Corporate Participation in Sustainable Development thru Feedstock Production for Biofuels

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ABSTRACT

Eastern Petroleum Corporation, through its subsidiary: Eastern Renewable Fuel Corporation has embarked on harnessing idle and underutilized resources for sustainable agriculture and Biofuel Production. Eastern Renewable has embarked on developing a cassava fed ethanol plant which can produce up to 30 million liters of ethanol per year. This project will entail the development of not less than 8,000 hectares of lands in the Province of Isabela in the island of Luzon and harness the corporation of farmers. This paper will discuss how the corporation is undertaking the massive task of identifying, organizing and training the various communities and farmers across 3 provinces: Northern Isabela, Western Kaling and Southern Cagayan for cultivating cassava as sustainable and profitable crop for eventual use not only for feeds but as raw materials for bio ethanol. Considering similarities in both climatic and rural conditions in the Asia Pacific Region, Eastern Renewable's experiences, approaches and challenges may help participating countries in the symposium tackle similar challenges in harnessing agriculture and biofuel production their respective countries.

GENERAL BACKGROUND

The Philippine economy has been growing significantly these past years. In 2007, it posted a GDP growth of 7.3%, its highest in 30 years and above the ASEAN 5 average growth of about 6.3% [USAID], but then the world financial crisis happened and it temporarily halted such growth. However, as of 1Q of 2010 the Philippines posted once again a GDP growth of 7.3% with a positive outlook for the 2Q and the rest of the year.

Despite growing at its fastest in the last 3 decades, poverty incidence is still high in the Philippines hinting that income does not trickle down to the poor. There is an imbalance in countryside development in the Philippines wherein the first 7 regions in the Philippines represents 78% of total productivity and only 22% of Philippine productivity is shared by the other 10 regions [Quesada, R.M., 2010]. Poverty incidence is mainly an agricultural phenomenon. Farmers are one of the top poorest sectors in the country with poverty incidence is at 44% [Dy,R., 2010]. It is an irony because basing on the data provided by the Department of Agriculture, there are around 3 million hectares of underutilized land areas in the Philippines.

The Biofuels Act of 2006 (otherwise known as Republic Act 9367) was signed in January 2007 with the intention to reduce the country's dependence on imported fossil fuel, reduction of Greenhouse Gas (GHG) emissions and rural development among others. This Act mandates all oil companies to have a five (5) percent blend of ethanol in gasoline products two years after the signing of the law (2009) and 10

percent blend of ethanol after four years (2011). In 2007, Transportation accounted for 42.7% of petroleum consumption. This translates to 80 Million Barrels or roughly around 1.27 Billion liters of Petroleum products were consumed in 2007 [Dept. of Energy, Key statistics 2007]. The energy plan of the Philippines for 2009-2030 projects that for 2011 at least 330 Million liters of bioethanol will be needed to reach the 10% blend mandate for oil companies. Due to the enactment of such Law, the Philippines would therefore need at least 11 Bioethanol plants by 2011, each producing at least 30 Million liters of Bioethanol per year. To date, however, there are only 3 bioethanol plants with total capacity of 60-80 Million liters.

A Bioethanol plant requires 8,000-10,000 hectares for its feedstock production to keep it operational throughout the year. This translates to development of at least 88,000-110,000 hectares to support the 11 plants needed depending on the type of feedstock. Philippine farmers' beneficiaries usually own between 1 to 5 hectares of farm land. At least 88,000 farmers and their families would therefore benefit from the Philippine Biofuels Program. The said Program will not only help displace millions of liters of imported fossil fuel, it will also help decrease GHG emissions, help move development into the regions and help in poverty alleviation in the Philippines.

COMPANY BACKGROUND

Eastern Petroleum Corporation (EPC) started in 1996 and became one of the country's pioneering new petroleum players. For the past 3 years it has been advocating the use of renewable fuels in the country by introducing more environment-friendly products such as use of liquefied petroleum gas for transport (Power gas), Biodiesel, bioethanol and creating its subsidiary Eastern Renewable Fuel Corporation.

