To: European Commission

cc.
UK Dept for Transport
UK Dept for Energy and Climate Change
UK Dept for Environment, Food and Rural Affairs
UK Renewable Fuels Agency

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The NFU represents 55,000 farm businesses in England and Wales involving an estimated 155,000 farmers, managers and partners in the business. In addition we have 55,000 countryside members with an interest in farming and the country.

Indirect Land Use Change Impacts of Biofuels: Consultation 2010

1. Do you consider that the analytical work referred to above, and any other in this field, provides a good basis for determining how significant ILUC resulting from biofuels is?

The NFU does not agree the work on ILUC provides a good basis for determining how significant ILUC resulting from biofuels is.

The concept of indirect land use change has not been developed with rigour and has been applied as a significant simplification after misunderstanding of the many drivers of land use and land use change.

The NFU in particular is concerned that the ILUC debate and studies are based on many misconceptions about agriculture, agricultural land use and agricultural commodity markets. Such misunderstandings of the drivers of agricultural land use including: physical (e.g. infrastructure), social (e.g. consumer demands, tradition, business structure), economic (e.g. ability to take financial risk, investment on farm, access to capital, ownership of land, technology investment), policy/regulation (e.g. limitations on land use, types of production) and climate (e.g. soil type, rainfall).

Land use change is not a new area of research and has been studied for many decades. Predicting LUC is acknowledged throughout this body of work to be difficult due to the complexity of factors and interactions of the drivers of land use including economics, politics, culture, technology, management and diversity of landscapes. The concept of ILUC introduces a further dimension of complexity and uncertainty by attempting to then attribute LUC to indirect, unrelated factors.

The various reports on ILUC, included those listed under the current Commission consultation, rely heavily on macro-economic modelling to try and "measure" these effects and quantify these complexities. The models used were not designed for this use and are inadequate, inappropriately used and have to rely on layers of assumptions about price, land availability, production potential, land types, market drivers, agricultural intensification, farmer decision making, impacts of co-products and the interaction between different supply chains.

The difficulties in the modelling and the layers of assumptions are also largely ignored by ILUC papers which report potential carbon impacts as percentages to detailed levels. This appears to be spurious accuracy, even ignoring the concerns over the inadequacies of the modelling, when the high levels of sensitivity to slight differences within data and assumptions resulting in widely different outcomes.

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Comments on ILUC reports and studies

1. Economic Models

- Aglink-Cosimo, Esim and Capri were designed to assess the impacts of the Common Agricultural Policy; including potential direct impacts on trade, in regions and greenhouse gas emissions. None of the models were specifically designed to asses the land use change impacts of a specific market. The ILUC studies have attempted to utilise the models adapting them via 'add-ons' to cater for the specifics of biofuels policies.
- Partial Equilibrium models do not consider all commodities and markets in the world; just agricultural markets. This has important implications for modelling results as fuel demand is considered exogenously. Therefore where the price of fuel is affected by biofuels content and other factors the subsequent decreased demand for both fuel types is not accounted meaning that all the models overestimate demand for biofuels, and therefore the feedstocks. This cannot simply be solved by inputting the new demand level, as this will change the final cost of fuel and hence the demand will change again.
- The reports and models despite claiming to model the demand created due to the renewable energy directive fail to model the direct fundamentals of the policy including the restrictions on sourcing under the carbon and sustainability criteria.
- There is a lack of transparency/objectivity in the macro-economic models in particular with assumptions not justified and sources not cited.
- The input data around land areas is subject to significant uncertainty.
- The models, including ESIM and Capri, are static and are not able to accommodate changing regulatory and technological environment.
- The GTAP model was not developed for agricultural trade or ILUC and has severe limitations. The IFPRI study attempts to compensate for this but uses arbitrary, unjustified figures for a range of factors.
- A central assumption in CARB calculations of the land-use change carbon intensity of biofuels is the "elasticity of crop yields with respect to area expansion." This elasticity attempts to capture differences in yields from newly converted lands and established areas of the same crop. The basic premise is that "all of the land that is well-suited to crop production has already been converted to agricultural uses; yields on newly converted lands are almost always lower than corresponding yields on existing cropland, i.e. that only technically marginal land is not farmed with arable crops. This principle is also taken up in other models. This is despite land use changing, cropped land moving in and out of use, technical productivity not maximised even for current technologies on significant areas of existing crop land.
- Farmers respond to policy and market signals – in the UK is might be reasonable to assume farmer reaction to low prices has resulted in extensification of grain production with lower output than might have been achieved but with significantly lower investment in machinery and labour and a changed approach to crop protection and nutrition inputs.

