Indirect Land Use Change Impacts of Biofuels

Consultation Response from the Low Carbon Vehicle Partnership[1]

1. Introduction

This submission has been prepared by the Low Carbon Vehicle Partnership (LowCVP), in response to the consultation by Commission Services examining possible elements of a policy approach to manage indirect land use change (iLUC) arising from the increased supply of biofuels.

The LowCVP is a UK-based, public-private partnership that works to accelerate a sustainable shift to low carbon vehicles and fuels. A multi-stakeholder forum with approaching 200 members, the partnership includes transport fuel suppliers (including energy companies, biofuel and feedstock suppliers); vehicle and component manufacturers; major fleet operators; environmental and consumer groups; academics; and, government departments. The Partnership undertakes activities to encourage the supply and raise demand for low carbon vehicles and fuels. LowCVP led the development of the world's first national system for carbon and sustainability reporting as part of the Renewable Transport Fuels Obligation and responded to the 2009 consultation. The organisation's depth of expertise and breadth of membership makes it well placed to provide balanced, expert advice in response to the consultation paper.

The paper represents a consensus view from the membership and highlights where the views of specific stakeholder groups substantially differ from this.

2. Context

Increased population, changing diet and economic growth is creating increased demand for food, feed and fibre and increasing pressure on agricultural land leading to land use change. Increased global demand for crop-derived biofuels adds to this pressure on land, although the scale of the effects are currently modest but growing, since biofuel feedstock production currently only occupies around 3% of globally cultivated land. Land use change to meet the increased agricultural production impacts upon local environmental quality including biodiversity and causes greenhouse gas emissions. International agreements which protect and compensate countries for preserving carbon-rich and biodiverse habitats, supported by local enforcement and land zoning, are the most effective way to limit the risks of agricultural expansion and land conversion. EU efforts should be directed at delivering better land use management as part of global climate and trade agreements.

Increased demand for biofuels in the EU (arising from delivery of the Renewable Energy and Fuel Quality Directives – RED and FQD) will displace some existing agricultural activities contributing indirectly to land use change (iLUC). The scale of the arising land change and iLUC emissions is uncertain but there is sufficient evidence to indicate the impacts overall appreciably reduce the net GHG benefits of biofuels. GHG savings are one of the key benefits of biofuels and one reason for the RED and FQD.

The timescales for agreement and implementation of effective global measures to slow deforestation and land use change are inconsistent with current policies driving increasing biofuel supply. It is therefore essential that urgent action is taken to amend EU biofuels policy to

[1] 83 Victoria St, London, UK, SW1H 0HW; secretariat@lowcvp.org.uk; +44 203 178 7862

compensate for indirect emissions (iLUC). Effective policy intervention is needed now to avoid uncertainty in biofuels markets that will otherwise undermine the investment needed to ensure RED and FQD targets are delivered and further erode public confidence.

3. The adequacy of the evidence base

Predicting future iLUC emissions is complex and uncertain. iLUC will vary over time, as well as with: changes in the vehicle parc; biofuel feedstock type and yield (Mega Joules bioenergy produced / hectare production); production and use of co-products (which can reduce net demand for land); the location of the cultivation (marginal land unsuitable for other agricultural uses may not cause ILUC whilst more productive land will reduce iLUC effects); carbon stock loss estimates and policy development.

Most LowCVP stakeholders (excluding environmental organisations) are not persuaded that the complexity of agricultural markets can currently be adequately modelled to estimate future land use changes. When uncertainties in the location and size of converted land are combined with those in the arising carbon emissions the resulting iLUC emission or factor must be treated with considerable caution. Specifically, the assessments undertaken by Commission Services rely upon General Equilibrium and Partial Equilibrium models for estimating the scale of iLUC that have significant limitations including:

- A lack of transparency in the underlying data, approach and assumptions
- Limited or inappropriate treatment of co-products – which can have a strongly beneficial impact on GHG emissions by reduced demand for animal feed
- Inappropriate assumptions concerning future crop yields
- An inability to appropriately model complex interactions between and within agricultural feedstock markets
- Uncertainty regarding the location of land use change arising from displacement and arising loss of soil and above ground carbon
- An inability to address uncertainty
- An inability to account for policy interventions

