E4tech (UK) Ltd
83 Victoria Street
London SW1H 0HW
United Kingdom

European Commission
DG Energy - ENER.DDG1.C.1
'Regulatory policy & Promotion of renewable energy'
Rue De Mot 24-26
B-1049 Bruxelles
Belgium

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RE: E4tech's response to the consultation on the indirect land use change impacts of biofuels

To whom it may concern,

This letter provides E4tech's submission in response to the European Commission's consultation on the scale and characteristics of indirect land use change (ILUC) impacts of biofuels and how the issues could be addressed.

E4tech is an independent business consultancy focused on sustainable energy. One of our main areas of expertise is biomass and biofuels, where we have worked with commercial and government sector clients on a broad portfolio of projects, such as technology and market assessment, strategy development and business planning, sustainable and global potential assessment and policy analysis and input. For example, we are currently working with the UK Renewable Fuels Agency on the implementation in the UK of the European Directive 2009/28/EC on the promotion of the use of energy from renewable sources (RED).

E4tech's work concentrates on areas where innovative thinking and new knowledge creation are important. As such, indirect impacts of biofuels have been part of many of our bioenergy projects. E4tech contributed to the background studies and modelling for the Gallagher review of the indirect effects of biofuels production[1]. More recently, E4tech developed a causal-descriptive methodology for the assessment of the greenhouse gas (GHG) impacts of indirect land use change associated with biofuels, and applied this methodology to five biofuel chains[2]. This study, commissioned by the UK Department for Transport, analysed the cause and effect links that lead to indirect land use change, based on a wide range of evidence from literature and stakeholders.

These projects point to the conclusion that GHG emissions associated with ILUC can be significant in comparison to direct GHG benefits of biofuels. Thus a mechanism needs to be put in place to ensure that these emissions, and the impact of ILUC more generally, are minimised. The most robust approach is to prevent any more high carbon stock land being brought into agricultural production worldwide. This will

[1] Renewable Fuels Agency (2008) *The Gallagher review of the indirect effects of biofuels production*: http://www.renewablefuelsagency.gov.uk/sites/renewablefuelsagency.gov.uk/files/_documents/Report_of_the_Gallagher_review.pdf.

[2] E4tech (2010) *A causal descriptive approach to modelling the GHG emissions associated with the indirect land use impacts of biofuels: http://www.dft.gov.uk/pgr/roads/environment/research/biofuels/pdf/report.pdf*.

ensure that biofuels provide net GHG savings compared to current fossil fuels. We recognise that this is challenging and will require time to be implemented through policy, and therefore we also recommend that in the short-term, an approach based on ILUC risk levels should be taken.

We do not believe ILUC factors are an effective mechanism for addressing the ILUC impacts of biofuels because of the uncertainties associated with accurately calculating them. GHG thresholds are similarly problematic if they attempt to take indirect emissions into consideration, and clearly would not address the ILUC issue if they only consider direct emissions. Furthermore, these approaches are reactive in the sense that they do not consider ways in which ILUC can be mitigated.

1 DO YOU CONSIDER THAT THE ANALYTICAL WORK REFERRED TO IN THE CONSULTATION DOCUMENT, 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?

Due to its indirect nature, ILUC cannot be observed or measured. Its understanding and estimation thus relies exclusively on modelling.

Different modelling approaches have been applied to date: economic partial and global equilibrium modelling, causal-descriptive modelling, allocation-based modelling. Within each of these categories, several models exist, which make different assumptions on how the systems behave and use different input data sets. The results provided by all these models vary widely, depending on assumptions, input data, calculation mechanisms, etc.

The three modelling studies launched by the European Commission are based on economic equilibrium models. While these models are in theory suitable tools for modelling ILUC mechanisms and impacts on GHG emissions, the models currently used still have many gaps which lead to considerable uncertainty over the magnitude of the impacts modelled. These deficiencies are described in the work published by the EU and referenced in the consultation document. We would therefore like to highlight our recent study, published by the UK Department for Transport, which uses a causal-descriptive modelling approach. We believe this work complements the results of the economic models by exploring some of the issues that have not yet been addressed in those studies.

