PLATFORM SUSTAINABLE BIOMASS

Food security and the use of biomass for energy purposes

DISCUSSION PAPER DECEMBER 2007

PLATFORM SUSTAINABLE BIOMASS

Food security and the use of biomass for energy purposes

DISCUSSION PAPER DECEMBER 2007

Imprint

DRAFTING, EDITING AND CONTACT

Gerald Knauf
German NGO Forum on
Environment and Development*
Phone: +49 228 92399352
E-mail: gerald@forumue.de

Imke Lübbeke
WWF – European Policy Office
Phone: +32 2 7438818
E-mail: Iluebbeke@wwfepo.org

Front page photo credits: Flickr/vredeseilanden; Flickr/valkyrieh116; MCF

PLATFORM SUSTAINABLE BIOMASS

The platform Sustainable biomass of German environmental, nature conservation and development organisations takes up the issue of production, trading in and utilisation of bioenergy at the interface between environmental, agricultural, development and energy policy. It aims to network knowledge and develop positions and demands on specific key issues, in order to reinforce the ecological and socioeconomic dimension of the issue.

The platform is coordinated by WWF Germany and the German NGO Forum Environment and Development.

The expansion of bioenergy production in Germany requires widespread acceptance in society, but this can only be ensured if the ecological and social impacts are equally taken into consideration. Further information is available at www.plattform-nachhaltige-bioenergie.de (in German)

This project is supported by:

Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit

Umwelt Bundes Amt
Für Mensch und Umwelt

* *Legal representative of the German NGO Forum on Environment and Development is the German League for Nature and Environment, umbrella organization of German conservation and environmental protection associations (DNR) e.V.*

Summary

A sweeping overhaul of energy policy at a global level is essential to efficiently and sustainably prevent dangerous climate change. Together with reducing energy consumption and increasing efficiency switching towards regenerative energies plays an important role here. Biomass is an important resource, since it can be readily stored and is always readily available.

However, the expansion of the use of biomass for energy cannot be seen in isolation but, instead requires that other processes at a global level also need to be taken into consideration. These include population growth predominantly in developing countries and the related concerns of food security, the growing global meat consumption, forecasted water shortages, loss of biodiversity and desertification in some regions of the world. These complex interrelationships and challenges raise the question of what conditions are required for an ecologically and socially sustainable development that enables bioenergy to be used as a beneficial alternative source of energy for the future.

The environmental and development NGOs in Germany see both opportunities and risks involved in the use of bioenergy. The NGOs regard it as extremely important to establish social, ecological and economic benchmarks in policy making to exploit the opportunities provided by bioenergy. This applies in particular to the need to prevent negative social and ecological consequences for people in countries where bioenergy crops are grown. Bioenergy policies need to be foresighted, effective and active.

This discussion paper first of all defines the underlying prerequisites for the sustainable use and production of biomass, then builds on this to introduce details of the different aspects of food security and finally presents demands and recommendations for a sustainable expansion of bioenergy.

The following requirements represent the **key premises** for a sustainable use of bioenergy:

1. The entire production and utilisation cycle for bioenergy must have a positive greenhouse gas balance compared to fossil fuels of at least 50% CO_2 equivalent. This has to include the impact of direct changes in land use brought about by the cultivation of energy crops. The use of raw materials and production goods, the choice of suitable technologies and the question of location play an important role here. Indirect land use also needs to be taken into account wherever possible since it can have dramatic impacts on the climate as well as other environmental consequences.

2. A reliable political framework needs to be established which includes the ecological impacts of the entire land use in order to ensure that bioenergy does not lead to an ecological deterioration compared to existing land use. Countries producing biomass should establish participative land use planning systems defining the protection of valuable ecosystems and biodiversity as well as a socially and ecologically sustainable use of cultivated areas. The prerequisite for the production and use of bioenergy should be a strategic social and environmental impact assessment.

3. The production and use of bioenergy should not worsen the food situation and further increase the concentration of land and income and the exploitation of rural populations.

The following issues play a substantial role in food security:

1. BIOMASS FOR ENERGY AND FOOD

The use of biomass for energy purposes has raised the question of the impacts on the availability of food for the local population in Southern production countries and increasing hunger. The production of bioenergy must not be accompanied by the forced displacement of indigenous population groups, human rights violations and one-sided dependencies being imposed upon small enterprises, farmers and local population groups. Instead it should enable participation in economic benefits, regional added value and suitably adapted biomass utilisation strategies.

2. LIMITED AVAILABILITY OF FERTILE PASTURE AND ARABLE LAND

Agriculturally viable land is becoming an increasingly scarce commodity, which is leading to intensified competition between the production of bioenergy and food. This effect is being magnified by high meat and milk consumption, which requires three to four times as much fertile pasture or arable land as needed for a vegetarian diet. Furthermore, organic cultivation of animal feed and food requires a far greater amount of land than conventional farming because organic methods involve more extensive forms of cultivation.

Photo: visipix/Glogg

Further negative impacts can be expected if the pressure on forests and their commercialisation through the production of synthetic biofuels increases. If this form of biofuels production increases, restricted access by local populations to their traditional forest products can be expected.

3. LIMITED AVAILABILITY OF WATER

The use of freshwater for irrigating energy plants directly competes with drinking water consumption by the local population. This has a particularly negative impact on regions which are in any case already affected by water shortages.

On the other hand, cultivating energy plants also provides the opportunity of establishing more adaptable production structures and reducing loss of income through rotting or drought damage. The use of plants for energy production is far more capable of tolerating such influences – this particularly applies to systems where the whole plant is utilised.