There is broad consensus amongst LowCVP members (excluding most environmental groups) that iLUC factors derived from assessments prepared for Commission Services using equilibrium models are not, in isolation, a good basis for robust policy. Furthermore, the model inter-comparison exercise undertaken for the Commission is of limited value since it uses a wide range of different base-cases and scenarios that do not adequately represent a full range of possible outcomes. Specifically:

- The wide range of input assumptions in different studies makes inter-comparison of model outputs unreliable
- The underlying assumptions concerning the mix of biodiesel and bioethanol, contribution of electric vehicles and advanced technologies used in several studies are considered inappropriate.

The literature review is incomplete and does not adequately assess or account for the quality of sources. Its conclusions are not considered to be demonstrated by the evidence presented.

Given the limitations of the current evidence base, it is essential that Commission Services seek to utilise new information and modelling approaches to improve understanding of iLUC. One such approach is the bottom-up (causal-descriptive) modelling undertaken by E4tech for the UK

Department for Transport (DfT).[2] This approach provides a valuable tool for exploring and estimating the range of ILUC emissions arising from RED targets. Specifically they can be used to provide an indication of the relative risk of emissions arising from ILUC from different feedstocks and the sensitivity of these outcomes to underlying assumptions. Cause-effect approaches have a number of strengths, notably:

- The grounding of the approach and underlying assumptions in supporting evidence from a range of sources
- The greater accessibility and transparency of the approach and assumptions for diverse stakeholders and therefore the capacity for peer review and continuous improvement
- The ability to readily generate ranges, test the sensitivity of estimates to input assumptions and explore uncertainties
- The ability to adapt the approach to account for key features influencing the ILUC assessment for different feedstocks
- The ability to assess the impact of policy interventions

The EC should make greater use of this type of assessment as an input to policy development building upon the work undertaken in the UK. In developing these models it is essential adequate account is taken of current policies to avoid land use change, including current RED criteria. It is also essential to build in appropriate review requirements which balance the needs of regulatory certainty with capturing new science and evidence of the effectiveness of new policy interventions.

Despite the uncertainties and limitations of the evidence base. most LowCVP members recognise that although iLUC cannot be directly measured, the effects are real, and that emissions can be significant for some biofuel feedstocks. Development of a reliable well-evidenced solution is supported.

4. Mitigation options

Growing evidence shows that iLUC risks can be mitigated, or avoided entirely, through a range of land stewardship and crop husbandry practices. These enable additional, sustainable crop production for biofuels use while minimising the risk of iLUC. Several such practices have been identified by Ecofys, WWF and Conservation International in their recent report *Responsible Cultivation Areas.*[3] Options to mitigate iLUC that policy should seek to encourage are available at the:

- National or international level , such as:
    - Protect high conservation and carbon rich lands from conversion (e.g. effective elimination of conversion of peat lands to grow oil palm)
    - Effective solutions to stop EU rapeseed oil for biodiesel being diverted from the food market and replaced by palm or soy oil
    - R&D investment to increase agricultural productivity at the national level (e.g. EMBRAPA)

- Regional level, such as by land use zoning and infrastructure to improve yields or establishment of responsible cultivation areas

[2] http://www.dft.gov.uk/pgr/roads/environment/research/biofuels/pdf/report.pdf
[3] http://www.conservation.org/sites/celb/news/Pages/10052010_closing_the_sustainability_gap.aspx

- Producer level, such as :
  - reducing waste and using wastes and residues such as by adopting advanced technologies
  - upgrading of biofuel co-products in order to displace other crops (e.g. wheat DDGS for animal feed displacing soy)
  - Sale of co-products into established animal feed markets instead of use for energy generation
  - Upgrading of crop residues (e.g. bagasse at the biofuel producer site to replace a primary feedstock crop)
  - Reducing the GHG-emissions through production efficiencies (this not does reduce the risk of indirect land use change but does reduce the risk of the iLUC criteria being exceeded since it is a combination of direct and indirect emissions)