2. Assumptions: Agriculture / Agricultural markets

- Agricultural commodities are dealt with in isolation from other markets and substitution between crop types and between different crop types are inadequately accounted for. For example the role of oilseeds in vegetable oil and protein markets. The drivers of production vary between these markets and also between different oilseeds depending on their oil content, oil properties and protein type and quantity.
- Yield/productivity gains from improved practice, changing varieties, distribution/uptake of technology, changing rotations to increase or decrease crops within cropping cycle are unable to be accounted for in many of the models and the related assumptions are not cited or justified.
- Co-products are not treated in a consistent or appropriate manner in the models. This is due to the inability and incorrect assumptions within the economic modelling to address the interaction

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and substitution of cereals, protein and oilseeds both between crops of the same type and between crop types.

- Distinction between permanent and annual crops is not made clear and often is not addressed within modelling and assumptions.
- Oilseeds and vegetable oil are treated too simplistically. Oilseeds interact in different markets, with vegetable oil, protein and whole seed/bean supply and demand operating often independently. In addition drivers in vegetable oil markets over simplify the different role different vegetable oils play in each market, technical limitations such as palm oils use in biodiesel and different oil qualities in oilseed rape (e.g. “0” and “00” varieties).
- The economic modelling equates price to demand and fail to acknowledge the differences within oil markets, based on quality and physical properties.
- Co-products have a significant importance, that is not recognised in the modelling, for reducing reliance on crop production in other sectors such as protein crops in livestock feeds. A recent ADAS paper has helped quantify the potential affects of grain based ethanol production on reducing reliance of imported soy into the European Union[1]
- Impacts of other policy’s such as the afforestation programmes in south America, the European policy impacts on protein and oilseeds trade of the GMO regulation, restrictions on nitrogen use in agriculture through water framework directive and other resource protection legislation are not considered as factors influencing the markets of grain, oilseeds and sugar.

3. Assumptions: Yield

Productivity is a function of many factors – yield potential of the crop, climate and inputs. Increasing yields doesn’t mean increasing emissions by increasing inputs and nitrogen. The use of fertiliser to increase yields increases the yield and CO_2 capture of that plant. Use of nitrogen fertilisers for example improves yields but also allows plant to fix more CO_2. For plants the main source of carbon is CO_2 in the atmosphere, which is captured during photosynthesis

- The ILUC models make statements/assumptions of yield and fertiliser use on a basis of higher yield comes (only) from increased fertiliser use, which is incorrect. Defra data in the UK shows increasing yields with a decreasing trend in fertiliser application rates
- FAO estimates extra food production by 2030 will come from 20% increased land, 70% increased yield and 10% greater cropping intensity… Biofuels provide a mechanism to encourage technical productivity through investment in agriculture to increase yields[2]
- Yields assumed to be lower on land brought into cropping. This assumption is widely quoted but is not justified nor supported by evidence. In this way many reports penalise production twice first by assuming conversion or increase in area cropped is from a different land type (grasslands, pastures, forest[3]) and second by inferring, without justification or evidence, that these yields would then necessarily be lower
- Yield gaps of approximately 20 per cent are common in developed countries. For example estimated sizes of yield gap for sugar beet production across Europe[4] showed at one extreme, France, Belgium, Netherlands and UK delivered approximately 75 per cent of the achievable yield while Poland only delivered 30 per cent. Polish sugar beet yields have since risen by about 60 per cent in the last 15 years. This clearly illustrates the effects that rewards, appropriate trading arrangements, and access to modern varieties and mechanisation and crop protection technology can have on productivity.

[1] Opportunities for avoidance of land-use change through substitution of soya bean meal and cereals in European livestock diets with bioethanol coproducts; GCB Bioenergy (2010); R. Weightman, B Cottrill, J Wiltshire, D Kindred, R Sylvester-Bradley

[2] Gallagher Report (2008) Box 3.1 p30

[3] See section 4 of the NFU comment below: Land Assumptions

[4] Pidgeon, Werker, Jaggard, Richter, Lister, Jones (2001) Climatic impact on the productivity of sugar beet in Europe, 1961–1995. Agric. Forest Meteorol. 109, 27–37

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Yield production effects from climate in the reports and others presented on ILUC often cite climate change impacts as only potentially reducing productivity. In fact some aspects of climate change may have important benefits for productivity, including in the European Union.

