Biofuels – driver of rural development?

There's no doubt about it: agriculture is back on the political agenda. Headlines about rising food prices, the investment boom in the farm sector, dwindling stocks of grain, the future of world food security and the growing challenge posed by climate change are all signs of a paradigm shift in farming. The current trend towards agrofuel production and its future role are also hotly debated issues.

Can the farm sector boost national and global energy security by stepping up its production of biofuels, and if so, how? This is becoming a highly contentious issue – and one which has provoked a rapid and dramatic shift in public opinion about the use of these fuels. Only a few months ago, farmed fuels (or "agrofuels") were being hailed as the great hope for increased global energy security. Today, by contrast, they are widely regarded as a threat to the world's food supply and the main driver of rising food prices.

To arrive at a reliable assessment of the real opportunities and risks associated with increased production of agrofuels, however, a more nuanced analysis of their various production methods and the highly diverse agro-ecological regions in which this is taking place is essential.

Whether the production of crop-based fuels can make a contribution to – or even become a driver of – rural development will largely depend on the overall policy framework and on trends in the international energy markets.

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Expanding energy markets: a new challenge for agricultural policy

Until now, energy has largely been a cost factor in agricultural production in the industrial countries. In the developing world, on the other hand, access to energy was the key issue. However, the energy price hike over recent years and policy decisions to step up biofuels use have created a radically new situation. With the world energy market continuing to expand and many countries now seeking to safeguard their energy supplies, at least in part, from biofuel production, a clear paradigm shift has taken place. Energy prices – especially the price of oil – now directly affect agricultural prices. With agricultural produce now regarded as a source of energy content as well as food, a new floor price is being created that is determined by oil price trends. As a result, the volume of inputs available for food production and the price of these inputs are crucially influenced by the current record oil prices and the associated speculation on the commodities markets. As cereal and oilseed crops can be converted to energy at any time, a new minimum price for their energy content is being established. This then impacts on food prices, reinforcing the price links between agriculture and energy markets. However, agricultural inputs will only be used for fuel production as long as the price of these inputs does not rise faster than the price of the energy they contain, for otherwise, investment profits would be at risk. Here, the policy framework – such as the availability of government subsidies or the adoption of minimum biofuel blending ratios in fossil fuel, as well as tariffs and market access restrictions – are of key importance.

In order to assess the potential significance of biofuels for rural development, I will begin by looking more closely at the global energy market and its development trends. A long-term rural development policy that is linked to biofuel production must identify the basic trends in the energy market, otherwise there is a risk that opportunities will be missed or large-scale investment will be misdirected. I argue that the energy market is so large that it will permanently influence biofuel production trends, whereas farm products are unlikely to exert downward pressure on the price of oil.

World energy consumption

In 2004, world energy demand was around 463 exajoules (an exajoule is

Photo: laif

The growing demand for agrofuels is causing an alarming shortfall of worldwide grain stocks.

a unit of energy equal to 10^{18} joules), of which an estimated 49 exajoules came from biomass. However, this biomass share in world energy supply must be interpreted with caution, for two reasons. Firstly, the figure is no more than a rough estimate, as the basic data available on biomass use are far from reliable and a large margin of error exists. Secondly, and more importantly, this biomass use must not be equated with modern biofuels. A significant share of the 49 exajoules estimated for biomass use in 2004 comprised traditional use of fuel wood for cooking and heating in the developing countries and, to a far lesser extent, wood-burning in the industrialised countries. In developing countries in particular, this form of biomass use very often involves the non-sustainable and environmentally destructive consumption of natural resources. Modern biomass technologies based on bioethanol or biodiesel accounted for just 1.5 exajoules or thereabouts in 2006. Both these facts clearly demonstrate that agrofuels still only make up a very small proportion of the world's energy supply – around 2 – 3 percent, at most, of the world's fuel consumption for road transport and less than 0.5 percent of its total energy supply. The International Energy Agency (IEA) predicts that world energy demand could virtually double by 2050. If biofuels are to meet a significant share of the world's rising energy demand, there will have to be significant impetus for an increase in biofuels production.

This analysis also highlights the continuing importance of traditional biomass use in many developing countries. More than 20 percent of the energy supply in non-OECD countries currently comes from biomass. In Africa, biomass accounts for almost 50 percent of the total primary energy supply and is therefore still a key energy pillar. In contrast, biomass within the OECD countries accounts for only around three percent of world biomass production and is therefore a very small part of the energy equation.

These figures also show that there is substantial regional variation in the importance of biomass for rural development.

Below, I will therefore present two fundamentally different variants of agrofuel production in more detail and examine their respective implications for rural development:

1. Production for local markets as a contribution to rural energy supply, and
2. Fuel production for the industrialised countries under world market conditions as a source of income generation.

