HIGH-RISK VS LOW-RISK ILUC BIOFUEL FEEDSTOCKS - WHERE DOES OIL PALM FIT IN?
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Abstract
The risk of large indirect land-use change (iLUC) induced by the increasing demand for biofuel feedstocks is at the centre of the debate about the sustainability of first-generation biofuels. The Greenhouse Gas balance of biofuels is strongly affected by the amount of iLUC. Currently, the strongest focus and the highest iLUC risk is given to palm oil-based biodiesel. However, these accounts have a shaky informational base since iLUC is induced by complex market reactions to increased biofuel demand. These accounts cannot be observed, but they can only be roughly approximated with economic simulation models.

What can be done to move towards low iLUC risk biofuel feedstocks? Two options are obvious. First, if biofuel feedstocks do not replace food products, there is no iLUC. Hence, increasing productivity on the plantations will lead to a supply of low or even zero iLUC risk. Secondly, if the conversion of forests is better regulated, iLUC risks will automatically reduce. Companies and governments can thus contribute to the move from high- to low-risk iLUC biofuels.

1. Introduction
Bioenergy – and biofuels in particular – are intended to contribute to the transition towards renewable energy sources and to the mitigation of climate change through a reduction of Greenhouse Gases (GHGs). As such, they should themselves emit as few GHGs as possible. In order to demonstrate and verify their contribution to the control of GHGs, the European Union requires a GHG assessment of all biofuels that are sold under the Renewable Energy Directive. It is by now common practice and works quite smoothly, namely, to compute the GHG savings of each biofuel brought to the European market. There is one aspect, which is an exception, the potential indirect land use change, which is induced by the production of biofuels and now runs under the acronym “iLUC”.

Keywords
Indirect land use change (ILUC), Renewable Energy Directive II (RED II), European Union (EU), biofuels, greenhouse gas (GHG), palm oil

JOPEH 2019, 10:8-12

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Figure 1: Impact of iLUC Factors on GHG Balances of biofuels

Source: ISCC
iLUC is used by opponents of biofuel use as an argument to advocate a complete phase-out of crop-based biofuels, and it is seen by producers of crop-based biofuels as a threat to their investment in a sustainable biofuel production. The Council of the European Union\(^1\) in its proposal for the new Renewable Energy Directive (RED II) acknowledges the uncertainties surrounding a quantification of iLUC and has refrained from including an iLUC-factor in the GHG balance calculations. Thus, iLUC will not enter the GHG calculations of the RED II, but it remains in the debate and will be subject to further investigations. The question is, will it enter an amended RED II? And if so, what should be done about reducing iLUC without being able to measure it? The iLUC factors discussed so far would practically rule out all crop-based biofuels if the default values are used as Fig. 1 illustrates.

2. What is iLUC really?

iLUC is relatively easy to understand and impossible to precisely quantify. So, let us go to the easy part:
The Council of the European Union rightly states: “Indirect land-use change occurs when the cultivation of crops for biofuels, bioliquids and biomass fuels displaces traditional production of crops for food and feed purposes. This additional demand may increase the pressure on land and can lead to the extension of agricultural land into areas with high carbon stock such as forests, wetlands and peat land causing additional greenhouse gas emissions.”\(^2\) The mechanism behind this process is price change in global biomass markets. Increasing demand for biomass for energy purposes will need to come from land that is already cultivated or from land that is not appropriated by human activity. If this demand is met by expanding the agricultural area and by growing biofuel feedstocks there, we are talking about direct land use change (dLUC), the middle part of Fig.2. If, however, biomass which has been grown for food and feed purposes on existing agricultural land is now diverted towards biofuels, then there is a supply shortage for food and feed on world markets. Rising prices as a response will create incentives to convert land to meet this demand as shown in the right-hand side of Fig.2. This conversion of natural areas is called iLUC. Unfortunately, it is not easy or even impossible to determine who causes iLUC.

Let us do a thought experiment: Suppose all biodiesel in Europe is produced with rapeseed oil from Europe. Also suppose, the food and feed demand that cannot be fulfilled in Europe is met by land conversion to palm or soy plantations outside of Europe through imports into the food and feed sector. This expansion would surely be counted as iLUC as usually defined and emphasized by the Council. But who would be charged with iLUC? Rape or palm producers? It should be rape according to the Council’s definition. Unfortunately, the Council is not consistent in its treatment of the iLUC issue. When it comes to controlling and reducing the risk of iLUC, it states and indirectly introduces a new definition of iLUC: “… high indirect land-use change risk biofuels, bioliquids and biomass fuels produced from feedstocks for which a significant expansion of the production into land with high carbon stock is observed.”\(^3\) This would put the “iLUC-blame” on palm instead of rape in our thought experiment. So, two competing definitions of iLUC lead to substantially different results for attributing iLUC to crops or regions.

