selective approach to the use of this study significantly affects the ranking of biofuels from oilcrops. Indeed oilcrop-based crops (used to produce bio-diesel) are given an ILUC factor that is 4-5 times higher than cereal and sugar-based crops (which are used to produce bio-ethanol). This result is derived in the study which the EC relies on (IFPRI), but is not an obvious conclusion from other ILUC studies. While soybean has the highest ILUC factor in the IFPRI study, it is considered as one of the lowest ILUC-feedstocks in three other models. For oil palm, three other models find it to be ranked first, second and third respectively (Table 4). The EC offers no explanation for this choice of results.

Such a diverse set of results reinforces the analysis that ILUC modelling is not a reliable basis for important policy decisions. The IFPRI result that oil-based crops have relatively higher ILUC is very much driven by one specific assumption which is not typically embodied in other models: no matter which oil crop is being used to produce biofuel, it is assumed that palm oil expansion will take place on peat land. The rationale is that palm oil production is the most competitive vegetable oil, and that it will fill a large share of the gap in the market for vegetable oils. This peat land removal does not take place (in the model) when producing bio-ethanol, and consequently this assumption alone drives to a large extent, the high ILUC for oil crops compared to cereal and sugar. This assumption does not seem to be applied in other ILUC modelling studies and depends crucially on an assumption that expansion will only occur in Southeast Asia despite existing limitations on expansion and conservation initiatives.

As we have underlined in our analysis of the different steps leading up to Table 2, there is no credible way that the expansion of demand for a particular kind of biofuel can be linked to a change of land-use in a particular region of the world. There are far too many more or less arbitrary assumptions that have to be taken to make this link. In addition, the model results do not seem to take into account one of the complex links between the different global markets: if demand for bio-ethanol increases, this will increase the market price for ethanol crops such as cereals. This gives incentives for farmers growing oil-based crops, such as rapeseed, to change their crops into cereal crops. This then increases the price for oil crops which – according to the model – should lead to peat land draining in Southhaast Asia. As it is easy for farmers to change the crops on their land, this suggests that crop-specific ILUC factors for cereals, sugars and oil crops should be more aligned.

One concern related to the large difference in ILUC predictions between oil-based crops and sugar-based crops is related to the assumed substitutability between the two in the market for land. In fact, many farmers can choose whether to grow an oil crop like rapeseed or a sugar crop like wheat or maize. Hence, when the demand increases for sugar-based bio-ethanol, farmers will have the incentive to stop growing rapeseed and replace it with maize or sugar beet, for example. This will then lead to the same pressures in the market for vegetable oil, which IFPRI assumes is linked to emissions from cropland expansion in Indonesia. Consequently, if it is possible for farmers to choose between an oil crop and a sugar crop without constraints (the degree of substitutability is high), then the difference between oil-based crops and sugar-based crops should be very small.

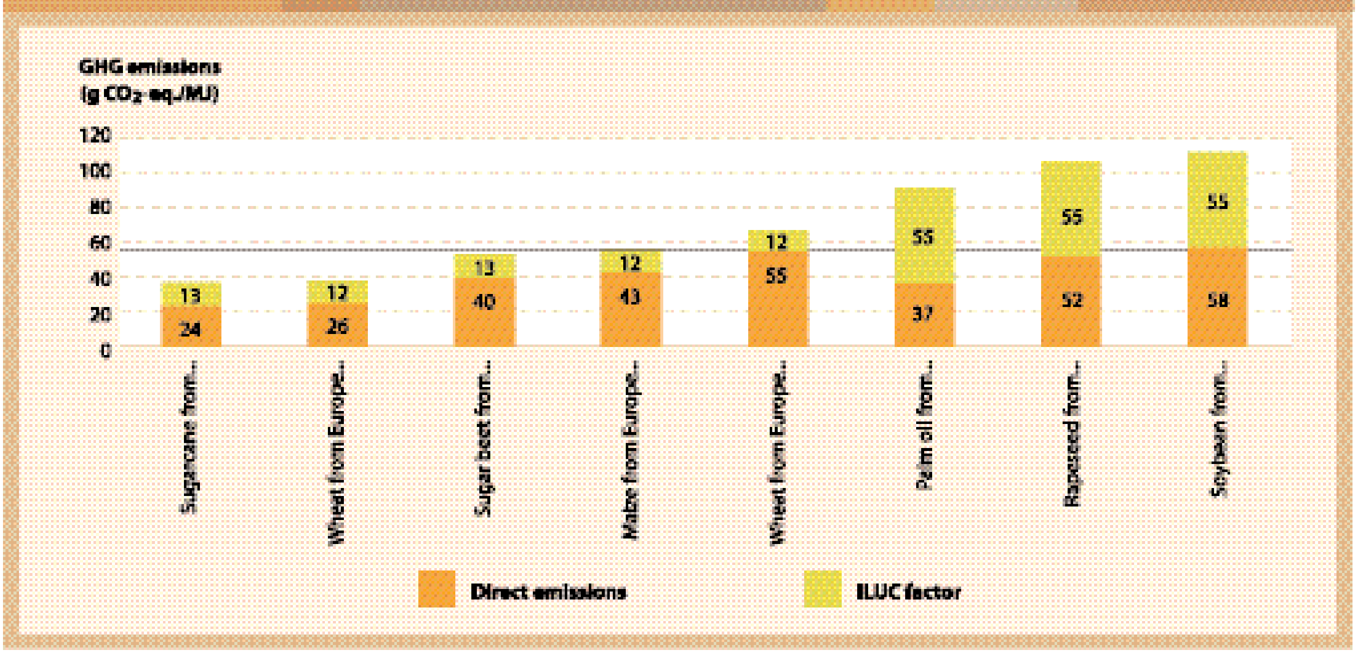
The subjective choice of summary metric can also significantly affect the ILUC prediction obtained, if ILUC estimates were to be based on more than one study.