The causal-descriptive approach helps elucidate the chain of events that can lead to ILUC, and in this way is more transparent than economic models. It is based on an analysis of historic and market trends, and makes wide use of stakeholder and expert input for understanding potential future deviation from these trends. For this reason, it also provides stakeholders with a greater understanding of how ILUC comes about and how it can potentially be mitigated. The study explored several scenarios and their influence on the ILUC impact, such as decreasing future deforestation rates, higher / lower yield increases than projected, different uses of biofuel co-products, etc. The analysis of the chain of events and the exploration of scenarios has allowed the identification of ILUC mitigation actions and their possible effectiveness.

Overall, the comparison of the key studies to date indicates that:

- There are large uncertainties associated with the estimates of ILUC impacts on GHG emissions associated with a growth in biofuel production. These uncertainties result from the uncertainty in modelling the future, modelling the interrelated market effects that lead to ILUC, as well as the

uncertainties on where exactly LUC will take place and the carbon stocks associated with that land.

- It is, and is likely to remain, impossible to calculate a robust and precise estimate of the magnitude of the ILUC impact caused by certain biofuels or of the risk of the biofuel causing ILUC. However, all models point towards the fact that additional demand for biofuels generally results in ILUC and that the GHG emissions associated with the ILUC impact can be significant in comparison to the emission savings.
- It may be possible to associate a level of *risk* of ILUC impact (called ILUC risk hereafter) to different biofuels based on the modelling of ILUC impacts and the comparison of different modelling outputs.

2 ON THE BASIS OF THE AVAILABLE EVIDENCE, DO YOU THINK THAT EU ACTION IS NEEDED TO ADDRESS INDIRECT LAND USE CHANGE?

There is strong reason to believe that additional demand for agricultural products for biofuel production can result in expansion of agricultural land somewhere in the world, at least in the short term. As European demand can contribute to this expansion, EU action is needed to avoid or mitigate the risk of ILUC impacts. We feel that this is needed to ensure that the European Commission's and Member States' biofuels policies are consistent with environmental objectives and to ensure a sustainable and sustained growth of the biofuels industry.

The problem stems from the fact that biofuels cause additional demand for products, but stakeholders only have a limited control on the indirect impacts of their supply. Thus the outcome of any proposed solution would have to do one of the following:

- limit demand,
- ensure demand is met by low ILUC risk biofuels,
- and/or ensure that any expansion at the agricultural frontier does not take place on high carbon stock land.

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:

The difference in approaches and results of ILUC models show that a classification of biofuels with regard to their ILUC impacts should not rely on precise GHG emissions estimates of one single model. Rather, we believe a classification in terms of ILUC risk is possible, based on a wide range of model outcomes.

However, ILUC impacts are dynamic, i.e. they vary depending on biofuel policies, land use zoning policies and other environmental and agricultural policies. Therefore there needs to be recognition of the fact that any ILUC risk-based categorisation of biofuels could change over time.

3.1 FEEDSTOCK TYPE?

Based on our ILUC modelling experience, biofuels could be classified in terms of ILUC risk, based on the type of feedstock used. The type of feedstock determines many of the modelling parameters that affect

the ILUC risk, such as substitute products for biofuel feedstocks and their production geographies, type of co-products produced and thus possible use, etc. And different modelling exercises, especially more recent ones, produce results which indicate that a common ranking of biofuels based on their feedstock could be possible. For example, palm biodiesel is assigned a high ILUC impact by most models (in comparison with other feedstocks) and could thus be associated with a high ILUC risk, while sugarcane is generally attributed a relatively low ILUC impact and could thus be associated with a lower ILUC risk. Our modelling has also highlighted that there are circumstances in which biofuels could have a much lower / higher ILUC factors. For example, the ILUC impact of palm can be significantly decreased if there is no further expansion onto peatland. Therefore, actions can be taken that can reduce the ILUC risk of biofuels based on different feedstocks. These actions can be broadly categorised as: a) actions that can control the type of land use change (e.g. protecting high carbon stock areas), or b) actions that control the extent of ILUC (e.g. increasing agricultural yields).

3.2 GEOGRAPHICAL LOCATION?

There are many different geographical locations that could be considered when dealing with indirect land use change. The location of demand, of feedstock production, of final biofuel production, or of impact can all be different. For example, an increased European demand for soybean oil biodiesel could be in part met by oils from soybeans grown in Argentina. The oil will be extracted in Argentina and then imported to Europe for final processing. But, our research indicates that the use of soybean oil for biodiesel, rather than causing an increase in production of soybeans, is more likely to lead to a reduction in soy oil in the food market in key soy oil importing markets, which will probably be replaced by additional palm oil produced in Indonesia or Malaysia. In this example, location of demand is Europe, location of feedstock production is Argentina, location of final biofuel production is again Europe and location of land use impact is Indonesia and Malaysia.