Production for local markets in developing countries

It is estimated that about 2.4 billion people living in developing countries currently rely on traditional biomass to meet their daily energy needs.

If we also include the 1.6 billion people living in the developing countries who do not have access to electricity, the vital need for a comprehensive strategy to improve the developing countries' energy supply becomes abundantly clear. Better conditions of life and economic development are highly dependent on access to energy. The oil price hikes in recent months and the likelihood of prices remaining at this high level will make energy imports increasingly expensive, further exacerbating energy supply problems in the developing countries' rural regions. This must be the starting point for a biofuel production strategy.

Furthermore, smoke from the burning of fuel wood in open fires or stoves poses one of the most severe health risks for women in particular. Here too, a modern energy supply with clean, climate-neutral, regionally produced fuels could have considerable benefits.

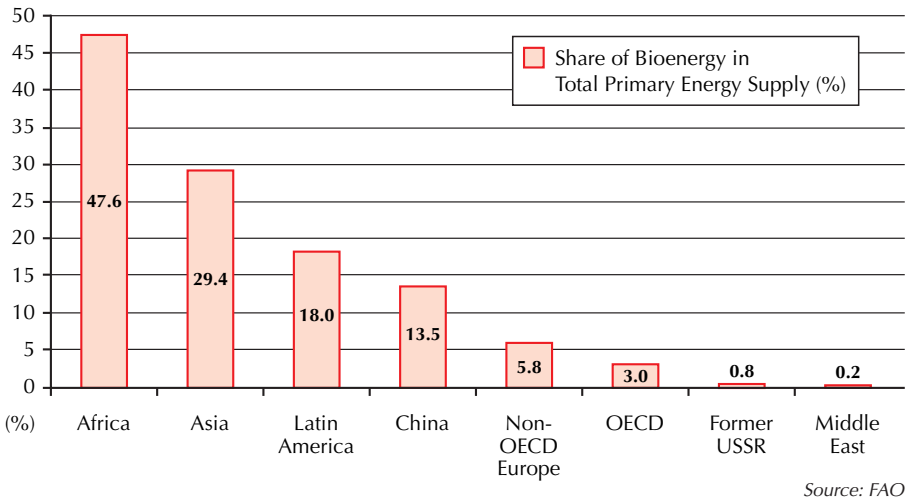
The production of agrofuels and of fuels for the local market can provide significant impetus for development. Locally-based production

Table 1: How big is the market for biofuels?
Energy production and potential, biofuels and land use

			Exajoule (10^{18}), EJ		
Energy source:		**Year**	**World**	**OECD**	**non-OECD**
All sources		2004	463	231	232
		2030	670		
		2050	850		
Biomass	Actual use	2004	49	8	41
Biofuels	Ethanol	2006	1.06	0.48	0.58
	Biodiesel	2007	0.45	0.27	0.18

Source: FAO

Bioenergy supply 2004 (according to IEA 2006)



Source: FAO

that is adapted to local conditions and increases value added in the region while reducing dependency on increasingly expensive imports, together with the establishment of a decentralised infrastructure, can contribute to this development process. Numerous pilot projects undertaken over the years show that access to energy generated from locally or regionally available sources is a viable and sustainable option. In the face of rising market prices and the predicted distributional conflict over scarce resources, appropriately adapted technologies (to use the term again) and sustainable management of renewable resources could become plus points for rural development. A targeted strategy for the production of climate-neutral fuels could therefore not only reduce exposure to rising oil prices but also stimulate growth in rural regions. For this strategy to become reality, however, well-designed national policies and targeted international support for the implementation process are essential.

New financial mechanisms arising from the international climate process (the Clean Development Mechanism (CDM), emissions trading etc.) offer a further entry point which should not be overlooked. Although still imperfect at this stage, this offers a new system of incentives and financing for the creation of decentralised generation structures in the developing countries' rural regions. Besides energy production, these rural regions could thus play a part in reducing and mitigating the effects of climate-damaging CO_2 emissions. Of course, this must not shift the burden of dealing with global warming on to the shoulders of the developing countries' rural regions. On the contrary, these new financial instruments offer new opportunities for financial transfers aimed at promoting development. As the prerequisite, not only must these financial instruments be appropriately adapted to the specific conditions pertaining in the rural regions; the relevant technologies, implementing strategies and national policies must also be in place. Farmers and rural regions could thus be remunerated for their contribution to cutting climate-damaging greenhouse gases and gain impetus for their own development at the same time.

Agrofuels for the world market

Personal mobility and freight transport will continue to rise, and so too will the demand for oil. Upward price pressure in the crude oil markets is therefore set to increase further. For some time now, energy security has been an increasingly important political issue; the industrialised countries' current policies of promoting the production and use of biofuels through government subsidies and regulations must be viewed in this context. Political decisions in Europe and the USA are thus the driving force behind the use, and hence

Photo: GlobalAware

Whether the production of crop-based fuels can contribute to rural development will largely depend on an overall policy framework and the international energy markets.

the production, of biofuels. Rising oil prices are also making some biofuels more competitive.

