



EMPOWERING RURAL COMMUNITIES BY PLANTING ENERGY

Roundtable on Bioenergy Enterprise in Developing Regions

22-23 October 2007

UNEP, Paris

UNEP brought together representatives from NGOs, research institutes, private sector and investors from Africa, Asia, Latin America and Europe, with specific knowledge and hands-on experience in bioenergy, particularly Jatropha, to discuss:

- ◀ Challenges and benefits of Jatropha and similar bioenergy sources
- ◀ Building successful bioenergy enterprises - limiting and enabling factors, emergent models and indicators of Bioenergy production
- ◀ Walking the talk: actors, their roles and capacity needs

A background paper on the agronomics and sustainability of Jatropha, conversion technologies, and business models was produced by the Mali Folkecenter to inform the discussions. Experiences from Mali, Ghana, Tanzania, Brazil, India and Guatemala were presented and perspectives from the private sector and an investor were shared.

The meeting confirmed the great interest in and the potential of Jatropha. It illustrated that the barriers to sustainable use and business development differ from one region to another; just as available information differs greatly, both in quality, findings and accessibility. Rigorous research and validation of information as well as knowledge management were seen as critical to remove information barriers. The group also identified a number of tools that are needed to help development and scaling up of small scale projects and ensure sustainability of large scale projects in the planning and implementation phases.

Participants found that a network of centers of excellence, drawing on experience and activities underway would be the most effective way forward to help address some of the barriers that were identified. Participants expressed interest in being part of such a network, which should be open for additional centers to join the effort. A few suggestions as to next steps were made, and are summarised at the end of this report.

Availability and Accessibility of Information on Jatropha

Jatropha growing wildly or as hedges is not new. Jatropha plantations with the aim of exploiting seeds for bioenergy production, however, are a recent development with a growing number of projects on a small, medium and large scale.

Information on the former is known and available, but of limited use for organised exploitation of the plant. A number of companies have started to test and breed Jatropha to maximise yields for Bioenergy production. With growing commercial interest and large investments being made, information is shared more reluctantly as it becomes part of commercial property and determines competitiveness.

Yet, a number of studies are publicly available, but the results vary largely, hence the need for validation and further testing. For example, in Guatemala, a private company received funding from a development agency to optimise Jatropha production techniques and related technologies. The company concluded that under optimal conditions (sunlight, irrigation, high quality arable land, fertilizer use), 2 tonnes of jatropha oil could be produced per hectare, but that under real life conditions the yields produced turned out to be much lower. Also, in India, relatively high yields are being reported, achieved on arable land, with irrigation and fertilizer use. In the Malian examples, yields achieved on a mix of land types including marginal or abandoned land and without chemical fertilizer and irrigation are considerably lower. This reflects different site-specific-conditions and differences in approaches chosen: water-scarce countries versus relatively wet tropical countries, marginal land or a mix of land qualities versus arable land, use of chemical fertiliser versus use of presscake as a natural fertilizer.

Don't believe the hype without a second look...

Jatropha has been hyped as the 'miracle plant'. But it does not produce miracles. It does survive under semi-arid conditions and grows on marginal land. However, the yields that it produces under these conditions are hardly interesting for an investor looking for quick return on investment. If produced on arable land, with irrigation and fertilizer use, yields can make for an economically interesting project. Still, Jatropha will have to prove that it is doing as well as other plants growing under these conditions, which have been used and researched for a longer period of time, such as oil palm. Finally, for the time being, Jatropha is harvested manually, which requires considerable man power. Depending on labour cost, Jatropha might or might not be an economically interesting option.

... but at the minimum, Jatropha can fill a niche

However, in areas with high unemployment, where water is a scarce resource, where little arable land is available, Jatropha is without doubt a promising alternative, generating a number of valuable side benefits that should be taken into account in cost-benefit analysis.

The FACT Foundation held a workshop in which a lot of information on agronomics was gathered. Building on this, available reports on Jatropha should be collected and analysed. If needed further verification and research should be undertaken. It was agreed that specific information is required on a regional, country or setting (geo-climatic conditions) basis.

However, maximising yields is not all - a balance has to be found between economics, environmental and social concerns, and this over the entire life cycle and for the different types of settings and approaches to allow for informed decision making. Sustainability standards have to be developed tailored to Jatropha, based on general sustainability principles for bioenergy.

As to knowledge management, information needs to be made available both on a specific website, credibility assured by the centers of excellence involved in this process, and through toolkits developed to inform and train farmers.

