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Indirect Land Use Change Impacts of Biofuels – Consultation
Argentina Document

Introduction

The Argentine Republic acknowledges the opportunity provided by the European Commission to submit comments regarding: the indirect land use change impact of biofuels.

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 no 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.

There is no scientific evidence about the impacts of the Indirect Land Use Change (ILUC) from biofuel production. Therefore, the implementation of measures related to ILUC factor would constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Moreover, those policies could have serious implications in developing countries, leading to the need to adapt their production patterns to foreign environmental standards –design by developed countries- which do not consider their development needs, capabilities and special conditions. Any model must be flexible, and take into account specific regional an national conditions, in particular the different capabilities to comply with those standards.

Developing countries tend to have characteristics that make them particularly difficult to introduce ILUC accounting, in particular those related with carbon emission generated by LUC. The application of such policies –through trade related measures- should not implies additional compliance costs in developing countries.
There must be a serious compromise from developed countries in terms of technical assistance and scientific cooperation.

In this regard, ILUC models should take into account that most developed countries created their agricultural land many decades ago producing also LUC. This means that historical responsibilities should also be taken into consideration when designing and implementing these kind of measures, besides the principle of "common but differentiated responsibilities."

It should be noted that trade measures -implemented within the framework of the EU Renewable Energy Directive by the application of the concept of ILUC- are oriented to modify process and production methods of other countries in order to adapt them to patterns of production and consumption in the EU. Developing countries should not be penalized, since local methodologies and studies indicate that there own index are sustainable.

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 is already doing to mitigate 'Land Use Change'.

'Land Use Change' Mitigation Facts in Argentina:

Argentina has large, fertile, natural meadows with a warm climate and above average productivity. These areas are ideal for crop production. Argentina is recognised as having one of the most sustainable agricultural systems in the world. Sustainable agriculture implies a virtuous circle integrating no-till farming, crop rotation practices, integrated pesticide/herbicide management, nutrient recuperation and rational use of agricultural machinery. This circle constitutes so-called Good Agricultural Practice (GAP). GAP increases productivity, conserves natural resources, contributes to carbon sequestration and natural nutrient replacement, and prevents soil exhaustion.

Argentine soybeans are typically cultivated using no-till techniques. No-till involves planting seeds without turning over the soil, using specialist drilling equipment capable of cutting through carbon-rich surface crop residues. Under conventional tillage these residues would be removed, releasing greenhouse gases. No-till techniques, properly applied under climatic and soil conditions typical of Argentine soy cultivation areas, can thus significantly reduce GHG emissions. It also minimizes water losses from direct soil evaporation, minimize residue disturbance and erosion losses, and favour soil biodiversity.

Soybeans, as with most leguminous, fix nitrogen from the atmosphere, avoiding the use of artificial fertilizers which is another source of GHG emissions.

Argentina has a vibrant group of soy-based industry associations which are proactively involved in shaping high sustainability practices and promoting industry self regulation. Examples include the Argentine Biofuels Chamber (CARBIO), the Roundtable on Responsible Soy Association (RTRS), the Argentine No-till Farmers Association (AAPRESID), the National Institute of Agricultural Technology (INTA) and the Argentine Soybean Chain Association (ACSOJA), among others.

Soy in Argentina is grown basically not for its oil – from which the biodiesel is made – but to produce soy meal, a high-quality feed for animals. Soy oil is a by-product of the soy meal production process. Growth in biodiesel production meaning more of the oil by-product which it can be used to make biofuel rather than for other purposes, but this does not result in pressure to expand the land area used to grow soy.

The Pampa region contains approximately 75% of Argentine land devoted to soybean cultivation, as well as the most important refining and export infrastructure. Another major reason for the geographical concentration of soy cultivation in the Pampa region, besides the fertility of the land, is the close proximity of shipping ports on the Paraná River, the South America's second largest watercourse which runs for more than 1,000 km through Argentina. This makes possible to reduce transportation costs as well as reduce greenhouse gas emissions.

Moreover, the heart of the Pampa soy growing region is around 1,000 km from the northern part of Argentina where tropical forests grow. Argentine government, producers and NGOs are actively involved in properly identifying and protecting these high conservation value areas from potentially negative land use changes. The best example is the 2007 Forest Law: In November 2007, the Argentine Congress passed Law 26.331, known as the "Forest Law". Among other provisions, the law establishes a moratorium on any natural forest cutting until each province produces a Native Forest Land Inventory and Land Management Plan and an obligation to produce an environmental impact study and hold a public hearing before approving any clearing respect for the rights of indigenous and rural communities over forests they use.

Argentine provinces have begun enacting land zoning policies under the Forest Law's land management provisions, laying out areas where agricultural expansion is banned due to environmental concerns and areas where agricultural expansion is permissible – an example is shown for the north-western province of Salta.

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]without 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.

[1] EU DG Energy (2010). "The Impact of Land Use Change on Greenhouse Gas Emission from Biofuels and Bioliquids". Literature Review. July 2010. P. 7.
[2] EU DG Energy (2010), *op. cit.,* p. 5.
[3] *Ibid*., p. 29.

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-Argentina[5] 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.

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 a common practice. Argentina soybean production has a significant wheat-soybean rotation practice, resulting in an annual land occupation ratio of 1.1 to 1.3[10] (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

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[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.
[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 Nº 102, "The Political Economy of Productivity in Argentina-Interpretation and Illustration", Santiago Urbiztondo (Coordinator).

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 studding this topic to have a common vision.

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 2006[15] 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 ±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 N_2O (EF_1default 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 consider 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

[11] EU DG Energy (2010), *op. cit*., p. 5.
[12] *Ibid*., p. 6.
[13] *Ibid*., p. 6.
[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.

three problems. On the one hand, this approach uses satellite images that are debatable, as INTA researchers have shown[17] 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 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 use, 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 (eg/MJ biodiesel in Searchinger et al. (2008) to a reduction of 40 gCO2 (eg/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]

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[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.
[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.

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.

Existing methodologies to calculate the impact of ILUC on greenhouse gas (GHG) emissions highlight major discrepancies when they are applied to different biofuel production processes, giving different results according to specific processes evaluated. Percentages of a biofuel's negative or positive impact on GHG emissions vary a lot depending on the crop and zone of production, and asserts that existing studies show a low level of scientific support. Therefore, it would be not appropiate to use current methods as a basis for policymaking.

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 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]

[22] *Ibid.,* p. 31.
[23] EU DG Energy (2010), *op.cit.,* p. 197.
[24] *Ibid.,* p. 25.

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 firth 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 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 biofuel 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

[25] *Ibid.,* p. 196.
[26] *Ibid.*, p. 197

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 Considering the currently available scientific data, any action which encourages a greater use of some kind of biofuels would be premature. There is no sound scientific evidence supporting the environmental effectiveness of the land-related sustainability and ILUC criteria, therefore the differential treatment on environmental grounds cannot be justified.

Consequently, those kind of policies could constitute an arbitrary or unjustifiable trade discrimination or a disguised restriction on international trade.

The Directive does not by its terms discriminate against biofuels from specific countries. However, if those biofuels that are treated less favorably by the Directive are in practice solely, or predominantly, from certain WTO Members, this would be inconsistent with the multilateral trade system. Moreover, biofuels that differ only on the basis of the feedstock used for production, or land-related sustainability criteria are probably “like products”, because the land from which they are derived does not affect the physical characteristics of the final product. Therefore, those products should be treated as “like products” according to the non discrimination principle.

In this regard, the EU measures could constitute a “de facto” restriction by penalizing biofuels that do not meet the land-related sustainability criteria.

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.