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European Union Policy on Bioenergy and the Role of Sustainability Criteria and Certification Systems

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European Union Policy on Bioenergy and the Role of Sustainability Criteria and Certification Systems

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Abstract

The EU has set ambitious targets to raise the share of renewable energies, particularly biofuels. With an increasingly controversial public debate and more scientific evidence about the downsides of biofuels, recently the European Unions biofuel targets have been bound to the condition that they have to be produced sustainable. Therefore the European Commission is currently developing sustainability criteria for biofuels.

Establishing certification schemes is a possible strategy to ensure that bioenergy crops are produced in a sustainable manner. However, many questions with regard to the design and implementation of sustainability criteria and certification schemes remain unsolved.

This article discusses the role that bioenergy plays in the European policy context and the approach the EU is currently following in order to ensure the sustainability of biofuels. It addresses the limits of the chosen approach, concluding that certification schemes can not serve as the only safeguard for sustainable bioenergy, but need to be complemented by other tools and policies.

1. Introduction

As oil prices continue to rise and with climate change and national security concerns high on the political agenda, bioenergy is increasingly attracting interest from policy makers and investors around the globe.

Although biomass has been used by humanity for bioenergy for centuries, it is only in recent years that interest in bioenergy, particularly biofuels, has exploded. Production and trading volumes are already rapidly growing and are expected to increase further (Verdonk et al., 2007).

There are many underlying objectives for the support of bioenergy since beneficial aspects can be multiple. A principle advantage is that bioenergy is more flexible compared to other renewables, as biomass is not only suitable for the generation of electricity, heating and cooling but also for transport fuels. Many governments, therefore, have been particularly supportive of biofuels.

A main driver for government support is to reduce dependence on oil imports and minimize the associated security and economic costs. Governments that have ratified the Kyoto Protocol also promote bioenergy as a way to meet national or regional greenhouse gas (GHG) emissions reductions targets. Moreover, governments are motivated by a desire to advance economic development in rural areas, create jobs and make use of technological development opportunities. For farmers, producing bioenergy feedstocks represents a new market and a way to diversify risk. Developing countries hope these products will bring new export opportunities, and both developing and developed countries see them as an opportunity to keep expenditures on energy within the domestic economy.

However, in addition to opportunities, the shift from fossil fuels to biomass feedstocks also creates serious risks. The substantial rise in the use of biomass from agriculture, forestry and waste for producing energy can result in negative ecological impacts, changing land-use patterns, socio-economic impacts and additional GHG emissions (EEA, 2006; JRC/IES/CONCAWE, 2007).

Setting sustainability standards and establishing certification schemes are possible strategies that can help to ensure that bioenergy crops are produced in a sustainable manner (WWI 2006). A number of European and international organisations, including the European Commission, have therefore proposed production criteria to ensure sustainable biofuel production.

Since the European Union has established ambitious targets for the increase of biofuel production and is at the same time committed to sustainable production, the debate in the EU about a sustainable growth in the bioenergy sector is increasingly controversial.

2. Current Bioenergy Production in the European Union

Biodiesel is the leading biofuel in the EU, representing over 80% of production (COM, 2007a). The production of biodiesel has increased more than 20 fold in the period 1994-2005 (Elbersen et al., 2007). In 2006 the total production capacity for biodiesel in the European Union in 2006 was just over 6 million tons, which is close to the actual production in 2006. More than 80 % of this biodiesel is made from rapeseed oil (Kutas et al., 2007). To date, the European Union is the largest producer of biodiesel in the world (WWI, 2006). Germany alone represents more than half of this production. This enormous share is the result of a very favourable legislation granting a total tax exemption for biofuels in Germany. However, this legislation was modified on 1st August 2006, introducing taxes for biodiesel (COM, 2007a).