4. SATISFYING LOCAL ENERGY NEEDS VS. CASH CROP EXPORT

Many developing countries hope for economic opportunities by exporting bioenergy. The export-oriented model focuses on liquid fuels because of their greater energy density, but these fuels are generally based on monoculture farming and are controlled by big landowners, capital intensive investors and multinational corporations. This creates few jobs but at the same destroys existing small scale farming and indigenous structures, creating an increasing gap between rich and poor and intensifying social inequality and poverty.

However, in addition to export-oriented production, it can be expected that developing and emerging countries will also increasingly expand their own energy supplies to develop alternatives to imported fossil fuels, which are becoming more and more expensive. This approach is above all positive for food security and rural development if energy plants are produced and used locally, hence securing energy supplies.

5. DEPENDENCE ON AGRICULTURAL MARKETS – GREATER MARKET VOLATILITY

An increase in energy prices has, amongst other things, encouraged producers to switch from food production to growing energy crops, which causes a local deficit in food and can trigger a drastic price increase for staple food. This above all affects low income population groups, leading to increasing poverty and existential threats.

Since biomass sales focus on the market price either on food or energy markets, the agricultural market is increasingly being coupled to the energy market. This can mean that price fluctuations on the fossil fuels market precipitate sharp and direct slumps or increases in prices on agricultural markets.

Subsidies have a considerable impact on the price development of agricultural products. Badly conceived or excessive subsidies for promoting the expansion of bioenergy can also cause negative impacts, which promote ecologically undesirable trade flows or abrupt price fluctuations on agricultural markets.

Introduction

In recent years the use of biomass for energy has witnessed a rapid development. Currently there is no sustainable energy scenario[1] which would be conceivable within the next 30 - 40 years without the use of biomass – neither at a global nor at a national level. The pressure to actively seek alternatives to fossil fuels and reduce greenhouse gasses has enabled biomass to become an important raw material for energy production.

A global and comprehensive "energy change" is required as an urgent measure to counter global climate change. Above all in the North this primarily includes a reduction of energy consumption, particularly in the transport sector, increases in efficiency and a change to regenerative energies. To achieve this, the proportion of regenerative energies produced to cover primary energy requirements must increase to 50% worldwide by the year 2050. This represents a quadrupling of primary energy produced from renewable energies by 2050. This requires for instance a hundredfold increase in the amount of primary energy produced by wind power worldwide by 2050, and the amount of solar energy must even increase by 300 times. However, under global conditions the maximum sustainable global increase in primary energy produced by biomass can only be doubled compared to the current amount. In doing so the most energy efficient form should be used, i.e. decentralised cogeneration of electricity and heat should be used instead of the more energy intensive conversion to fuel.

Parallel to the climate policy goal of reducing greenhouse gases, the issues of energy security and the finitude of fossil fuels in industrialised countries have been promoted to the political agenda. Due to cost considerations this increasingly above all also applies to developing countries with no oil and gas reserves of their own. Due to a lack of alternatives, biofuels[2] in particular are promoted by political decision makers as an important building block for securing future energy supplies.

With its measures for opening markets and reducing trade-distorting subsidies and the abolition of all forms export subsidies, the WTO Agreement on Agriculture has also had direct impacts on the development of the use of biomass for producing energy. Because of the reduced subsidies, the agricultural sector, as well as upstream and downstream sectors, is looking for new income opportunities. In this context the production and use of biomass for energy offers an alternative. Both the time pressure and political pressure to develop as quickly as possible solution scenarios for the three cited areas – electricity, heat, transport – have led to very ambitious targets across the political spectrum and in numerous sectors, above all in Europe and the USA. But other industrialised and developing countries have also formulated targets for the expansion of a domestic production primarily consisting of biofuels.

Currently it is virtually impossible to correctly assess the global potential. According to a study by Worldwatch Institute[3], the additional global potential can be between 0 and 1,000 exajoules [4] per year, depending on requirement. A study by the Ökoinstitut[5] on potentials in Germany, which also evaluates sustainability aspects, comes to the conclusion: "…if the full potentials of residues and waste materials as well as the available areas for growing energy plants are consistently used, by 2030 around 16% of electricity, 10% of heat and a good 15% of fuel for automobiles can be produced from biomass. And at the same time higher standards were required for environment and nature conservation".

The expansion of the use of biomass for energy cannot be accelerated in isolation from other global and very dynamic processes, some of which involve fundamental changes:

⇨ At least 9 billion people must be fed in 2050 and today there are already more than 850 million people suffering from hunger.

---

[1] *Two studies as examples: Greenpeace: Energy (r)evolution: www.greenpeace.org/international/campaigns/climate-change/solutions and WBGU: Neue Impulse für die Klimapolitik: Chancen der deutschen Doppelpräsidentschaft nutzen (New impulses for climate policy: making use of the opportunities arising from the German twin presidency): www.wbgu.de/wbgu_pp2007.html*

[2] *The term "bio" energy, which in this text refers to the use of biomass for energy, does not stand for ecologically correct production processes but, instead is derived from the term biomass. This term is intended to cover all forms of use of biomass for producing energy, which includes raw materials from agriculture and forestry as well as biogenous residues and waste materials.*

[3] *Worldwatch Institute "Biofuels for Transportation" 2006 (http://www.worldwatch.org/node/3954)*

[4] *Equivalent to 1018 joules*

[5] *Öko-Institut "Stoffstromanalyse zur nachhaltigen energetischen Nutzung von Biomasse" (Material flow analysis of the use of biomass for producing energy) (http://www.oeko.de/service/bio)*

Photo: visipix/Derrer

⇨ In the future 95% of population growth will take place in developing countries.

