elobio

Biofuel policies for dynamic markets

Policy Paper 3 – June 2009

In this issue:

- Implications of an accelerated biofuels production on food security and the environment
- Sustainability certification of biofuels

Intelligent Energy Europe

Elobio: a very short introduction

I. The problem:

Increased demand for biofuels could have significant long-term impacts on several commodity markets. Current disputes on this issue (with rising prices in today's markets) require responsible policy.

II. The objective:

Formulation of efficient and low-disturbing policy options that enhance biofuels while minimizing the impacts on e.g. food and feed markets and biomass for power and heat.

III. The activities:

- Review of current experiences with biofuels and other renewable energy policies and their impacts on other markets;
- Iterative stakeholder-supported development of low disturbing biofuels policies;
- Model-supported evaluation of these policies' impacts on food & feed and lignocellulosic markets;
- Assessment of selected optimal policies' impact on biofuels development, potentials and costs.

The Elobio Policy Paper series

In the course of the project (November 2007 – April 2010), the Elobio team will prepare a short series of Policy Papers presenting Elobio results and news in the context of the actual policy debate on biofuels. Key target audience are policy makers at the EU and EU member state level. Contributions will largely be based on (intermediate) results of the project.

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Biofuels, food security and the environment

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The recent expansion and growth of bioenergy markets as a result of new energy and environment policies enacted over the past decade in most developed countries and in several developing countries, is reshaping the role of agriculture. While modern bioenergy holds promise for the creation of income and employment in the rural sector, the speed of recent expansion of feedstock for the production of liquid biofuels for transport has generated increasing competition for natural resources. Competition for land becomes an issue especially when important food and feed crops, including maize, wheat, and soybean, are redirected toward the production of biofuels.

Liquid Biofuels for transport have been strongly acclaimed and heavily criticized for their potential to benefit society as well as the considerable risks their expansion may pose to food security and the natural environment. In particular issues related to food security and emission of greenhouse gases due to indirect land use changes call for a global analysis of accelerated biofuel production and consumption.

1. An ecological-economic world food system modelling framework

For the analysis of the global agricultural system a state-of-the-art ecological-economic modelling framework is applied (figure 1). It includes as two major components, the FAO/IIASA Global Agro-ecological Zone (GAEZ) model and the IIASA-LUC's world food system (WFS) model. The WFS was updated and extended to include biofuel feedstock supply and co-products (e.g., the potentially huge amounts of livestock feeds produced when crushing oilseeds and converting starchy crops to bioethanol). GAEZ has been used for the global assessment of production potentials of selected biofuel feedstocks including (i) sugar cane, maize and cassava for ethanol production; (ii) rape, soybean, oil palm, and jatropha for biodiesel; and (ii) herbaceous and woody ligno-cellulosic plants for 2nd generation cellulosic ethanol or FT-diesel production.