Eastern Renewable Fuel Corporation (ERFC) was formally registered in the Securities and Exchange Commission on August 2007 and renamed Eastern Renewable Fuel and Commodities Trading Corporation (ERFCTC) in 2010. The company is into developing existing and emerging alternative sources of energy as well as projects related to enhancing the energy security and promotes sustainable energy development in the Philippines. It aims to build a 100,000LPD bioethanol plant in the Province of Isabela in Northern Luzon. To date, the company has planted a cumulative total of at least 800 hectares of cassava feedstock production cassava in Mindanao (started in 2007) and North Luzon-- Isabela Province (started in 2009).

PROJECT IMPLEMENTATION

Approach: Feedstock Selection

A lot of feedstock is available that can be used for bioethanol. Feedstock available canbe seen in Table 1 where in its conversion rate to ethanol and yield per hectare can show the total ethanol yield per hectare of the said crop. Table 2 shows the composition of cassava and its conversion into ethanol when converted fresh or in dried form. In order to check the economics, the cost of feedstock conversion can be seen on Table 3 and the impact to the reduction of GHG through the use of cassava-based bioethanol compared to other feedstock sources can be seen in Table 4.

Corn can be seen as yielding the highest conversion to ethanol. However, due to the food vs. fuel debate it is not recommended to use it as a feedstock. In the Philippines, sugarcane and cassava are the most viable source of bioethanol. Sweet sorghum's yield and conversion is still at experimental stage as of 2009.

Table 1. Ethanol Feedstock in the Philippines (except wheat)

	Conversion rate to ethanol	Yield per hectare	Overall ethanol yield
Feedstock	L/MT	MT/ha/yr	Liters/hectare/yr
sugarcane	67	80	5,360
cassava (fresh)	167	25	4,175
corn	410	24	9,840
sweet sorghum	55	55	3,025
wheat	390	4	1,560

Source: Demafelis, R [2007],], Kuiper, et. Al [2007], Wang [2007] & ERFCTC [2010]

Table 2.Cost Comparison of Cassava vs. Sugarcane

	Conversion rate to ethanol	Yield per hectare	Overall ethanol yield	Production Cost/ha/yr	raw mat cost/liter
sugarcane	67	80	5,360	$ 1,860	$ 0.35
cassava (fresh)	167	25	4,175	$ 814	$ 0.19

Source: ERFCTC [2010]

Bioethanol can be derived from cassava either as fresh tubers or in the form of dried chips. The starch content is converted into sugar which is then further converted intobioethanol. Fresh cassava tubers usually has a starch content of up to 30% while dried cassava chips can have 60-80% starch content.

Table 3. Cassava to Ethanol Conversion

COMPONENTS OF FRESH CASSAVA TUBERS			
Cassava Tubers			
Peel			10-20%
Cork layer			0.5-2%
Edible Portion			80-90%
	Water	62%	
	Carbohydrate	35%	
	Protein	2%	
	Fat	0.30%	
	Fibre	1%	
	Ash	1%	

Source: Kuiper, et. Al [2007]

Cassava Conversion to Ethanol in liters		
Volume	min	max
1MT fresh (<30% starch)	143	167
1MT dried (>65% starch)	333	417

Source: ERFCTC [2010]

Depending on the yield, cassava as a feedstock source is cheaper than sugarcane wherein cassava's raw material cost is at $0.19/liter vs. sugarcane's $0.35/liter. Additional costs will depend on cost of other costs and inputs and efficiency of the bioethanol plant.

