

Indirect Land Use Change Impacts of Biofuels – Consultation Argentina Document

Introduction

The National Bioenergy Program of Institute of Agricultural Technology INTA acknowledges the opportunity provided by the European Commission to submit comments regarding: the indirect land use change impact of biofuels.

The action of different research centers, ecologic non-government organizations and interested parties has installed with force the issue of the threats posed by an unrestricted biofuels expansion worldwide. Faced with the awareness of these matters, the political sector reacted by requesting measures from their regulation bodies, to put this activity in order. Such bodies have turned to institutes and research groups in look for adequate tools to provide scientific criteria and foundations for the regulations under preparation.

Presently, the fact is that the speeds are asymmetric and there still remain many doubts and unsolved problems within the scientific field, which imply moving forward with considerable degrees of uncertainty. This reality is present in all contexts and, in spite of the uninterrupted regulation progress, certain measures are being taken in order to correct possible errors if confronted with lack of sound and consolidated support.

Since the year 2005, the INTA (National Institute of Agriculture Technology) has been taking part in different technologic and scientific forums devoted to the study of the sustainable production of bioenergy worldwide.

Alliances with the major research centers in the field have been created and strengthened, and collaborative work has been carried out with the exchange of information and knowledge - new in many cases- about Argentina. These actions have been carried out by actively participating in international forums: the Global Bioenergy Partnership (GBEP) and the Roundtable on Sustainable Biofuels (RSB), as well as specific research projects such as the Global Biopact.

The National Bioenergy Program (NBP/PNB) of the INTA contemplates this issue as one of its main creation pillars, and it is within this frame that there is a specific project under way, related to energy balance, greenhouse gases, biodiversity, as well as the possible expansion area of different bioenergy crops and croplands.

We consider that the ILUC factor is a relatively new concept that has still not been sufficiently developed and any requirement to account for an ILUC factor is in itself premature. We do not believe that current findings of scientific or other analyses can provide policy makers with a sufficient basis to put forward regulatory frameworks, as this could undermine EU biofuel policy in the international market.

We made specific studies on the international studies on Argentina with this conclusions

- The influence of the original use of the lands converted to agriculture is highlighted in the estimations of greenhouse gas emissions.
- Significant errors have been verified in the determination of the original use of lands in the Argentine Republic, as well as the magnitude of the detected changes.
- It has been verified that errors may be made in using low resolution images without the adequate support of local experts.

- The real land origin as well as the magnitude of the changes would render significantly lower values for the case of Argentine soy.
- Agriculture expansion has been seen as not producing any significant reduction either in cattle stock or in its production, taking as witness case the province of Buenos Aires, and putting the assumptions of the models employed to the question.
- The errors arising from the assignment made on the basis of a classification of low resolution images, without the assistance of local experts, are highly risky for the assignment of land use changes.
- Through the experience in cover classification, we can state that the 1-km resolution employed generates errors of a magnitude which can only be considered valid in analysis of academic type for the comprehension of the dynamic of change in the different vegetation covers detecting highly degrading actions, or to see the evolution of processes of large dynamism and impact in the environment, such as flooding, draught, etc, but may in no way be the basis of a research work to determine the magnitude of GHG emission changes, lest to determine a future trend which could be applied as an international trade regulatory instrument.
- To the considerations made above, the significant state intervention in agricultural markets should be added, as this may alter significantly the assumptions taken by the models, since they fail to consider these assumptions.

Below, we answer the four questions of the consultation, based on the work the European Commission did and based on our own analyses

First we would like to sum up what Argentina INTA is already doing to mitigate 'Land Use Change'.

- Ecoregion National program looking at soil final destination and overall development of the different activities.
- Specific sustainable programs on land farming.
- Satellite image survey of the principal agricultural areas.
- Promotion of high efficiency systems with intensification of the production looking at social and environmental issues.
- Specific case studies survey
- Complete life cycle analysis of the principal Biofuels and feedstocks
- Active role at international forums GBEP RSB looking at indicators and criteria
- Coordinate work with political authorities and private sector.

Answers to the question of the EU consultation

- 1) Do you consider that the analytical work referred to above, and/or other analytical work in this field, provides a good basis for determining how significant indirect land use change resulting from the production of biofuels is?