Compared to biodiesel, bioethanol currently plays a subordinate role in the European Union, accounting for 18.5% of all biofuel production in 2005 (COM, 2007a). In the EU, ethanol is mainly made out of cereals (wheat, corn, rye, barley) and sugar beets. In 2007 the EU production of bioethanol, with Germany, Spain and France as the leading ethanol producers, has risen to 1.6 billion litres per year (Agra Europe, 2007). This is still low in relation to global overall production of more than 40 billion litres. However, due to increasing demand for bioethanol, the International Grains Council (IGC) expects an increase from the current 3.2 million t of grain produced to 6.4 million t within the next two or three years, thus bringing the share of average grain harvest in the EU to 2.3%.

Much research is also invested in so-called second-generation technologies. They involve the gasification of biomass and the further transformation of the gas into a liquid. Using this process, wood, straw or other biomass sources can be turned into a syngas before being converted into a liquid fuel by means of the "Fischer-Tropsch Process" (biomass-to-liquids or BTL). Second generation biofuels have the potential to deliver approximately 12% of Europe's total transport fuel demand, while potentially avoiding many of the negative effects of conventional fuels. However, these technologies are still in the demonstration phase, it remains to be seen whether they will become economically viable over the next decade. Even with positive technological developments there are serious doubts about the feasibility of using residue material as biomass feedstock on a large scale (Doornbosch and Steenblik, 2007).

Besides liquid biofuels and the use of solid biomass, biogas is also a growing market in the EU. Biogas production reached nearly 5.3 million tons oil equivalent in 2006, representing a 13.6% increase with respect to 2005 (EurObserv'ER, 2007).

3. European Union Policy on Bioenergy

Recently, the European Community has undertaken a review of its energy policy with the aim at improving the sustainability of energy use across Europe. As outlined in the Commission's Green Paper (COM, 2006a), the new European energy policy is built on three core objectives:

1. *sustainability* - to actively combat climate change by promoting renewable energy sources and energy efficiency;
2. *competitiveness* - to improve the efficiency of the European energy grid by creating a truly competitive internal energy market; and
3. *security of supply* - to better coordinate the EU's supply of and demand for energy within an international context.

Essential elements of this policy are the need to reduce energy demand; increase reliance on renewable energy sources and diversify energy sources; and enhance international cooperation. Eventually, these elements should contribute to the reduction of Europe's dependence on energy imports, increase sustainability and stimulate growth and jobs (COM, 2005).

The support of renewable energies has played a big role in this context and already has a long history as a central focus of European energy policy. The Commission's most recent initiative, the energy and climate-change package (COM, 2007b and COM, 2006b) of January 10, 2007, established the target of 20 percent of all EU energy consumption to come from renewable sources by 2020.

It is in this wider context of an integrated and coherent energy policy, in particular with respect to the support of renewable energy sources, that the European Unions' bioenergy policy has developed. Biomass already accounts for about half of the renewable energy used in the EU (COM, 2005). Given the wide possibilities of energy uses of biomass, bioenergy is an important component in the renewable energy mix.

In order to further support bioenergy use, a great deal of legislation has been passed in recent years. In contrast to other countries, the European bioenergy policy foremost aims to reduce greenhouse gas emissions, reduce dependence on imported fossil fuels and diversify sources of energy supply. However, bioenergy policies are also directed toward generating employment in agricultural and rural areas and promoting innovation and technological development (Schlegel and Kraemer, 2007 and COM, 2006c).

Biofuels have received particular attention in the EU, representing one of the few renewable fuels for transport. After all, the transport sector is responsible for more than a quarter of all EU greenhouse gas emissions, and cars generate about 80 percent of the transport sector's emissions in the EU (Hansen and van Vaals, 2005). Given that biofuels are currently more costly than pure petrol and diesel,

the Commission concluded that a specific biofuels target was necessary to encourage renewable transport fuel use (Piebalgs, 2007a).

One of the most important initial steps to support biofuels was the Biofuels Directive (COM, 2003). The Biofuels Directive went beyond previous legislation on renewable energy to establish a specific target for the use of biofuels. It set an indicative target for 2 percent of transport fuels to be made up of biofuels by the end of 2005 and 5.75 percent by the end of 2010.

