

Biofuel issues in the new legislation on the promotion of renewable energy

**EC Energy and Transport Directorate-General public consultation exercise
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**Response by the Sussex Energy Group and SPRU Environment and Energy
Programme, University of Sussex¹
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Introduction

This submission was prepared by researchers from the Sussex Energy Group (SEG) and SPRU (Science & Technology Policy Research) at the University of Sussex, United Kingdom. The SPRU Environment and Energy Programme research addresses innovation of low-carbon technologies, the development of sustainability metrics for firms, and policy instruments. A major research effort is dedicated to improving environmental governance through developing participatory methods and processes of appraisal. The Sussex Energy Group is a team of 17 researchers dedicated to understanding the challenges and opportunities for transitions to a sustainable energy economy. We undertake academically excellent and inter-disciplinary social science research that is also centrally relevant to the needs of policy-makers and practitioners. We pursue these questions in close interaction with a diverse group of those who will need to make the changes happen. Core funding is provided by the Economic and Social Research Council.

Summary of key points

- Consider reframing EU biofuel targets in terms of bioenergy, instead of limiting them to liquid fuels
- Include in the sustainability criteria the full fuel cycle, instead of only fuel supply (to accommodate demand-side solutions and prioritising biofuel use in collective transport, taxis, and delivery vehicle fleets)
- If biofuel target is retained, define it in terms of avoided CO₂ emissions, instead of energy content of biofuels in the total fuel use
- Conduct further research and engage in broad-based consultation to ensure that broader social and environmental impacts – beyond CO₂ emission reductions – are integrated into the certification system
- require sufficiently large GHG reductions (e.g. 50%) for biofuels to qualify
- set up an independent, third-party certification system, with equal participation from all relevant stakeholder groups

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- give precedence to small-scale biofuel production
- apply the same stringent certification criteria to both 1st and 2nd generation biofuels, but promote 2nd generation technologies through other means (e.g. R&D support)
- match any increase in support to biofuel crop production by a corresponding reduction of subsidies to intensive agriculture

General

We recognise the importance of the EU initiative to ensure the sustainability of biofuel supply chains through a robust certification scheme. By setting a precedent in the area of certification, the shape of the EU scheme will greatly influence the future ability of biofuels to help combat climate change and promote sustainable development worldwide. It is therefore all the more important to make sure that the system has the credibility, transparency and legitimacy without which the budding biofuels market is highly likely to fail. Any watering-down of the certification criteria, in the face of market pressures, would be short-sighted and would seriously jeopardise the future of biofuels. We congratulate the Commission for having launched this public consultation, as a first step towards such a robust certification scheme, and wish to draw its attention to the following concerns that we consider the most relevant for the future of EU biofuel policy.

Biofuels vs. other types of bioenergy and biomaterials

Even though the present consultation takes the biofuel targets as given, and concentrates on the ways of ensuring the sustainability of biofuel production, it is worth remembering that biofuels are a rather inefficient way to harness solar energy, because biomass can capture only a small fraction of solar input (WBGU 2003). Even among the different bioenergy options, biofuels rank in most cases significantly below heat or electricity production from biomass in terms of their potential to reduce GHG gas emissions. Also the cost of a tonne of avoided CO₂ emissions is many times higher for biofuels than for alternative uses of bioenergy (e.g. Henke et al. 2002). Rather than converting biomass into transport fuels, biomass might better be used for materials products (packaging, food containers, insulation products) first, and to recover the energy content subsequently to the use of these products (Weiß et al. 2004). Woodfuel used for heating, hot water and cooking very often is sustainable in developed and developing countries alike. The definition of biofuels targets in terms of ‘liquid transport biofuels’ is in itself excessively restrictive. In designing certification systems for biofuels, care should be taken to ensure that these alternative uses of biomass are not penalised.

An important criterion for the planned EU approach would therefore be the degree of flexibility it allows in terms of policy objectives. The biofuel objectives may in the future be redefined, possibly drastically, as we gain more experience about the consequences of the current policies. The approach adopted by the EU – to first fix targets for biofuel use and only then start examining whether the targets can be achieved sustainably – may risk locking-in a market dominated by biofuels sourced in an unsustainable manner. This

could compromise the future potential of biofuels, and bioenergy more generally, for a long time to come.

