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Your Ref: -

European Commission
Brussels
Belgium

29 October 2010

by email: ec-land-use-change-biofuels@ec.europa.eu

Dear Sir/Madam

CONSULTATION ON THE INDIRECT LAND USE CHANGE IMPACTS OF BIOFUELS

Thank you for providing the Scottish Environment Protection Agency (SEPA) with the opportunity to comment on the above consultation document. SEPA's responses to the specific questions raised within the consultation are contained in the attached Annex.

In Scotland, SEPA regulates activities that may pollute water, land and air; the storage, transport and disposal of waste; and the keeping and disposal of radioactive substances. SEPA, in carrying out its duties, is aware of the pressures placed on the environment by transport choices, in particular we are concerned by the increasing greenhouse gas emissions and local air quality impacts attributable to transport.

SEPA believes the overall objective of transport policy should be clearly directed towards the reduction of overall fuel consumption in conjunction with an increase in the productivity of the fuel being consumed. Biofuels should not be seen as a substitute to encouraging measures that reduce our overall dependence on transport fuels.

Sustainable biofuels have the potential to make a meaningful contribution towards reducing the carbon intensity of liquid fuels used in transport. However, in order that biofuels for transport deliver real world carbon savings, it is essential that their full lifecycle impacts are taken into account, including the Greenhouse Gas (GHG) impacts of Indirect Land Use Change (ILUC). Whilst managing GHG emissions from ILUC is a key consideration, land use change also has far reaching environmental and social consequences. SEPA believes European Union (EU) action is necessary to mitigate the wider impacts of ILUC on biodiversity, water and soil quality, water use, waste management, local communities and GHG emissions.

Over the next decade, it is likely that most biofuels will be derived from first generation crops. Biofuels derived from second generation energy crops may provide better results in terms of overall GHG savings, but may still contribute towards land use change. The development and encouragement of biofuels which do not compete for land - such as biofuels derived from wastes and residues and biofuels derived from microalgae - may help address the problem of negative land use change impacts associated with some biofuels production. It is also the case that some non-crop feedstocks may have other indirect effects. Therefore, a full lifecycle analysis, which also considers indirect impacts, should be applied to all biofuels.

SEPA welcomes the work which has been carried out so far by the European Commission (EC) on the indirect land use change impacts of biofuels and SEPA awaits with interest the EC report due later this year on biofuels, bioliquids and ILUC. Consideration should also be given to implementing these proposals for solid and gaseous biomass as appropriate.

As a public body committed to openness and transparency, SEPA feels it is appropriate that this response be placed on the public record. If you require further clarification on any aspect of this correspondence, please contact Duncan Roebuck, Senior Policy Officer, SEPA Corporate Office, at the address shown above.

Yours faithfully

Janice Milne
Head of Environmental Policy

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ANNEX

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?

Whilst the difficulties and complexities associated with accurately modelling land use change have been revealed in the Commission's work, this does not imply that indirect GHG effects are insignificant or should not be considered when establishing the wider impacts of biofuels. It is SEPA's belief that the weight of analytical evidence, produced by the Commission and others, points towards the need for measures to mitigate the unintended negative impacts of indirect land use change resulting from the production of biofuels.

The indirect land use change impacts of biofuels cannot be observed or measured directly; therefore, analytical modelling techniques have been used to predict the likely impacts. An assumed contribution of first generation biofuels to the renewable fuels mix in 2020 has been used in the Commission's analytical work. An assumption has also been made with respect to the likely bioethanol/biodiesel split in 2020[1]. The predicted land use effects resulting from European Union (EU) biofuels policy are particularly sensitive to these parameters and as such further and careful consideration should be given to how these and other parameters are selected.