However, despite ambitious targets, the 2005 goal of the Biofuels Directive was not achieved. In fact, it appears that only very few Member States (e.g. Germany, Austria and France) were able to come close to the 2 percent goal. Consequently, in 2005 the Commission adopted the Biomass Action Plan (COM, 2005) and in 2006 the Strategy for Biofuels (COM, 2006c), both of which aim to improve both the supply and demand for biomass. While indicating the willingness to further develop biofuels and biofuel technology, the Strategy for Biofuels makes clear that the growth of biofuels should not lead to an increase in environmental damage and emphasises the need for improving the greenhouse gas saving.

All three documents also emphasise that increasing the use of bioenergy must be achieved through a balance between domestic production and imports. Therefore, policy must be designed in a way that both European producers and third countries benefit from the growing market for bioenergy (COM, 2006a; COM, 2005 and COM, 2003).

The most recent supporting target for the biofuels market was set by the European Commissions' energy and climate package of January 10, 2007. A new "minimum target" of 10 percent of the petrol and diesel market to be represented by biofuels by 2020 was established and eventually endorsed as binding by the EU heads of state and government at the spring meeting of the European Council in Brussels on March 8–9.

The new draft of the European Fuel Quality Directive (COM, 2007c) published by the European Commission around the same time as the energy and climate package, is also important for the development of biofuels. This proposal contains a target to reduce GHG emissions from transport fuels by one percent each year from 2011 onwards and increases the current limit for the incorporation of biofuels in fossil fuels from 5% by volume up to 10%. According to Environment Commissioner Dimas, this policy should "open the way for a major expansion in the use of biofuels" (Euractiv, 2007 and TNI, 2007).

Bioenergy policy in the EU is not wholly comprised of targets and is complemented by a set of policies outlined for example in the Biomass Action Plan and in the Renewable Energy Road Map (COM, 2006b). These policies aim to create incentives and eliminate any unnecessary legislative or regulatory barriers for an increased use of bioenergy within the EU and its Member States.

Bioenergy support has also been introduced in the Common Agricultural Policy (CAP). The CAP offers an energy crop premium payment on top of a producer's decoupled farm payments and allows producers to grow energy crops on set-aside land (Hansen and van Vaals, 2005). Rural Development policy has also addressed bioenergy issues by making investments in bioenergy on farms eligible for support from the European Union.

On Member State level, tax reductions and subsidies play an important role in government support for bioenergy. Eight Member States have introduced biofuel obligations and many others are considering them. Kutas et al. (2007) recently calculated Member States' level of support of biofuels (only ethanol and biodiesel). The level is significant, and support is implemented through a large number of programmes, mainly provided by the Member States, amounting to around 3.7 billion Euros in 2006. Reduced tax rates for biofuels are the primary source of support in the European Union. Excise tax exemptions are estimated to have cost around 3 billion Euro in 2006, up from 1.8 billion Euro in 2005 (Kutas et al., 2007).

4. Implementation of Bioenergy Policies in the EU Member States

Meeting the targets of 20 percent of renewable energy consumption and at least 10 percent of transport fuels from biofuels until 2020 will pose a big challenge for many EU Member States.

Despite the enormous growth in many bioenergy sectors, the European Union is currently not on track to meet its ambitious targets. National bioenergy support activities still differ substantially from mere implementation of related Directives to comprehensive inter-institutional action packages on both bioenergy supply and bioenergy demand (COM 2007d).

The Commission's biofuels progress report (COM, 2006d) indicates that while biofuels have doubled their market share from 0.5 percent in 2003 to 1 percent in 2005, it is unlikely that the goal of 5.75 percent by 2010 will be met. In contrast, estimates show that given the present policy environment, biofuels' share of the transport fuel market will not be much higher than 4 percent by 2010 (Piebalgs, 2007a).