Procedures to ensure the credibility and legitimacy of the certification system

The reduction of greenhouse gas emissions must be the primary objective of certification, in order to ensure the credibility of the scheme – necessary to make the system effective. The success of the system also requires legitimacy in the eyes of the key participants, only achievable by involving all the relevant stakeholders in the process. There is an inherent trade-off between these objectives. Credibility requires the biofuel options to be assessed by ‘objective’, independent experts, whereas a key requirement for legitimacy is broad participation by different stakeholders, entailing a need to seek compromises, sometimes at the expense of reductive scientific rigour. At this initial institution-building phase, the credibility of the certification scheme is of primary importance and the desire to create markets should not override the objective to ensure that biofuels deliver on their promises in terms of environmental benefits.

Recognising the potential tension between credibility and legitimacy in the present context, the challenge is to bring to the negotiating table the increasingly broad and international range of stakeholders. Both successes and failures with certification systems applied in the forestry sector – e.g. the Forest Stewardship Council certification – could serve as useful examples of such broad-based, international processes. Particular care should be exercised in designing the wording of the proposed legislation. The appearance of ‘loopholes’ that allow the use of overtly unsustainable production methods would be a sure way of undermining public and political support.

Broader socio-economic consequences of biofuel choices

A second major shortcoming in the consultation document’s “possible way forward” is the absence of attention to the broader environmental and socio-economic consequences of biofuels. The food vs. fuel debate is one of the most central, but not the only one. Decisions on biofuel production both within and beyond the EU involve crucial choices between small and large scale systems, which have fundamentally different consequences for sustainability, and would therefore need to be addressed by the EU. A recent UN report (UN-Energy 2007) estimates that, all other things being equal, smaller-scale bioenergy industries offer higher social returns on public investments, and by generating greater local revenues, lower social welfare spending, as well as providing benefits to local businesses as community members spend a greater amount of their income locally. Small-scale production may, however, come at the cost of lower production efficiency, thereby necessitating higher government support than large-scale systems. The risk with the procedure proposed in the consultation document is that in focusing on market creation and direct GHG reductions, it may give undue preference to large-scale solutions, with potentially harmful other environmental and social effects. In the medium to long term, large-scale biofuel systems may be detrimental even from a narrow CO₂-reduction perspective, if they mean replacing e.g. vast areas of forest or perennial crops

by of annual crops grown with highly mechanised methods relying on large chemical inputs, and transport of intermediate and final products over long distances.

Developing country perspectives and technology pathways

Overall, the certification criteria proposed for imported biofuels are not stringent enough. The main environmental and other sustainability impacts of EU biofuel decisions may well occur not within the EU itself, but indirectly, through the types of production systems that EU policies indirectly support in the potential biofuel producing countries, especially in the global South. Also, support to European biofuel production can have significant impacts especially on the agricultural development of the developing countries. Finally, public and private technology transfer from the EU can decisively shape the speed and direction of technological development in the developing countries – with obvious sustainability implications. Therefore, the procedures and criteria for assessing the sustainability of biofuel options must explicitly focus on the impacts in the producing countries. EU support to collaborative research projects with participation from institutions in the South could be a way to help potential biofuel producing countries develop capacities and ‘leapfrog’ to 2nd generation technologies.

1st vs. 2nd generation biofuels

It can be argued that the GHG reductions, not to mention the broader sustainability benefits of the currently used 1st generation biofuels are in most cases questionable, with few exceptions (e.g. Brazilian sugarcane-based ethanol significantly helps avoid GHG emissions, while generating some substantial social and environmental problems at the local level). Support to R&D for 2nd generation biofuels may therefore be warranted, especially to avoid locking the industry in an unsustainable pathway. Yet given that some sustainable 1st generation options exist, the EU policy should seek to create a system for assessing the sustainability of different biofuel options on an equal footing. Any measures to support 2nd generation technologies should be carefully thought out, not least because of the substantial vested economic interests involved. In particular, they should address the broader sustainability concerns, such as the potential role of GM crops, and the socio-economic impacts of large-scale biomass production.