The study "Global Trade and Environmental Impact Study of the EU Biofuels Mandate", prepared for the Commission, assumes a first-generation land-using biofuel share of 5.6% in the overall EU renewable energy target of 10% for road transport fuels by 2020[1]. The 5.6% share of first generation biofuels was obtained through deducting the expected share in 2020 of other renewable road transport fuels from the 10% target. In other words electric vehicles (EVs), advanced biofuels and other renewable fuels and transport options are assumed to make up the remaining 4.4% share. However, advanced biofuel technologies face serious barriers for their commercial applications. The main challenge for all the advanced biofuel technologies is their high production costs and all advanced biofuel technologies have a number of technical constraints[2]. Depending upon type of biofuels, feedstock prices and conversion costs, the cost of cellulosic ethanol is found to be two to three times as high as the current price of gasoline on an energy equivalent basis; and the cost of biodiesel produced from microalgae is many times higher than the current price of diesel[3]. Therefore, the commercial deployment of advanced biofuel technologies and market uptake may take some time. The extent to which advanced biofuels will contribute to the fuel mix by 2020 is also uncertain. Similarly, the market share of EVs in 2020 is also unclear. As a result it is possible that the assumption that 4.4% of the 10% target will be met through renewable fuels other than first-generation land-using biofuels may be overestimated.

The Commission report which assumes a 5.6% share of first generation land-using biofuels by 2020 also establishes that for simulations of EU biofuels consumption above 5.6%, ILUC emissions can rapidly increase and erode the environmental sustainability of biofuels. This suggests that there may be a threshold or a tipping point beyond which the production and use of first-generation land-using biofuels could result in net GHG emissions rather than savings. It is therefore important when modelling the impact of EU biofuels policy that careful consideration is given to the proportional share of renewable fuels which are likely to make up the 10% target in 2020. If there is a significant risk that the share of land-using first generation biofuels could exceed a certain threshold which renders them unsustainable, then further measures should be explored

[1] Al-Riffai, P., Dimaranan, B., Laborde, D. (2010), "Global trade and environmental impact study of the EU biofuels mandate." Final report to the Directorate General for Trade of the European Commission from the International Food Policy Institute.

[2] Cheng, J., Timilsina, G. (2010, p.40), "Advanced Biofuel Technologies, Status and Barriers ." Environment and Energy Team, Development Research Group, The World Bank

[3] Carriquiry, M., Du, X., Timilsina, G. (2010, p.41), "Second-Generation Biofuels, Economics and Policies." Environment and Energy Team, Development Research Group, The World Bank

to incentivise biofuels which do not compete with food crops, and additionally targets in the Renewable Energy Directive (RED) may need to be revisited.

The same Commission study concludes that the role of the mix between biodiesel and bioethanol is important and depending on the flexibility allowed for the ratio between the two biofuels, land use effects and trade policy effects can be very different. The study in question makes the assumption that there will be a 45/55% split between biodiesel and bioethanol by 2020. In 2009, most biofuel used in transport in Europe was sourced from biodiesel and accounted for 79.5% of the total energy content, whereas bioethanol accounted for 19.3% in the same year[4]. The rate of growth in bioethanol consumption was steadier between 2008 and 2009 (up 31.9%) than that of biodiesel (up 19.9%). However, whether bioethanol consumption can catch up with, and surpass, biodiesel consumption by 2020 is uncertain. The results from the Commission's work on ILUC suggest that on average, feedstocks used in biodiesel production could have larger land use effects than feedstocks used in bioethanol production. Therefore, a higher proportion of biodiesel in the biofuels mix than is currently assumed could challenge the environmental sustainability of the EU biofuels policy. Further investigation into the assumptions regarding the biodiesel/bioethanol split is required.

2) On the basis of the available evidence, do you think that EU action is needed to address indirect land use change?

Analytical work carried out by the Commission and others provides compelling evidence that EU biofuels policy could lead to significant land use change impacts with serious human and environmental consequences. SEPA believes EU action is necessary to address and mitigate the indirect land use change impacts of biofuels.

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 location; land management?

Feedstock type, geographical location and land management will likely have a significant influence on the indirect land use change impacts of biofuels. However, biofuels that are not derived from crops, such as those derived from waste and residues, may have significantly reduced or no land use change impacts.