To this point, the growth in the use of biofuels is concentrated in only a few countries. Only Sweden and Germany achieved the goal of 2 percent by 2005, and only Austria, France and Lithuania achieved as much as 0.7 percent. Moreover, the growth in the use of biofuels mainly consisted of increased use of biodiesel. Biodiesel represented 1.6 percent of the diesel market in 2005, while ethanol only achieved 0.4 percent of the petrol market. However, this situation is likely to change as a result of recent policy measures in Member States.

5. Sustainability Issues of Bioenergy Development

Given the expected potentials of bioenergy and the current policy support, bioenergy can contribute a large share of future renewable energy supply. With the huge range of development and use pathways, the development can theoretically be designed in a sustainable way.

However, the downsides of the bioenergy boom, particularly the boom of biofuel world-wide, are subject of an increasing number of scientific studies, NGO statements and political petitions (GRAIN, 2007; WWI, 2006; EEA, 2006; Hooijer et al., 2006; COM, 2007e; Ernstling et al., 2007; Knauf et al., 2007 and Birdlife International, 2007). They stress a wide range of social and environmental problems around the globe that are either accelerated or have newly emerged by the strong boost in bioenergy cropping.

Many scientists expect further intensification of agricultural production in Europe and around the world, corresponding with monocultures, higher input of pesticides and fertilisers and therefore increasing pressure on environment and ecosystems. Growing bioenergy crops also requires great amounts of land, even to achieve the 10 percent biofuels target until 2010 (COM, 2007f; Piebalgs, 2007b; Dimas, 2007; EEA, 2006 and Righelato and Spracklen, 2007). Social issues include the influence on food security due to the competition for land and inputs between food and energy crops, violation of land rights (also of indigenous people), bad labour conditions in energy cropping plantations and lack of benefits for smallholders.

The studies also question one of the most often claimed benefits of bioenergy, which is their potential to reduce greenhouse gas emissions (GHG). Because photosynthesis performed by bioenergy crops removes GHG from the atmosphere and can reduce fossil fuel consumption, it is often understood that their production is carbon neutral. But when the full lifecycle of biofuels is considered- from land clearing, to fertilization and transport to consumption- the moderate emission savings are often outweighed by great emissions from deforestation, burning, peat-drainage, cultivation and soil-carbon losses. For example, the boom in palm oil plantations for biodiesel in Indonesia and Malaysia at the expense of tropical rainforest leads to habitat destruction and diminishing biodiversity and to high GHG emissions when rainforests are burned and peatlands are drained (Hooijer et al., 2006).

According to a recent study of the OECD (Doornbosch and Steenblik, 2007) only few technologies have a reasonable greenhouse gas emissions balance - even without taking into account carbon emissions through land-use change. Among current technologies, only sugarcane-to-ethanol in Brazil, ethanol produced as a by-product of cellulose production (as in Sweden and Switzerland), the manufacture of biodiesel from animal fats and used cooking oil can substantially

reduce GHG compared with gasoline and mineral diesel. The other conventional biofuel technologies typically deliver GHG reductions of less than 40% compared with their fossil-fuel alternatives. When such impacts as soil acidification, fertilizer use, biodiversity loss and toxicity of agricultural pesticides are taken into account, the overall environmental impacts of ethanol and biodiesel can very easily exceed those of petrol and mineral diesel (Doornbosch and Steenblik, 2007).

Moreover, there are many other ways to use biomass for energy purposes, which often have better environmental performance. Many studies indicate that the energy yield per hectare is much higher if corn is used to produce biogas than cereals based ethanol or rapeseed based biodiesel. In this regard, even second generation biofuels do not perform as well as biogas or biomass used for combustion does (SRU, 2007).

Another studies' result recently published in the science magazine by Righelato and Spracklen (2007) analysed carbon mitigation by biofuels also compared to other land uses. It revealed that carbon saving potentials of biofuel production are low. By contrast, forestation of an equivalent area would sequester two to nine times more carbon.

