



MSM/ESAMI DOCTOR OF BUSINESS ADMINISTRATION PROGRAM

**ASSIGNMENT TWO: The 2<sup>nd</sup> Value Chain Analysis**

**Analysis of District Sugar Ethanol Value Chain in Nyanza  
Province**

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**PROPOSED RESEARCH TOPIC:**

**Biofuel value chain development in Kenya and Uganda: organizations, opportunities, and challenges of linking rural farmers with global biofuels markets.**

# The Sugar Based Ethanol Value Chain Analysis

## Introduction

Bioethanol is an alcohol-based fuel which can be mixed with petrol or used alone in vehicles. Ethanol is alcohol produced by the fermentation of sugars, and bioethanol is the form that uses naturally occurring feedstocks such as wheat, sugar cane, sugar beets, wheat, barley, maize and oats or from cellulosic materials. Majority of these feedstocks are grown widely by small and large scale farmers in Kenya and Uganda as food crops or cash crops. Majority of these feedstocks are grown widely by small and large scale farmers in Kenya and Uganda as food crops or cash crops. Worldwide, sugarcane and Maize are the most popular feedstock for ethanol production.

In Kenya, ethanol is a byproduct of sugar processing and is produced for consumption, for industrial purposes such as solvents, and for fuel used in transportation locomotive. The difference between ethanol for industrial use and for transport fuels depends on the amount of water present in the substance, where ethanol for fuels has less water and has 96.5 percent alcohol (or what is technically called hydrous ethanol). Hydrous ethanol can be used as a complete gasoline substitute in vehicles designed for that purpose. These types of vehicles are not present in Kenya but exist in other countries. Studies have indicated that anhydrous ethanol or fuel ethanol is less efficient than gasoline because it produces only about 66% of the energy produced by gasoline combustion.

Over the years, the world market for ethanol has been growing rapidly. Berg (2004) estimates that the size of the ethanol market is currently at 55,000million liters and by 2010 it is expected to be around 70,000M liters and forecasted to reach a record 120,000m liter by 2020 with 7% growth in Europe, 2.5% in North America and Brazil, and 2.3% for the rest of the world.

## ***Commercialization of ethanol Production in Kenya***

Kenya has a history of ethanol production which dates back in 1977, when the government, with funding from the World Bank, established the Kenya Chemical and Food Corp. (KCFC) in Kisumu. The state owned company was to use molasses from the surrounding sugar mills

as feedstock in producing fuel ethanol and other variety of associated products, such as vinegar and baker's yeast. However, the program was abandoned 1981, for political reasons. In 1983 another similar company the Agro Chemical and Food Corp (ACFC) was put up in Muhoroni to produced fuel ethanol for a short time but stopped as world gas prices fell and competition from fossil fuels increased.

Today, with increased energy prices, many of these programs have been revived and the government draft policy paper on National Energy Development points to the importance the current government attaches on future ethanol fuel production. ACFC currently produces industrial and potable alcohol, while Mumias Sugar Company has been allocated more than 3000 acres of land in Tana River Distribution to increase ethanol production in addition to Sugar. The closed Miwani Sugar Company has a 45-year-old distillery which has the capacity to generate sufficient ethanol for national use and plans are under way to revive it (MOA 2006).

Under very dilapidated condition, the KCFC facility was sold to a private company Spectre International, in 1996 at about half the construction cost. The company has refurbished the project and is currently producing potable alcohol, mainly for export to Uganda, Tanzania and neighboring countries, while only less than 20% of its product is consumed domestically. Based on current molasses production levels, Kenya is very close to having the feedstock to produce 50 million liters of fuel ethanol/year. Over 150ha currently under cultivation, up to half of which can be dedicated to ethanol production.

There are many ethanol production project in the country with government parastatal, and private companies taking the lead in productions. Many of these programs are located in sugar producing zones and in recent time, there has been increased interest and investment in ethanol producing countries. The Ngima Project located in Homa Bay District, at the shore of lake Victoria is the focus of this analysis.