Table 4. GHG-reduction of cassava from bioethanol

GHG-reduction compared to fossil gasoline		
Cassava in China		23.00%
Cassava in Thailand		62.90%
Corn in the USA		48.40%
Sugarcane in Brazil		90.90%

Source: Kuiper, et. Al [2007], Nguyen [2006]

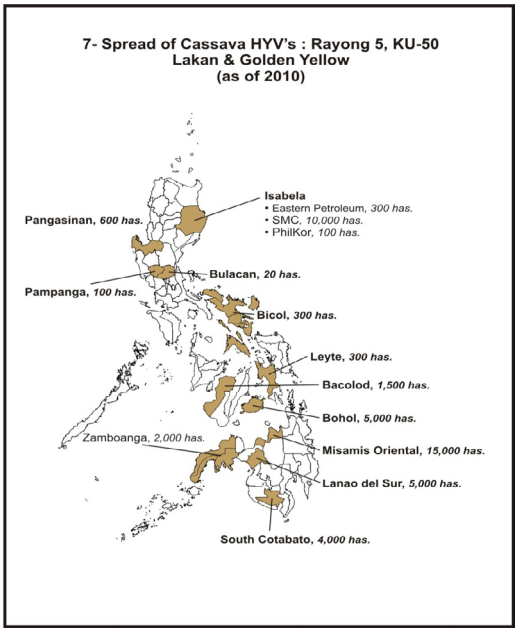
After consideration, cassava was selected after comparative evaluation and based as well on the experiences of China and Thailand which were visited by ERFCTC officials. Some additional conclusions are:

- Corn, which commands higher market price, is best suited for food use and feedstock production.
- International price of sugar are volatile aside from higher production cost than cassava.
- Erratic climatic conditions now and with Philippine's 20 typhoons per year favors the production of root crops primarily cassava.

Project Area Selection

Several areas in the Philippines are suitable for cassava production which includes Northern Mindanao, Region Figure 1:

Figure 1: Cassava Plantations in the Philippines



Source: Philippine Rootcrops, Visayas State University [2010]

ERFCTC, in fact, started in General Santos City with an initial contract growing model of up to 600 hectares but eventually settled in Northern Luzon; Region 2 due to availability of huge tracks of land and market proximity considering the island of Luzon consumes 70% of the total fuel market for the country. Being a new entrant in the Biofuels and Agriculture industry the company was also assisted Philippine Agricultural Development and Commercial Corporation (PADCC) under the Department of Agriculture for land identification and certification. In order to avoid the food vs. fuel debate that was in full blow in 2007-2008, the ERFC was shown idle lands in Region 2, North Luzon wherein more than 117,000 hectares of available and suitable lands for cassava production were identified. It is to be recalled that the Department of Agriculture cited more than 3 Million hectares of vacant and underutilized agricultural land areas in the Philippines. In addition, the Department of Environment and Natural Resources (DENR) estimated 4 Million of hectares of logged over areas also available. In sum, as much as 7 Million hectares of land are underutilized in the Philippines and this could partly explain why poverty incidence are highest among rural settlers.

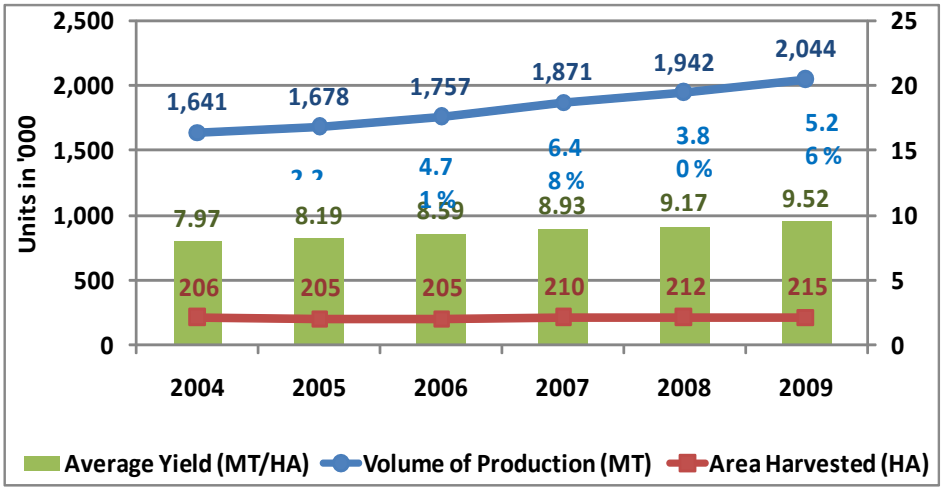
Most of the farmers in Isabela and Kalinga Province are land reform beneficiaries, and small landholders while some are holders of certificate of stewardships which were issued by the Department of Natural Resources. In addition, most of their lands have been idle for more than 5 years and some haven't been planted at all.