⇨ In 2030 an estimated 5 billion people will live in urban areas and in developing countries this could be 81% of the population[6].

⇨ Currently the East Asian and South East Asian region is in the process of changing from a primarily vegetarian diet to a diet based more on animal products. At 32kg/year[7] the average per capita consumption in developing countries is currently well below the European consumption of 98kg/year.

⇨ For the year 2050 it is estimated that at best 2 billion or in the worst case scenario 7 billion people will suffer from water shortages;[8]

⇨ Demand for raw materials, including for regenerative raw materials, will continue to increase whether this involves their use for energy production or other purposes.

⇨ Today loss of biodiversity is already more serious than at any time in the history of mankind.

⇨ Because of desertification[9] 4.2 billion hectares, or approximately 33% of the surface area of the world is already jeopardised, 12% of this seriously. More than 20% of all dry areas and 8% of the total surface area of the world have been damaged by soil degradation caused by human interference.

⇨ The biological capacity of the earth is currently being overused by 20% yearly, i.e. human beings are currently using more resources than the earth can regenerate[10].

According to the Institute for Energy and Environment (IE)[11], because of the problem fields cited above, global requirements for agricultural land will at least double by 2050. To satisfy these new and additional requirements there is an additional area of land that can be made available through improvements in technology and breeding methods as well as changes in agricultural practice. Through optimum utilisation of the additional available land, a potential amount of land approximately the size of the current area under cultivation will become available for producing energy.

The majority of the challenges cited above will particularly play a central role for developing countries.

This places complex requirements on the further expansion of bioenergy utilisation. It is becoming evident that a larger framework is necessary for many of these requirements.

---

[6] *United Nations Population Fund: www.unfpa.org/swp/swplain.htm*

[7] *FAO 2007: http://www.fao.org/docrep/010/ah864e/ah864e09.htm*

[8] *UNESCO (United Nations Educational, Scientific and Cultural Organization) (2003): Water for people, water for life. United Nations World Water Development Report, Barcelona.*

[9] *Konventionsprojekt Desertifikationsbekämpfung (Convention project combating desertification): (www.iydd2006.de/uploads/media/Daten_Global.pdf)*

[10] *WWF, Living Planet Report 2006: http://assets.panda.org/downloads/living_planet_report.pdf*

[11] *Institute for Energy and Environment (Institute for Energy and Environment) http://www.ie-leipzig.de/Energetik/Referenzen.htm)*

The big framework

1. In recent years a raft of **multilateral agreements** on climate change, species diversity, desertification and the right to food and labour standards[12] have been developed. However, many of these agreements, which are also important for bioenergy, have not yet been implemented in national legislation in all member states. The agreements must form the basis for the bioenergy sector, but at the same time it is essential that the different agreements are understood to be complementary, i.e. bioenergy can only be successful for fulfilling climate change objectives if – for instance – species diversity or the right to sufficient food is not jeopardised. With regard to such considerations the expansion of the use of bioenergy must respect international standards and also the respective national legislation.

2. A **sustainable agriculture**, as producer of food, feed and raw material must form the basis for expanding bioenergy production. Only a global change in agriculture will enable the further expansion of bioenergy to be integrated into farming without encouraging competition. Such an agricultural change must advance the ecologisation of farming and promote a just distribution of land, particularly in countries with unjust land ownership. This should also address consumption patterns and eating habits. The development policy agenda should concentrate on the agricultural sector.

3. An **internationally binding framework** must be created for promoting bioenergy. This should facilitate a modern use of biomass for energy in developing countries and also help to establish fair trade.

4. Because the available areas of land throughout the world are already subjected to various uses, bioenergy can only make a **limited contribution** towards a future energy mix. In the longer term only those biomass resources which cannot be used for food security should be used for producing raw materials and energy. An efficient use must have top priority[13]. Furthermore, bioenergy can only make a significant contribution towards climate protection and securing energy supplies if total energy consumption is simultaneously reduced by 50% in the industrialised countries by 2050.

5. Currently there are no comprehensive socioeconomic and ecological life cycle analyses on the impacts of expanding bioenergy production. Consequently the **precautionary principle** must be strictly applied for any further expansion, particularly if insufficient data is available for making strategic decisions (for instance incentive and control mechanisms). The exception is greenhouse gas balances, which are already widely available and show that bioenergy can lead to very high cuts in emissions but also to increased emissions compared to fossil fuels, depending on their production and use.

---

[12] *International Labour Standards (ILO) have been developed since 1919.*

[13] *The German Environmental Advisory Council (SRU) press report of 12.7.2007. www.umweltrat.de: the special expert report of the German Environmental Advisory Council (SRU) stressed that biomass in heat generation and cogeneration of heat and electricity can be used up to three times as efficiently and considerably more cost-effectively than for the production of the currently used biofuels – biodiesel and bioethanol. This particularly applies if coal is replaced by biomass.*

Basic premises for a sustainable bioenergy use

Under what conditions can bioenergy be an alternative energy source for an ecologically and socially sustainable development? In addition to a global framework, bioenergy production and use must be subjected to specific requirements which secure its social and ecological sustainability.