### ***The Ngima Ethanol Production Project in Homa Bay District***

Homa Bay District is one of the administrative districts in the Nyanza Province located at the shore of Lake Victoria in the western part of the country. The district has 5 administrative divisions including Rangwe, Asego, Ndhiwa, Nyarongi, Riana and Kobama. It has a

population of 288,540 (1999 census) and an area of 1,160km<sup>2</sup>. The climate is inland equatorial with two distinct regions, the Lake Shore Lowlands lying between 1,143m to 1,220m above the sea level and mainly comprise of a narrow stretch bordering Lake Victoria on the northern part of the district and the Uplands Plateau which from 1,220m to 1,560m and has undulating terrain. The district climate and land terrain is conducive for sugar plantations. The residence of the district are mainly small scale sugar farmers. The main sources of income fishing and sugarcane farming. Although with potential for increased sugar and other farming activities, Like Kutui, Homa Bay is one of the poorest district in the country and Nyanza, with poverty levels of 65 per cent is the poorest province, followed by North Eastern with 64%.

HG Consulting in partnership with other Stakeholders has initiated a community based ethanol production project dubbed “Ngima Project” at Homa Bay in Kenya. The Project is based on a 1,000-hectare nucleus sugarcane farm and also has contracted sugar outgrowers in Rangwe, Ndhiwa, Rongo, Nyatike and Gwassi constituencies) of Western and Nyanza provinces in Kenya who in total represent 42,000 hectares of sugarcane plantation. Once, fully operational, the project will produce 100,000 metric tonnes of white sugar annually for the domestic market as well as 259 million litres of fuel-grade ethanol for the export market with availability for the domestic market. The project also plans to extends its operations to Uganda in Njinja.

In addition to sugar and ethanol production, the project is also designed to produce enough electricity from bagasse to supply the entire project’s needs as well as provide 225,000MWh of electricity that will be sold to the national grid. The project has also been designed to conform to climate change mitigation initiatives under the United Nation’s Clean Development Mechanism (CDM). Thus, it is estimated that once fully operational, the initiatives will produce 217,000 tonnes worth of Certified Emissions Reductions (CERs), or carbon credits.

Regional and International investors owns over 95% shareholding, while only 5 percent is owned by local sugarcane out growers union. Hence the project is entirely privately owned.

The project goals are;

1. To develop an economically feasible sugarcane production system;
2. To produce white sugar for the domestic market;

3. To produce fuel-grade ethanol for the domestic and export markets;
4. To produce “green” electricity for the benefit of the local and the country;
5. To develop the local community through the provision of social services

The project feasibility study was conducted by Kenana Engineering and Technical Services (KETS) of Khartoum which analyzed the technical, financial, social, marketing and environmental components of the project. The study concluded that the Ngima Project is a viable business venture that has the potential to benefit not only the investors but also will improve the standard of living of residents around the project area, increase local employment and overall improves the rural economy.

The Project is also working with Kenya Sugar Board (KSB) the local government and community leaders to ensure that all issues are amicably resolved. The implementation of the project begun early this year, hence it is in its initial stages and is expected to take approximately 18 to 24 months for the first crush to begin and implementation is being managed by Kenana Engineering & Technical Services who have experience in managing such project in Africa.

### **Potential Project Benefits**

Under KETS' management, the Ngima Project plans to provide about 1000 employment opportunities to local communities to work in the various aspects of the projects. The sugar smallholding farmers will also benefit from increased earnings from the sugarcane. Also included in the overall project budget is the construction of 50 kilometers of internal roads between the cane farms and 45 kilometers of roads connecting the farms to asphalt roads as well as the provisions of social services for the local community, employees, outgrowers and their families. During implementation, a township will also be developed and about 14 million euros have been set aside for the design and construction of the township which will include flats for senior staff and their families, a bachelor complex for 100 on-site workers, a water treatment plant, elevated water tanks, water supply networks, a sewer treatment plant, and sewer networks.