NO. On the basis of the analytical work presented by the European Commission for this consultation, the Indirect Land Use Change (ILUC) factor remains a complex notion that lacks a coherent and consistent scientific evidence basis to implement a responsible and non discriminatory biofuels policy within the implementation of the Renewable Directive.

Our position is also reflected in the review conducted for DG Energy, which states that “[i]n terms of results, the estimated impact of the land use change attributed to biofuels has fallen over time, presumably as study methods have become more refined. While the original work of Searchinger et al. suggested that the greenhouse gas impact of biofuels land use change was twice as great as that of the fossil fuel consumption avoided, three of the four most recent studies estimating greenhouse gas impacts – including the only one dealing with the EU – have concluded that biofuels are beneficial in greenhouse gas terms even when their land use impact, as well as a full life cycle analysis, is taken into account.”¹

At the same time, the quoted study argues that the modeling of the land use change impact of biofuels is new, particularly with the first study only having been released in 2007. It goes on to state that “[a] great deal of scientific progress has been made since then. However, it becomes clear that in the course of the literature review consensus is far from being reached among scientists on many key aspects of methodology and data; there are still aspects that none of the studies reported in the consultation have addressed; and these issues have a significant impact on the studies’ results”².

On the other hand, the analytical work referred in the consultation does not split up the impacts from direct land use change from indirect land use change. So “[w]ithout such an estimation of the volume of “direct” land use change it is impossible to derive an estimate of the volume of “indirect” land use change.”³ The absence of this division in the literature review it talks about the complexity about doing it.

More specifically, we would like to address the following issues included in the consultation guidelines:

Land Use Data: This is a very questionable topic and a very important issue for the modeling result. Moreover, there is no consensus about which data-set is best to use. The main sources for land use data are the agricultural inventories (such as FAOSTAT and the Global agro-ecological – GAEZ) and satellite datasets. Both present several difficulties for this purpose.

On the one hand, the agricultural inventories sources provide general information for each country not conducting differentiation by zones or regions (FAOSTAT) or present outdated information (like GAEZ, which only contain information for 2004).⁴

On the other hand, the Satellite datasets (like Global Land Cover 2000, GlobCover 2005, M3 Datasets and MODIS VCF) present several problems, if they are not used with high definition. As Carballo and Hilbert (2010) from INTA-Argentina⁵ had clearly developed, the satellite images with low resolutions can confuse, for example, flooded areas with non agricultural areas and then, when the flood finishes and the agricultural crops are produced in this area, they consider it as an expansion in crop areas. It occurred in Argentina during 2001-2004 and the Environmental Protection Agency (EPA) of the US has wrongly considered it an expansion in crop areas in Argentina.

¹ EU DG Energy (2010). “The Impact of Land Use Change on Greenhouse Gas Emission from Biofuels and Bioliqids”. Literature Review. July 2010. P. 7.

² EU DG Energy (2010), op. cit., p. 5.

³ Ibid., p. 29.

⁴ Ibid., p 32.

⁵ Carballo, S. and Hilbert, J (2010). Análisis de metodologías empleadas para el cálculo de emisiones de GEI derivados del cambio de uso del suelo. INTA.

Therefore, we propose the use of satellite data with high definition (like LANDSAT), national databases and experiences in order to make studies and avoid the use of outdated, misleading and inaccurate land use data. In many countries like Argentina or Brazil there are complete and detailed databases and geographical systems with high resolution that are focused on the land use in the different regions of the countries. A solid number of expertise that come from universities, research centers and agricultural organizations are also available. There are public and reserved databases on this issue.

Models' treatment of crop yield growth in the baseline and in response to growth in demand: These are both very sensitive for the results. Although the DG Energy literature review mentions that most of the modeling reviewed assumes a yield increase in the baseline, it also points out that its size is rarely clear and states that: "[h]igh assumptions could reduce the amount of land converted by 15% compared with low assumptions"⁶. This average is expected "...from comparing the "business as usual" and "maximum improvement" forecasts in the work from ADAS UK Ltd..."⁷ for the period 2006-2020. It also mentions that as the literature on yields generally expresses land use in terms of area harvested, "[t]here is reason to believe that in the underlying data, increases in cropping intensity (such as multiple crops per year) are mis-classified as increases in land use"⁸.⁹ In Argentina, second sowing or multiple crops are an important issue. Argentina soybean production has a significant wheat-soybean rotation practice, resulting in an annual land occupation ratio of 1.1 to 1.3¹⁰ (between 10% to 30% annual land overlapping use).