- At the farm / production level by:
  - Driving feedstock crop yield improvement through partnership and investment in the agricultural supply chain (although only the marginal production associated with the increased yields is iLUC-free
  - Using idle or marginal lands.

iLUC mitigation opportunities are not widely adopted today, largely because they present a significant additional cost and/or burden to producers. To encourage practices which minimise or eliminate the risk of iLUC, value must be cascaded through the supply chain to encourage producers to make the appropriate investments and continue to supply the transport fuel market in Europe. Without adequate incentives producers are unlikely to invest in systems which mitigate iLUC which will be largely viewed as simply imposing a further layer of sustainability practices within the RED.

To date, most of the effort to develop iLUC mitigation options has been focused on feedstocks produced in tropical plantations where the risks are greatest. It is also important to develop options for highly productive EU feedstock production, such as by amending crop rotations, to avoid unfair and inappropriate treatment of these feedstocks.

Understanding and application of iLUC mitigation options are at an early stage of development. Despite this, it is essential the policy response adequately encourages these practices.

5. Managing uncertainty in the policy response – a risk based approach

The design of the policy response needs to recognise inherent limitations and uncertainties in the evidence and seek to achieve six overarching objectives:

- To manage the risk that iLUC arising from EU biofuels policy undermines the policy's GHG-benefits
- To encourage the supply of biofuels which have less or no risk of causing iLUC
- To encourage approaches which, as far as is practicable, mitigate the risks of ILUC.
- Treat both EU indigenous production and imported biofuels or feedstock in an equitable manner based upon the level of risk presented
- To be based upon the best available evidence of the scale of the effects and contribution of biofuels produced from different feedstocks and cultivation and production processes
- To incorporate the need for continuous improvement to progressively lower risks over time.

The majority of LowCVP members is not in favour of modifying the existing FQD and RED criteria to account for an iLUC factor (although most environmental organisations and some energy companies do support this approach). The majority of LowCVP members believes raising the 35% minimum GHG saving criteria in the RED and/or 6% FQD target (and/or modifying the calculation method through addition of an iLUC-factor) will not provide an appropriate mechanism to encourage low iLUC feedstock and production systems. Raising these targets would, however, reduce the risk that biofuels policy leads to net GHG-emissions. From 2017, the planned increase in the minimum GHG-threshold to 60% will, in part achieve this and may also reduce supplies of the highest risk feedstocks unless there are significant improve in their carbon balances.

As an alternative to an iLUC-factor this submission proposes an alternative risk-based approach as the best way to meet the identified policy objectives. This would operate by requiring that biofuels produced in a manner that had a significant risk of causing net GHG-emissions (when iLUC is taken into account) would not meet RED and FQD sustainability criteria unless adequate mitigation measures are adopted. This could be achieved by the addition of an supplementary mandatory sustainability criteria into the RED that requires that *biofuels supplied and counted towards the RED (&FQD) do not lead to net emissions when GHG-emissions arising from iLUC are taken into account*. The criteria recognises that biofuels can have wider benefits in terms of security of supply and as a new market for agricultural produce supporting rural development; but would prevent any biofuels counting towards the RED that may cause net GHG-emissions.

The framework is supported by a broad range of LowCVP members including biofuel companies, feedstock producers, some energy companies and expert consultants and academics. Most environmental groups remain sceptical of its benefits and some energy companies would prefer to only incentivise low iLUC production rather than combine penalties and rewards and others would prefer to modify existing criteria.

