



Criteria for a Viable Biofuel Industry in Africa

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Introduction

The deployment of agricultural resources to the growth and production of Biofuel brings several significant considerations in the development and execution of a strong, socially responsible, scalable, sustainable business model. In our research and experience within the agribusiness industry.

Environmental Sustainability

While Africa has a plentiful supply of land, in many countries water resources are scarce, and expected to decline under conditions of global warming. Two additional priorities must also be acknowledged: (1) contrary to common practice in the developed world, it is imperative that biofuels should not be in competition with food supplies. Thus, arable land now under cultivation, much of which enjoys the most favorable soil conditions, shall not be converted to growing Biofuel crops. Nor should water resources that would otherwise be used for growing food, or providing potable water supplies to human populations, be challenged by abstractions for Biofuel crops. (2) With its biodiversity under threat from habitat destruction, the bushmeat trade, and climate change, it is imperative that the needs of wildlife be protected.

A Biofuel plantation cannot be regarded as environmentally benign, and must be labeled as unsuitable, if it should result in deforestation of a protected/gazetted area, impinge on wildlife reserves or wildlife corridors, abstract water from rivers that are critical supplies for wildlife during the dry season, or otherwise introduce roads and human habitation into pristine areas. Nor is it appropriate to ignore downstream consequences of Biofuel production, such as the transport of sediments or effluents that adversely impact marine, estuarine, riparian, or lacustrine environments and thereby the populations that depend on these for their livelihoods; we show one such example in the Associated Press report, reproduced below. Clearly, this marine zone devoid of life has significant impact on those who earn their living from marine living resources. However, this is the US, where nobody will starve as a consequence. In Africa, however, the outcome may well be more dire.

Scalability

For a viable enterprise, the agribusiness model must be of a size to support the commercial objectives and investment requirements. Scaling-up of plantation/out-growing areas is mandatory for financial success. In the African context, larger is generally better.

Given the needs of all African countries to generate jobs, and in line with the UN Millennium Development Goals, mechanization can only be supported alongside growth of employment opportunities. Absorbing labor should not be compromised in the face of demands for crop optimization and production. There is little developmental benefit for large, wholly mechanized plantations; such enterprises should be considered as examples of the now-discredited colonial model of resource extraction.

Economic Sustainability

Having discussed environmental sustainability in the Introduction, we next focus on how to ensure that an enterprise is economically sustainable over the long-term.

To attain economic sustainability in the African context will, in many instances, require significant public participation as well as private investment. This public participation can



include investment from local governments and/or external donors. Overseas private capital is reluctant to enter Africa except for a few countries regarded as low risk, such as South Africa, Botswana, and, increasingly, Angola. Note that these three nations have significant mineral as well as, for Angola, oil wealth. Such “privileged” nations may not be politically stable in the long run, nor currently low in corruption, but investors are quick to overlook this. Public participation is mandatory to generate a perception among potential private investors of sufficient spreading of risk.

Beyond enterprises created by such Public-Private Participation (PPP) initiatives, neither the Biofuel nor the Company can be dependent on subsidies at the farm, refinery, or the pump. Subsidies distort; for maize, a staple food across much of Africa, subsidies in the developed world have undercut African farmers’ ability to compete. And now that the price of maize is rising fast because of demand from ethanol refineries, Africans who once relied on this feedstock for food now face the short-term prospect of hunger secondary to supplying a food stock to the Biofuel industry. This lack of food security will be addressed by expansion of arable enterprises in Africa, but these will take some years to come on-line.

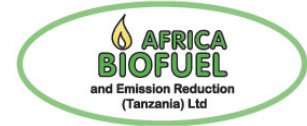
In line with avoidance of subsidies, the production costs of the Biofuel must reflect reasonable costs for land, labor, capital, and operating/working costs. Even in places with a glut of labor availability, paying wages of less than UN-determined global poverty line of US\$2/person/day is tantamount to indenture.

To ensure long-term economic sustainability, assuring vertical integration between out-grower farms and the biorefinery is mandatory. For tree-crop biofuels, a necessary initial step is to provide assurance to out-growers that the company is there to stay; too many well-meaning projects that have had no significant longevity or long-term economic impact has engendered a lassitude, a wait-and-see attitude among rural populations in Africa. Overcoming this barrier will take significant efforts by farm extension agents. Finally, out-growers must clearly understand how it is that they will be participating in the enterprise – for example, who is responsible for bringing the oil seeds to a central collection point, or to the biorefinery – as well as what their income can be expected to be over the duration of the enterprise.

Choice of Feedstock

The feedstock must have, at a minimum, one annual harvest. For tree crops, multiple harvest cycles need to be an outcome of the Research and Development program that should be directed towards improved crop efficiency and production. The fastest route to improved yields will be found through micro-propagation techniques. In any biological system, yields follow a normal curve. In other words, some trees will yield scarcely at all, while others are prolific. Identifying the high-yielding genotype and propagating it using technological means is a superior strategy when compared to reliance on nature, albeit one with a certain in-built hubris. It is well-known that uniform genotypes form “bottlenecks,” in that such populations are particularly vulnerable to disease or climate-induced stress. If micro-propagation techniques are used, finding a way to spread its associated risk is therefore optimal.

The feedstock phenotype must be optimal to realize production in the shortest period of time. Waiting three years for initial yields, while a difficult prospect for traditional investors, is manageable for a nascent business if alternative income streams are available during this period. Having to wait ten years, on the other hand, would be a most difficult prospect to sell to investors.



Because much of the African continent is water-poor, in most circumstances the feedstock should have to be irrigated only minimally, if at all. It should be able to grow robustly in semi-arid to sub-humid conditions, and if a perennial crop, be able to withstand typical African dry seasons, in which very little rain, if any, falls for around six months. It is during this extended dry season that fires are likely to ignite, particularly during the dry lightning episodes that are a precursor to the onset of rains. The feedstock should therefore be naturally fire resistant, or planted in such a way as to localize and then extinguish fire outbreaks.