- For example the concentration of CO2 in the atmosphere affects the water economy of crop plants. Increased CO_2 increases the rate at which this gas diffuses into leaves through the stomata, relative to the rate at which water vapour diffuses out. Because the extra CO_2 increases the rate of dry matter production of C3 plants, this change in relative diffusion rates also increases the water use efficiency (WUE), the amount of dry matter produced per unit of water transpired. An increase in the $[CO_2]$ also causes a decrease in the aperture of the stomata, which reduces the rate of water consumption[5]. While this is to not try and state that production will increase as climate changes it is to balance out claims in reports of only potential negative impacts of climate changes expected., and to highlight the complexity of aspects not considered within the economic modelling
- Many analyses of attainable yields suggest in most regions of the world large attainable yield gaps are present which given correct political, economic and technological conditions are bridgeable[6]

4. Assumptions: Land

To enable production of figures regarding land use change in other countries it is important to have an assessment of which other countries an increase in imports might come from and hence where land use change might occur.

- Most economic models use simple (positive) relationships between demand for products and land use change. However, empirical evidence and analysis from the many decades of research on LUC reveal significantly more complex relationships, where land use change is influenced by profitability of farming (and reduced need for subsistence farming), regulation, infra-structure.
- Land use is seen in discrete categories “cropland”, “pasture land”, “idle land” rather than the reality that the same land parcels regularly change in use. (See FAO stats on land use, example below)
- Land use is also always assumed as being at a maximum technical efficiency for that land category across or even within calendar years.
    - This is clearly demonstrably not the case, with variations in productivity between different farms in the same countries. For example in the UK the wheat average was 7.9 tonnes over the last 5 years. Some farmers regularly achieve over 10 tonnes per hectare average, and others less than 7 tonnes. Differences can be partly attributed to soil and climate however the adoption of technology, and up to date crop management understanding also plays an important part.
    - Yield gains are about more than technology and variety development but also sharing best practice and education.
- LUC equally in models is simplified and is deemed to be linked to commodity price.
- In reality land use change is influenced by multiple factors and land comes in and out of production each year depending on local and regional policy and regulation, market prices, market value/risk, market access, productivity and infrastructure.
- In the economic modelling land use is taken to be in a constant equilibrium state; with all land assigned to use (crop/pasture) with fixed area, with all LUC driven by relative prices. This fundamental baseline assumption is weak but is relied on to determine area of land change between different defined uses. In reality land cover and uses are in constant flux[7].
- The drivers of initial conversion of high carbon/high biodiversity land areas such as grasslands and rainforest are often distinct from later use. For example clearance of woodlands/forest for

[5] Ibid 3

[6] ADAS – Anticipated potential improvements in land productivity and increased agricultural inputs (Gallagher contributory report)

[7] For example EU arable land area fluctuations over the last 10 years

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timbre where infrastructure is developed to access land areas allowing farming/cropping or other uses to move in at a later stage on already cleared land.

- Land is assumed to be in an optimal allocation, where in reality actual land use allocation is not optimal. This can be shown by varying production each year, yield gaps between potential yields of varieties and on farm averages.
- Previously cleared but under utilised land is omitted as an asset class. Models based on better data for available land assets and classes have totally different LUC results
- Modelling assumes land assets are private owned managed assets, to help" describe" ability to change its use. Most initial LUC occurs when tenure is uncertain
- Co-products: for OSR, soy, wheat and maize the land requirements per tonne of biofuel are reduced by 60-81%.[8]

Additional observations on the reports presented under the Commission consultation