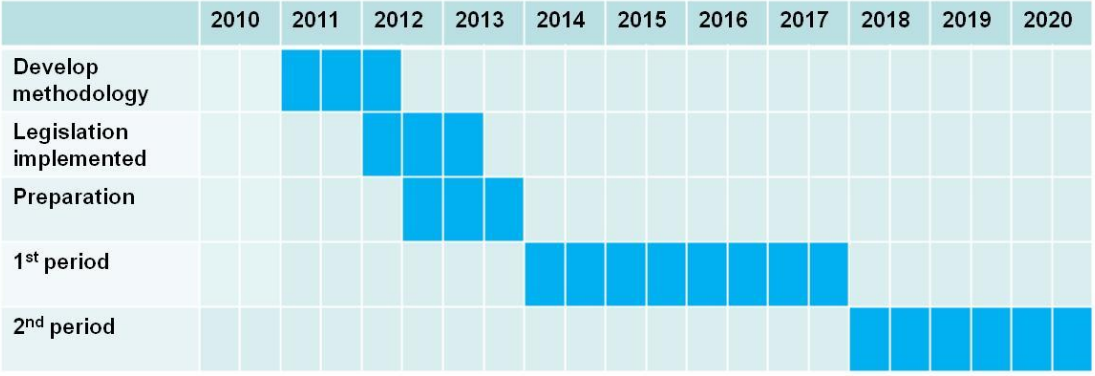
The proposed risk-based framework would require significant further work to define the details – particularly the system to reward adequate mitigation measures. Development of the risk-based framework into an operational methodology could be completed in around 18 months, based upon previous LowCVP experience developing carbon and sustainability reporting guidance for the RTFO. In operationalising the framework it would be important that the approach and assumptions are transparent and are based upon the best available evidence. An open and inclusive process of stakeholder review should ensure the best possible understanding and interpretation of the evidence.

Given the requirements for further development commencement in 2014 appears a realistic goal with more demanding criteria introduced from 2018. This also allows for a period of preparation by suppliers of affected feedstocks to enable the mitigation measures to begin to be implemented. Most industry stakeholders believe such a timetable (illustrated in Figure 1) is challenging but achievable. Environmental organisations prefer a sharply accelerated process and earlier implementation of iLUC controls.

To identify which biofuels achieve the proposed criteria a three stage process would operate in which:

- Feedstock specific assessments define risk levels that iLUC leads to net emissions;
- The assigned feedstock risk level determines the appropriate mitigation options;
- Biofuel producers using affected feedstocks choose from a suite of mitigation options and certify these have been implemented and adopted for fuels supplied to meet the RED and FQD.