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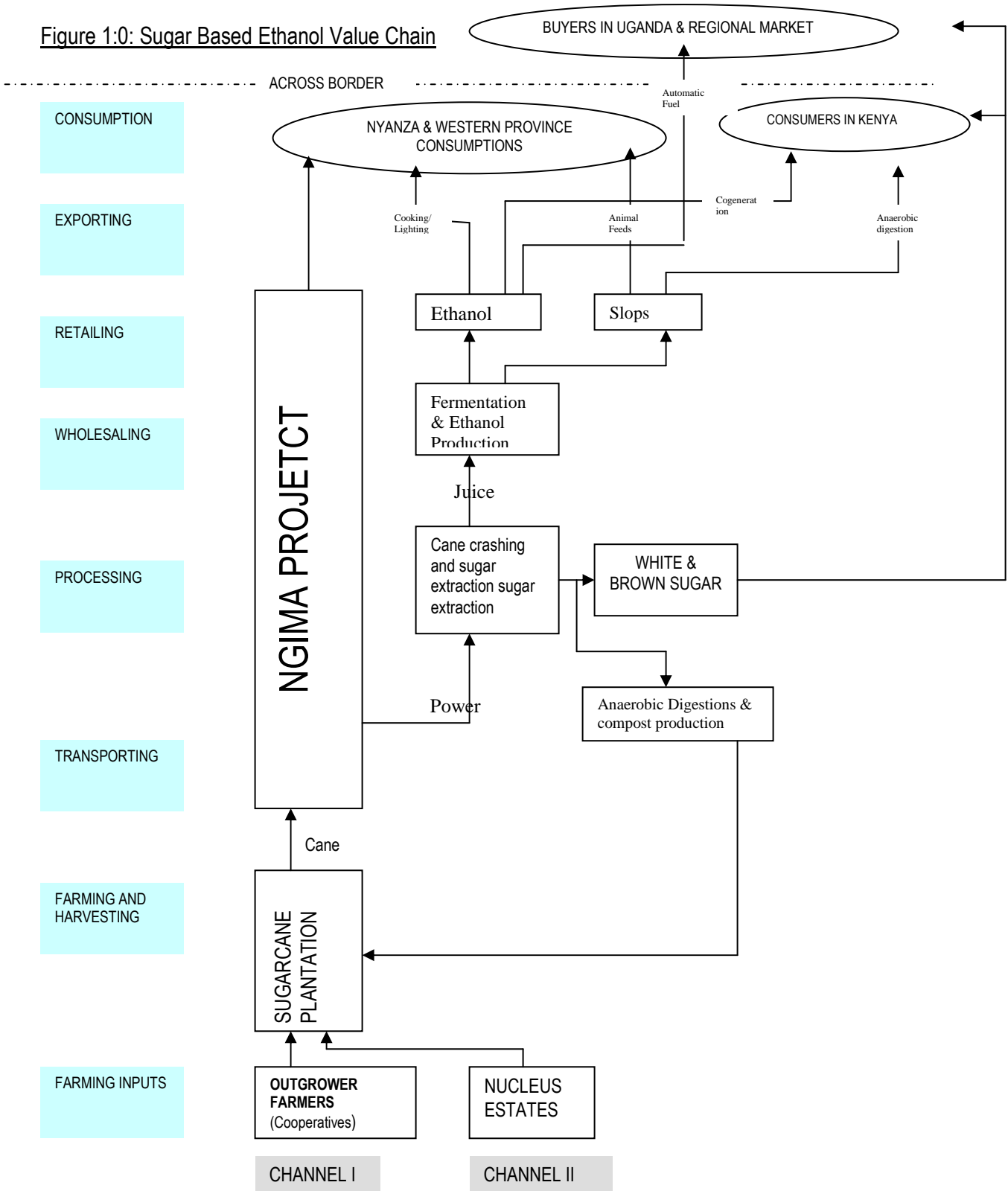
roads as well as the provisions of social services for the local community, employees, outgrowers and their families. During implementation, a township will also be developed and about 14 million euros have been set aside for the design and construction of the township which will include flats for senior staff and their families, a bachelor complex for 100 on-site workers, a water treatment plant, elevated water tanks, water supply networks, a sewer treatment plant, and sewer networks. Ethanol production will increase the demands for sugar, and save farmers from the current exploitative state from the current sugar millers. The project also intends to increase energy access by the locals.

In addition, the project is also constructing educational and health facilities, a network of mobile HIV/AIDS vans for testing and treatment. To promote rural economic development, the project also plans to initiate a microfinance program that will allow the families of employees and the farmers as well as organized community groups such as women and Youth to access business startup training and seed capital to start their business. The initial investment of the seed capital is targeted at enabling outgrower farmers buy farms inputs and initiate sugar plantations activities.

### **Mapping of the Sugar Based Ethanol Value Chain under Ngima Project/Kenya**

Kaplinsky (2000) defines the value chain as the full range of activities that are required to bring a product or service from conception, through the intermediary phases of production and involving a combination of physical transformation and the input of various producer services, through delivery of the same by the final consumers, including the disposal of the same. A careful analysis of the Ngima project reveal an emerging localized biofuels value chain that links small sugarcane farmers in Homa Bay District with international markets. The details of this chain are depicted in figure 1:1 overleaf.