Against this background, the question of how to ensure that bioenergy is produced in a sustainable way has stimulated an intense and controversial debate in Europe and other parts of the world. At the March 2007 summit of EU leaders, a coalition of industry groups representing the oleochemicals, paper, woodworking, margarine and pine chemicals sectors expressed opposition to binding targets for renewables in general and for biofuels in particular, warning that these could lead to disproportionate subsidies and distort market access to raw materials. At the same time, opposition to such targets arose from environmental groups and human rights organisations, who called on governments to reject any binding biofuels target, saying that it would result in "major environmental and social problems" and that the EU should instead introduce a target for "lifecycle greenhouse gas emission reductions" for transport fuels (TNI, 2007 and ENDS DAILY, 2007a). As for some aspects those concerns were considered in the Council on the March summit, which bound biofuel targets on the condition that biofuels are produced sustainably (EC, 2007).

6. Sustainability Standards and Certification Systems for Bioenergy

In response to the urgent demand of sustainable standards, various efforts have been undertaken towards the development of international sustainability standards and certification systems to assure sustainable bioenergy production. A number of projects and documents have analysed and outlined crucial issues for the development of sustainability standards and certification schemes (van Dam et al.,

2006; Lewandowski and Faaij, 2005; Fritsche et al., 2006; and Zarilli, 2006).

Moreover, many standard setting initiatives are in place, driven by civil society organisations, the private sector and/ or (inter-) governmental organisations. One of the most promising standard setting initiatives is the Roundtable on Sustainable Biofuels (RSB). It has a transparent and open stakeholder discussion and proceeds rather quickly in the establishment of principles and criteria. Other international initiatives with programmes to address sustainability issues of bioenergy include the Global Bioenergy Partnership (GBEP), UNEP, the International Energy Agency, and the International Bioenergy Platform (IBEP).

On the European level, the European Commission is currently drafting sustainability criteria for biofuels. Also, the Netherlands, the UK and Germany have initiatives in this respect, in part with the aim of influencing how the European Commission deals with the issue.

The preliminary draft of the Commission's set of sustainability criteria was subject of a public consultation process launched in April 2007 (COM, 2007g). The consultations results will be considered within the revision of the EU Biofuels Directive and possibly also in the revised Fuel Quality Directive (European Parliament, 2007).

The criteria presented in the consultation included only two sustainability issues: GHG balances and the impact on high biodiversity value areas. The exclusion of other sustainability issues, particularly social aspects, was heavily criticised by many civil society organizations. Also, members of the European Parliament announced that they are unlikely to favourably vote for a legislative package if they are not satisfied with the sustainability criteria proposed (ENDS Daily, 2007b and TNI, 2007).

The proposal also outlined the possible design and implementation of the scheme. It foresees that Member States would be responsible for ensuring that the identified sustainability criteria were respected. A main instrument to enforce the scheme will be that biofuels that fail to meet the sustainability criteria would not count towards national biofuel targets and would not be eligible for tax reductions and similar types of financial support. Evidence that sustainability criteria are respected can be shown by the adherence to the so-called "meta-standard-approach", which is also favoured by the national standard initiatives in the UK, The Netherlands and Germany (for details see Dehue et al., 2007).

A meta-standard would serve as benchmark standard and build on existing labels and certification initiatives like the Forest Stewardship Council (FSC), the Roundtable on Sustainable Palm Oil (RSPO), the Round Table on Responsible Soy (RTRS) or the Better Sugarcane Initiative (BSI). Once accredited for EU use through a comitology process, existing standards covering biomass products would be approved as qualifying standards of the 'meta-standard' for biofuels.

The main advantage of the meta standard approach is that it allows the sourcing of certified sustainable feedstocks in a relatively short time frame and can effectively make use of the stakeholder processes of existing standards.