The growth of biofuels may have a significant influence on land management practices with potential consequences for local environmental quality and GHG emissions. For instance the expansion of biofuels, in particular those that compete for land used for food production, might lead to the unintended effect of higher crop prices which in turn may encourage more intensive production methods and associated environmental problems (such as more nitrate and phosphate leaching, nitrous oxide emissions, pesticide contamination, soil degradation, loss of biodiversity and landscape deterioration)[5]. An increase in the use of nitrogen fertilisers can have significant impacts in terms of increased emissions of the GHG nitrous oxide. The unintended indirect effects which lead to increased releases of nitrous oxide need careful consideration and should be included in any biofuel GHG emissions lifecycle analysis.

[4] EurObserv'ER (2010, p.75), "Biofuels Barometer." http://www.eurobserv-er.org/pdf/baro198.pdf, (Oct. 28, 2010).

[5] Blanco Fonseca, M., Burrell, A., Gay, H., Henseler, M., Kavallari, A., M'Barek, R., Perez Dominguez, I., Tonini, A. (2010, p.26), "Impacts of the EU biofuel target on agricultural markets and land use: a comparative modeling assessment." Joint Research Centre, European Commission.

If an increase in demand for biofuels crops is met largely through crop expansion in geographical locations where there are carbon rich habitats, then significant ILUC impacts may occur. Careful consideration must be given to those regions where considerable amounts of carbon are stored in the soil. As an example of the carbon storing capacity of soils, Scottish soils are estimated to hold around 3 billion tonnes of carbon (mostly within peatlands), which represents 25 times as much carbon as all the vegetation in the UK[6]. This carbon can be released by processes which disturb the soil surface or dry the soil out. Displaced food production resulting from biofuels expansion may lead to drainage and cultivation of land with particularly high soil carbon content. The Commission's in-house literature review found that most models used for predicting the land use change impacts of biofuels expansion did not allow for the possibility of converted land being peatlands or wetlands[7]. As a result this may lead to an underestimation of the carbon stock loss caused by crop expansion.

4) Based on your responses to the above questions, what course of action do you think appropriate?

SEPA is of the opinion that the issue of indirect land use change needs to be addressed as soon as possible. Consideration should be given to exploring and adopting interim measures if uncertainties still exist about the most appropriate longer-term policy response.

SEPA believes it is appropriate that a quantity of GHG emissions from indirect land use change, in the form of an ILUC factor (CO_2/MJ biofuel), be applied to all biofuels that use land for their production. It may not be clear how an ILUC factor should be calculated at this time, but a report by CE Delft proposes a possible risk-based approach to calculating the factor summarised as follows[8]:

A. Minimum ILUC risk: Use maximum ILUC factors from models
   To assure that any ILUC risk is eliminated, the maximum calculated ILUC factor from model calculations for the different individual crops can be taken as representative.
B. Low ILUC risk: Use an average and general ILUC factor
   Using one or a selected number of models, an average ILUC factor for the complete biofuel policy target is estimated. Alternatively, an average factor for diesel substitutes and for petrol substitutes could be applied.
C. Medium ILUC risk: Use crop-specific average ILUC factors
   If a certain level of ILUC risk is deemed acceptable in biofuel policies and model simulations are considered sufficiently accurate, one could conclude that the average crop-specific ILUC emissions calculated with model simulation(s) are a reasonable prediction of the ILUC effect. This approach will lower the ILUC risk but will not completely eliminate it, because actual ILUC may be higher if the more pessimistic models prove to be more representative for real-world effects.
D. Eliminate any ILUC risk: Do not apply model simulations but use a direct link between biofuels and land use
   A maximum-risk scenario is applied in which the basic assumption is that each hectare of land used to produce biofuels leads to conversion of one hectare of natural forest to new farmland.

In relation to option D, it is possible that a maximum risk scenario could also be reflected by the conversion of 1 hectare of functional peatland ecosystem to farmland.