Figure 1:0: Sugar Based Ethanol Value Chain



Key  
 → Flow of the Value

### ***Description of the Value Chan***

Analysis of ethanol production activities under Ngima project reviews at least 9 functions of ethanol production value chain. Namely, sugar cane farming inputs, farming and harvesting, transportation to the crashing sites, the processing which involves cane crashing and the processing of sugar and ethanol. This is followed with the marketing of finished sugar and ethanol as well as related by product, and involving wholesaling, retailing, in both local and international markets as well as export market. Value is added at each stage of the process and the Ngima project is committed to ensuring that the local and particularly the farmers benefits from the project.

### ***Farmers Income Margins***

Ordinarily sugar in Kenya is produced mainly by smallholders and at nucleus estates belonging to the sugar mills and is processed at the mills into sugar, which is sold mainly in the COMESSA markets. Throughout the country, it is estimated that there are about 200,000 smallholders providing more than 80% of sugarcane grown in the sugar producing regions of Nyanza, Western and Coast Province of the Country. In terms of income the Ngima project plans to pay farmers Ksh. 12 per kg of sugar cane delivered to the centre. The farmers also through their outgrowers corporative will owns 5 percent of the project shareholding and will therefore receive dividends from the sale of ethanol and related products. The project will also buy sugar cane from nucleus estates, which are mainly privates companies. Currently, there are seven sugar mills, plus the Ngima one, while Miwani still remain closed. The Ngima project is designed to produce sugar as well as ethanol.

Ordinarily, the sugar mills produce C Molasses as a byproduct of sugar production. The mills sell the molasses to livestock farmers, illicit brewers of potable alcohol and large potable alcohol distillers who use it as feedstock. They also export a significant, but unknown amount of molasses every year to Uganda and several other neighboring countries. The price of molasses in Uganda is three times Kenya's price. Locally, the molasses is bought and used by private companies such as SPM and ACFC for ethanol production while sugar companies such as Mumias Sugar and Miwani have the capacity to produce their own ethanol. The Ngima project is designed to produce both sugar and ethanol for local and international markets.

## ***Production Margins***

It is estimated that producing 100 liters of fuel ethanol requires 1,270 kg of sugarcane or 360 kg of molasses (ECLAC, 2007). Other studies mention ratios as high as 500kg/100liters). In a study, conducted by Dutch Sustainable Development Group (2005) in developing countries, the average price of producing fuel ethanol in a least developed country is Ksh 42 (\$0.562) per liter. Using average Kenyan prices for molasses (KSh 1800 per ton of molasses 231) and sugar (KSh 53,540/ton 232) in a cost structure provided in the study, yields prices of \$0.40 per liter for fuel ethanol derived from molasses, and \$1.592 per liter for fuel ethanol derived from sugar crystals. The molasses price for ethanol, compared to the observed Kenyan gasoline price of around one.

*Table 1:1 Estimates cost of producing ethanol*

	<i>DSD Study (LDC avg)</i>	<i>Kenyan Estimate</i>
Ethanol from Molasses	\$0.562	\$0.40
Ethanol from Sugar	\$0.977	\$1.592
Ethanol from Juice	\$0.562	-
Avg. Price	\$0.562	-

According to one of the Ngima Project consultant, a new ethanol plant with the capacity to produce 60,000 liters per day would cost around KSh 1 billion (\$15 million) an estimates that is close to that of Dutch study, which proposed an investment cost of 10 to 15 million euros to add a distillery with an 80,000 liter per day capacity to an existing sugar mill. According to several sources, one can expect a fuel ethanol distillery with capacity to produce 60,000 liters per day to cost about \$15 million.

Without an estimate of the value of cane juice it is difficult to estimate how much it will cost to produce ethanol directly from the juice, but the total cost is way below the current price of a liter of gasoline which is currently selling at more than Ksh 100, or more than one dollar. In 2007, all Kenyan mills produced 170,938 metric tons of molasses, up from 168,975 tons in 2006 and 163,989 tons in 2005. Assuming that 360kg of molasses produces 100 liters of fuel ethanol, using all the molasses produced in Kenya in 2004 would yield 45,552,500 liters of ethanol. Although there is scant information on expected demand and costs associated with fuel ethanol production in Kenya, the regional and international markets is sufficient justify large scale ethanol production.