Answers to the specific questions raised in the consultation document

Question 1.1 Do you think the "possible way forward" described above is feasible?

Question 1.2 What do you think the administrative burden of an approach like the "possible way forward" would be? (If possible, please quantify your answer.)

Question 1.3 Please give your general comments on the "possible way forward", and on how it could be implemented. Does it give an adequate level of assurance that biofuels will be sustainably produced?

If you think the problem should be tackled in a different way, please say how, giving details of the procedures that would be used.

As argued above, the *scope of the sustainability assessment* suggested in the consultation document is too narrow. The three criteria relating to greenhouse gas emissions, biodiversity, and changes in carbon stocks resulting from land use changes, should be complemented by criteria covering the entire range of relevant sustainability concerns associated with biofuel production and use. Establishing these criteria requires far more research, especially into the impacts of biofuel supply chains in tropical countries and 2nd generation biofuels more generally. The criteria should be established through an inclusive, participatory process, especially to determine the social impacts. SPRU and the Sussex Energy Group have experimented with this type of methods and processes, which might find useful applications also in the field of biofuels assessment (see e.g. Stirling & Meyer 2001; Millstone et al. 2006; Stagl 2007).

Even from a limited environmental and climate perspective, the proposed criteria are insufficiently stringent and do not justify the potential negative side-effects of large-scale deployment of biofuels. In particular, the *required GHG savings should certainly be set higher* than the proposed 10% compared to the ‘baseline’ of petrol or diesel use. The way in which the criterion 1 is formulated in the consultation document seems to contain a significant error in indicating that eligible biofuels should “not emit more greenhouse gases in production than they save by avoiding the use of petrol or diesel”. Surely, this sentence should be reformulated, to accommodate also the emissions through the use of biofuels, for instance along the lines: “the GHG emissions from biofuels, measured throughout the fuel lifecycle, should not exceed those of the equivalent energy measure of petrol or diesel”.

A problem inherent in a certification system only covering the EU countries is the *risk of a ‘race to the bottom’*, if companies in countries not covered by the scheme (say, the USA or China) buy cheaper, but unethically or unsustainably produced biofuels from developing countries, thereby gaining an economic advantage over their European counterparts who would have to pay the ‘sustainability premium’. This would induce EU countries to be lenient in their enforcement of the scheme. It is therefore necessary, as far as possible, to co-ordinate the EU’s approach with that of other important fuel importers. Examples from other areas (e.g. logging in rain forests, overfishing) suggest that proper enforcement is absolutely crucial for the success of international certification schemes.

The suggested ban on biofuels production on lands that were “in certain uses before a certain date” addresses the problem of direct conversion of valuable land to biofuel production. However, in case biofuels become more profitable to cultivate than food crops, such a provision would do nothing to prevent valuable land areas being converted to non-biofuel crop cultivation, while biofuels are grown on existing arable land.

To use the JRC/EUCAR/Concave *‘well-to wheels’ study as a source of default values for GHG savings is problematic*, as it would seem to give no incentive to producers to

improve their performance beyond the estimate. Indeed, given the absence of broader environmental criteria, the use of ‘default values’ would provide an incentive to take short-cuts, e.g. through the use of more intensive agricultural practices (e.g. greater use of inputs, such as fertilisers and pesticides), which would not only increase the carbon footprint of biofuels, but would also generate other harmful environmental impacts. Therefore, sustainability criteria should incorporate other types of environmental damage, such as water and air pollution, water consumption, pesticide and fertiliser use. Sustainability criteria should be negotiated through an inclusive process, and certification carried out by trained, independent inspectors.