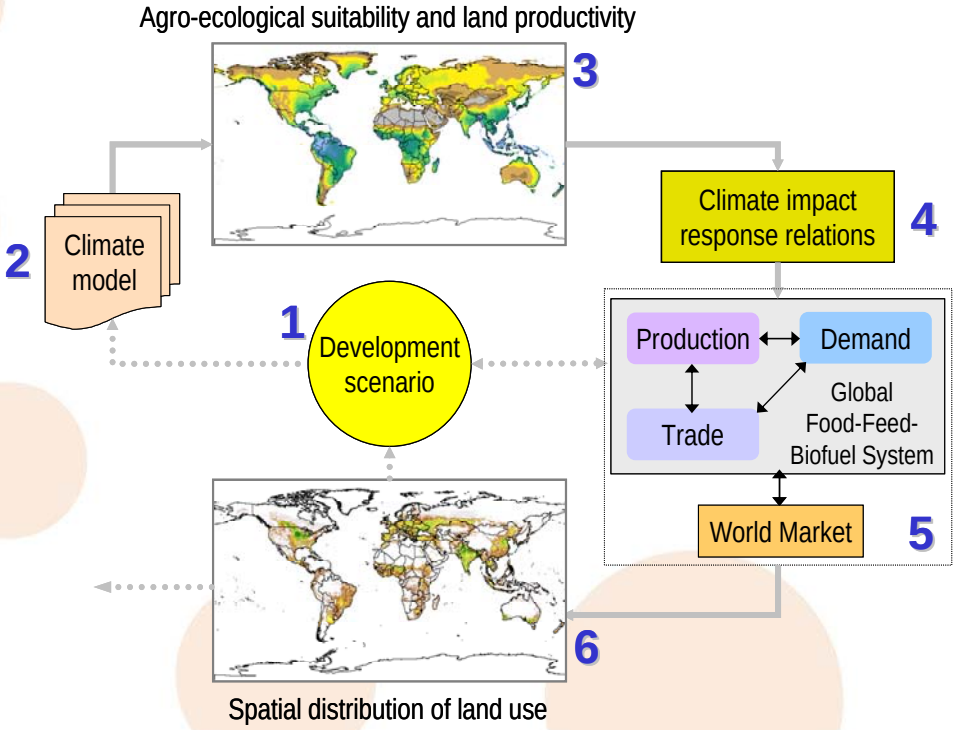

Figure 1: Framework for ecological-economic world food system analysis

2. Implications of an accelerated increase of biofuels production

The objective of a global IIASA-LUC study[1] was to scientifically assess the implications of an accelerated increase of biofuels production. Sustainability issues, competition for land use, food security, and greenhouse gas savings were amongst the aspects that the study addressed.

A number of scenarios covering a wide range of possible future demand for transport biofuels for the period 2000 to 2030 were assessed in terms of their impacts on food availability, prices, trade, and worldwide use of agricultural inputs (notably fertilizer) and land. Scenario inputs included: the International Energy Agency's (IEA) recently published World Energy Outlook 2008; mandates and indicative biofuel targets announced by several countries; and various sensitivity analyses and expert opinions to account for the uncertainty of the availability of second-generation biofuel conversion technologies.

Lessons and conclusions drawn from the quantitative scenario analysis provide guidance towards policies for establishing a socially beneficial and environmentally acceptable way forward with biofuels development and deployment. Among the robust policy-relevant research findings are the following:

(i) Implementing ambitious global biofuel targets for 2020 based on current first-generation technologies will put food security in developing countries at risk and will not achieve any significant reduction of greenhouse gas emissions;
(ii) Meeting ambitious global biofuel targets for 2030 in a sustainable manner requires rapid deployment of second-generation feedstocks and conversion technologies;
(iii) Biofuel policies require a global scope and international development partnerships to avoid pitfalls; and
(iv) Biofuels are not all equally "good" or "bad" and knowledge-based policymaking is required.

Impacts on food and feed markets

Substantial consumption of biofuels (i.e. 10% of global transport fuel use) will not be achievable in the short term (2020 or 2025) without significant impacts on food and feed markets as within this time frame neither of the following is expected to be available:

- industrial scale 2nd generation technologies, and more efficient biobased processes for e.g. food, feed, chemicals and energy (biorefineries);
- radical increases in crop production through major yield improvements;
- fundamental changes in our food production and consumption patterns towards less resource intensive biomass use (i.e. less meat consumption in developed countries).

Indirect land use changes

Results also indicates that greenhouse gas savings of first generation biofuels compared to fossil fuel can become relatively marginal when indirect land use change is considered (with the exception of sugar cane ethanol). The extent to which additional policies may lead to more favourable effects will be analysed further, e.g. the impact of enhanced productivity increases in agriculture or enforcement of restrictions on land use conversions.

[1] The study "Sustainable Agriculture and Food Security: Implications of an accelerated expansion of biofuels production.", commissioned by the OPEC Fund for International Development, has generated a comprehensive assessment report: Fischer G, Hizsnyik E, Prieler S, Shah M, Velthuizen H van. Biofuels and Food Security. OFID/IIASA, Vienna, 2009. The report is available in print and for download at:

http://www.iiasa.ac.at/Research/LUC/luc07/Homepage-News-Highlights/Biofuels%20Report%20Final.pdf

3. Policy support measures critical for achieving sustainable expansion of biofuels

First scenario results highlight the need for a global, comprehensive and long-term perspective for the development of least disturbing biofuel policies. The following policy-support measures are critical for achieving sustainable expansion of biofuels:

Renewed efforts to enhance agricultural productivity, especially in lacking regions. Current biofuel systems and the ones likely to be available in the next decade to 2020 rely fundamentally on agricultural crops. Unless sustained and sustainable yield increases can meet additional feedstock demand for biofuels expansion, the obvious consequences would be food price increases on one hand and rapid land conversion to bring more resources into agriculture production on the other hand. In order to create a win-win situation, increasing yields would be most effective in currently lacking regions, notably sub-Saharan Africa. Such development, especially when engaging and focusing on the rural poor, would improve regional food security and could free up land to provide an additional stimulus for biofuels development, thus possibly creating a positive feedback loop for rural development.