Based on EU Mandate demands estimates, one can reach the conclusion that Kenya would need to produce close to 50 million liters of fuel ethanol if the government developed a national blending mandate. At that level of demand, distilleries have to produce an average of 131,000 liters per day each day of the year. Since distilleries do not generally operate year-round without downtime, so three distilleries producing 60,000 liters/day each should suffice to meet domestic demand.

### ***The Stakeholder***

Analysis of the Ngima Project reviewed a number of stakeholders in the fast developing ethanol value chain, including HG Consulting as the implementing agency, the Kenana Sugar Company, the Agrinergy LLP, the Carbon Market Project, the Kenana Engineering and Technical Services (KETS), the farmers and their representatives cooperative, nucleus sugar estates, the Government of Kenya and the local authority, the Sugar Board and other interested parties.

### ***Kenana Sugar Company***

The Kenana Sugar Company is a Private Company registered in Sudan and headquartered in Khartoum and London and specializes in production, refining and marketing of sugar, molasses, animal feed, yogurt and cheese. The company was established in 1975 as a combination of Arab finance, western technology and the natural resources of the developing world and currently has over 6,000 employees. The current total production capacity is 400,000 tons of sugar per year.

The company is regarded as, the largest integrated sugar project in the world, with an estimated production capacity of 387,044 metric tonnes (mt) of white sugar and a major international player in the Sugar Export and particularly in the Common Market for Eastern and Southern Africa (COMESA) and the European Union. Kenana is located at the Rabak town on the bank of the White Nile, 250 kilometers south of Sudan's capital, Khartoum. Kenana Engineering and Technical Services (KETS) of Khartoum, is the technical wing of the The Kenana Sugar Company and located in Sudan. The company is the one that developed the feasibility study for The Ngima Project and is key partner in the project development.

## ***Agrinergy LLP***

The other important stakeholder in the Ngima Project is the Agrinergy which is an international company that specializes in providing carbon credit services to companies with a focus on the Clean Development Mechanism (CDM), one of the three flexibility mechanisms outlined in the Kyoto Protocol. The company provides private companies in industrializing countries with an end-to-end solution for the development and implementation of CDM projects. In the industrialized world, it assists the governments and companies in meeting their Kyoto emissions targets. The company has a track record in registering and transacting CDM projects, developed successful methodology submissions and has a diversified portfolio of established projects. Agrinergy manages all stages within the CDM project cycle for its clients, including, project identification and development; obtaining host country's approval; validation and registration of the project with CDM; Verification of the CERs; issuance of the CERs and sales of the CERs to companies and governments

The company was also one of the first companies to develop an in-depth understanding of the key CDM concepts and how to apply them successfully and is estimated to be managing and developing a diversified portfolio of over 70 CDM projects. In addition, the company has developed and implemented its first CDM projects in the sugar sector and has a particularly strong track record in this industry. The company also has a very strong track record in bagasse cogeneration projects.

## ***The Carbon Market Project***

The recent 4th Assessment Report of the International Panel on Climate Change (IPCC) concluded that at least 90% of the GHG emissions is caused by humans, rather than natural variations, and is responsible for the warming of the planet. The Report states that there is need to for all nations and development initiatives to take necessary effort to reduce this emission. In order to encourage, government, companies, development partners and individuals to actively participates in the GHG emissions, the Kyoto Protocol and its flexibility mechanisms - Clean Development Mechanism (CDM), Joint Implementation (JI) and Emissions Trading - created a market for carbon. This market is based on the trading of emissions reductions and/or emission allowances to assist countries in meeting their emission reduction commitments. Some countries have passed on part of this commitment to

industry. As this market is defined by legally binding obligations it is referred to as the Compliance Carbon Market or Regulatory Carbon Market. Parallel to the compliance market, a Voluntary Carbon Market has emerged which unlike the compliance market does not rely on legally binding reductions to generate demand for carbon credits. Companies and individuals purchase carbon credit for philanthropic reasons to offset their carbon emissions.

### ***Opportunities for the Country's Ethanol Productions***

Kenya needs to develop strategies, which would promote sustainable development, without contributing to increased emission of Greenhouse Gas. In addition the CDM provides opportunities for financing private investment in ethanol production before it expires in 2012. Again in a situation where, all the sugar factories are largely owned by the government and characterized by inefficiencies, with good policy framework, private investment in ethanol production is a viable business

However, any effort to develop ethanol cogeneration in Kenya will have to begin with a look at feedstock production infrastructure, and ensure that it incorporates the farmers who owns much of the land in the country. By working with the farmers, private sector can improve rural economy through increased rural employment, increased farmers earning, improved road infrastructures, increased affordable energy access for the majority of the rural poor, and improved climate protection from gas emissions.