Another shortcoming of the suggested criteria is their exclusive focus on the production of biofuels. However, from sustainability and climate perspectives, different potential uses of biofuel raise different questions. For instance, incentivising the use of biofuels in public transport could generate far greater benefits for the society than their use in private vehicles. Providing support to biofuel use in private vehicles is problematic, as it can be perceived as a subsidy to transport systems based on private passenger cars, with all the problems that such systems entail in terms of air pollution, biodiversity and congestion problems. Furthermore, support to private transport is also questionable from a social equity point of view. Ways should be sought in the certification system to **prioritise biofuel use in public transport**, while maintaining the same ambitious sustainability requirements for biofuels production, regardless of their use.

On the basis of the short consultation document, it is difficult to judge how well the suggested approach would work. This is so because the feasibility and credibility of the certification system would crucially depend on the contents and wording of the EU legislation setting out the procedural requirements on reporting, verification and monitoring, as well as the precise types of information that Member States would have to accept as evidence. The “possible way forward” gives reason to doubt whether such legislation would provide sufficiently **rigorous enforcement mechanisms**.

Earlier in this document, we drew attention to the importance of the **procedures of biofuels certification** systems. The process of designing and updating the certification criteria as well as the procedures for applying the system should involve key users and participants throughout the biofuels supply chain, environmental and public interest NGOs, and independent experts. A combination of general sustainability criteria, agreed centrally through such an **inclusive process**, and **independent certifiers**, accredited by the **central certification body**, could provide a workable model. Lessons should also be drawn from the mixed experience from the existence of competing forest certification systems, some with doubtful public credibility.

Accrediting voluntary international certification schemes through the EU comitology process (as suggested in Box 2, point 2 of the consultation document) could be a workable second-best solution. By contrast, the suggestion that EC could negotiate bilateral or multilateral agreements with third (exporter) countries, confirming that these countries have in place sufficient procedures to ensure that undesirable land use changes do not happen, is vulnerable to political pressures and bargaining. Agreements at the

governmental level, without *credible third-party verification and control*, would almost certainly not be strong enough to guarantee the credibility of the system. As stressed above, it would highly desirable be to co-ordinate the EU approach with those of other major fuel importers.

One alternative way forward would be a process whereby independent certification body would assess the carbon balance of each supplier's fuel and compliance with the sustainability criteria. Tax reductions, financial support and other *support measures would then be established in proportion to GHG savings* relative to fossil fuels. Indeed the biofuels target itself should be based on the savings of GHG (or CO₂) rather than on the share of biofuels in energy content of fuel.

Biofuel growth and production under different systems should be monitored and inspected regularly. *Grading biofuels sourced from different sites with different labels* would allow consumers to be aware which biofuels are being made in the most sustainable systems (for which they might pay a premium). Such a system could draw on the experiences from other EU labelling schemes (e.g. electrical appliances), in which the criteria are revised and made progressively more stringent so as to give producers an incentive to continuously improve their environmental performance. A minimum grade following inspection might be used to detect minimum standards, below which fuels would not be imported into the EU or face carbon taxation.

Using a '*mass balance*' approach to certification, as suggested in the consultation document (page 5, footnote 7), is *not advisable*, as it entails the risk that biofuels will be produced in a relatively benign way in the EU, but then 'bulked out' with unsustainably produced fuels from raw materials grown outside the EU.

Question 1.5 As described in the "possible way forward", criterion 3 focusses on land uses associated with exceptional biodiversity. Should the criterion be extended to apply to land that is adjacent to land uses associated with exceptional biodiversity? If so, why? How could this land be defined?

A buffer zone in which no land-use change due to biofuel crop production is allowed should be established around high biodiversity sites (e.g. the core biodiversity zones of protected areas). This is important particularly in view of the need to provide species with areas into which they can migrate as climate change shifts bio-ecological zones. The definition and extent of such buffer zones should be part of the tasks of the independent certification body charged with assessing the sustainability of biofuels. This definition should also take account of the issues related to ecosystem services / critical natural capital outlined below.

The suggestion that EU Member Countries would be responsible for ensuring compliance with the certification criteria raises concerns about effectiveness. Notwithstanding the procedural requirements and types of valid evidence to be set by EU legislation, there is a risk that MCs would seek not only to adapt the system to their needs – which is legitimate as such – but to do this in a manner so as to favour their own producers and attract more

business. A central verification process would therefore be preferable over national verification.