Protecting the poor against impacts of rising agricultural prices. As demonstrated by the food crisis in 2007/08, uncoordinated biofuels development can contribute substantially to short-term price shocks on international commodity markets and may result in a stable trend of rising food prices. Safety nets are required at the international and domestic levels to shield low-income food importing countries from price spikes, to prevent deterioration of their terms of trade, and to protect poor food-buying households against erosion of their incomes.

Enabling poor rural producers. Policies must enable and engage poor rural producers in biofuels development. Apart from providing the necessary credit and physical infrastructure, the poor and marginal rural producers also need support that ensures continued access to natural resources and secured land rights.

Promoting second-generation technologies. As shown in this IIASA analysis and confirmed by several recent studies, second-generation technologies and feedstocks may help overcome the risks and negative impacts of current biofuel chains. While second-generation biofuels are still uncertain and under development, current biofuels based on sustainable sugar cane production or produced from recycled waste and residues are hardly competing with food commodities and are highly efficient in terms of greenhouse gas saving. Hence, until large scale deployment of second-generation technologies is technically and economically proven, support policies should focus on these forms of biofuel production where economically viable.

Establishing sustainability criteria and best land use practices. Expanding biofuel production is creating a growing environmental footprint. Environmental sustainability must clearly be accepted as ‘sine qua non’ condition of biofuel development. There is a large and growing body of understanding to guide land use practices and regulation which, when complied with, can avoid pitfalls and environmental disasters, both with regard to carbon emissions as well as biodiversity losses. While policies focused on biofuel feedstocks only may contribute to protecting high-value ecosystems and carbon-rich land, it is obvious that such partial approach would hardly avoid indirect land use effects and much larger positive impacts could be achieved if best practices and sustainability criteria would be agreed and extended to all agricultural activities and land use.

Fostering equitable partnerships. International cooperation and policy coordination is essential for sustainable biofuel expansion. It is essential for creating an efficient and enabling environment for investment in biofuels, but even more so to counter the risks of environmental damages and social exclusion that may derive from selfish and narrow biofuel development objectives. Both international partnerships as well as beneficial private sector and local community partnerships will need to be well designed to ensure mutual commitments and equitably shared benefits.

4. Further analysis in ELOBIO

In Elobio the ecological-economic world food system modelling framework will be applied to do specific additional analyses on the basis of assumptions and policy suggestions based on inputs from the second stakeholder consultation. Scenarios will be developed for further analysis of biofuel policy impacts in food and feed markets. Critical parameters in the scenario assumptions relate to (i) agricultural productivity growth rates; (ii) options concerning land use; (iii) the extent of anticipated future biofuel consumption; (iv) the introduction rate of 2nd generation technologies; (v) Implementation of sustainability criteria.

Sustainability certification of Biofuels

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Governments are stressing the importance of ensuring sufficient climate change mitigation and avoiding unacceptable negative effects of bioenergy and they undertake actions towards regulating instruments. Examples include the requirement in the new Directive on Renewable Energy in the EU that biofuels used for compliance with targets – and benefiting from national support schemes – fulfil sustainability criteria; parallel formulation and promotion of sustainability criteria in several member states (e.g., Germany, the Netherlands, Sweden, UK); and various initiatives by NGOs and private entrepreneurs. Another example – the California Low Carbon Fuel Standard – is presently restricted to considering GHG emissions, but is on the other hand more comprehensive than other systems in this respect by including a penalty for emissions caused by indirect land use changes (regulation to take effect in 2011).