However, many issues with regard to the design and implementation of sustainability standards and certification systems on the European and International level remain unsolved, namely:

1. *Availability of feedstocks:* The availability of certified bioenergy feedstocks is much lower than the current demand for bioenergy. A meta-standard approach can therefore not yet provide substantial amounts of sustainably produced bioenergy feedstocks. A major obstacle is that many of the current certification initiatives (RSPO, BSI, RTRS, RSB) are still in the process of developing standards.
2. *Limited focus on biofuels:* A major downside of all relevant current standard setting initiatives, including the European approaches, is that they only focus on liquid biofuels. However, sustainability concerns do not only apply to the biofuels sector. Biofuel feedstocks can principally also be used for food, fodder, chemical and material use and are produced under similar conditions with similar impacts. There is no justification why, for example, different or even higher sustainability requirements should be applied to the production of corn used for bioethanol than corn used for biogas production or food and fodder. Sustainability standards should therefore be extended to all types of bioenergy feedstocks or even biomass production.
3. *Definition of sustainability:* A major question when discussing ‘sustainability standards’ for bioenergy is which issues shall be addressed and how high or demanding their requirements should be. As outlined above, the EU Commission’s draft for sustainability criteria does not even cover social aspects. In order to come to a uniform internationally applicable standard, criteria would need to be harmonised. Moreover, it needs to be assured that the level of requirements is high enough to efficiently reduce social and environmental impacts. In this context, it has to be noted that the higher the sustainability requirements will be, the less feedstocks fulfilling these requirements will be available in the short term. This correlation leads to a conflict of objectives between the high biofuel targets set in the EU on the one side and the condition that these need to be sustainable on the other.
4. *Stakeholder participation:* Achieving a high level of stakeholder participation is crucial for the legitimacy and long term acceptance of the standard. However, most of the current standard setting processes lack a meaningful participation of civil society organisations and local stakeholders, particularly from the Global South. Their participation would be necessary since the major

share of biomass production will take place in southern countries, with local stakeholders being heavily affected by the agreed standards. Another complex task will be the adaption of sustainability criteria to regional conditions, responding to fact that standards cannot automatically be generalised for all biomass producing countries and regions.

5. *No exclusion of unsustainable practices by the introduction of voluntary standards:* Although voluntary standards and certification schemes can have substantial effects on markets, they do not oblige producers to use sustainable practices.
6. *Macro-level impacts:* To ensure sustainable bioenergy, macro-level impacts need to be taken into account as well. In this respect, increased food prices and displacement (or so called “leakage”) effects are the key issues that cannot be addressed by a set of criteria to individual producers. Bioenergy cropping can have severe impacts on the environment and on social conditions, since former land uses will be displaced on another piece of land. Displacement effects are not addressed in the currently developed standards and not reflected in any of the currently available life cycle analyses. Certification systems excluding these macro issues can therefore not be the only safeguard for sustainable bioenergy but need to be complemented by other policy instruments.
7. *Potential trade obstacles:* The creation of an international standard or certification system may pose obstacles to trade. According to rules of the World Trade Organisation, imported products should not be discriminated against by technical barriers in relation to “like products” that are produced domestically or in other importing WTO Member States. Voluntary standards on a business level normally do not conflict with WTO disciplines. Binding standards and certification systems on the other hand can be obstacles for international trade. Certification systems that attest compliance with specific criteria might become preconditions for entering certain markets. If, for example, the European Union sets a high standard for biofuels and implements it in a mandatory manner, developing countries could be prevented from importing biofuels in the EU when they are not able to adhere to respective requirements. This is likely to run contrary to WTO rules, leading to additional conflicts in the WTO negotiations between the EU and respective developing countries. However, WTO rules also give the right to discriminate in favour of other public policy objectives such as protection of the environment and conservation of natural resources (Doornbosch and Steenblik, 2007). The question of if and under what design criteria trade rules should be allowed to exclude bioenergy products such as biofuels that fail to meet minimum performance levels from mandatory schemes or preferential tax treatments should be addressed urgently.