- IFPRI model still shows a net positive affect even where ILUC is considered
- The figures resulting from the modelling undertaken in the various studies show the land use change figures are within the normal existing variation year by year in arable land use.
    - Average annual variation in arable land area (2000 – 2007[9])
        - Global = 2 Mha
        - EU = -0.9 Mha
- Studies and analysis is clear that arable land area in the EU will continue[10] to fall with or without the RED. By encouraging utilisation of biomass feedstocks into energy markets it is predicted that this decline can be slowed. This ability to slow such decline maintains the productive capability of that arable land area, important for maintaining our productive agriculture for all future demands.
- Land availability for increasing production has been shown by many detailed studies.
- European crop land is expected to still fall in those studies presented by the EU Commission. Biofuel demnand can help reduce this expected fall of area decline however the importance of this in maintaining agricultural productivity is not mentioned in any study.
- IIASA study [*taking into account water availability biodiversity value, forest cover and other indicators showing unsuitable land for agricultural expansion*] indicated hat between 790million hectares and 1,215 million hectares of suitable land was potentially available globally. [11]

Land use impacts overview of the study results[12]

IFPRI/MIRAGE
Globally 0.07% - 0.08% land use change, with 0.05% - 0.07% in the European Union.

JRC – IPTS
(Modelling EU land use only) Overall reduction in land area still predicted; although smaller than without the RED

AGLINK-COSIMO
0.7% increase in sugar, cereal and oilseed area
EU land use: again a reduction in overall arable area, smaller decrease than with the RED (- 0.72% against prediction without the RED of - 1.15%)

ESIM
EU land use again a reduction in arable land area, smaller than without RED (-0.72% against predicted -1.15% without the RED)

8 ECOFYS: Land use requirements of different EU biofuel targets in 2020 (Gallagher contributory report)
9 FAO Stats (2010) analysis courtesy of Porter Alliance
10 FAO Stat 2000 – 2007 EU arable land area declined by around 7Mha from 115 Mha to 108 Mha.
11 p34
12 Initial findings presented at LowCVP stakeholder meeting 3 September 2010

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CAPRI
0.05% for cereals, 10.5% for oilseed rape

JRC-ISPRA
Ethanol 0.1 – 1.4Mha = 0.05 – 0.7% global arable land area
Biodiesel 0.2 – 2.0 Mha = 0.1 – 1% of global arable land area

2. On the basis of available evidence, do you think EU action is needed to address ILUC?

The available evidence on indirect land use change is highly uncertain and is based on many sensitive assumptions, in which small variations significantly affect numbers generated in the model, including taking numbers from positive emissions to negative and vice versa.

In order to keep within sound science based policy there cannot be a policy solution based on the current available evidence.

However in light of the media and public concerns relating to the concept of indirect land use change the NFU recognise a policy response may be needed in order to help address the concerns

Any policy response will need to consider the potential impact of introducing additional requirements on this single market and the damage to the current policy which will act as an important driver for sustainable sourcing in the future.

3. If action is to be taken and if it is to have the effect of encouraging greater use of some categories of biofuels, it would be necessary to identify these categories of biofuel on the basis of analytical work. As such do you think it is possible to draw sufficient conclusions on whether ILUC vary according to
   - Feedstock type
   - Geographical location
   - Land management

<u>Feedstock type:</u> there is significant variance of production between countries and within countries between different farmers. Banning certain feedstock types is significantly distorting in the market place and also does not encourage best practice through development of market incentives.

<u>Geographical location:</u> Although there is often areas of high risk identified in the discussions around ILUC and land change in general excluding specific reasons as well as risking action in WTO ignores the likliehood that there will be multiple feedstocks and differences in production type within regions and lays the blame for land use change solely on agriculture, despite there being many different drivers. Because one is bad does not mean they all are. Indiscriminate penalties will fail to incentivise best practice adoption in those regions.

<u>Land management:</u> Land management is not an indirect approach it is about preventing direct changes. It also again misses the point about agriculture as different feedstocks have different needs, land management in situ will be different depending on infrastructure, crop type etc. The only possible route for taking a land management approach would be at a country wide level where governments are involved in policy to address damaging land use change. This may help inform bilateral trade agreement decisions but cannot be the basis for an exclusion policy.

4. Based on your responses above, 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 date.

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B: Take action by encouraging greater use of some categories of biofuel
C: Take action by discouraging the use of some categories of biofuel
D: Take some other form of action

Attempts with extreme assumptions are set to generate only worst possible scenarios to firstly identify and then address ILUC through a renewables policy in Europe needs to be questioned as the most appropriate method of addressing what the ILUC debate has importantly raised as a concern over drivers of damaging land use change world wide.