Furthermore, it is important to highlight the way in which the DG Energy study mentions that "...studies that rely on historic figures for their yield assumptions will tend to use a lower value than they should." It goes on to say that "[s]ensitivity exercises showed that different assumptions about the response of yields to demand have big impacts on the results, with higher-response assumptions leading to reduction of 27-80% in land conversion or carbon stock loss as compared to the results with studies central assumptions."¹¹ Such statements provide further evidence to argue that the analytical works published so far do not represent a sufficient basis for determining how significant an ILUC factor could be.

Models' treatment of co-product is a very important issue because "[t]he production of the most biofuel crops necessarily entails the production of co-products, many of which – used as animal feed – replace crops that would otherwise need to be grown. When this is taken into account, the estimated land use change impact of biofuel promotion is reduced. Studies suggest that this reduction is by between 8 and 64% (media 36%) for the policy as a whole..."¹², "There is significant divergence between studies concerning the rate at which co-products are assumed to substitute for other types of animal feed and for the types of animal feed they are assumed to replace."¹³ Therefore, it is important to continue studying this topic to have a common vision.

⁶ EU DG Energy (2010), op. cit., p. 5.

⁷ Ibid., p. 47.

⁸ "The distortion could be quite significant since, according to Millennium Ecosystem Assessment, 2005, increases in cropping intensity accounted for about a third of the global increase in area harvested between 1961 and 1999" from EU DG Energy (2010), op. cit., p 12.

⁹ EU DG Energy (2010), op. cit., p. 5.

¹⁰ Cristini, Marcela (2009). "Agricultural Conflicts in Argentina and their Effects on Productivity", docto. Section 4.2, in IDB Working Papers Series N° 102, "The Political Economy of Productivity in Argentina- Interpretation and Illustration", Santiago Urbiztondo (Coordinator).

¹¹ EU DG Energy (2010), op. cit., p. 5.

¹² Ibid., p. 6.

¹³ Ibid., p. 6.

The carbon stock values and the type of converted land are both important issues but – inaccurately used in the modeling process. As for the carbon stock values, all the analysis reviewed based on general information about carbon stocks and biodiversity values present in land use types that are converted. This assumption is inaccurate and thus it can artificially increase the estimations/results. Such values vary from one zone to another and there is a lack of detailed information for all the different regional configurations in the world. In fact, the literature review presented by DG Energy warns that “the carbon stocks attributed to particular land types vary by factors of between 2 and 15 from one study to another.”¹⁴ Also, the IPCC Guidelines 2006¹⁵ recognize the high uncertainty existing in carbon stock values, when in the note of the Table 2.3 warns “...Mean stocks are shown. A nominal error estimate of $\pm 90\%$ (expressed as 2x standard deviations as percent of the mean) are assumed for soil-climate types...”. Moreover, the IPPC recognise that the emission coefficient for direct emission of N₂O (EF₁ default value: 0.01) has a very high level of uncertainty (0.003-0.03). It is important to highlight here that these coefficient and parameters was not developed for estimating emission for a particular crops, if not they were developed to built national inventories.

DG Energy also warns of the numerous differences in how the studies calculate changes in carbon stocks. In other words, DG Energy concludes that studies differ on the proportion of carbon stock loss when land is converted to cropland.¹⁶ Moreover, neither of the studies considers that no till practice is a conservative practice which can reduce the carbon stock losses until a land use changes form grassland to cropland, for example. No-till farming is a conservation practice widely used in Argentina (90% in soybean cropping practice) based on the absence of tillage and permanent soil coverage with stubble on its surface. The no-till practice results in 96% lower soil erosion, 66% lower fuel use, higher water quantity and higher biological activity, between others.

As for the type of converted land, this is not a minor issue as different types of land have different carbon stocks and the methodologies used to establish this are under considerable scrutiny. As DG Energy's literature review identifies, there are two main approaches: the “historical” approach and the “suitability” approach. The “historical” approach has at least three problems. On the one hand, this approach uses satellite images that are debatable, as INTA researchers have shown¹⁷ and as commented previously uses general information by region (e.g. Latin America, pacific developed, etc.) that it is inaccurate. On the other hand, this approach assumes that the same pattern will be reproduced in the future, without considering policies and regulations enforced by governments at the federal, regional and local levels in each country. As a result of the new regulations that are being developed in each producer country, it is likely that the conversion of high biodiversity zones would be avoided. Finally, this approach attributes all the responsibility in the land use change to biofuel producers. The deforestation or change in soil use from grassland to crop land could have been produced (and certainly was primarily produced) by factors other than biodiesel production. This leads to an overestimation of the carbon stock loss caused by crop expansion.