Impact of chosen ILUC factor

The introduction of ILUC factors is likely to have a massive impact on the biofuels industry if ILUC factors are included in sustainability requirements. Most first-generation biofuels will be deemed unsustainable as a result of the application of these factors – not on the basis of their actual emissions.

The case of sugar beet and maize from Europe is particularly illustrative. Including the supposed ILUC emissions, which are

Figure 1: Choice of ILUC factors crucial for 'sustainability'



Sources: Copenhagen Economics based on European Commission (2009), Annex VII in European Commission (2012)

Note: The ILUC factors used are taken from the Commission proposal based on IFPRI (2011). The horizontal line indicates the 35% GHG savings minimum equivalent to 54 g CO2eq/MJ. The direct emission estimate for palm oil from Southeast Asia is with methane capture facilities.

estimated to be 53 and 55 g CO_2eq/MJ respectively, biofuels from these feedstocks lie at 1 g CO_2eq below and 1 g CO_2eq respectively above the sustainability threshold stipulated in the RED (Figure 1). Whether or not these fuels are counted as sustainable is thus decided by a precision of their supposed ILUC estimate of 1 g CO_2eq/MJ. Such precision is impossible to justify within the range of uncertainty embedded in ILUC modelling. Note also that palm oil (with methane capture) comes out very well when looking at observable direct emissions, but supersedes several sugar/starch-based crops when adding the high ILUC factor for oil crops suggested by the EC.

The EC has already acknowledged that the estimation of ILUC factors is very likely going to change over time. This is due to the sheer level of uncertainty involved in the modelling:

- Models, assumptions and parameter value are likely to change over time as a response to different trade patterns, changes in technologies, land-use policies in different parts of the globe and the way such policies are integrated (or not) in ILUC estimates.

- When actual production or consumption behaviour changes, the models need to be re-specified.

- Several studies illustrate that ILUC factors are likely to be non-linear with respect to the amount of biofuel production envisaged. This implies that the ILUC factors will not remain constant as the amount of biofuel production changes, as well as change the ranking of alternative sources of input and biofuel variants.

- The EC may choose to apply truly crop-specific ILUC factors instead of the crop-aggregation currently proposed.

This strongly highlights that the nature of the modelling exercise will lead to different figures produced, and thus a continuous need to change the legislation based on these

Box 1: Examples of Malaysian land conservation policy

Land conservation efforts in Malaysia are some of the most advanced in the developing world. In 1992 (Rio), the Malaysian government pledged to maintain forests at a minimum of 50% of the land mass, thus capping the expansion into forests. This pledge was reiterated in 2009 (Copenhagen). Oil palm plantations are in this respect not classified as forests. Currently approximately 55% of land is covered by forest. Malaysia joined the UN-REDD programme in 2012.

Strategies in place to achieve this include sustainable forest management practices; establishing forest plantations on marginal/unproductive land to ease logging pressures elsewhere; along with enrichment of and replanting in logged-over or poor forests. A nationwide initiative to plant 26 million trees by 2015, or one tree per Malaysian, was launched by NRE in 2010. In addition, the National Landscape Department is to plant 20 million trees in urban areas from 1997-2020 to 'green' cities.