1.The entire production and utilisation cycle for bioenergy must have a positive greenhouse gas balance which shows a reduction of at least 50% CO_2 equivalent compared to fossil fuels. This must include direct and indirect changes in land use caused by the cultivation of energy crops.

⇨ The feed stocks used are mainly responsible for emissions of greenhouse gas (GHG). The lowest GHG emissions arise when residues from forestry and agricultural production as well as waste (organic household waste, wood and food processing) are used as feed stock: for instance the GHG emissions for straw are scarcely more than 0.5t/ha[14] CO_2 equivalent, followed by wood from short rotation coppice with approximately 0.7t/ha. Considerably worse is grain and rape seed with over 2t/ha CO_2 equivalent.

⇨ With about 40% (without soil emissions) the industrial production of nitrogen[15] has the biggest significance in terms of GHG emissions (measured in Germany) for cultivating energy crops. A further 30 to 40% are caused by direct soil emissions. These are also due to nitrogen fertiliser which stimulates bacteria to produce more nitrous oxide, called laughing gas (N_2O). This gas is the fourth largest greenhouse gas contributor to overall global warming and has a far greater global warming potential than carbon dioxide.

⇨ Another important factor is the choice of technologies. The GHG balance for biogas in particular can be positive – binding up to two tons of CO_2 equivalent per ton of biogas – when waste is used as a feed stock and the resulting fermented residues are used as fertiliser. The GHG balance is particularly negative if fossil fuels such as coal are used for the energy-intensive conversion processes which are necessary for ethanol and biodiesel production, for example.

⇨ The question of location is also very important. For instance, oil palms and sugar cane have a much higher productivity and better GHG balance under the advantageous climatic conditions of the tropics and subtropics than grain or sugar beet in temperate latitudes. However, a positive GHG balance can only be achieved if the entire life cycle and land use change is taken into consideration. Such an overall balance becomes negative if biomass and humus are reduced through land conversion. This is particularly evident when primary tropical forests are destroyed, but the conversion of savannahs and wetlands also causes huge emissions of greenhouse gases. For example in Indonesia, where tropical forests are destroyed and peat soils are dried out to expand palm oil plantations. This agricultural policy has turned Indonesia into the world's third biggest GHG emitter. However, positive changes are possible if, for instance, areas of land that had been degraded by agricultural mismanagement are improved again through e.g. agro forestry systems.

2. Bioenergy must not lead to ecological deterioration of existing land use – this applies not only to direct but also indirect changes. On the contrary, a reliable political framework must be developed which includes the ecological impacts of the overall land use. Countries cultivating biomass should implement participative land use planning, ensuring ecologically and socially sustainable use of land. A strategic social and environmental impact assessment must be included in this planning.

⇨ The deforestation and conversion of ecologically valuable forest, marshland and pasture is a serious problem from an ecological and social point of view. The increasing demand for bioenergy production, which is driven by energy policies and oil prices, is intensifying pressure on ecosystems. Consequently even more habitats and important hot spots of

[14] *Institute for Energy and Environment: Schlüsseldaten Klimagasemissionen – Welchen Beitrag kann Biomasse zum Klimaschutz leisten? (Key data on climate gas emissions – what contribution can biomass make towards climate protection) 2007.*

[15] *Institute for Energy and Environment: Schlüsseldaten Klimagasemissionen – Welchen Beitrag kann Biomasse zum Klimaschutz leisten? (Key data on climate gas emissions – what contribution can biomass make towards climate protection) 2007.*

biodiversity are becoming degraded, fragmented or destroyed. When species diversity is lost forest communities also lose the traditional basis for their livelihoods (for instance fruits, wild animals and medicinal plants).

⇨ Increased use and pollution of water through biomass conversion plants can also cause a loss of species diversity, even though there are bioenergy production systems available with less water consumption than conventional agricultural production.

⇨ Prices of feed and food are rising because of increasing competition for land use, which could force particularly poor people in rural areas to develop more land for growing food and hence increase pressure on intact ecosystems. On the other hand, income from bioenergy production can improve access to food markets and the establishment of infrastructures and logistic systems in rural areas, and the use of bioenergy as a modern energy supply in peripheral regions can improve life as well as working and production conditions there[16].

⇨ In favourable locations for producing energy crops in particular agro biodiversity could suffer under an intensive cultivation if locally adapted species are replaced by less diversified agriculture production systems. This would also weaken the resilience and adaptability of local agricultural ecosystems.

⇨ Proponents of genetically modified organisms (GMO) in the agricultural sector hope that the spread of bioenergy will create new markets for such products, since the food chain should not be polluted by the use of GMO. However, the introduction of GMO into the agricultural production cycle has direct negative impacts on biodiversity as well as indirectly affecting the entire ecosystems. Therefore certifying and counting genetically modified bioenergy in the German and European quota for the blending of biofuels should be banned. Furthermore, GMO do not bring any proven advantages in the foreseeable future, and increases in yield can be achieved far better using conventional breeding techniques.

⇨ However, producing bioenergy can also have a positive impact on biodiversity. For instance, if intensively farmed land can be converted into more extensive cultures grown over several years (for instance planting trees and energy grasses), erosion can be reduced through ground cover the whole year round and fauna species diversity increased. The use of pesticides and fertilisers can also be reduced and agriculturally degraded areas made productive again through suitable crops and cultivation systems. The cultivation of energy crops enables old plants species to be used and also facilitates a wider genetic diversity. .

3. The use of bioenergy should not worsen the food situation and cause further concentration of land and income as well as exploitation of rural populations.