The distinction between dLUC and iLUC is important, as you will see in a moment. It is also important to recognize: dLUC is accounted for in the GHG accounting of certification procedures, iLUC is not. So, the big question is: can one distinguish between dLUC and iLUC in order to quantify it? That is the question, nobody can answer precisely. Why is this so? All models looking at the dynamics of land use change induced by, e.g., biofuel mandates simulate the impact of higher prices due to these mandates on the additional land that has gone into cultivation. But the important point is, they cannot distinguish between new agricultural land that is used in bioenergy production and land that is devoted to food or feed production. There is no doubt that land expansion is taking place but there is no way to attribute it correctly to the different final uses. Currently, the expansion is completely attributed to bioenergy use, but then it could as well be accounted for as dLUC.

If the additional land is used for bioenergy crops, it is counted as dLUC and its GHG-impact is accounted for in the bioenergy product. If it were used for food and feed, it
would be iLUC, not considered in the GHG-balance. Since all models compute the total land use change from the biofuel mandate, they cannot separate out the iLUC part from the overall land use change. This is the fundamental impediment for computing the GHG-effect of iLUC, besides many other more technical modelling problems.

Using these model results would overstate the role of iLUC and they would also be quite imprecise. So, the arguments for attributing iLUC to specific regions and/or crops rely on historical evidence. It is simply assumed that in areas where there has been substantial land use change, it is likely that it will continue in the future and the preferred crop grown in the region is causing this land use change, even though other forces not related to biofuels may have caused the deforestation. This is the logic of the Council’s definition of “high indirect land-use change risk biofuels”. And this is the cause for demands to ban the import of palm oil as a feedstock for biodiesel.

The areas which experienced large deforestation in the past and produced significant amount of bioenergy crops are the Amazon region and the South East Asian rainforest areas. Therefore, and because nobody can exactly predict or determine where iLUC is taking place, the proposal is to denote all crops grown in these regions as high iLUC risk feedstocks. Ironically the same crops grown in regions not experiencing land use change would not be considered as risky, even though they supply the same markets. But this approach has nothing to do with the true causes of iLUC!

3. What can be done about iLUC?

iLUC exists, there is no doubt. But we do not know how big it is. So, what are the options for dealing with iLUC? The causes for iLUC to happen are two-fold, as shown above: Firstly, prices for biomass need to increase sufficiently to create incentives for land conversion. And secondly, the opportunities and cost of land conversion should be relatively low. In fact, if conversion of natural areas such as forests into agriculture is very easy, it will and is done for reasons other than agriculture as well. So, if prices do not increase by much and it is difficult to turn untouched land into plantations – especially forests with large carbon stocks and large biodiversity - then the risk of iLUC will be reduced. So, moving from a high-risk towards a low risk iLUC biofuel can be achieved by limiting price effects and by better controlling land conversion.

The European Union has stated one possible solution, namely reducing those first-generation biofuels, which pose a high risk of iLUC. But it also offers to treat biofuels with low iLUC risk more favourably. So, what needs to be done to produce a low-risk biofuel feedstock and who needs to act? Producers have an incentive to increase production. If they concentrate on increasing yields instead of expanding area, they will be able to supply the market for feedstock without raising market prices and thus without creating incentives for others to convert forest or biodiversity rich grassland into agricultural land. This additional yield could go into biofuels without compromising food security. This process needs to be accompanied by actions to limit the opportunities to destroy carbon stocks and biodiversity rich areas.
4. Who is called upon?

Much or even most of the current and past deforestation cannot be directly attributed to the expansion of biofuel production. It is caused by a combination of many factors such as population growth with increasing demand for food and feed, increasing land scarcity and many others. But it is often also caused by a lack of governmental control of a country’s carbon stocks and its biodiversity. Regulating land use for the protection of a country’s natural resources and enforcing these regulations is and should be the task of each responsible government, regardless whether biofuels are produced or not. It would tremendously help to reduce iLUC risks but also the risks of any unsustainable direct land use change. The GRAS tool provides ready to use for identifying low iLUC risk activities such as productivity increases or the integration of smallholders into sustainable agricultural practices.

Concentrating on low iLUC risk biofuel feedstocks through improved land management and technologies is also in the interest of producers, as they can improve their GHG balance and the premiums accompanying them. By-products and waste products such as Palm Acid Oil, Palm Sludge Oil, POME recovered Oil, PFAD etc. definitely do not contribute to ILUC. ISCC has developed certification standards for these products such that they can be certified for use in the European market.

Concentrating on lowering iLUC risk promotes bioenergy much better than trying to compute – most likely unsuccessfully – the amount of GHGs caused by iLUC. Such a focus could also begin to turn the debate on iLUC away from attributing past and current deforestation to the crops grown in those regions towards a discussion about how the real causes of iLUC can be reduced, namely through a climate and biodiversity friendly land use regulation and a more efficient agriculture. Moving away from the iLUC debate could also offer the opportunity to communicate much better the fact that palm oil especially provides the highest oil output for every hectare planted. So, both producers and regulators should join to move towards low iLUC risk biofuels.

References

2. Ibid.
3. Pg. 110 Ibid.
4. [https://www.gras-system.org/](https://www.gras-system.org/)