Figure 1 – Outline timeline for development and implementation



Assigning iLUC risk levels to feedstocks

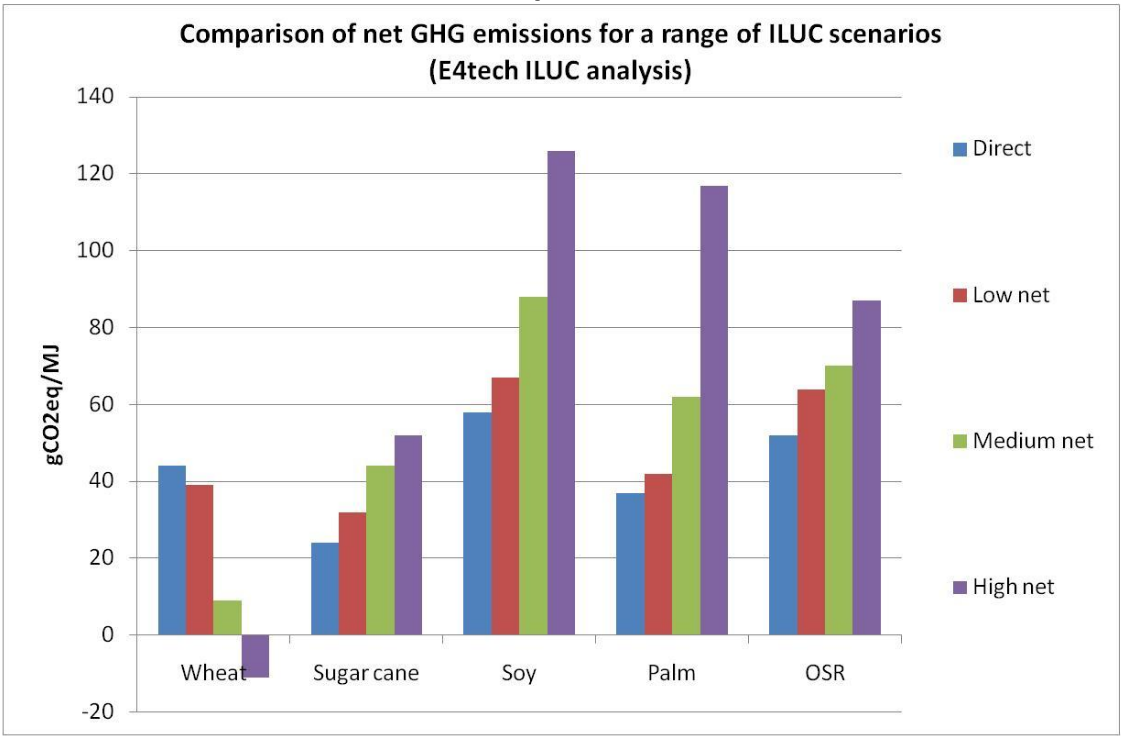
Modelling iLUC emissions is inherently uncertain with a wide range of potential future scenarios (and arising iLUC-emissions). A risk-based approach can use a range of scenarios (including policy internvetions), and potentially tools, to estimate likely future ranges of iLUC (rather than needing to define a single factor). For example, the extent to which there will be conversion of peat-rich land for additional palm oil production; or, the extent to which by-products in wheat-ethanol production are used for animal feed reducing the need for soy production. By using a range of models, assumptions and scenarios it is possible to develop a profile of which feedstocks present the greatest risk of causing net-GHG emissions and which deliver the likelihood of the greatest GHG savings and to what extent policy interventions are likely to mitigate the risk.

Figure 2 provides an illustration of the outputs of such an approach (using data developed by E4tech). As previously discussed, causal-descriptive modelling approaches have a number of advantages over general and partial equilibrium models - including their capacity to model the effectiveness of policy interventions and transparency.

Once likely ranges of net emissions (direct emissions plus iLUC factors) have been derived these are translated into risk levels which illustrate the likelihood of the iLUC criteria being breached. Figure 3 illustrates such a matrix which assigns qualitative risk levels based upon the ranges of net emissions. As more conservative assumptions or pessimistic scenarios are adopted the thresholds for each risk category increases. The proposed locations of the risk bands are illustrative and would be determined by the level of risk that policymakers are willing to tolerate providing flexibility in negotiations without undermining the underlying scientific approach.

Figure 4 illustrates the risk of the proposed iLUC criteria being exceeded for specific feedstocks using the data presented in Figure 2 and Figure 3 matrix. The analysis illustrates different scenarios (low, medium and high iLUC ranges) lead to a different levels of iLUC-risk for different feedstocks. The precautionary principle suggests feedstock should be categorised into the highest level of identified risk – as illustrated in Figure 3 (e.g., wheat – low; OSR – medium etc).

Figure 2



Notes:

- Direct - signifies the default emissions factor for the feedstock used in the RED. Individual biofuel producers should be able to use a value appropriate to their site. This would provide the opportunity for producers to meet the iLUC criteria by improving the efficiency of their own process or reducing the GHG-emissions from feedstock cultivation)
- Low net – this is based upon an iLUC factor at the low end of the likely range
- Medium net - this is based upon an iLUC factor at the middle of the likely range
- High net - this is based upon an iLUC factor at the upper end of the likely range