Personal and freight transport mainly uses ethanol or biodiesel. It is already apparent, however, that producing the requisite amounts of biofuels will far exceed the industrial countries' own agricultural capacities. Table 2 shows the percentage of Germany's total farmland that would have to be dedicated to biofuels production in order to substitute 10 percent of its total annual fuel consumption with crop-based fuels.

The example of Germany in Table 2 shows that politicians' targets for the blending of ethanol or biodiesel cannot be met solely from the cultivation of relevant crops in Germany or, indeed, in the EU. Assuming that there is no downward readjustment of these targets, an expansion of the world trade in agrofuels can thus be anticipated. This will necessitate a debate about issues such as the WTO's classification of agrofuels and the sustainability of biofuel production. In the interests of rural development policy, it is essential to follow these debates pro-actively and monitor the overall conditions with accuracy.

Table 2: Amount of farmland required to substitute 10 percent of fuel consumption with farmed fuels

	Feedstock	Cropped area (%)	Proportion of total farmland (%)
Germany	Rape, beet, wheat	29.6	20.5
EU 15		26.7	14.0
EU 25		16.9	13.3
EU 25	Rape, beet, wheat Yields as in Germany	13.0	10.2
Germany	Ethanol solely from beet Yields as in Germany	27.2	19.0
EU 25		15.6	12.3

Source: FAO

Policy decisions – e.g. to reduce the blending quota, establish criteria for biofuel production, introduce certification schemes as proof of sustainable production or modify trade tariffs – could quickly spell the end of the current soaring demand.

For rural regions, there is substantial potential for biofuel production and thus the generation of value added, but there are also uncertainties and risks due to the dependency of this sector on political decisions. Bioenergy markets are highly dependent on political considerations, and their future development – positive or negative – will therefore be determined by them as well.

World food prices – especially staple foods – have already been rising for some time. There is thus a fear that biofuel production will exacerbate the problem of hunger in the world, which will further intensify the political debate about the parameters and sustainability criteria for crop-based fuel production. The food-fuel competition for land, water and investment will add urgency to this debate. In setting the parameters for the cultivation of renewable fuel inputs, it is therefore not only energy and food security which should be a key consideration; the debate must also focus on the importance that should be attached to rural development.

Zusammenfassung

Die Frage, ob die Produktion von Agrartreibstoffen einen Beitrag zur ländlichen Entwicklung in Entwicklungsländern leisten kann oder in Konkurrenz zur Nahrungsmittelproduktion steht, wird heftig diskutiert. Politische Entscheidungen in den Industrieländern, etwa diejenige, eine Mindestmenge an Bioenergie in Treibstoffen zu verwenden, werden dazu führen, dass sich die Länder Agrartreibstoffe auf den Weltmärkten beschaffen müssen, was zu einem weiteren Anstieg der Lebensmittelpreise führen wird. Ändern sich diese politischen Rahmenbedingungen, beispielsweise durch veränderte Import- und Exportzölle, kann der Boom auf den Weltmärkten sehr schnell zum Erliegen kommen. Für die ländlichen Räume in Entwicklungsländern bedeutet dies zum einen ein hohes Potenzial an neuen Absatzmärkten zum anderen aber auch Gefahren durch eine Abhängigkeit von politischen Entscheidungen in den Industrieländern. Wirtschaftliche Entwicklung ist erheblich vom Zugang zu Energie abhängig. Die lokale Produktion und Verwendung von Energie aus Agrarrohstoffen bietet hier ein hohes Potenzial.

Resumen

Hoy en día se discute con ardor sobre si la producción de combustibles agrícolas puede prestar un aporte al desarrollo rural en los países en desarrollo, o si compite directamente con la producción de alimentos. Las decisiones políticas en los países industrializados, por ejemplo sobre la fijación de un límite mínimo de utilización de bioenergía en los combustibles, obligarán a los países a adquirir combustibles agrícolas en los mercados mundiales, lo cual conducirá a un mayor aumento en los precios de los alimentos. Si cambian estas condiciones políticas del entorno, por ejemplo debido a variaciones en los aranceles de importación y exportación, el alza en los mercados mundiales puede desaparecer muy rápidamente. Para los ámbitos rurales de los países en desarrollo esto implica un alto potencial de nuevos mercados de consumo, pero a la vez entraña peligros debido a una dependencia de las decisiones políticas de los países industrializados. El desarrollo económico depende considerablemente del acceso a la energía. La producción y utilización local de energía proveniente de materias primas agrícolas conlleva un alto potencial en este sentido.