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Biofuels in Africa: growing small-scale opportunities

Global demand for climate-friendly transport fuels is driving vast commercial biofuels projects in developing countries. At the opposite end of the spectrum is small-scale bioenergy production. This offers a way for the poor to meet their energy needs and diversify their livelihoods without compromising food security or environmental integrity. Governments hope that it will be possible to combine the advantages of both large- and small-scale production of biofuels to generate energy security and GDP at the national level, while opening up local opportunities. In Africa, most governments are keen to attract foreign direct investment, and see big business as a strategic means of scaling up rural development. But there is a middle way. By encouraging business models that bridge large and small enterprise, African governments could show that commercial competition can go hand in hand with a range of real local benefits.

Policy pointers

- **Biofuels offer a growing** future for energy security and rural development in African countries.
- **Pioneer companies are** already planning and implementing innovative business models that include small-scale local farmers and enterprises.
- **There is scope to take these** approaches much further, particularly to include small-scale enterprises in processing and distribution as well as crop production, and to exploit the full range of biofuel by-products and end-uses.
- **Governments can help by** complementing enabling legal frameworks, with practical guidance for investors and small-scale enterprises, drawing on the breadth of international experience.

Demand drivers: current contexts

Despite ongoing and widespread financial disarray, demand for biofuels remains high. This should stimulate prices and provide more of a sellers' market for these fuels, derived from plant 'feedstocks' such as jatropha, a bush growing wild in many parts of the world. The demand is not only for transport fuels, which is driven by policy, but also for side products including food, feed and industrials (such as lubricants and cosmetics).

There is, at the same time, a trend in biofuels production towards the large-scale, and concentrated ownership and operations. This is driven by efficiency through economies of scale, long-term security of assets, predictable operating environments and assurance of quality and regularity of supplies, particularly to meet the standards of European and US markets. But there are major counterweights to this form of production: land tenure and rural development policies – stronger in some countries than others – that seek to protect the rights and livelihoods of local people. Further, drivers towards 'inclusive business' are growing, as the social licence to operate [?]becomes an increasingly important issue for private sector investors in rural areas.

Providing opportunities for local people to join the biofuel supply chain can reduce operational as well as reputational risks, while expanding the business. The markets and finance for biofuels are international, so they enable global sustainability initiatives that provide further incentives for inclusive business.

On the production side, there are many opportunities for the small-scale. Capital-intensive bioethanol projects may demand a fast switch to mechanised production, but that process may be much slower for oilseed plants such as jatropha and palm oil – leaving a role for rural labour and outgrowers.

And there are also opportunities for small-scale involvement further down the supply chain, through processing, storage, distribution and service provision. At the customer end, there is increasing interest in new climate-friendly energy services for poorer consumers. Locally produced and consumed biofuels are one strong option. Second-generation biofuels – online in 2015 – should be suited to a similar range of inclusive business models, if more technology-intensive.

Focus on Mali, Mozambique and Tanzania

Several African governments are moving to attract investment in biofuels and to encourage inclusion of

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local people in production and processing. This section describes examples of current and planned practice in three such countries on including small-scale enterprises in national and international biofuel supply chains.

Mali In the landlocked West African country of Mali, both NGOs and European companies are producing biofuels feedstocks, mostly through small-scale projects based in the immediate vicinity of the company's or NGO's processing facilities. As such, there is no real distinction between 'large-scale foreign' versus 'small-scale local' operations as in, say, Tanzania. Business models are almost always based on contracted smallholder production.

Mali Biocarburant SA, for example, is a private Dutch company that aims to produce biodiesel for the country's domestic market, sourcing its feedstock from 3000 hectares (ha) of smallholder-grown jatropha. The company is investing in locally appropriate research and development, testing new ways to improve the profitability and durability of multi-function platforms – portable engines running on jatropha oil or biodiesel derived from jatropha that can power a range of rural needs, from grinding grain through to running an electricity generator.