Figure 3

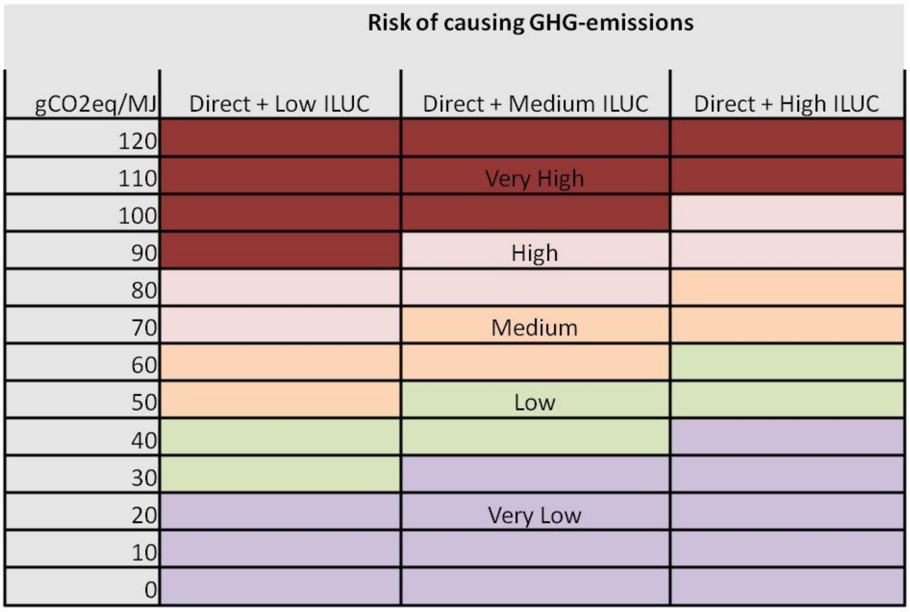


Figure 4 – Illustration of the assignment of risk, the proposed iLUC criteria are exceeded for specific feedstocks

gCO2eq/MJ		Low net	Medium net	High net
Wheat		39	9	-11
Sugar cane		32	44	52
Soy		67	88	126
Palm		42	62	117
OSR		64	70	87

Assigned risk	Very High	High	Medium	Low	Very Low

Defining mitigation requirements and options

The categorisation of the iLUC-risk for different feedstocks determines the mitigation requirements in order that the feedstock complies with the proposed iLUC RED criteria. Figure 5 illustrates how this could be applied.

Figure 5 – Requirements on feedstock depending upon the risk that the iLUC-criteria is exceeded

iLUC-risk	Criteria for supply 2014-17	Criteria for supply 2018-20
Very High	Mitigation to reduce risk to Medium	Mitigation to reduce risk to Low
High	Mitigation to reduce risk to Medium	Mitigation to reduce risk to Low
Medium	No requirements or incentives	Mitigation to reduce risk to Low
Low	No requirements or incentives	No requirements or incentives
Very Low	Incentivise – 1.25 certificates / I?	Incentivise – 1.25 certificates / I?

In accordance with the precautionary principle, the greater the risk the iLUC-criterion is exceeded the greater the level of mitigation which should be adopted. These requirements are progressively strengthened overtime. For example:

- To 2017, a Medium level of risk is considered acceptable and there are no additional requirements on feedstocks with a Medium or lower categorisation
- From 2018, a Low level of iLUC risk must be achieved, Medium risk feedstocks must then adopt some mitigating measures

- Feedstock with a Very Low risk of iLUC could be incentivised – such as by rewarding additional RED or FQD certificates.

Different feedstocks have different iLUC-risks and different mitigation options have entirely different efficacy. Since the impact of different options is difficult to measure it is suggested a simple framework is adopted in which a range of mitigation options are defined as either:

- Very effective mitigation, or
- Moderately effective mitigation

"Effectiveness" would be measured based upon the extent to which the adopted mitigation measure reduces iLUC and the risk of net GHG-emissions. Figure 6 illustrates the mitigation requirements based upon the number of bands reduction needed to achieve an acceptable level of risk. For example; a 1 band reduction would be required for a High risk feedstock to achieve a Medium risk level; but 2 band reduction would be needed for the same High risk feedstock to achieve a Low level risk (as would be needed by 2018).