Conversion Technologies

The two main options for Jatropha conversion were discussed: biodiesel and straight vegetable oil. As described in the background paper, each pathway has its advantages and disadvantages. While straight vegetable oil can not be used in all modern engines without undergoing an additional conversion, it is easier and cheaper to produce. The conversion into biodiesel requires more sophisticated technology, additional energy input and considerable water. Particularly the latter point was of concern for countries already facing water pressure. As to energy input, biogas production from Jatropha presscake can dramatically improve the economics of Jatropha. In the Indian experience, 1 tonne of presscake can produce 550nm³ of biogas, made up of 65% methane and 18% CO₂. IAT in India has developed specific Jatropha processing hardware.

Policy issues

Enabling policy frameworks were found to be necessary for bioenergy projects.

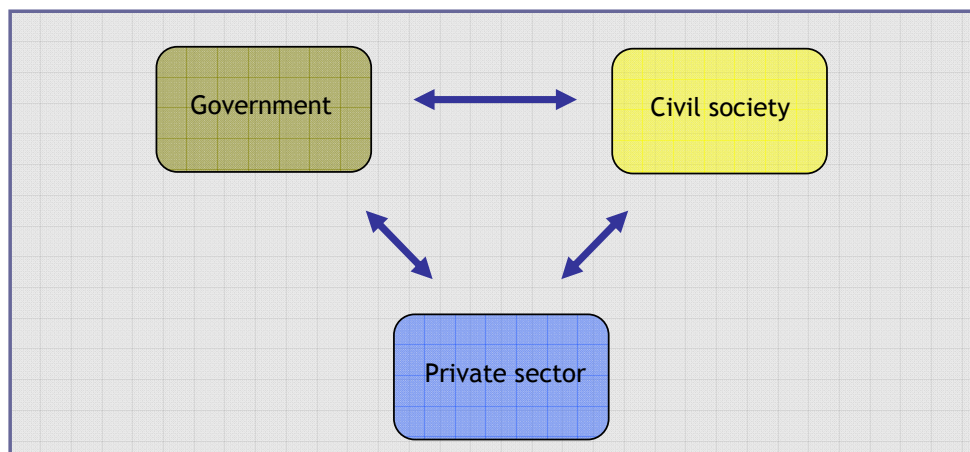
This comprises a range of possible activities and interventions:

- ◀ bioenergy planning based on mapping of available resources in terms of sun, water, land quality, conservation areas and competing uses. In Mali for example, a Renewable Energy Commission was created involving different ministries, civil society and the private sector to elaborate the national renewable energy strategy, which foresees 750 million FCFA from a special government investment fund for a national Jatropha project.
- ◀ governance and institutional frameworks to attract foreign investment
- ◀ national strategies promoting rural development and access to energy for the poor, allowing national interest to filter down to the village level for example, if the government committed to a target of 20% of all villages to be powered by jatropha, it would create a stable climate for investors and a virtual cycle of development would be created.
- ◀ incentives (e.g. tax breaks for renewable energy equipment)
- ◀ policies to avoid over reliance one cash crop (example: Ghana's cacao market)

It was pointed out that policies need to be put into place quickly as the bioenergy market develops fast, and is mainly driven by demand from developed countries.

There was a strong call for policies to empower rural communities, as they will be involved in the production and the first ones to be affected by any potential negative consequences.

The “Government - Civil society - Private sector” trinity of actors



... policy should reflect country needs - priority 'local production for local use'

In many developing countries a large number of people live in rural areas, mainly living of subsistence farming, and facing a lack of access to modern forms of energy. Hence, energy access can be the real driver of bioenergy development in developing countries. The point was made that with just 200 ha of Jatropha a typical village could produce its own fuel. However, to replace only a small part of the global fossil oil consumption, hundreds of thousands of hectares would be required, with considerable investments for storage tanks, trucks, ships pipelines, refineries. This is not to rule out the latter, but to make a call for starting with solid and tangible projects of the type of the Malian Garalo project 'local production for local use'. Excess production could then substitute oil imports and eventually cater for global markets. Brazil, for example, created its ethanol industry by first satisfying its own needs, which contributed to the country's economic development. At the same time the local market provides independence from fluctuations of global oil and ethanol prices. Only now after almost 30 years of experience the country is starting to export. In sum, valuable national resources need to be managed sustainably and should not be sold off too cheaply.

Interventionist policy is not popular. However, de facto, the agricultural sector has seen interventionist policies around the globe. Minimum prices for Jatropha seeds might be one way to kick start the sector's development. Yet, just as any subsidy this guarantee should be withdrawn as the sector gathers steam (sunset clause).