When considering however the concept of indirect land use change the primary concerns highlighted by the issue must identified. The primary concern is the need to prevent damaging land use change and ensure sustainable sourcing.

If sustainable land use is the real concern – direct action is the only effective way of addressing the issue. International agreements (Copenhagen etc) need to begin to value carbon in land/forests and all land changes should be scrutinised for sustainability compliance. In addition to specific policies at a national, regional or global level introduction of sustainability criteria as a condition of access for certain markets is also an important driver in incentivising the correct land use, in this way the Renewable Energy Directive is already an important step forward in influencing land use.

The NFU has supported the inclusion of mandatory sustainability criteria for biofuels and bioliquids in the Renewable Energy Directive 2009/28/EC and in UK legislation since the initial development of the RTFO.

The NFU feels such criteria ensuring sustainable production and sourcing of feedstocks is a leading example of how renewable energy legislation in Europe is not only leading on how to move away from a fossil carbon based economy to a renewable economy, but also demonstrates that it can be carried out in a sustainable way.

The NFU believes if there is a serious commitment to address such issues then direct action is the only credible option available. Attempting to address unconnected concerns indirectly through biofuels policy will not only be inadequate, and is likely to fail to make any difference, but it also risks failure of the original policy and continued inefficient consumption of fossil based energy sources.

The NFU considers creation of the over reaching policy such as the renewables targets as the most appropriate way of creating market drive for the best feedstock production. The GHG reduction targets for example under the Fuel Quality Directive will help incentivise the use of the better biofuels, with higher savings, allowing the individual supply chains to act in the most appropriate manner to achieve these.

Other potential options for addressing ILUC

In order to help address concerns over ILUC and in recognition that there are feedstocks that have higher risk of ILUC than others we believe the introduction of a mechanism equivalent to the NUTS2 provision in the RED, in relation to EU feedstocks, for all feedstocks produced worldwide would help improve data, account for general emissions by regional feedstock production rather than specific supply chain, ensure greater ownership of the feedstocks within supply chains and further highlight responsible sourcing.

Currently for feedstocks sourced from outside the EU the standard default within the annex V is available for use, with no differentiation on sourcing or production systems.

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We feel by the removal of automatic right to utilise the standard default without evidence that the region/country has a better than or equivalent cultivation profile will encourage better data collection and ownership and responsibility of sourcing in the supply chain.

As regional cultivations have to consider the typical soils, cultivation, yield and other major factors for production of crops across the whole area, not the specific crops for biofuels supply chains, this will automatically account for the typical profile of the production type for that feedstock within that region, rather than the production for biofuels alone.

<u>The concept of “responsible cultivation areas”:</u>
The potential for allowing feedstocks from “responsible cultivation areas” to be granted exclusion from sanctions imposed through an ILUC policy.

Such proposals suggest where *‘additionallity’* can be demonstrated (beyond business as usual) there will be deemed to be no “ILUC” impact. This approach, however, fails to recognise:

- Farmers produce crops for multiple markets each year (food, feed, fibre, chemical, energy, pharmaceutical, industrial)
- Crops from the same land may be utilised in different markets within the same year
- Farmers are not necessarily aware of where crops will be utilised, particularly grain for export
- The concept of idle land is one which is difficult to prove
- Claims of ‘additionalilty’ would not be able to be verified therefore would hold no credibility in terms of standards or public expectations
- Production is affected by weather conditions and other aspects outside individual producers control
- ‘Additionality’, productivity – existing producers with good practice are penalised in such a concept as they cannot prove sufficient additional production.
- ‘Additionality’, land – existing producers are penalised as only ‘new’ entrants can show additional production.

<u>The “ILUC Factor”</u>

An introduction of a so called ILUC factor is not an appropriate policy response for the following reasons:

- The science and modelling is currently flawed in basic understanding of agriculture and agricultural commodity markets.
- The modelling shows significant and serious sensitivities of final numbers to minor changes in assumptions. Including moving from positive to a negative emissions profile and vice-versa
- There is no demonstration of how an ILUC factor is expected to address and more importantly prevent such damaging land use change.
- ILUC factors will add significant distortion in the markets forcing demand to focus on limited crop types, automatically changing the market any ILUC factor were to be based on.
- Growers have by definition only control over the land on which they produce. The introduction of an ILUC factor would be penalising those producers who comply with the sustainability and environmental requirements

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