Production Approaches via 'Big-brother' Contract Growing Approach

The Comprehensive Agrarian Reform Act of the Philippines (CARP) in 1987 transformed the agricultural landscape of the country. From landlords owning vast tracks of lands, the lands are now broken up to individual farmer beneficiaries. These agrarian reform communities usually do not have enough production capacity to produce due to limited access to financial institutions and market access as they continue to rely on traditional rural institutions of lenders and middlemen.

In most cases even members of cooperatives have inadequate access to capital, not enough farm implements and they also have to rely on traditional farm practices of animal-drawn implements limiting their production capacity. Precisely, the Philippine National Average is 9.52MT/hectares in 2009 which has only grown by 19% from 7.97MT/hectares in 2004 and can be seen in Figure 2.

Figure 2:Cassava Yield in the Philippines from 2004 to 2009



Source: Department of Agriculture, Bureau of Agricultural Soils [2010]

Given the situation, ERFCTC adopted the following big brother concept:

1. Financing Guarantee. The Company signed an Agreement with a local bank in the Philippines for financing of company Growers for cassava production
2. Advanced the cost of land preparation equivalent to 15% of total production cost using its own mechanized farm implements
3. 100% Market cover for all production at pre-agreed price at the start of planting
4. Training and Support

Figure 3:Cassava Yield per Region (Region 2: Valley)

REGION	Volume of Production (ton)	Area Harvested (ha)	Average Yield (t/ha)
ARMM	1,012,330	94,113	10.76
Northern Mindanao	417,942	18,933	22.07
Bicol Region	115,112	22,895	5.03
Central Visayas	106,078	13,701	7.74
Eastern Visayas	73,194	22,165	3.30
Western Visayas	60,966	6,665	9.15
CALABARZON	54,786	8,150	6.72
CARAGA	47,885	7,631	6.27
Cagayan Valley	38,545	3,090	12.47
SOCCSKSARGEN	31,313	1,884	16.62

Source: Department of Agriculture. FY 2009

The loan guarantee of ERFTC enables the farmers to receive up to 80% of their production cost for cassava cultivation from a local bank. The funds are channeled to the cooperative which is then channeled to the individual farmers.

Mechanized land Preparation

The Philippines, like the rest of the world, have aging farmers with an average age of 50. Farmer-parents send children to school who migrates to urban centers ending up in skilled and white collared jobs. It is no wonder why farmers' children would readily prefer to be maintenance personnel as floor sweepers in a mall or messengers rather than to be a farm laborer. This gives rise to mechanization as the only viable alternative which necessarily demands bigger capital which is beyond the means of ordinary farmers and even small cooperatives. There are over 300 cooperatives in Northern Luzon where the project is being carried out and most of them lack farm tractors.

For ERFCTC's cassava project in Isabela, the Company deployed 7 tractors that can initially plow 350 hectares a month or at least 2,450 hectares per year assuming operations of 7 months/ year.

100% Market coverage

Given a fixed buying price, the company guarantees to purchase all produce of the farmers provided that it also meets the quality standards. With 100% coverage, this gives farmers and their cooperative which extended other credit, guarantee of repayment including potential income should production be met.

Trainings and Linkages

To improve productivity and success of the cassava plantation project, the Company provides training to the farmers and extends technical assistance for areas under cultivation

ERFCTC Training for Balligi Cooperative June 25, 2010.