The second approach, of “suitability”, bases its methodology on a set of suitability criteria (e.g. soil suitability, climate suitability, land form/slope, proximity to existing cultivation, legal restrictions, etc.), under which the land assumed to be converted is the land that is considered

¹⁴ Ibid., p.7.

¹⁵ IPCC (2006). “2006 IPCC Guidelines for National Greenhouse Gas Inventories”. Chapter 2. pp. 2.31.

¹⁶ EU DG Energy (2010), op. cit., p. 22.

¹⁷ Carballo, S. and Hilbert, J (2010). Análisis de metodologías empleadas para el cálculo de emisiones de GEI derivados del cambio de uso del suelo. INTA.

most suitable according to biophysical criteria. These criteria vary substantially from one study to another and, "It has not been possible to assess how these differences affect the studies' results."¹⁸ "A general criticism of the modeling exercises that use the biophysical suitability method is that they are not transparent. It is not clear exactly what suitability data are used, how they are weighed or what results they give."¹⁹ Therefore, it could be arbitrary to base a regulation on it.

Significance of the results in terms of hectares of land use change and emissions: Finally, after highlighting the significant number of problems in the modeling of the ILUC, the results obtained from different studies are not reliable at this stage of the scientific progress. Moreover, they demonstrate that the impact of land use change has fallen over time, from a situation where the use of biofuels was clearly undesirable in the early studies (in terms of the results of the emissions), to a beneficial situation for the implementation of biofuels in more recent studies. In the case of soya biodiesel, the emission in comparison with fossil fuel goes from a positive emission of 127-232 gCO₂ (g/MJ biodiesel in Searchinger et al. (2008) to a reduction of 40 gCO₂ (g/MJ biodiesel in EPA report (2010)).²⁰

- 2) On the basis of the available evidence, do you think that EU action is needed to address indirect land use change?

On the basis of the available evidence, we believe that there is no general accepted method for determining an ILUC factor within the Renewable Directive, and there remains a significant degree of inaccuracy. As mentioned before, the ILUC factor is a new concept that has still not been sufficiently developed.

This position is supported also by the independent research company Ecofys, which affirms, that "...no general consensus exists among biofuel stakeholders on whether these indirect impacts are actually significantly large and if so, how large exactly."²¹

At the same time, the Ecofys report outlines that "[t]here are very significant differences between the quantifications of the indirect impacts of biofuels on land use change and associated carbon emission. The impacts on the GHG balances of the fuels, range from 30 to 103 gCO₂eq/MJ fuel, more than a factor of three in difference... these differences in opinion between the different reviewed initiatives do not stem from a radically different approach of the problem but in a few key quantitative assumptions."²²

In light of the currently available data and information, any requirement to account for an ILUC factor is in itself premature. We do not believe that current findings of scientific or other analyses can provide policy makers with a sufficient basis to put forward regulatory frameworks, as this could undermine EU biofuel policy.

- 3) If action is to be taken, and if it is to have the effect of encouraging greater use of some categories of biofuel and/or less use of other categories of biofuel than would otherwise be the case, it would be necessary to identify these categories of biofuel

¹⁸ EU DG Energy (2010), op. cit., p. 6.

¹⁹ Ibid., p. 20.

²⁰ EU DG Energy (2010). Op. cit., p. 189.

²¹ Ecofys (2010). "Summary of approaches to accounting for indirect impacts of biofuel production". Commissioned by Roundtable on Sustainable Biofuels. p.8.

²² Ibid., p. 31.

on the basis of the analytical work. As such, do you think it is possible to draw sufficiently reliable conclusions on whether indirect land use change impacts of biofuels vary according to:

- Feedstock type?
- Geographical locations?
- Land management?

If action is to be taken, on the basis of existing analytical work, it is impossible to draw a reliable conclusion on whether indirect land use change impacts of biofuels vary according to feedstock type, geographical locations or land management.