The development of impact assessment frameworks and sustainability criteria involves significant challenges in relation to methodology and process development – and not the least harmonization of the large number of initiatives presently running in parallel and having more or less interaction and coordination. International organizations and forums supporting the further development of sustainability criteria and methodological frameworks for assessing GHG mitigation benefits of bioenergy include IEA Bioenergy; Roundtable on Sustainable Biofuels (RSB); the G8 +5 Global Bioenergy Partnership (GBEP); the International Bioenergy Platform at FAO (IBEP); OECD Roundtable on Sustainable Development; and also standardization organizations such as European Committee for Standardization (CEN) and the International Organization for Standardization (ISO).

A reliable certification scheme needs to comply with basic requirements that have been pointed out in documents like the ISO/IEC Guide 59:1994 Code of good practice for standardization, or the WTO Agreement on Technical Barriers to Trade. The elements of a certification scheme include the normative document or standard, a governance structure and regulations to rule interactions between users and certifiers. In terms of the standard, this type of document is usually developed through a hierarchical structure including principles, general tenets to achieve sustainability; criteria, conditions to be met in order to achieve these tenets; and indicators, elements to assess compliance.

For understanding the consequences of sustainability certification becoming implemented, one can identify commonalities among different standard initiatives and recognize their implications in terms of production and compliance. Most of the initiatives aim to certify biofuels in general, but ethanol from sugar cane is the largest biofuel currently traded in the world and consequently much attention is directed towards this product. Another biofuel that has come into focus for certification initiatives is biodiesel from palm oil that has been subject to much debate considering the socioeconomic and environmental consequences of expanded palm oil production.

Some of the initiatives for sustainability certification rely on multi-stakeholder processes, which by nature are time consuming. Basic aspects that need to be secured include consensus reflecting a balance of interests of involved stakeholders; and transparency by means of a clear and accessible process. Responding to market demand for a certification system, some actors are considering the implementation of a meta-system in which previously developed

certification schemes are part of a larger and more complex system. The main drawback of this approach is that the system may represent (or be perceived to represent) only some of the stakeholder interests. Other approaches include business to business initiatives in which the conditions for a biofuel to be considered sustainable are agreed among buyers-suppliers and included in the commercial transaction.

Seven initiatives for certification of biofuels – important in terms of actors and markets covered – are compared and depicted in table 1. All of them are limited to certain aspects of sustainability – mostly social and environmental conditions whilst quality aspects (e.g., physical or chemical characteristics) are not included. A comparison of the initiatives in Table 1 can provide leads to which aspects that are likely to be included in a future certification standard possibly resulting from convergence of these early initiatives.

Table 1. Selected standard initiatives for certification of biofuels and sugar cane

Initiative	Aim	Country	Type	Stage	Scope
Roundtable on Sustainable Biofuels: Global principles and criteria for sustainable biofuels production – RSB	Certification	Based in Switzerland but multi-stakeholder process	Voluntary - institutional	Public consultation of documents	Crop production and biofuel processing
Regulation for assessment of conformity for fuel ethanol – INMETRO	Certification	Brazil	Voluntary – governmental	Public consultation of documents	Crop production and biofuel processing
Better Sugar cane Initiative – BSI	Certification	Based in UK but multi-stakeholder process	Voluntary – institutional	Public consultation of documents	Crop production and sugar processing
Renewable Transport Fuel Obligation – RTFO	Reporting	UK	Compulsory – governmental	Implementation	Plantation. Exclude processing and transportation
Verified Sustainable Ethanol Initiative – SEKAB	Verification	Sweden – Brazil	Voluntary – private (Business to business)	Implementation	Crop production, biofuel processing and distribution
Biofuel Sustainability Order	Certification	Germany	Voluntary – governmental	Awaiting EC confirmation	Crop production, biofuel processing and distribution
Cramer Criteria	Certification	Netherlands	Voluntary-government	Criteria formalised, certification system under development	Crop production, biofuel processing and distribution

Each initiative implies different procedures for companies depending on the aim and scope. The initiatives comprise voluntary and compulsory standards and private, public and institutional initiatives. An important aspect that differs among initiatives is the scope: some of them aim at assessing the whole value chain from production in the field to supply of biofuels, whereas others are centred only on the crop production phase.

Two of the initiatives do not aim for a certification. RTFO presents a reporting framework, but includes a complete set of principles, criteria and indicators to assess sustainability;

contrary to all initiatives for certification this one is already in implementation. The SEKAB initiative represents a "pilot system" where compliance with selected sustainability criteria is verified for Brazilian ethanol. The intention is to further develop the system based on a process of learning and open communication with concerned stakeholders.