Another case in point is the Jatropha Mali Initiative (JMI), a French-Malian joint venture that started off in 2007 with the aim of biodiesel production, but has since simplified to producing jatropha oil for local and national markets. JMI operates a cooperative system for seed collection and oil expelling that involves 1300 small-scale producers on 1300ha. JMI provides training and knowhow on cultivation, and a guarantee to purchase seeds.

The creation of Mali's National Agency for Biofuels Development (ANADEB) in mid-2009 signals a positive future for biofuel outgrower schemes, though it is not clear whether industrial-scale production will eclipse the current set of smaller-scale, socially oriented enterprises.

Mozambique Both large- and small-scale biofuel developments are underway in Mozambique, Southern Africa – one of the continent's poorest countries. The largest, Procana, a private company with British interests, is set to invest US$510 million to develop 30,000ha, of which 60 per cent will be under sugarcane feedstock and the remainder will be used for a bioethanol plant and other infrastructure. Sugarcane outgrowers are expected to add an extra 5 to 11,000ha. They are likely to be better off than unskilled Procana employees – experience with two farmers' associations in Xinavane shows that sugar outgrowers, even those farming less than a hectare, can generate more income than factory employees earning the minimum salary of US$690 a year. Procana is limiting communities to a maximum of a third of their agricultural lands under cane, for business and food security reasons, and has a modest target of 4000ha under outgrowers by 2022.

The outgrowers will be supported with technical advice, inputs and irrigation infrastructure, but the cost and benefit sharing are unclear. The renewables company Mozambique Principle Energy is planning a similar integrated bioethanol facility, with a 20,000ha plantation supplemented by large- as well as small-scale outgrowers. This may drive up competition and enhance quality among farmers, but there are dangers of disadvantaging small-scale producers in terms of level of support, prices and access to the market. Mozambique is also host to small-scale biofuel projects such as Elaion Africa, a German company aiming to produce jatropha on 1000ha, with opportunities for small-scale suppliers.

Tanzania Several European biofuels companies are now operational in Tanzania, East Africa, which borders Mozambique. They are experimenting with a range of innovative production models, but with much less attention to inclusion of small-scale enterprises and customers further along the value chain.

FELISA (Farming for Energy for Better Livelihoods in Southern Africa) is a Tanzanian-Belgian joint venture targeting production of 10,000ha of oil palm, of which 50 per cent is expected to come from outgrowers who will receive technical and financial support. Diligent Tanzania Ltd, a Dutch biodiesel company, does not plan to produce jatropha directly. Instead, it relies entirely on contracted smallholder production, with 4000 suppliers at present, most planting jatropha as farm hedges, on contours and on degraded land.

Sekab Bioenergy Tanzania Ltd, a major Swedish bioethanol producer, is pursuing the development of large-scale sugarcane production for bioethanol, with 22,000ha in eastern Tanzania's Bagamoyo District, and 500,000ha planned for acquisition in nearby Rufiji District. Sekab has long-term plans to retransfer production lands to small-scale producers under a franchise block-farm model, whereby contracted farmers agree to follow company procedures in return for guaranteed purchase at agreed prices.

Sun Biofuels, a British company, is addressing local energy supply through planned provision of biodiesel and multi-function platforms to local communities, though this service is philanthropic rather than a revenue-generating component of the business model.

Emerging opportunities and challenges

As the examples in Mali, Mozambique and Tanzania reveal, biofuels investment in Africa is dominated by early-arrival European companies, motivated by ambitious targets set by the European Union for substituting fossil fuels for transport. Given the emphasis

	FARMING	MILLING	REFINING	DISTRIBUTION	END USES
Business arrangements to include small-scale owners and enterprises	Outgrower schemes Purchase contracts Land leases Sharecropping Management contracts Joint ventures (e.g. community land inputs = shares in the business)	Cooperative mills Share ownership Small-scale facilities aimed at local end-uses Supply contracts with larger refineries and distributors	Limited options given high capital costs of biorefineries	Intermediary traders Transport contractors Utilising existing distribution systems (e.g. networks of rural retail outlets aimed at farmers	Sliding-scale energy pricing Subsidised multi-function platforms Subsidised improved appliances Use of unrefined oil rather than refined biodiesel
Options for government policy support	Support to positive models through regulation, information, model contracts and borkerage Underwriting community business involvement	Active promotion of small-scale milling operations, e.g. via supply of prototypes Range of support to pomising joint equity models	Employment laws Holding developers accountable to job projections in approved investment contracts	Local content requirements	Support to off-grid energy schemes Subsidies as above