It was also argued that increased food prices is a good thing for farmers as it makes it a more interesting business proposition, and attracts investment and transfers technology to increase production. This means that the rural poor can be winners. Urban poor who would have to pay more for food without seeing an increase in income might face hardship and which would have to be balanced with policy measures. Yet, revalorisation of rural areas might help break the rural-urban-cycle and entice rural poor to take chances at home rather than migrating to the city.

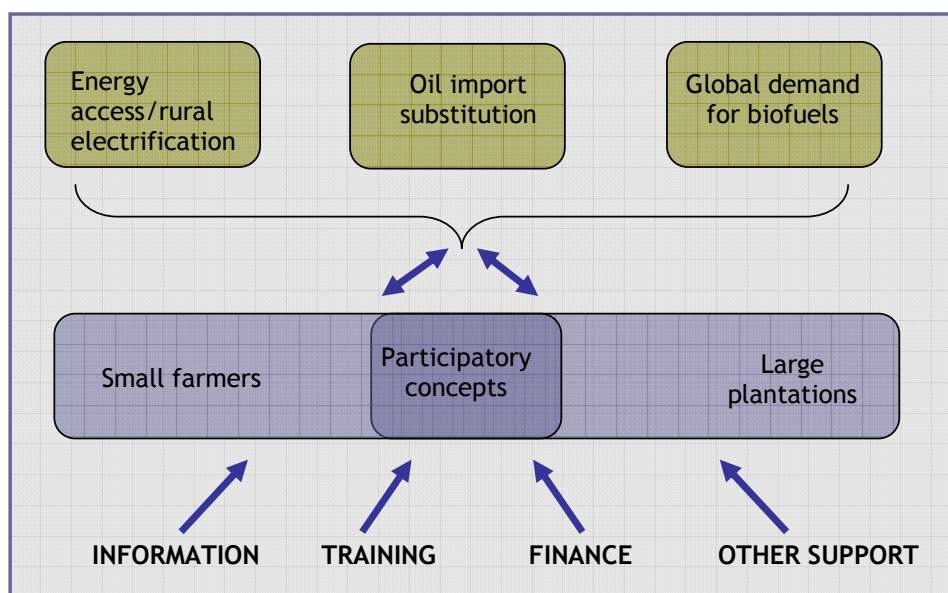
Finally, it was recognised that demand can trigger markets. Credit, price incentives and agricultural extension services provided to farmers can encourage them to produce a new crop. This process has been followed in the case of other crops, and experiences could serve as models. If farmers get electricity in return, they have an additional strong incentive.

Business models

For various scales of activity, different exploitation models can be envisaged - there is room for small scale and large scale production, both coming with different risks, benefits and requirements. In addition, there is an area of overlap, ensuring participation of small farmers into large scale production, via equity, outgrowers schemes (also known as 'contract farming') and other participatory concepts. Experience with the outgrowers concept demonstrated that the design of the contracts and awareness raising of farmers is important for the success of the scheme (e.g. farmers sold seeds to third parties buying seeds to replant and start their own production because they offered a higher price).

No matter which business model, involving the local population is critical for any biofuel project to reduce social or environmental risks related to feedstock production, which could lead to rejection and putting investments at risk.

Main motivators for jatropha upscaling



Importance of sustainability in any up scaling

As for any other crop, ensuring sustainability of production is crucial. The best possible use needs to be made of natural resources.