Finally, the use of chemicals must be as little as possible. Not only are these expensive, but their application poses potential health risks to workers, however well trained they may be. In particular, insect and other pest-management programs must support “green” solutions. At one end of this scale, OPM techniques are now widely used globally to control for insects, while at the other end elephants have been excluded by planting a barrier of hot chili pepper bushes.

Marketing and Sales

A more logical business model requires both local and/or regional markets, which can support the enterprise's full production capacity. This brings the benefits of biofuels to African consumers and the local urban environment. However, in some cases – perhaps especially in the event that Biofuel production increases exponentially across the continent – exports may provide a viable secondary market.

Transportation to the biorefinery facility and subsequently to the market must support a rational economic model. To maintain such rationality, is to consider all potential revenue streams for the business, including the acquisition of carbon credits.

Management

Skilled on-site management is mandatory. Too often in Africa this fact is under-appreciated, leaving businesses to fail. In the African context, micro-management is a fact of life if a business is to succeed. A fully loaded, capitalized company training program which provides on site mandatory education across all levels of management is critical to the success of local management and the sustainability of the enterprise.

AP Associated Press

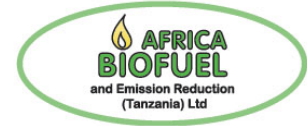
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JEFFERSON, Iowa - Because of rising demand for ethanol, American farmers are growing more corn than at any time since World War II. And sea life in the Gulf of Mexico is paying the price.

The nation's corn crop is fertilized with millions of pounds of nitrogen-based fertilizer. And when that nitrogen runs off fields in Corn Belt states, it makes its way to the Mississippi River and eventually pours into the Gulf, where it contributes to a growing "dead zone" — a 7,900-square-mile patch so depleted of oxygen that fish, crabs and shrimp suffocate.

The dead zone was discovered in 1985 and has grown fairly steadily since then, forcing fishermen to venture farther and farther out to sea to find their catch. For decades, fertilizer has been considered the prime cause of the lifeless spot.



With demand for corn booming, some researchers fear the dead zone will expand rapidly, with devastating consequences.

"We might be coming close to a tipping point," said Matt Rota, director of the water resources program for the New Orleans-based Gulf Restoration Network, an environmental group. "The ecosystem might change or collapse as opposed to being just impacted."

Environmentalists had hoped to cut nitrogen runoff by encouraging farmers to apply less fertilizer and establish buffers along waterways. But the demand for the corn-based fuel additive ethanol has driven up the price for the crop, which is selling for about \$4 per bushel, up from a little more than \$2 in 2002.

That enticed American farmers — mostly in Iowa, Illinois, Minnesota, North Dakota and South Dakota — to plant more than 93 million acres of corn in 2007, the most since 1944. They substituted corn for other crops, or made use of land not previously in cultivation.

Farmer: 'Try to be a good steward' Corn is more "leaky" than crops such as soybean and alfalfa — that is, it absorbs less nitrogen per acre. The prime reasons are the drainage systems used in corn fields and the timing of when the fertilizer is applied.

The Environmental Protection Agency estimates that up to 210 million pounds of nitrogen fertilizer enter the Gulf of Mexico each year. Scientists had no immediate estimate for 2007, but said they expect the amount of fertilizer going into streams to increase with more acres of corn planted.

"Corn agriculture practices release a lot of nitrogen," said Donald Scavia, a University of Michigan professor who has studied corn fertilizer's effect on the dead zone. "More corn equals more nitrogen pollution."

Farmers realize the connection between their crop and problems downstream, but with the price of corn soaring, it doesn't make sense to grow anything else. And growing corn isn't profitable without nitrogen-based fertilizer.

"I think you have to try to be a good steward of the land," said Jerry Peckumn, who farms corn and soybeans on about 2,000 acres he owns or leases near the Iowa community of Jefferson. "But on the other hand, you can't ignore the price of corn."

Peckumn grows alfalfa and natural grass on the 220 or so acres he owns, but said he cannot afford to experiment on the land he rents.

The dead zone typically begins in the spring and persists into the summer. Its size and location vary each year because of currents, weather and other factors, but it is generally near the mouth of the Mississippi.

This year, it is the third-biggest on record. It was larger in 2002 and 2001, when it covered 8,500 and 8,006 square miles respectively.

Soil erosion, sewage and industrial pollution also contribute to the dead zone, but fertilizer is believed to be the chief factor.

Fertilizer causes explosive growth of algae, which then dies and sinks to the bottom, where it sucks up oxygen as it decays. This creates a deep layer of oxygen-depleted ocean where creatures either escape or die.



Marine life struggle to survive Bottom-dwelling species such as crabs and oysters are most at risk, said Michelle Perez, an analyst with the Washington-based Environmental Working Group. "They struggle to survive," Perez said. "They can't swim away."

Crabbers complained at a meeting in Louisiana earlier this year that they pulled up bucket upon bucket of dead crabs.

Rota warned that if the corn boom continues, the Gulf of Mexico could see an "ecological regime change." The fear is that the zone will grow so big that most sea life won't be able to escape it, leading to an even bigger die-off.

"People's livelihood depends on the shrimp, fish and crabs in these waters," he said. "Already, some of these shrimpers are traveling longer and longer distances to catch anything."

Given the market pressure to grow corn, the Natural Resources Defense Council and others argue that the nation needs a comprehensive, federal approach to the problem.

Among the ideas floated: rules to force farmers to use fertilizers with more care, and the establishment of buffer zones to contain runoff.