7. Summary and Conclusions

Bioenergy plays an important role in the European Unions' energy policy. High targets have been set, particularly in the biofuels sector, and a wide range of supporting instruments have been implemented. If applied at an appropriate scale, using biomass for energy has the potential to make an important contribution towards sustainability objectives. However, in the rush to develop this sector, these benefits are by no means guaranteed, and without consideration of social and environmental impacts, biomass production could lead in entirely unwished directions.

With an increasingly controversial public debate and more scientific evidence about the downsides of biofuels, sustainability issues of bioenergy are high on Europe's political agenda. In response, the European Unions' biofuel targets have been bound to the condition that feedstocks have to be produced sustainably. The European Commission is therefore currently developing sustainability criteria for biofuels.

However, the focus of sustainability criteria for biofuels is limited as the European biofuel mandates are still targeting ambitious market shares without profound knowledge from where these bioenergy feedstocks could be supplied. There is serious concern that demand targets are higher than the potential sustainable supply. While bioenergy industries are pushing for rapid market expansion, political targets for biofuels are bound to the condition of "sustainable production", for which an in-depth understanding is still lacking. This conflict of interests and insecurity creates strong incentives to define weak sustainability criteria supported by the fact that high sustainability criteria cannot be introduced into the market within a short timeframe, given the high-incurred costs and the time to change production systems.

There are basically only two ways to solve this conflict. One way is to reduce or even revoke bioenergy targets as long as there are no safeguards for sustainable production and until there is a better understanding of a sustainable production level. However, cutting support and targets is not a desirable option. Despite many criticisms, bioenergy inevitably needs to and can play an important role in the future energy mix and in the transition from a fossil fuel economy to an energy-efficient, renewables-based energy system. The better option, however, is to achieve the targets by reducing the consumption of fossil fuels in the energy sector, thus automatically increasing the share of biofuels without actually increasing their production level. Otherwise and under the given conditions European targets for sustainable biofuels cannot be achieved.

Another aspect is that even if the European market is an important one and although the European Union is taking action to ensure the sustainability of bioenergy feedstocks, sustainability of bioenergy production and trade is an

international problem. Standards therefore need to be applied internationally. The development of criteria and a possible certification system in Europe therefore needs to be seen in an international context and should be closely co-ordinated with other standard setting initiatives that are either already in place or are in development. Moreover, criteria should not only focus on biofuels but should target all bioenergy feedstocks. From an environmental and social perspective, only one credible worldwide applicable standard and/ or certification that is effectively enforced and covers the majority of bioenergy feedstocks stands a chance of making a difference.

However, the road to legally binding and internationally uniform sustainability criteria will be long and many issues remain unsolved. One major question in this context is the compliance with WTO rules, particularly, if trade rules can be designed in a way to exclude bioenergy products from imports that fail to meet minimum performance levels.

In addition, it will be necessary to complement certification systems aiming for sustainable bioenergy production by other tools because certification systems cannot address macro-level impacts such as food prices and displacement. The reliance on certification schemes alone to ensure the sustainable production of biofuels is not a realistic safeguard. For the future development of bioenergy policy in the European Union, it will therefore be crucial to link bioenergy policies to a broad range of policy fields that influence production and use of bioenergy. There are various available instruments, which cannot all be outlined in this paper. However, three policy fields are of particular relevance. First, energy policy must put the main focus on energy efficiency, since this reduces the demand for energy fuels in general, which is also related to social and environmental impacts. Second, bioenergy policy needs to be linked to instruments aiming towards a more sustainable agriculture and forestry. Third, incentives and support schemes for bioenergy should be linked to an effective land use policy in order to successfully address macro-level impacts.

In this context, a clear discussion of policy objectives will be needed as well, since different objectives will lead to different support measures. Particularly with regard to GHG savings, which is not the sole, but a prominent policy justification for the support of biofuels, it must be noted that liquid biofuels are neither the best nor most (cost-)efficient instrument to reduce GHG emissions. However, biofuels might be a good way to support domestic agriculture and diversify farmers income. Only if such trade offs are seriously taken into account and policies are further reconciled will a sustainable form of bioenergy use be realised in the future.

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