



The example  
of Burkina Faso

## Food or biofuels – must we choose?



Marie-Hélène Dabat, Joël Blin

Would the Southern countries benefit from producing biofuels? This is the subject of heated debate. For some, biofuels are a factor of development; for others, they compete with food production. Pro- and anti-biofuel positions are based as much on personal beliefs as on substantiated arguments. The case of Burkina Faso demonstrates how this question can be answered at country level.

Burkina Faso is faced with two forms of insecurity: food and energy. In this country, where half of the population lives below the poverty line, cereal production varies considerably and not all households have access to sufficient, and diversified food. Low energy consumption hampers the development of the country, which uses less energy than a medium-sized town in the United States. Fuelwood is predominant; 15% of urban areas and less than 1% of rural areas have electricity. Energy requirements are therefore immense, and biofuels could have a role to play.

### A broad range of options

Which crops should be grown? Where? Using which factors of production? Which techniques should be used to turn biomass into energy? Using which forms of produc-

tion, supply, transformation and distribution? Which production chains should be used? Which development model should be chosen: large- or small-scale; contractual or competitive; industrial or decentralised? These choices will have consequences for food security, income and employment, industrialisation, household vulnerability and migration, among others.

Several types of biofuels could be produced in Burkina Faso using technologies that already exist at the local level. Bioethanol and biodiesel have certain limitations that we will not go into here. Pure plant oils have the greatest benefits in Burkina Faso. Made from oilseed crops using simple technologies that are accessible from the village scale to the industrial scale, they are mainly intended for use in static diesel engines (generators, mills, motor pumps, etc.).

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Many different kinds of crops can be used to produce these oils, including jatropha, cotton, sunflower, peanut and soybean. An advantage of jatropha, a perennial plant, is that it will grow in relatively infertile soil, but its disadvantage is that it can only be used for energy production (its oil cake cannot be used for animal feed, being toxic). Annual oilseed crops provide greater flexibility for farmers, who can easily change crops and choose to sell their products on several markets: food, animal feed, or energy. But the development of these crops implies improving agronomic knowledge to adapt them to the agro-climatic and social conditions in West Africa. Attempts to grow rainfed sunflower, for example, are providing good yields in terms of oil and oil cakes for cattle feed.

Two production models appear to be of interest for Burkina Faso: first the decentralised development of short agricultural production chains, the transformation of biomass and the use of energy as a driving force; and second the substitution of pure plant oil for imported fuels used in power stations to generate electricity.

The first model consists in supplying static village engines of the multifunctional platform type. This is an engine used to power a variety of different tools – grinding mills, huskers, alternators, battery chargers, pumps, welding stations and carpentry equipment – as well as to distribute water and electricity. It is both a system for producing mechanical and electrical energy and an enterprise providing energy services for micro-economic activities. This model can foster local development, improve the living conditions of local populations, and generate income through the use of energy and also the local production and transformation of biomass.

It is easy to set up at the technical level, although there may be problems of oil quality in small processing units. Finally, it is suited to the social conditions of rural populations (limited land use, little investment, etc.). However, it requires better understanding of the needs and uses of households and it may suffer from stakeholder strategies to minimise risks (solvency, barriers to innovation and to practice changes, etc.). Other difficulties are customary in the establish-

ment of new production chains, such as the emergence of private operators and collective initiatives, or the sustainable construction of coordination mechanisms.

The second model, which is not exclusive of the first, consists in substituting pure plant oil for imported fuels used in power stations feeding the national electricity company's grid and in those supplying major towns or industrial units. Several configurations are possible: agricultural production that may or may not be decentralised; oil processing units located close to users or to plantations in order to limit transport costs; the involvement of family farmers and agro-industrial companies partly supplying themselves and concluding agreements to varying degrees with farmers' organisations. This model has a number of advantages. It can be set up rapidly. It uses all types of oilseed crops – producers can choose those that suit them. It can be adapted to different supply levels in the sense that it can be supplemented by petroleum products. In the short term, it would be an outlet for the first jatropha harvests that will arrive on the market in 2011. Finally, in case of high crude oil prices, it would provide a means of reducing not only energy bills, but also State fuel subsidies and the cost of electricity, at the same time as paying Burkinabe farmers.

## A threat to food security?

Although biofuels provide a possibility for ending energy insecurity, is their development not a threat to food security? Biofuels may threaten food security through several different mechanisms: competition between outlets (for example, whether oil is sold on the food market or on the energy market); the transfer of international prices to national prices (the effect of high prices of imported cereals such as rice on the prices of local food products, such as sorghum, millet and maize); competition between several products for access to land and water (jatropha in monoculture or intercropping; sugarcane, which is a water intensive crop) or for the allocation of labour and capital within households (cash crops). What effect do these mechanisms have in Burkina Faso?

Competition between oil outlets is not an issue at present. The only edible oil produced

*Two production models: the development of short production chains; the substitution of pure plant oil for imported fuels.*

*Choosing crops, techniques and farming methods in order to limit competition with food crops.*

in the country comes from cotton. At the height of cotton production, this oil only covers half of all requirements. The country imports low-cost palm oil from Côte d'Ivoire and especially from Asia to meet demand that is increasing due to population growth. The recent international price instability for cotton fibre makes the future of this oilseed crop uncertain on the edible oil market. The promotion of new oilseed crops (sunflower, soybean, etc.) could help to meet demand for edible oil. Stimulating these sectors could be beneficial to both the food market and the energy market. Commitment by national electricity companies and fuel distribution companies to secure outlets by buying plant oils at a floor price set by the national authorities would provide incentives for oilseed crop producers. They would then be free to choose the food market if its prices were higher and to keep surplus or lower quality oils for the energy market.