Geographical location of demand can have an impact on the ILUC impact through the choice of feedstock to supply that demand (e.g., use of ethanol from wheat in Europe vs. use of ethanol from corn in the US). Production location of the biofuel feedstock may also affect the ILUC impact (e.g. producing wheat for biofuels in Europe may lead to different land use change impacts from those that would occur if the wheat were imported). Therefore, demand and production location may affect the market response of how that demand is supplied. However, given the uncertainty of market responses, it would be most prudent to consider the ILUC risk based on a range of scenarios that consider how production location and trade patterns may be affected. This is likely to be more important for crops that can be cultivated across wider geographies.

3.3 LAND MANAGEMENT?

Land management is crucial to reducing the ILUC risk, but it is only effective if applied across all sectors (agriculture and forestry).

4 BASED ON YOUR RESPONSES TO THE ABOVE QUESTIONS, WHAT COURSE OF ACTION DO YOU THINK APPROPRIATE?

Increased demand for biofuels currently presents a risk of ILUC and associated GHG emissions. Obviously, a precautionary principle could be applied and biofuel demand not stimulated through policy. Or policy incentives could only be directed towards biofuels that do not rely on cultivated feedstocks that compete for agricultural land, e.g. residues and wastes and feedstocks that could be grown on land that would not be used for food production.

However, it is likely that bioenergy will need to play an important part in the future energy system to complement other renewables and low carbon sources of heat, electricity and fuels, as indicated by IEA and other energy scenarios such as the UK DECC 2050 pathway scenarios.

As a result, and in the light of the EC RED targets, there is a need for biofuels policy to mitigate the risk of ILUC to levels that would prevent any significant GHG emissions and environmental impacts. This will require taking actions that will control the land use change that may result from biofuel demand and limit the GHG emissions that may result from it.

This can be done by: a) actions that control the type of land use change, and b) actions that control the extent of ILUC. See table below (E4tech (2010) referenced above).

Objective of ILUC mitigation action	Examples of actions
To control type of LUC	• Direct biofuel feedstock production to certain types of land • Protect high carbon stock areas • Use low carbon stock areas for agriculture • Use land use zoning and planning • Ensure sustained and sustainable use of agricultural land
To control the extent of LUC	• Increase agricultural yields • Improve supply chain efficiency • Ensure co-products replace land-based products

These actions rely on the implementation and enforcement of appropriate agricultural and forestry policies, and improved feedstock production and management of biofuel chains. Our modelling shows that the implementation of such actions can significantly reduce the risk of ILUC and the GHG emissions associated with it. The integration and stimulation of these actions through policy mechanisms requires further thinking, but there are several ways in which these could be stimulated e.g.:

- Through global land zoning and enforcement of policies that protect high carbon stock and ecological value land. We see such policies as tackling the root of the problem and having other indirect benefits, such as conservation of biodiversity.
- Through additional sustainability criteria related to the actions in the table above which apply to biofuel chain practices and more broadly to agricultural, forestry and land use policies.
- Through the introduction of ILUC risk categorisation of biofuels that would distinguish between different biofuels and possibly between the sustainability criteria that would apply to them. An example of ILUC risk categorisation approach is provided in the ILUC consultation response submitted by the Low Carbon Vehicle Partnership (LowCVP). We would like to point out that we

see this as a transitional approach to mitigating the risks of ILUC impacts from biofuels, with effective protection of high carbon stock and ecological value lands taking place in the long term. In addition, the need for updating these ILUC risk categories over time (an essential component of ensuring the categories best represent the risk at any one point in time), the effort required and the implications for the biofuel industry need further consideration.

We thank the European Commission for the opportunity to comment on the issues around the indirect land use change impacts of biofuels. Please contact us if you have any questions or would like to discuss further the content of this response.

Yours sincerely,

Dr Ausilio Bauen (on behalf of the E4tech team)
Director

Email: ausilio.bauen@e4tech.com
Tel.: +44 20 30086140