Figure 6 – Mitigation requirements

Number of bands reduction	Example Assigned risk → Required Risk	Requirements
3	Very High → Low Risk	1 Very Effective mitigation measure
2	Very High → Medium Risk High → Low Risk	1 Very Effective mitigation measure
1	Medium → Low Risk High → Medium Risk	1 Moderately Effective mitigation measure

Very Effective measures would include use of idle or marginal land, effective protection of high carbon stock land and use of waste materials or residues. Further work is needed on the efficacy of alternative mitigation approaches. To date most work undertaken on mitigation options has focused on tropical crops. DGAgri should further examine options for rotational crops and mechanisms to ensure production from the most efficient producers is not inadvertently disadvantaged.

Policy should be not be prescriptive about allowable mitigation options but prescribe boundary conditions for mitigation measures. In considering which options should be allowable to mitigate high risk iLUC feedstock a range of criteria should be considered including whether the approach is:

- Politically, economically and technically feasible
- Very or Moderately effective
- Performance-based and measureable
- Based on evidence/science
- Verifiable

Benefits and development of a risk-based approach

The risk-based framework outlined has a number of advantages over alternative approaches:

- It focuses on the high risk feedstocks and therefore minimizes market disruption by having no impact on Medium or Low risk feedstocks
- It can account for uncertainty in assumptions and future scenarios by assigning ranges to the iLUC risk and assigning classes of risk - which is more realistic than seeking to precisely quantify an iLUC factor for each feedstock
- It does not alter the current RED and FQD targets or criterion maintaining a degree of regulatory certainty
- It is based upon sound science but can operate flexibly accounting for inherent uncertainties – for example in the way thresholds for risk levels are defined
- It incentivises low risk feedstock and provides a mechanism through which high risk feedstocks can meet the criteria through adopting appropriate mitigation measures
- It has an element of continuous improvement and has some time incorporated to allow feedstock suppliers to begin to adopt appropriate mitigation measures
- It groups mitigation measures into two classes (Very and Moderately Effective) which is simpler (and more realistic) requiring to quantification of every mitigation measure

The approach outlined requires further development but provides a framework to meet the policy objectives highlighted.

6. Conclusions

The consensus view from the membership of LowCVP is that increased demand for biofuels in the EU will displace some existing agricultural activities contributing, indirectly to land use change (iLUC). The current evidence-base, particularly opaque, questionable outputs from equilibrium models must be strengthened by other analytical tools - such as cause-effect models. Despite the uncertainties and limitations of the evidence-base most LowCVP members accept iLUC effects are real, and emissions can be significant for some biofuel feedstocks. Development of a reliable well-evidenced solution is supported and uncertainty should be managed and not be used as an excuse for inaction. Significant delays, or ineffective interventions, will continue to erode public confidence in biofuels increasing the uncertainty in markets and undermining the investment needed to ensure RED and FQD targets are delivered.

The policy response should be designed to achieve six overarching objectives:

- To manage the risk that iLUC arising from EU biofuels policy undermines the policy's GHG-benefits
- To encourage the supply of biofuels which have less or no risk of causing iLUC
- To encourage approaches which, as far as is practicable, mitigate the risks of ILUC.
- Treat both EU indigenous production and imported biofuels or feedstock in an equitable manner based upon the level of risk presented
- To be based upon the best available evidence of the scale of the effects and contribution of biofuels produced from different feedstocks and cultivation and production processes
- To incorporate the need for continuous improvement to progressively lower risks over time.

The majority of LowCVP members (excepting environmental organisations and some energy companies) is not in favour of modifying the existing FQD and RED criteria to account for an iLUC factor since this will not provide an appropriate mechanism to encourage low iLUC feedstock and production systems. Instead a risk-based approach is outlined that would ensure that biofuels for which there is a strong likelihood of net GHG-emissions (when iLUC is accounted for) must adopt adequate mitigation measures to be counted towards the RED and FQD. Further detailed studies to develop the framework are needed but implementation by 2014 is a realistic goal with more demanding criteria introduced from 2018.

7. Further information

If you require any further information regarding this submission please do not hesitate to contact:

Greg Archer,
Managing Director,
Low Carbon Vehicle Partnership
83 Victoria St, London, SW1H 0HW

greg.archer@lowcvp.org.uk
+44 203 178 7862