[6] Scottish Government (2010, p.21), "Getting the best from our land, a draft land use strategy for Scotland, consultation for discussion and feedback", Edinburgh, Scotland.
[7] DG Energy (2010, p.7), "The impact of land use change on greenhouse gas emissions from biofuels and bioliquids." European Commission.
[8] Bergsma, G.C., Croezen, H.J., Otten, M.B.J., van Valkengoed, M.P.J. (2010, p.50), "Biofuels: Indirect Land use Change and Climate Impact." CE Delft, Commissioned by BirdLife International, Transport and Environment and the European Environmental Bureau

An ILUC factor should be complimented by other wider measures to help secure the production and consumption of sustainable biofuels that deliver carbon savings. For instance, there should be work towards International agreement on protecting carbon-rich habitats such as forests and peatlands. This protection should be extended to include biodiverse grasslands and other carbon rich and biodiverse habitats. Measures could also be introduced that incentivise the use of marginal, severely degraded or abandoned land which has not been used for food production for a set period of time and is not in use by local communities.

Commodity price volatility, growing human and environmental pressures and concerns about food security are triggering an increasing interest in the acquisition of farmland, especially in the developing world[9]. The expansion of biofuels may contribute to this trend. There are concerns that large-scale agricultural land acquisition in developing countries could lead to vulnerable local communities losing access to their land. Measures should be introduced to ensure large land acquisitions respect the existing rights to land and associated natural resources.

The encouragement and development of biofuels which do not compete for land, such as biofuels derived from wastes and residues, may help address the problem of land use change associated with crop-derived biofuels production. However, research commissioned by the United Kingdom Renewable Fuels Agency (RFA) and Department for Energy and Climate Change (DECC) suggests the use of materials which have existing uses (in the absence of biofuels/bioenergy usage) will likely cause negative indirect GHG effects (i.e. create additional emissions which are not currently accounted for in the carbon reporting methodologies for the RED). Alternatively, the use of materials which are disposed of (in the absence of biofuel/bioenergy usage) could create large positive GHG effects (i.e. create a reduction in emissions which is not accounted for in current carbon reporting approaches)[10]. The same piece of work develops a methodology for quantifying the indirect GHG impacts of using "wastes", "residues" and "by-products" for biofuels or bioenergy. The RED currently provides an incentive for biofuels derived from wastes and residues through double counting their contribution to the 10% renewable transport fuel target. However, care must be taken to provide a clear definition for waste and residues in line with the definitions in the EU Waste Framework Directive (and the waste hierarchy therein should be adhered to). Wastes and residues could also be applied for electricity and heat generation; therefore, consideration should also be given to the possibility that biofuels production may then have to compete with bio-energy for limited resources.

All biofuels, whether they are derived from crops or non-crop feedstocks such as waste and residues, should undergo a complete GHG lifecycle analysis to establish their suitability. Biofuels that do not achieve a defined level of GHG savings (after taking the full lifecycle into account, including indirect effects), within a system that provides a clear level of environmental protection, should not benefit from the advantages afforded to sustainable fuels.

Consideration should also be given to extending a methodology for quantifying indirect GHG effects to materials and feedstock used for bioheat, or biopower. The recent Scottish Government consultation on the changes to the Renewable Obligations (Scotland) Order 2010 indicates an intention to apply the proposals the Commission is due to make later this year on biofuels, bioliquids and ILUC to solid and gaseous biomass[11].

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[9] The World Bank (2010), "Rising Global Interest in Farmland. Can it Yield Sustainable and Equitable Benefits?" http://siteresources.worldbank.org/INTARD/Resources/ESW_Sept7_final_final.pdf, (Oct. 28, 2010).
[10] Brander, M., Hutchison, C., Sherrington, C., Ballinger, A., Beswick, C., Baddeley, A., Black, M., Woods, J., Murphy, R. (2009, p.4), "Methodology and Evidence Base on the Indirect Greenhouse Gas Effects of Using Wastes, Residues, and By-products for Biofuels and Bioenergy." Report to the Renewable Fuels Agency (RFA) and the Department for Energy and Climate Change (DECC) from Ecometrica, Eunomia and Imperial College London.
[11] Scottish Government (2010, p.16), "Changes to the Renewables Obligation (Scotland) Order 2010 Statutory Consultation." Edinburgh, Scotland.