⇨ Experience has repeatedly shown that global industrialisation of agriculture has often been accompanied by the expulsion of indigenous population groups, human rights violations and has forced small entrepreneurs, farmers and local population groups to rely heavily on multinational corporations. With regard to world trade, global expansion of bioenergy production will adopt the same neoliberal globalisation models and hence further increase pressure on rurally marginalised population groups.

⇨ Furthermore, bioenergy production runs the risk of further strengthening structures of global market concentration – in particular in the agricultural sector. This would result in prosperity for just a limited number of people and mean that economic benefits would remain in the hands of a minority.

⇨ In view of the current sharp price increase for feed and foodstuffs on global markets and the historically low stocks of important types of grain, such as wheat, the impacts of the demand for bioenergy on price structure must be carefully monitored. It must be ensured that in particular poor social groups do not face growing difficulties in securing their basic needs and that the poor are not driven deeper into poverty.

⇨ On the other hand, establishing decentralised and efficient use of bioenergy can improve access to energy, which currently cannot be ensured for approximately 1.6 billion people. This applies particularly under the premise that in many developing countries, in Africa in particular bioenergy accounts for more than 40% of primary energy supplies, but in some cases even accounts for 90% and hence represents the most important source of energy. Efficient use of bioenergy, especially for cogeneration of electricity and heat, can contribute towards rural development, particularly through regional value added activities, alternative incomes for farmers and the creation of jobs.

[16] *UN Energy, May 2007.*

Points for food security in detail:

1. BIOMASS FOR ENERGY AND FOOD

⇨ The food security problem affecting the world's population is by no means new. It is a chronic global problem, not least illustrated by FAO figures on the global food situation: throughout the world 854 million people are undernourished (2006). Hunger is a problem of access and allocation, not the existing quantity of food – from a global perspective enough food is produced. However, the use of biomass for energy purposes can limit the availability of food and hence exacerbate the problem of hunger.

⇨ Access to food is primarily determined by basic economic conditions; availability of land and participation in economic development is a basic prerequisite for being able to produce or buy food. At the same time access to modern energy services is a key element of economic development. Approximately 2 billion people have no access to electricity and a total of 3 billion people use traditional sources of energy (for instance wood), which sometimes has devastating impacts on the environment and health. Modern forms of bioenergy can make an important contribution to fighting hunger and poverty if biomass for generating energy is produced and used locally. Strategies for using biomass which are tailored to meet regional requirements can also provide a clean source of energy for small scale farmers, small entrepreneurs, hospitals and schools.

⇨ With the UN Millennium Development Goals[17] (MDGs), in the year 2000 for the first time the international community committed itself to achieve quantifiable goals in the fight against poverty. It called for decisive improvements in living standards of people in developing countries; here the important role of energy in fighting poverty is undeniable.

⇨ Despite the opportunities for economic development raised by bioenergy, its further expansion harbours considerable risks. The production and cultivation methods as well as changes in land utilisation, together with the increased demand it generates for available areas of land, represent a threat to biodiversity and climate. Violent expulsion and expropriation[18] as well as exploitation and repression are social impacts of the strong demand for bioenergy, which are increasing because of the pressure placed on the available area of land.

2. LIMITED AVAILABILITY OF FERTILE PASTURE AND ARABLE LAND

⇨ Since most energy crops[19] that are used today require the same soils as food and animal feed crops – generally this involves the same crops (for instance oil palms, sugar cane, rape seed and maize) – the expansion of bioenergy production limits the availability of agricultural land for growing food and animal feed. Farmable land is becoming an increasingly scarce resource, which is increasingly leading to regional competitive situations between food production and the production of bioenergy. This will intensify in the future in the wake of higher expansion targets for bioenergy and the changing way of life in emerging countries.

⇨ Most energy plants used today are annual and are grown as pure culture, and if the plants are self-compatible as monoculture (for instance maize, sugar cane). They are grown on high quality land, and have a similar considerable requirement for fertilizers, pesticides and water as conventional agricultural production.

---

[17] www.un.org/millenniumgoals

[18] *About 30 per cent of Indonesian palm oil is produced by smallholders, supporting up to 4.5 million people. Most of these are drawn from local communities and indigenous peoples that lost their land to the advancing plantations and were 'rewarded' with a two-hectare plot on which to grow oil palms. These smallholders are bonded to the palm oil companies that provide the credit with which the land is prepared and the seedlings procured. This debt accumulates over the first eight years before the oil palms become profitable, and farmers are obligated to sell to the companies to which they are indebted. This, and the fact that the harvested product must be processed within 48 hours, means that smallholders have no choice to whom they sell – they are price takers. As a result, the payment they receive for their products bears little or no resemblance to the market price, is often late, and is frequently subject to various opaque deductions. Oxfam 2007 (http://www.oxfam.org.uk/resources/policy/trade/downloads/bn_biofuels_german.pdf)*

[19] *A whole range of new plants is being researched in different countries throughout the world, some of which are already being grown, for instance Jatropha: www.jatropha.de; overview of different energy plants: (www.energiepflanzen.info/cms35/Portraets.1572.0.html)*

Photos: flickr/Schuba, flickr/Brewbooks, pixelio/Brenner

- Eating habits of people in industrialised countries and also the growing number of wealthy people in developing and emerging countries are characterised by high meat and milk consumption, and they hence require three to four times as much fertile pasture or arable land than would be necessary for a vegetarian diet. This means that land required by the global increase in meat consumption competes directly with bioenergy production, irrespective of whether it is used for a country's own consumption or for export.