Biofuels may also threaten food security if international price variations for agricultural products are transferred to national prices. Biofuels played a role in the rise in international prices in 2007-08, although this responsibility is still debated. But studying monthly prices of local and imported cereals from 1997 to 2009 shows that the cereal market in Burkina Faso is relatively isolated from the international market. An analysis over several decades also makes it possible to put the rise in agricultural prices into perspective. The hunger riots of 2007 were not just about the prices of cereals and oil.

As regards competition for land, the agricultural land sown with cereal crops every year represents about 45% of potential cropland (Nonyarma and Laude, 2010), leaving land available for new production. The land required to produce biofuels depends on the type of crop used (agronomic yield and oil content), the planned production level and the model developed. Around 15 hectares of jatropha must be grown to meet the energy requirements of a rural community of 2 500 people with a multifunctional platform. To replace 30% of the diesel imported to generate electricity in the national company's power stations, the land required represents less than 6% of the country's arable land (Blin *et al.*, 2008).

*The interplay between actors and the alliances formed mark the political choices that will determine the consequences of investment in this sector.*

It remains to be determined whether the land in question is actually available, in other words that it is neither cropped, nor grazed nor appropriated. Much of the land supposedly available is actually used by local populations for their survival: gathering, transhumance, collecting fuelwood, etc. Moreover, some of this land may soon become unavailable as a result of population growth in a country that has not yet begun its demographic transition.

Attention must be given on a case-by-case basis to the choice of crops, techniques and farming methods, in order to limit competition with food crops for land, water, labour and capital. However, food security is not just a matter of production capacities or levels. The causes of insecurity are found as much in badly functioning markets, inefficient agricultural policies and certain social factors as in physical availabilities and the effects of substituting different uses or factors of production. Food insecurity comes back to the more global problem of poverty.

On the other hand, synergies are possible between energy and food: intensifying production by means of mechanisation and increasing yield per hectare, thereby limiting the land problem; developing food crops by processing and preserving products, thereby improving their availability over time; and facilitating access to food products through transport, thereby improving their spatial distribution. Efforts must be made to exploit these synergies.

## **A response specific to each country**

Must we choose between food and biofuels? The answer depends on the country. A number of conditions must be met to ensure the advantages of biofuels outweigh the disadvantages: prioritising domestic use over exports; supporting the emergence of decentralised systems; localising dedicated crops in order to avoid competition with food crops; regulating the edible oil market; removing technical obstacles to production and processing; and prioritising projects implying family farming over agri-business. In the current context of the threat to food security, but also of the fluctuating com-

## A few words about...

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petitiveness of biofuels due to crude oil price volatility, and of limited financial capacities among rural populations, the emergence of local production chains requires the implementation of national public policies to guide, protect and encourage stakeholders. But other non-State actors also play a part in the construction of these production chains. The interplay between public and private actors and also between local,

national and global levels is complex. Relations are sometimes conflictual. Alliances are also formed between private companies and the State, between foreign companies and local ventures or traditional power, and between regional authorities, NGOs, foundations and international aid. This interplay and these alliances leave their mark on the political choices that will determine the consequences of investment in this sector. ■

This issue of *Perspective* is the result of two research projects currently underway:

• **Promoting biomass energy in West Africa – section on biofuels.** This project, financed by the European Commission (2010–2014), is aimed at analysing the technical and economic potential of biomass as a source of renewable energy production in West Africa. It should help to define a regional policy on biomass energy in order to foster access to energy in rural areas. The work deals more specifically with Benin, Burkina Faso and Mali. The participants in the project are EIFER (European Institute for Energy Research), 2iE (International Institute for Water and Environmental Engineering) and CIRAD, along with their local partners. For further information: philippe.girard@2ie-edu.org

• **Living conditions, access to energy and local development (ENVISUD).** This thematic research initiative by CIRAD (2009–2011) is aimed at defining and assessing the potential of biomass energy, and analysing how it can be realised. The approach proposed is original: focusing on rural areas and the local level, it is based on populations and their requirements; it adopts an interdisciplinary approach (human and technical sciences); and it explores the relationship between energy and living conditions. The areas associated with this research are in Brazil, Burkina Faso, Madagascar and Mali. For further information: laurent.gazull@cirad.fr

This *Perspective* is also based on the international conferences on biofuels in Africa in 2007 and 2009, which were organised by 2iE and CIRAD with the support of their partners.

• The 2007 conference focused on “Challenges and opportunities for biofuels in Africa” <http://www.cirad.bf/fr/anx/bioenergie-conf07.php>.

• The 2009 conference sought to provide answers to the question “Biofuels: a factor of insecurity or a driving force for development?” <http://www.cirad.bf/fr/anx/bioenergie-conf09.php>. The proceedings of the 2009 conference have just been published in the 2iE *Sud Sciences & Technologies* biannual journal, N° 19 & 20, December 2010. [http://www.2ie-edu.org/index.php?option=com\\_phocadownload&view=category&id=25%3Asstn-19-20&lang=fr](http://www.2ie-edu.org/index.php?option=com_phocadownload&view=category&id=25%3Asstn-19-20&lang=fr). The next conference will take place in November 2011.

Several articles have been published based on this research, including:

Blin J., Dabat M.-H., Faugère G., Hanff E., Weisman N., 2008. Opportunités de développement des biocarburants au Burkina Faso. Report for KfW/GIZ, December, 166 p. <http://www.cirad.bf/doc/bioenergie-kfw.pdf>

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Doornbosch R., Steenblik R., 2007. Biofuels: Is the Cure Worse than the Disease? Round Table on Sustainable Development, OECD, Paris, 11-12 September 2007. 57 p.

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