As the DG Energy literature review states, "...various modeling exercises have not managed to present definite and detailed conclusions on whether or not to prefer certain feedstocks, feedstock-growing regions or fuel types. There can be large range of uncertainty within studies and partly contradicting results across studies."²³

Moreover, "[s]ome studies present results that can be used to compare the land use change impact of different types of biofuels. Their results vary widely. Most often, these suggest that one or another type of biodiesel – most frequently soya - performs worse than ethanol – although the results of the model comparison exercise coordinated by the JRC-IE tend to point in the opposite direction."²⁴

The Table below illustrates the different conclusions that can be drawn, depending on the study used. "EPA results on international land use change in line with IFPRI study by attributing the greatest international land use change effect to soybean biodiesel followed by corn ethanol, both clearly outperformed by switchgrass and sugarcane-base ethanol. The CARB results do not fit the picture that emerged from the IFPRI and EPA studies by predicting the highest land use change effects for sugarcane, which seems very questionable in light of the other studies results."²⁵

Estimation of land use change emission
gCO₂/MJ per annum, 20 year like cycle

Biofuel	IFPRI*	EPA	CARB
Maize ethanol	54-79	51	28-67
Sugarcane ethanol	18-19	6	49-85
Soybean biodiesel	75-68	68	41-77
Palm oil biodiesel	50-48	n.a.	n.a.

Source: EU DG Energy (2010).

Notes:

IFPRI: the first number is the scenario MEU_BAU (Business as Usual Trade Policy Assumption) with peatland effect, the second is the MUE_FT (Free Trade Agreement). March 2010

EPA: March 2010

CARB: 2009

In addition, an incoherent picture emerges from the model comparison coordinated by the JRC-IE. "Biodiesel leads to somewhat higher LUC in FAPRI and EU/German biodiesel leads to much higher LUC than remaining scenarios in the LEITAP model. However, in the most cases this exercise suggests that bioethanol causes greater land use change than biodiesel. Further, these results do not convey information about emissions resulting from LUC. JRC-IE calculated emissions based on a uniform emission factor of 40 tC/ha, providing uncertainty range from

²³ EU DG Energy (2010), op.cit., p. 197.

²⁴ Ibid., p. 25.

²⁵ Ibid., p. 196.

10-95 tC/ha. Looking at the total of results in their figure 22 shows that the highest emission values are found in biodiesel scenarios while the lower are found in ethanol scenarios. However, comparing scenarios within models, again no clear-cut picture of biodiesel versus ethanol emerges for all models (Edwards et al., 2010, p.84)."

Finally, the same study concludes that "It is necessary to devote more research into the question of whether feedstock, fuel or origin matters for the land use change effect. At the moment, the results are too uncertain to be a basis of firm conclusions."²⁶

- 4) Based on your responses to the above questions, what course of action do you think appropriate?
 - A. Take no action for the time being, while monitoring impacts including trends in certain key parameters and, if appropriate, proposing corrective action at a later stage.

On the basis of the analytical work presented by the European Commission and our additional literature review and analysis, we conclude that the only option is take no action for the time being.

Regarding how monitoring should be done and what parameters should be considered, we propose that, the EU follows and/or supports local analysis in the main biofuels producer countries which use accurate information (like satellite data with high resolution focus on the land use in the different regions of the countries, national and updated databases, local GHG emissions measure on fields) and local solid expertise from universities, research centers and/or agricultural organizations in each countries.

- B. Take action by encouraging greater use of some categories of biofuel

Considering the currently available scientific data, any action which encourages a greater use of any kind of biofuels would be premature and could violate WTO rules. The implementation of a discriminatory measure detrimental to a product based solely on the feedstock used for production (or production procedure or method) could be challenged before the WTO Dispute Settlement Body. Such a measure could be considered as an unjustified discrimination, benefiting one product over another, and thus harming or benefiting certain producing countries over others. It is therefore important to treat as "like products" the various types of biofuels within the guidelines developed at length within WTO DSB findings.

- C. Take action by discouraging the use of some categories of biofuel

As it was aforementioned in the above paragraph, any action which discouraging the use of any kind of biofuels would be premature and could violate WTO rules.

- D. Take some other form of action

For the time being, based on the analytical work done, we do not consider it appropriate to include some other form of action.

We encourage the EC to foreseen a multilateral approach on ILUC, particularly with developing countries, in order to exchange different views and information and to promote a common understanding about this novel concept and the link with biofuels and climate change policies.

²⁶ Ibid., p. 197