- In the course of further technical development, particularly through the development of a second generation[20] of biofuels, such as the use of biomass gasification as well as lignocelluloses, international corporations have focussed their interest on wood as a raw material for producing energy. Currently it is estimated that decentralised production of these fuels will not become economically viable because of the complex manufacturing process, and that consequently only intensive farming and forestry is capable of satisfying the demand for raw material. Even if it is possible to use the whole plant and its residues and if a whole variety of plants can be used for producing synthetic biofuels, it must be assumed that this will further increase the pressure to use and commercialise forests. If this form of biofuels production was also established in developing countries, it would probably have a negative impact on the local population's access to traditional forest products. The expansion of large wood plantations of fast growing tree species would lead to a loss in biodiversity and sources of human food as well as adversely affecting water supplies: this is already evident in the case of eucalyptus. Currently there is also no reliable assessment of the energy efficiency or even the ecological aspects, such as food cycles.

- The cultivation of animal feed and foodstuffs in accordance with ecological criteria requires more land compared to industrial production methods, because organic farming involves more extensive land use. The greater the amount of organic farming, the less land is available for direct bioenergy production.

3. LIMITED AVAILABILITY OF WATER

- Many regions of the world suffer from water shortages. This trend will increase due to climate change[21] : global temperatures will rise, causing intensified evaporation of water and reducing water availability. There will also be a shift in regional precipitation patterns, which will on the one hand affect precipitation distribution throughout the year and, on the other hand, reduce overall precipitation in some regions.

- If wide areas of land are irrigated for growing energy plants, there is a danger that they will not only compete with the production of food crops in terms of the available land but also with regard to clean water. Worldwide 70% of fresh water is used for agricultural production[22] .

---

[20] *BTL fuels (biomass-to-liquid synthetic fuels): for manufacturing synthetic fuels from solid biomass, firstly the so-called synthetic gas (mixture of H_2 and CO) is produced from the biomass through thermochemical conversion (gasification) with subsequent gas scrubbing and conditioning. Catalytic hydration (Fischer-Tropsch (FT synthesis) is used to synthesise hydrocarbons from the synthetic gases. Products can be manufactured which are similar to diesel (FT diesel) or motor spirits, such as FT naphtha, methanol or dimethylether. BTL fuels are not expected to contribute towards satisfying overall automobile fuel requirements before 2010 (KAVALOV and PETEVES 2005; DENA 2006; REINHARDT et al. 2006).*

[21] http://www.ipcc.ch/ipccreports/ar4-syr.htm.

[22] http://www.unep.org/geo/.

⇨ For countries which today use large areas of agricultural land for water intensive cash crop production for export, cultivating energy plants is also an opportunity for establishing more resilient production structures and reducing loss of income through rotting or drought damage. Growing plants for energy production is far less susceptible to such influences – this particularly applies to systems where the whole plant is utilised.

4. ENERGY SELF SUFFICIENCY VERSUS EXPORT

⇨ For many developing countries with good infrastructure and transport connections to international harbours, exporting bioenergy is a very promising macroeconomic option (for earning foreign currency), and they will try to exploit this opportunity. Some regions, especially tropical ones, are more suitable for expanding the production of bioenergy because of the climatic conditions prevailing there, and consequently the pressure on agricultural land increases over proportionally in precisely these regions and increasingly puts pressure on the ecosystems there, which often have great biodiversity and contain large amounts of carbon dioxide. However, in addition to Brazil, Malaysia and Indonesia, other developing countries, in particular sugar export countries like Guatemala, El Salvador, Pakistan, South Africa, Senegal and Swaziland, are beginning to develop strategies for producing and exporting biofuels.

⇨ The export-oriented model concentrates on liquid fuels which, however, is generally based on large scale monoculture production systems and requires a considerably higher technical standard. Previous experiences in developing countries have already shown that the production of cash crops for export[23] takes place as large scale cultivation, controlled by rural elites, financially strong investors and multinational corporations. The export of bioenergy leads to a drop in food cultivation in exporting countries and reduces the overall availability of agricultural products on the global market. For instance, an average corn yield of 8.5 tonnes per hectare in the USA can produce approximately 3,500 litres of ethanol. The ethanol required to fill the 85-litre fuel tank of a large off road vehicle is equivalent to 200 kg of maize – enough to feed one person for a year[24]. In conjunction with population growth, a change in eating habits in emerging countries and the impacts of climate change, the increasing expansion of bioenergy production is causing considerable price rises for food and animal feed.

⇨ Large-scale industrialised and mechanised agricultural production only creates a small number of jobs, but at the same time destroys existing smallholding and indigenous structures. This not only affects commercial agriculture and rural workers employed there but also rural communities who produce the food and income for local populations. This results in greater social inequality and poverty.

⇨ In addition to export orientation many developing and emerging countries also want to increasingly expand their own production of energy supplies. They are looking for alternatives to increasingly expensive imported fossil fuels, developing local markets for bioenergy. This approach can above all have positive impacts on food security and rural development if the energy plants are used locally, and hence improve local and regional energy supplies. In this case positive effects on the local economic cycles and development can be expected. However, this can only succeed if the underlying agricultural conditions are designed to integrate local agriculture and the local population into the value added chain.