- Subsidised finance and insurance schemes
- Fiscal incentives (e.g. tax breaks, reduced concession fees)
- Local supply quotas (e.g. Brazil's Social Fuel Seal)
- Active support: information, guidance, research

Table 1. Business model innovations that provide small-scale opportunities in biofuels supply chains

these countries' governments are giving to sustainable practice, there are great opportunities to incentivise these companies to adopt inclusive business models, providing a lead for future investors from Asia and Brazil. (Table 1 summarises emerging options for including small-scale enterprises in biofuels supply chains.)

Many companies are already planning and implementing supply chain innovations that include local people. But they focus primarily on the inclusion of small-scale farmers – and pay much less attention to enterprises in the downstream supply chain. There should be considerable scope to innovate in areas such as inclusion of small-scale contractors (such as, for services and transport) and biofuel supply at affordable prices to low-income consumers locally and nationally. Joint equity models are also worth exploring.

Such innovations are not easy. Companies need to balance local development objectives against duties to shareholders and lenders. Their dominance in local economies may also limit opportunities to negotiate equitable inclusion.

For example, experience with both sugarcane and palm oil shows that where large-scale mills are 'monopsony' (single) buyers, small-scale suppliers can lose out on fair prices. Similarly, there are no clear points of leverage for equitable ownership or benefit-sharing in biorefining, or actually turning the feedstock into fuel, which the most capital-intensive portion of the supply chain. Practicality should prevail – both proponents and critics need to compare business models against alternatives, not against abstract ideals of partnership and equity.

Broader experience from agricultural and forestry sectors provides much useful guidance, for example around involvement of third parties and the advantages of regular review and renegotiation of business arrangements. A key emerging lesson is that a wider view of bioenergy makes more sense than a single focus in liquid biofuels.

First, large-scale shifts from solid bioenergy (wood and charcoal) to liquid biofuels or other fuels are unlikely for African households in the near future. Simplicity works better – biofuels companies aiming at local supply frequently reorientate from biodiesel production to plain vegetable oil. Secondly, there may be many opportunities for spin-offs and multiple uses of raw materials and by-products: food, feed, solid fuels, industrials, building materials. International experience demonstrates that biofuels are often more valuable for their side products (as indicated at this briefing's start) than their main use.

Action by governments

To enable the development of a constructive biofuels industry, most African governments find themselves needing to review legal frameworks across energy, land, agriculture and trade sectors. Many countries have been quick to establish oversight bodies and policies, but the threat remains that the industry is moving faster than governments' abilities to make biofuels work for development.

A promising course of action is to complement regulations with practical guidance. Investors welcome clarity on issues such as community consultation and consent, and inclusive business models, as these can reduce uncertainty and ease the burden of impact assessment and compliance. Tanzania, for instance, is soon to release guidelines for sustainable development of biofuels, which will serve for two years while issues of policy and institutional frameworks are solved.

Other countries' experiences can provide ideas. For example, Brazil's Social Fuel Seal policy requires that biofuels processing companies sign contracts to buy a proportion of inputs from small farms. Farmers get pre-set prices, credit and technical assistance while the processor gets tax benefits, low-cost finance and guaranteed suppliers. Canada, Malaysia and several other countries have valuable experience in joint equity models, in which communities or local enterprises share ownership of the business, taking on a fair share of the risks as well as the benefits and decisions. Key principles for useful policy are to match targets and quotas with capacity-building and support, and to provide opportunities for suppliers and customers, not lock them into having to grow a particular crop or use a particular type of fuel. In the case of jatropha, for example, the forceful promotion of the crop among rural people is premature, given the scientific uncertainty around agronomy, yields and markets.

None of the options summarised in Table 1 is perfect – but there is much opportunity for experimentation. With innovations, the best may be yet to come.

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Further reading & websites

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