In addition, nearly half (16 million of 33 million ha) of Malaysian forests are under management as natural forests; 14 million of 33 million ha are set aside as permanent forest reserves; and 2 million ha are designated national parks and wildlife sanctuaries.

Source: Copenhagen Economics based on Malaysian Government (2011) and USAID (2010)

figures. This demonstrates a basic incoherence and inconsistency of the policy.

Continuous updating of ILUC factors would also create considerable uncertainty for producers (of both the feedstock and biofuel), as their particular biofuel may opt in and out of 'sustainability requirements' over time depending on the changes made to the models and variables used. This is likely to deter investments both in the current fuels but, more importantly, also in more advanced and sustainable fuels or production processes. In addition, implementing such ILUC factors as a part of the sustainability requirements will have strong negative welfare implications as huge investments into current biofuel production facilities will be valueless for the fuels that are no longer deemed sustainable. The investments were, to a large extent, driven by EU regulatory incentives through the RED and the FQD.

Non-recognition of national land conservation efforts

Non-EU stakeholders have argued that the EU does not sufficiently recognise local development needs and domestic conservation efforts. As previously discussed, we believe the proper regulatory approach to land-use change in Third World countries should be based on local considerations and cost-benefit analysis of environmental and economic effects.

In the study which the EC relies on, as in most other ILUC modelling exercises, it is assumed that certain feedstock are grown in certain regions of the world. This is a plausible point of departure, as most sugarcane is currently produced in Latin America; most palm oil is currently produced in Southeast Asia; and most wheat and maize is currently produced in North America, Europe and Russia. When the models include these historic facts, the result is that whenever an expansion of, say, soybean or sugarcane production occurs, land-use change takes place in Latin America; and similarly for oil palm expansion in Southeast Asia.

This fails to take into account developments in local conservation efforts. Consider Southeast Asia, for example. The region currently produces by far the largest share of global palm oil. However, historic levels of agricultural development are a poor measure for future land conversion for at least two reasons:

1. There is an increasing focus on land conservation measures

Box 2: Palm oil development in Africa and South America

In the face of rising global demand for palm oil and available land for cultivation running out or being restricted for conservation and other purposes in Southeast Asia, palm oil producers are looking to expand in other parts of the world, notably Africa and South America.

Several are also planning to open plantations in Africa, where an estimated 1 million ha are available for development. Sime Darby has been considering expansion in Cameroon on 300,000 ha of agricultural land or already degraded forest. In 2012, Olam was granted the right to develop 88,000 ha in Gabon. Wilmar International has established a 5,000 ha plantation in Ghana following the acquisition of a 35,000-ha plantation in Nigeria in 2012.

In South America, expansion of oil palm plantations has mainly been taking place in Colombia and, to a lower extent, in Brazil, Ecuador and Peru. In Colombia, most of this expansion is taking place on low-productivity pasture lands and grasslands and in some cases replacing illicit production of the coca plant. In Brazil, where the rate of expansion has been the highest in recent years, much of the land available for plantations is degraded pasture and other already deforested areas.

Sources: Bloomberg News (April 3, 2013), CIFOR (2012), Financial Times (Feb 27, 2011), Greenpeace (2012), US Department of Agriculture (2011), Yale Environment 360 (2011)

in Southeast Asia – in particular, Malaysia – where steps have been taken to ensure that conversion of land for development purposes occurs in a sustainable manner, including joining the UN-REDD programme (Box 1).

2. Evidence suggests that expansion of oil palm plantations is now taking place in Africa and South America on low-carbon soil (Box 2). This implies that historic patterns cannot be used to determine future outcomes.

Incoherent reporting requirements on ILUC

The Commission has proposed that the suggested ILUC factors should be included in national reporting on GHG emissions, for example, by instructing economic operators to report. While the idea of ILUC reporting requirement is presumably motivated by a wish to estimate global GHG emissions from ILUC, we argue that it is essentially incoherent.

Due to the complexity of ILUC, the reporting requirement faces a trade-off between *simplicity* and *meaningfulness*. If the reported ILUC factors are intended to reflect actual conditions of specific crops and local/regional land conservation efforts, reporting would have to be complex and entail very high compliance costs. In a nutshell, economic operators would be required to report on (the lack of) forest conservation efforts in all other countries, where the induced agricultural expansion is expected to take place.

The EC has chosen (for now) to opt for the manageable but very *simplistic* regime, where the reporting is simply to follow the proposed ILUC factors in the directive. This has the consequence that biofuel producers are punished by assumptions made within the modelling exercises. This could substantially harm companies producing biofuel from feedstock – and producers of feedstocks – where the IFPRI model has assigned a high ILUC factor to their particular biofuel feedstock.

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