Question 1.6 How could the term "exceptional biodiversity" (in criterion 3) be defined in a way that is scientifically based, transparent and non-discriminatory?

Given the absence of universally applicable criteria for measuring and valuing biodiversity, it is essential to ensure that the *process of defining "exceptional biodiversity"* fulfils certain minimum requirements. The process needs to ensure sufficient participation from both biodiversity experts and actors from the civil society. The participation of civil society is perhaps even more important in developing countries, because of the gaps in scientific knowledge on the one hand, and the strong dependence of local populations on local natural resources, on the other.

Among the numerous approaches suggested for measuring biodiversity and ecosystem values, the notions of essential *ecological functions and services, or 'critical natural capital'* (e.g. de Groot et al. 2002; Chiesura and de Groot 2003) are among the most promising. Their strength is in their ability to capture a broad range of conservation values – not only those with a direct relation to biodiversity. Often, approaches focusing exclusively on scientifically defined biodiversity values risk generating artificial conflicts between biodiversity conservation on the one hand, and local livelihoods on the other. On the other hand, using biodiversity as the sole criterion for excluding ecologically unsustainable biofuel production practices might lead to the approval of projects that endanger crucial ecosystem functions that local communities depend on. The notion of ecosystem services covers the value of ecosystems in providing both the various economic values (sources of economic income through cultivation, resource extraction, tourism, etc.) and ecological life-support values (e.g. provision of drinking water, habitats, uptake of CO₂, etc.).

In the absence of more specific information, different types of proxy measures and general indicators (e.g. density of plant cover) could be used to give an approximate estimate of biodiversity. Such seemingly objective measures should not be used as an excuse for taking short-cuts and excluding stakeholders from the process of defining ecosystem values.

Question 2.1 Please give your comments on the "possible way forward" described above. If you think the problem should be tackled in a different way, please say how.

The suggested approach, whereby the Commission would 'report regularly' on land use changes is necessary, yet insufficient alone to guarantee sustainability. Monitoring of land use changes, and periodic in-depth evaluations to establish cause-effect relationships (e.g. between changes in food prices and increased biofuel crop production) can provide valuable information that would help detect any indirect harmful impacts from increased biofuel production. Effectiveness of any evaluation scheme, however, relies on the *transparency of the evaluation procedures and the authority and independence of the*

evaluators (see e.g. Lehtonen 2005). National and European evaluation associations (e.g. European Evaluation Society), adhering to national and European evaluation standards, could be relied upon to provide the required evaluation expertise. The Commission should ensure that sufficient resources are available to disseminate evaluation findings widely.

Beyond the need for periodic monitoring and evaluation, trade-offs such as those whether land released from intensive food crop production should be dedicated to high-biodiversity uses or biofuel production should be tackled head-on. EU biofuel objectives need to be placed in a global context of increasing pressures on global land use, stimulated by population increase, economic growth, and changes in consumption patterns (e.g. towards more meat-based diets). Given that the EU-15 already uses more than its equitable share of globally available high intensity farming land,² and the expected decline in the global availability of arable land and permanent cultures³, any ***increase in biofuel production should be accompanied by a corresponding reduction of subsidies for intensive cropping***. The reduction of subsidies to meat, dairy and animal feed production – which constitute three quarters of EU-15's global land take – would be a necessary corollary of biofuel production. In practice, this could involve, for instance, requiring that for every 2 hectares going into biofuels one is withdrawn from intensive cropping.

Land to be converted to annual bioenergy crops should be restricted to land that has been under annual food crops for at least 5 years. Allowing a shorter period, say 1 or 2 years, could provide an incentive for producers to try and make a quick profit by clearing land under perennial crops (e.g. in scrubby marginal land, or even under vineyards), plant it for the required time with annual food crops, and then further into biofuel crops if these are expected to provide a higher return on investments. This would mean foregoing the manifold benefits of perennial crops – e.g. less soil compaction and subsequent erosion, more space and time for non-crop species and associated ecosystems to develop, build up of soil carbon over years.