⇨ The Brazilian biodiesel programme for promoting smallholding agriculture in the Northeast of Brazil takes a step in the right direction. A social seal encouraged by tax concessions for biodiesel manufacturers who cooperate with a stipulated minimum number of small farmers encourages their integration into the production process. Contracts, advice and special credits are aimed at enabling the small farmers to remain independent and at the same time earn additional income. A final evaluation of the programme is currently not possible, since results are only just beginning to emerge after some initial teething problems. However, considerable financial support and technical advice to include the small farmers into the production process will be necessary, as well as investments for the operation of conversion plants.

---

[23] *Currently in Germany alone 85% of agricultural land is used for producing meat and dairy products, and additional land is used in other countries for producing animal feed (particularly soya). Currently Germany imports 4 million tons of soya annually, which means an area of approximately 2 million hectares is required for its production (with a productivity of around 2/t per hectare). In 2007 Brazil exported approximately 42 million tons of soya (www.abiove.com.br/exporta_br.html).*
The conflict "food versus bioenergy" takes on a completely different dimension if one takes the animal feed production for the excessive meat consumption in industrialised countries out of the equation. In 2006 the area of land under cultivation in Brazil amounted to approximately 264 million hectares (2006, http://ec.europa.eu/agriculture/publi/map/02_06.pdf). Of this cultivated land 197 million hectares of pasture are used for breeding cattle and 22 million hectares for growing soya. The soya cultivation is almost exclusively for exports, respectively for industrial meat production.

[24] *USDA: www.ers.usda.gov.*

5. DEPENDENCE ON AGRICULTURAL MARKETS – GREATER MARKET VOLATILITY

Photo: visipix/Salomon

⇨ If energy prices increase, it becomes economically viable for food producers to switch to energy production, which can cause a local deficit in foodstuffs. Such developments would particularly affect the poor in rural regions and countries which import foodstuffs (Low Income Food Deficit Countries). This effect was evident in Mexico, where the poor population groups suffered in particular – although previous developments also have to be taken into consideration here[25].

⇨ Because of the market price oriented sale of biomass either on the food or the energy market, both markets are becoming increasingly linked, so that price fluctuations of the fossil fuel market can lead to falls or increases in prices with big impacts on the local availability of animal feed and food.

⇨ In many developing countries a flexibilisation/deregulation of "land markets" is taking place. Also, areas of land that had been redistributed within the framework of agricultural reforms are part of this. They become included in the market economy, whereby pressure grows to sell them depending on the respective economic situation. Furthermore, the increasingly scarce availability of land is hindering agricultural reforms. Recent utilisation of previously fallow land, for instance in Brazil, is making agricultural reforms more difficult there and hence hindering the progressive implementation of the right to food. Corporations are increasingly buying up land worldwide to serve the animal feed, food and bioenergy markets. For instance, China has leased areas of land in the Philippines to produce bioenergy, in areas where the land was actually earmarked for agricultural reform.

⇨ Whether they are for bioenergy or for foodstuff production, subsidies greatly contribute to the price development of agricultural products. As in the case of EU and US subsidies on agricultural exports, this can influence the entire agricultural market in developing countries, sometimes with massive negative impacts on food security. Badly designed subsidies or excessive subsidies for promoting the expansion of bioenergy production can also encourage undesirable trade flows or trigger off abrupt price fluctuations with corresponding negative impacts on poor population groups.

---

[25] *The rapid increase in ethanol production in the USA was one of the reasons for a 400% increase in the price of maize tortillas in Mexico, the staple diet of the country, since the end of 2006. However, the tortilla crisis was not sparked by the ethanol boom in the USA, but already began in 1994 with the market liberalisation and the integration of the Mexican farming industry into global markets within the framework of NAFTA. Because of this development Mexico became a net importer of foodstuffs. The USA swamped Mexico with subsidised maize, hence ruining smallholding production in Mexico in particular and robbing the country of its food sovereignty. Many developing countries are subjected to a similar development because of "export dumping" by the EU and the USA. The smallholding production systems suffer in particular. This trade policy by the industrialised countries drove small farmers out of business and continues to do so, forcing them to migrate to urban centres. Some of the highly subsidised products of the EU in developing countries are grain with 29%, milk with 42%, sugar with 56% and poultry with 26%.*

Demands by the Platform Sustainable Biomass

Against the background of the interrelationships outlined above, the members of the Sustainable Biomass Platform have worked out a list of demands for food security and sustainable expansion of bioenergy:

BASIC DEMANDS

With oil prices at today's level, at least in most industrialised and emerging countries, bioenergy markets are still being created through political intervention in form of active market intervention. However, with oil prices set to rise even further and the need for climate protection, which is pushing up the prices of fossil fuels, bioenergy can increasingly manage to "pay its own way". In the future it will become increasingly difficult to use political instruments to regulate production and utilisation conditions. In this time frame for shaping policy, decision makers can establish guidelines to prevent negative social and ecological impacts of the further expansion of bioenergy or to at least limit these impacts. Politicians therefore bear a great responsibility to act quickly and effectively.

An important normative basis for food security is the human right to appropriate food, ratified by 156 countries. It is part of the international pact for economic, social and cultural rights, and is binding under international law. The resulting state obligations determine specific instructions on how all participating states are to act at a national level and also within an international framework. In 2004 the FAO guidelines on the right to food were already unanimously adopted. However, currently there is still a lack of implementation mechanisms.

1. Biomass is a limited resource. It should therefore be used where it achieves the best results. Currently the biggest reductions in greenhouse gas can be achieved with cogeneration of electricity and heat. Energy crops, plant residues and liquid manure should be directly used in decentralised plants. Short production processes also encourage decentralised technologies. Appropriate incentive mechanisms should support the development and implementation of such technologies.