There is uncertainty regarding which specific issues that will be included in a final normative document. Still, based on the comparison of the five standard initiatives some commonalities can be outlined. A first group of principles common to all initiatives consists of (i) ***legality***, (ii) ***GHG emission savings*** and (iii) ***human and labour rights***. ***Legality*** refers to compliance with the law; producer country laws should be obeyed in all stages of production or processing. It may also refer to compliance with international treaties. This principle cover diverse aspects like agricultural practices, management of natural resources, labour and human rights, biodiversity, etc.

GHG emissions are included with the purpose to favour those biofuels that account for greater savings in GHG emissions. To comply with this condition, companies need to monitor and record emissions released during all stages of production, processing and distribution of biofuels. The main hindrance in fulfilling this principle is the complexity to monitor such emissions in a reliable and standardized manner; internationally agreed methodologies are not yet available but commonly stressed as important.

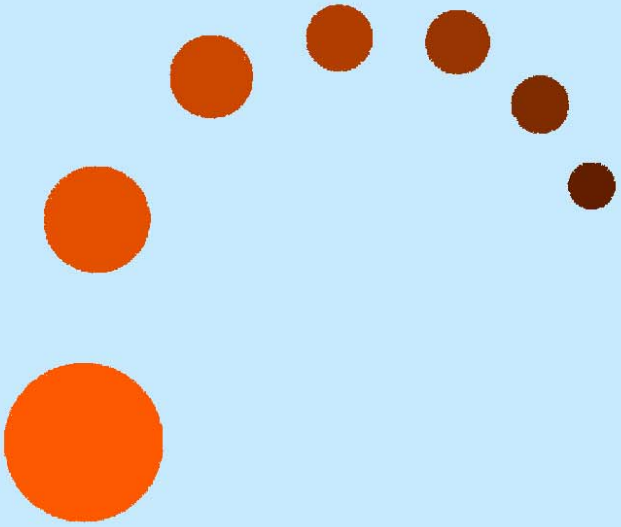
The principle of ***human and labour rights*** includes aspects such as occupational safety, welfare of workers, prohibition of child labour and slavery, promotion of collective bargaining and unionization. It also takes account of legality in contracts and wages according to local legislation and previous agreements. There are differences in the level of strictness of each initiative and factors like maintenance of machinery and special equipment for protection are also mentioned in some of the initiatives.

A second group of principles common to all initiatives but with greater differences among them include (iv) ***conservation***, (v) ***soil***, (vi) ***water*** and (vii) ***air***. ***Conservation*** deals mainly with preserving high conservation value areas (natural habitats where conservation values are considered to be of outstanding significance or critical importance), native ecosystems, ecological corridors and public and private biological conservation areas. The principle implies identification of such areas to respect them during the biofuel project planning and operation. This principle is connected to local legislation and public efforts to map such areas.

Principles regarding ***soil***, ***water*** and ***air*** concern good practices to maintain and make appropriate use of soil and water and to avoid air pollution. In relation to these principles, good agricultural practices are essential including correct use of pesticides and disposal of packaging, crop rotation, preservation of watersheds, rational use of water, etc. In terms of air pollution the most common requirement is to avoid open-air field burning practices with the mid-term goal of total elimination of this practice.

Other principles also considered in some of the initiatives include (viii) ***land rights***, which purpose is to legalize the use of land for production of fuel crops. The principle of (ix) ***economic efficiency and continuous improvement*** seeks cost-effective use of resources and appropriate use of technology. Aspects such as (x) ***rural and social development*** and (xi) ***food security*** are also mentioned but given that these depend on governmental or public efforts they cannot be controlled by companies. Finally, all initiatives include (xii) ***consultation, planning and monitoring*** by encouraging the involvement of relevant stakeholders during design and operation of projects for production of biofuels.

To summarize, several initiatives for sustainability certification of biofuels are currently underway but due to the range and complexity of issues involved (in addition to uncertainty for some of the requirements) the process to establish each scheme is time consuming and the global harmonization – though much requested by stakeholders – will likely take a long time. It is very likely that aspects for compliance with law, GHG emission savings and human and labour rights be included in a final standard. Several additional principles are included in the early initiatives but it is not clear yet if they will be part of a final standard as well and how.



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