Ethanol production does not solve many of the constraints facing smallholders but would guarantee a market and perhaps also offer greater returns for sugarcane production. Importantly, because Kenya imports all of its oil, producing fuel ethanol domestically offers a possibility for conserving foreign exchange and improving the nation's balance of payments. With rapidly increasing oil prices the country could position itself strategically to feed growing international demand for fuel ethanol or for biofuels feedstocks.

Other associated benefits that fuel ethanol production could have are advances in human capital development and technology transfer. The introduction of state-of-the-art practices, such as those of Brazilian distillers, and the training of local Kenyans in ethanol production would improve the nation's competitive edge in biofuels production.

Experts estimate that the domestic sugar industry directly and indirectly supports 6 million Kenyans in Nyanza and Western Provinces. Among these people are about 200,000 smallholders whose farm sizes average between 2 to 5 acres. No other cash crop grown in the area although there is a potential for other biofuels feedstock farming such as groundnuts, sunflowers, jatrophas etc. There are opportunities for investment in sugar processing to meet the local and regional markets also.

### ***Some constraints***

The Kenya potable ethanol industry's major constraint is the availability of feedstock. For example, SPM in their annual report indicated that the plant operates 20 days each month, with 10 days of downtime necessary to accumulate enough molasses for ethanol production. ACFC has also been experiencing the same problem. While Spectre needs 250 metric tons of molasses/day to produce 40,000 liters of potable alcohol each day, ACFC requires close to 180 metric tons. To operate at full capacity (around 60,000 liters/day) would require the feedstock from 17,100ha under cultivation sugar and a mill that can crush 8,000 tons of cane/day. Since, much of the molasses produced in Kenya is exported mainly to Uganda that leaves very little as raw material for local ethanol processing.

To meet the evidenced shortfalls, there is an opportunity for small holding/out growers farmers as well as large scale farming companies to reap the benefits of increased sugarcane plantation. The other constraint relates to policy and vehicle technology. Since there is currently no market for fuel ethanol in Kenya because the country lacks a mandate for blending it with gasoline the local market demand is very low except for other commercial purposes.

Policy wise, there also appears to be no clear government priority for the for the promotion of ethanol fuels since the current Energy Act only advise the Ministry of Energy to “promote the development and use of renewable technologies,” including ethanol and biodiesel (Energy Act, 2006). Today, many private investor are reluctant to include an ethanol distillery in their sugar processing plant until national mandate on use of biofuels is established and standardization procedures are elaborated. Other constraint includes the cost of setting up the ethanol production facilities, public acceptance to the use of ethanol, appropriate farming technologies, and lack of first yielding sugar variety.

In Uganda, the Ministry of Energy has completed development of a policy on a renewable energy that will make it compulsory for oil companies to blend petroleum with a variety of bio-fuels as the country tries to beat rising oil prices by reducing dependence on petroleum. According to the Energy Minister Daudi Migereko, the policy, which requires oil companies to blend petroleum with ethanol to a maximum ratio of 20% (East Africa 2/10/2006). Since, Uganda produces less than 200,000 metric tonnes of sugar annually and it is not known how much ethanol the sugar industry is capable of producing a raised demand will mean more feedstock market opportunities for Kenya. At current production figures, at least 10.6 million liters of ethanol would be required every month to meet the ministry's target of 20 per cent blending.

In Uganda too, oil companies have been reluctant to blend ethanol with petroleum, arguing that the majority of motor engines in the country, are not optimized to burn on ethanol and will suffer corrosion and since HP Consulting Project in Homa Bay also wish to expand their ethanol production in Uganda, the Kenyan market is not very promising while the export market is.

Further, factors surrounding the supply side of ethanol needs careful study since the local sugar industry lacks the capacity to supply adequate quantities. Some experts have argued that ethanol blending may be uneconomical as a result of high ethanol prices and could also distort food production. Without a stable source, there is a danger that food prices could skyrocket as energy competes with nutritional needs from source crops, the industry warned. Other issues such as the mitigation of the project negative impact to the community and environment needs to be addressed.

