PATAGONIA BIOENERGIA

Indirect Land Use Change Impacts of Biofuels – Consultation
Argentina Document

Introduction

Patagonia Bioenergía SA, a biodiesel producer company from Argentina, 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 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.

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 recognized 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 Practices (GAP). GAP increase 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, minimizes residue disturbance and erosion losses, and favors soil biodiversity.

Soybeans, as with most leguminous plants, 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 means more of the oil by-product which is 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.

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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, South America's second largest watercourse which runs for more than 1,000 km through Argentina. This makes it possible to reduce both, transportation costs and 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. The 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, and 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.

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 Energy 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].

[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.

On the other hand, the analytical work referred in the consultation does not split 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 talks about how complicated it can be.

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-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 body of expertise that comes from universities, research centers and agricultural organizations is 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 miss-classified as increases in land use[8]."[9] In Argentina, second sowing or multiple crops are an important issue. Argentina

[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.
[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.

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 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 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% (median 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.

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 are 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 they warn "…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 coefficients and parameters were not developed for estimating emissions of a particular crop but to build 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, none of the studies considers that no-till practice is a conservation practice which can for example reduce the carbon stock losses when land use changes from grassland to cropland. 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

[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).
[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.

practice results in 96% lower soil erosion, 66% lower fuel use, higher quantity of soil water and higher biological activity, among other benefits.

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. First, 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. Second, 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 will be avoided. And third, this approach attributes all the responsibility for the land use change to biofuel producers. The deforestation or change in soil use from grassland to cropland 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 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, emissions in comparison with fossil fuel go 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.

[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.

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 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 are 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-based 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]

[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.
[23] EU DG Energy (2010), *op.cit.,* p. 197.
[24] *Ibid.,* p. 25.
[25] *Ibid.,* p. 196.

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Estimation of land use change emission
gCO_2eq/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: CARBIO, 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 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, it 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)."[26]

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."[27]

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.

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

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 mentioned in the above paragraph, any action which discourages the use of any kind of biofuel 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 appropriate to include some other form of action.

We encourage the EC to foresee 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.

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