2. To achieve the biofuel targets of 20 volume percent in fuel mixes in Germany and the proposed EU target of 10 percent renewable energies in the transport sector relies on imports of biomass. But for the foreseeable future it cannot be guaranteed that the vast amounts of exports will not lead to degradation and destruction of ecosystems and to social distortions. The Federal Government of Germany and the EU must carefully design their expansion targets to ensure that ecological and social problems in developing countries can be ruled out.

3. The fulfilment of quotas through the mandatory biofuels blend in Germany which came into force on 01.01.2007 is not secured by any appropriate ecological and social benchmarks. The objective of policy making surely cannot be to force the oil industry to fulfil a high quota although up to now no sustainably produced biomass is available on the market.

4. The German Federal Government must make any support for the expansion of bioenergy dependent on proof of sustainable production and utilisation. The bonus for regenerative raw materials in the Renewable Energy Sources Act and tax concessions on the basis of the German Biofuel Quota Act should only be granted if verifiable and binding standards for the sustainable cultivation of bioenergy are proved. This paper explains in detail which requirements are necessary for such sustainability standards.

5. The introduction of the quota for blending biofuels does not promote decentralised structures in rural areas. Because of the global and concentrated structures in the oil industry it can be assumed that producing biofuels will create similarly concentrated structures. The members of this platform regard the impacts on rural regions and land use in Germany, Europe and at the global level as extremely problematic in terms of land utilisation rights, labour rights, participation in regional added value and quality of life as well as the maintenance of biological diversity.

DEMANDS REGARDING BIOENERGY IN THE CONTEXT OF FOOD SECURITY:

1. To strengthen the rights and opportunities (financing, capacity building and purchasing guarantees) of small farmers, farm workers and local population as well as to guarantee their food security, the German Federal Government must integrate the **right to adequate food approach** into all relevant political fields. In doing so the FAO guidelines on the right to food must be used as an instrument for securing the priority of food.

Photo: flickr/kenpower

The German Federal Government's promotion of international or bilateral bioenergy projects should give priority to ensuring that the producing countries are able to ensure **their own energy supplies** and above all decentralised energy supplies for the rural regions. This should also include good governance through government dialogue and policy advice as well as the integration of affected population groups in the decision making processes.

2. For **guaranteeing traditional land and participation rights as well as maintaining health and labour security** the ILO Convention 169 must be respected and sanctions imposed against any violations. Furthermore, other existing certification systems, for instance of the Fairtrade Labelling Organization or the Forest Stewardship Council, must be involved as part of the basis of any such processes or considerations.

3. To ensure access to land resources and **traditional ownership and utilisation rights**, national **land use planning** is required, which involves the local population, informs them in advance and respects their freedom to make decisions (free prior informed consent).

4. Before any bioenergy projects exceeding a certain size are implemented, **independent environmental and social assessments** must be finalised with positive results. Uniform standards must be developed and applied for this purpose.

5. The maintenance of rural structures is essential for food security and the utilisation of bioenergy sources, and can encourage developments in regions, establish appropriate technology and combine the goals of food security and improving access to clean energies at regional levels.
The German Federal Government should therefore give priority to promoting **rural structures** through the German development cooperation and also promote them at a European level.

6. To avoid land conflicts and competition for available areas of land, energy crops should be **primarily cultivated on degraded land**. This requires previous evaluation of the actual functions of these areas of land, to avoid replacing seasonal utilisation and aggravating competition for water. Furthermore, a definition of "degraded", "not used" and "extensively used" areas is required to ensure that valuable ecosystems are not

first "degraded" in order to then legitimise their use for agricultural purposes.

7. No renewable energy materials from countries **afflicted by violent conflicts** should be allowed to be certified and promoted by the EU or the German Biofuel Quota Act.

8. Biomass cultivation should be based on a **broad variety of plant species** as well as innovative and sustainable cultivation systems and technologies. This can considerably reduce water, pesticide and fertiliser requirements. Appropriate incentives must be created and research projects initiated to promote diversified and extensive bioenergy production.

9. Bioenergy which uses **genetically modified organisms** in its cultivation process must not be allowed to be certified as sustainable product and imported into the German/European market.

10. Areas of farming land in developing countries which have up to now been used for growing animal feed for export should in future be increasingly used for producing bioenergy for providing these countries' **own energy supplies**. To facilitate this, appropriate political and economic framework conditions must be created in the industrialised countries. Possible political options for reducing the amount of land required to cover meat consumption in Germany could be incentives for more extensive production types of animal husbandry, controlling imports of animal feed and increased domestic cultivation of protein rich animal feed, combined with measures to inform the public about the impacts of meat consumption.

11. To ensure **food security** in developing countries political measures must be undertaken to absorb the impact of extreme price fluctuations of staple food, and these must be backed up by suitable subsidies policy. In particular there must be sufficient food available at reasonable prices for poor population groups in the future. Appropriate framework and supporting conditions must be created for rural development, agricultural trading policy, early warning systems for forecasting droughts and food safety nets, food aid, state guarantees for "basic food income" and disaster relief.

12. The German Federal Government must ensure that the above considerations are incorporated into the development of sustainability standards in the EU and into international processes (Global Bioenergy Partnership, Roundtable on Biofuels, UN Environmental Programme, Global Environmental Facility, World Bank, etc.).