### ***Proposed Investment Models***

Investment in biofuels (both ethanol and biodiesel) could take several forms. The proposed research is interested in investigating the best investment model and proposes the business model that would bring maximum benefits to the farmers while ensuring sustainable supply of feedstock to the private investors. Several investment models are available including the greenfield in which the foreign investor opens a previously untapped market with an entirely new operation, called a foreign affiliate. This perhaps the most common FDI inflows to

developing countries but many countries including Kenya restrict the percentage of ownership by foreign companies) and usually exercises direct control over the affiliate's operations. The Mergers and Acquisitions is the other option in which a TNC enters a market by acquiring a firm that is already present. This strategy tends to offer less in terms of local economic development than greenfield investments because it does not necessarily entail an increase in productive capital, employment, infrastructure, etc. but is simply a transfer of ownership.

In terms of foreign investment motivation, a foreign company could investment in another country for the three main reasons, namely resources seeking in which the investor desires to extract resources, almost always for export, the market seeking motivation in which the investing company seek to expand its operation and access the local market and the efficiency seeking option where the company seeks operational efficiencies (low wages, etc.). Investment in Kenya biofuels sector offers these opportunities for the would be investors.

Another way to promote local investment is looking at what the foreign investor offers the host country. For a host country's comparative advantage can arises from three types of upgrades, namely assets upgrading, in which TNCs provide competitive assets not previously present or widely available, then disseminate them by employing local labor and developing linkages with local firms, the market upgrade where the investor improve local firms' access to competitive export markets and improve demand conditions for local goods and/or services and the employee upgrading in which the investing company train the local workforce and disseminate technical and managerial skills.

Although all these investment options offers opportunities into the country biofuels investment, the needs for sustainable development and the role of private companies in poverty eradication has shifted the focus of motivation by investigating the overall benefits accruing to the locals, and the overall impact on the environment and the society. Today, it is generally agreed that linkages between foreign affiliates and local businesses are perhaps the best way for host economies to reap the potential benefits of FDI.

Backward linkages, in which the local producer of biofuels feedstock acts as suppliers to foreign affiliates, are proposed for the country biofuels energy markets development. Such models are

likely to lead to increased output, greater sophistication from skills and knowledge transfer, and perhaps introduction to larger markets. The Kenya economy also stand to gain from increased economic activity, higher employment and more sophisticated local firms that provide better products and, in turn, attract more investment. Clearly one can envisage opportunities where rural farmers are contracted by private companies, or development agency to cultivate the feedstock in their farms and sell the same to the company under working arrangement. However, empirical research is necessary to investigate, evaluate and recommend the most viable business model the would ensure wealth creation to the rural poor while providing sustainable feedstock supply to the investors.

### **Research Interest**

The researchers is motivated by the desire to assess, describe and recommends an appropriate farmers based biofuels feedstock supply model(s) that gurantee sustained smallholding farmers incomes while ensuring sustainable supply or raw material to the investing company. The proposed study intends to gather both quantitative and qualitative data from the farmers, representatives of farmers and other community groups, local leaders and agriculture extensions workers as well as from the stakeholders representatives from Ngima Homa Bay Project, The Green Fuel Africa Project in Kitui District, The Wagala Biodiesel project in Coast Province and the Bidco Palm Oil Program in Uganda. The four cases studies were selected because they represent both biodiesel and bioethernol productions activities, targets the rural farmers and rural based community groups and incorporate many key stakeholders, including, foreign investor, local and regional private companies, the government, development organization and the NGOs. For example, while the Ngima Project brings the various stakeholders together under the direction of a foreign private company, the Kitui project is being facilitated by a NGO.

### **Reference**

1. The Government of Kenya, 2006 Sessional Paper on Revitalization of the Sugar Industry” (Ministry of Agriculture, August 2006), p6.
2. The Energy Act, 2006, Kenya Gazette Supplement No. 96 (Acts No. 12) (Government of Kenya, January 2007) p416.
3. Economic Commission Latin America and Caribbean ECLAC, (2007) Biofuels Potential in Guyana, Government o Guyana.

4. Dutch Sustainable Development Group, "Feasibility study on an effective and sustainable bio-ethanol production program by Least Developed Countries as alternative to cane export." (2nd Edition, June 2005), p24.
5. Cornland, et al, D. W. "Sugarcane Resources for Sustainable Development: A Case Study in Luena", Zambia (Stockholm Environment Institute, 2001), p39.
6. Energy Information Administration, "Alternatives to Transportation Fuels 1996" (US Department of Energy, December 1997), p40.
7. UN HABITAT. Kisumu City Development Strategy (2004-2009).