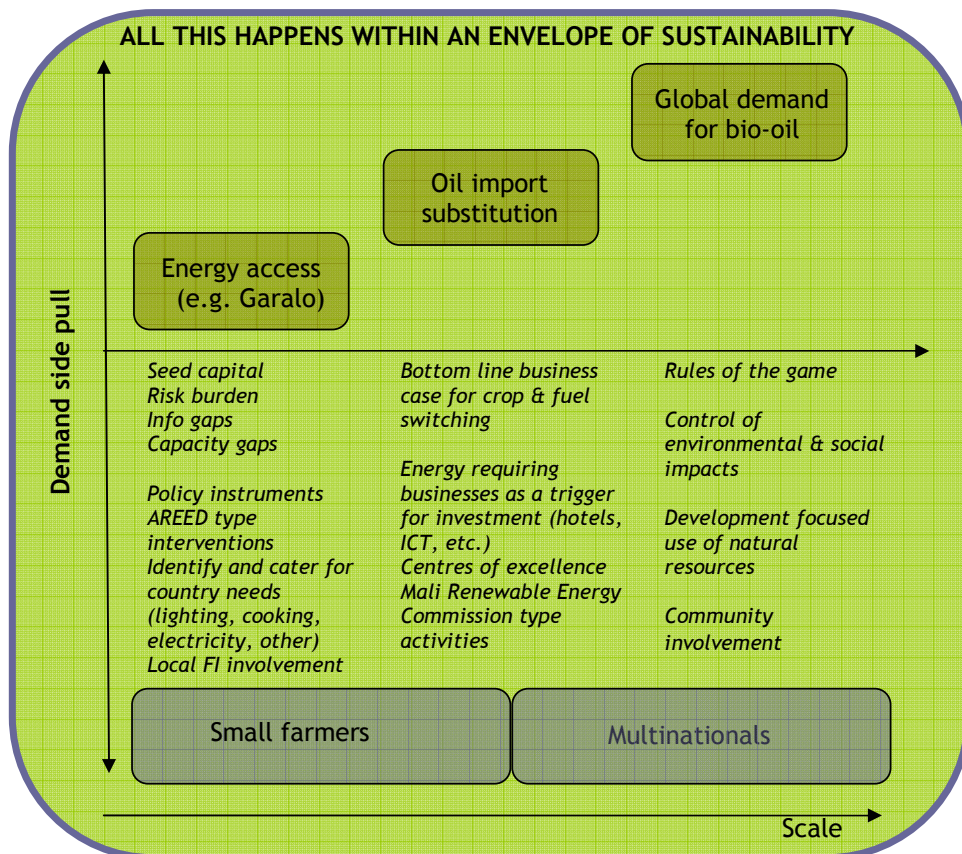
The STEEP concept was introduced, applicable to all scales of production:

Social - Technological -Environmental -Economical - Political

Tools

Barriers and gaps for both, the uptake of sustainable production of Jatropha and the maximisation of development benefits (access to energy / support to small farmers and participatory approaches) were identified so as to determine what the Roundtable could do collectively, which tools could be developed to address them.

Prerequisites for sustainable jatropha upscaling - gaps, barrier, tools



Emphasis was put on the following:

- ◀ Support tool for small farmers for the first 2-5 years before the plants reach maturity and can provide sufficient seed for sale
- ◀ Development and promotion of lower tech lighting and cooking applications
- ◀ Decision trees to take different types of stakeholders through a flow process to plan policies or projects, including choices on land use, crop, technology
- ◀ Protection of intellectual property (IP). Provide information on who holds which patent and skills. Support entrepreneurs to register own IP. Need for “public good” information to be kept in the public domain (open source software)

Next steps

It was found that there is a need to develop materials that could be used by stakeholders directly or through intermediaries (who would provide training and capacity building) through a network of national / regional centres of excellence for bioenergy in general and *Jatropha* in particular. Details of both, tools and the set up of the network would have to be sketched out further:

- ◀ Clients/target groups (policy makers, small medium and large investors, farmers, consumers)
- ◀ Outputs/services
- ◀ Knowledge management
- ◀ Accreditation on information provided - a “UNEP stamp of approval” or some clear branding so that stakeholders know the knowledge is reliable

- ◀ Terms of Reference
- ◀ Business Plans
- ◀ Funding

Credible centres of excellence

Centers of excellence must be credible, particularly with their specific target groups, e.g. local farmers, local/national government, and financial institutions.

Draft selection criteria for the centres of excellence were proposed as follows:

- ◀ Proven track record in the field/demonstration projects
- ◀ Proven track record in willingness to disseminate and share knowledge
- ◀ Size and management of the institute
- ◀ Located/represented in a high potential zone for *Jatropha*, easy to be reached by its clients
- ◀ Cost effectiveness of the output based on offer
- ◀ Own contribution to the cost of running the centre

The centres of excellence will need information, human and financial resources and a time frame. Each centre will have its own parameters, experience and business plan. Commercial information cannot be shared, but non commercial information should be.

Sustainability a crosscutting issue

Sustainability of Bioenergy production is the overarching objective. The centres of excellence should not promote information on unsustainable practice, even if it can produce good short term results.

UNEP will

- ◀ Develop and circulate draft TOR for Centers of Excellence
- ◀ Develop and circulate final selection criteria for Centers of Excellence and invite additional potential centers to be part of the network
- ◀ Put the background document, the presentations and the proceedings of the meeting on the UNEP website
- ◀ Circulate a list of participants and a list of e-mail contacts to be used for communication and further input from participants to the meeting.