Question 2.2 Do you think it is possible to link indirect land use effects to individual consignments of biofuel? If so, please say how.

This may only be possible by viewing the country or political jurisdiction as a whole. It is better to say “the EU will not import biofuels from countries actively engaging in deforestation at xx%”. This is one more argument for stakeholder-focused decision-making processes of agreeing which supplies are acceptable and which are not. To avoid charges that such a provision would act as a barrier to trade, the express purpose of the

² If the trade in agricultural products is taken into account, the EU-15 already uses more than its equitable share of globally available high intensity farming land. In 2000, the actual global land use by the EU-15 exceeded its own agricultural area used by 18.4 % (Bringezu and Steger 2005).

³ With a projected increase of the world population to 8.3 billion in 2030, and despite the estimated expansion of arable land by 120 million ha (FAO 2003), the global availability of arable land and permanent cultures will decline to 1900 m²/cap (Bringezu and Steger 2005).

legislation would need to be defined as reduction of CO₂ emissions and only a violation of this principle would constitute a reason to ban imports.

Question 3.1 How should second-generation biofuels be defined? Should the definition be based on:

- a) the type of raw materials from which biofuels are made (for example, "biofuel from cellulosic material")?**
- b) the type of technology used to produce the biofuel (for example, "biofuels produced using a production technique that is capable of handling cellulosic material")?**
- c) other criteria (please give details)?**

Regardless whether 2nd generation biofuels are defined in terms of the type of raw materials or the technologies, it is essential to make sure that potentially innovative future technologies are not excluded from the definition. Research funding should be made available for a broad range of options, ranging from algae in bioreactors to GM enzymes. The legislative framework should apply equally rigorous sustainability criteria for all biofuels/bioenergy options, with a view to giving an incentive to producers and users to innovate and improve their performance against the criteria whose stringency would increase progressively over time. To provide incentives to demand-side innovations (e.g. new collective transport solutions), the sustainability criteria should pertain to the entire fuel cycle, and not only the production of biofuels.

Question 3.3 Should second-generation biofuels only be able to benefit from these advantages if they also achieve a defined level of greenhouse gas savings?

Second generation biofuels should be subject to the same requirements in terms of GHG reduction as the 1st generation ones. The suggestion that 2nd generation biofuels should count for double their volume towards the biofuels target is arbitrary. Second generation biofuels should be subject to the same requirements as the 1st generation ones, based on the overall biofuels target defined in terms of GHG reduction rather than their share in fuel consumption, measured by energy content. The Directive should be formulated in such a way as to incentivise innovation in both 1st and 2nd generation biofuels towards those with a more favourable energy balance and other sustainability characteristics (such as food vs. fuel considerations).

Question 4.2 Should the legislation include measures to encourage the use of ethanol and biodiesel in high blends? If so, what?

Possibilities of high blends – up to 100% biofuel – should be examined. For example, lessons could be drawn from the Brazilian experience in vehicle technology development. While the policy approach applied in Brazil 30 years ago cannot be directly copied and replicated in today's Europe, the experience shows that significant breakthroughs are possible, provided sufficient determination by the public authorities, and active R&D policies based on public-private partnerships. The participation of the automobile

industry was pivotal in developing and introducing to the market vehicles running on 100% ethanol, and later, the flex-fuel vehicles able to use any mix of ethanol and petrol. While the main instrument to promote innovation in vehicle technologies falls within the area of R&D policies, biofuel legislation can facilitate the introduction of new vehicles in the market, for instance through *tax exemptions given to flex-fuel and pure biofuel vehicles*. Such incentives should in the first instance be targeted at public transport fleets.

Question 4.6 More generally, what role should taxation play in the promotion of biofuels (considering different situations such as low blends, high blends and second-generation biofuels)?

Fuel taxation should primarily be related to CO₂ emissions and not just % biofuel content. Tax credits could be accorded to for example taxis, delivery vehicles, bus fleets and trains, in proportion of their use of biofuel. Vehicles running on 100% biofuel, as well as flex-fuel vehicles should enjoy lower vehicle taxation than the conventional petrol and diesel vehicles.

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