Figure 4: Mechanics of Loan Guarantee

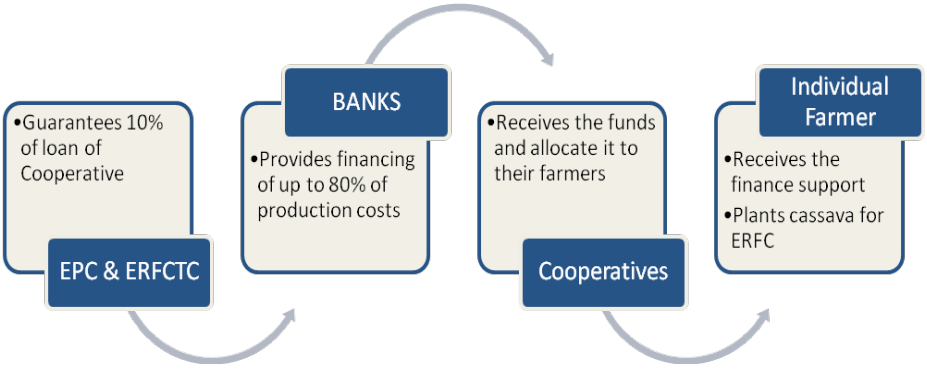


Table 5. Assemblies and Trainings

Date	Cooperative	Location	Participants
2008	VAPDECO	Isabela	120
Apr 2010	Epiphany Coop	Quezon, Isabela	40
Jun 2010	Balligi Coop	Quirino, Isabela	70

Community Impact and Project Sustainability

The first year of implementation enabled the mobilization of 100 farmer families covering 300 hectares. The limitation in expansion was due to the limited planting materials which have to be sourced from the best available planting material which can yield up to 65MT/hectare. Cassava as an alternative crop to corn, tobacco and sugarcane for marginal lands is now widely accepted increasing farm productivity and alternative income.

Even if the plant is yet to be constructed, feedstock production is sustainable considering existing demand as raw material for feeds for poultry, hog and growing aquaculture industry which can be shown in Table 6.

Assuming 20,000 hectares will be planted with cassava with Gross Sales of at least Php 60,000/hectare (US$1,395.00/hectare) will translate to Php 1.2 Billion (>US$27Million) annually for the Province. This will also benefit around 4,000 farmers with an average family of 5.

Production Approaches via Direct Corporate Farming

Another possible production approach is via Direct Corporate Farming. This involves the identification of suitable lands for cassava production owned either by government or individuals via a direct lease or joint venture arrangement. The Company has received offers from private owners covering thousands of underutilized lands in the region to support the project and is currently evaluating said areas for project implementation.

CONCLUSION

Defining Sustainable Development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs must be a way of life for everybody. The Company is particularly proud of its contribution in pursuing sustainable development in energy which at the same time will enhance local capacity to produce indigenous and environment-friendly resources. Even with limited experience, it is important that participation of local communities; who are ultimately the principal actors and beneficiaries, be harnessed thereby creating a popular base upon which further development of further project can be assured. Governmental support for policy, as in the case of Philippines' Biofuels Act and Clean Air Act have proven to be the policy stimulus which enabled bioethanol and biodiesel program for the Philippines. At the same time, infrastructure development in the countryside is proving a critical ingredient in attaining farm productivity and efficiency without which competitive advantage will not be attained and will only negate the very purpose of self-sufficiency in energy sourcing. It must likewise be emphasized that without capability building assistance by the sponsoring Corporation or Non-Government Organizations (NGOs), financial intermediation and market access are essentials in ensuring sustainability in putting together this project with corporate participation.

Table 6:Philippine Cassava Demand Projection

LOCAL DEMAND PROJECTION (in '000)					
Particular	2010	2011	2012	2013	2014
Food	654	784	944	1,124	1,334
Feeds	4,000	4,800	5,760	6,950	8,294
Bio-Ethanol	50	110	220	220	220
Starch	312	328	344	344	379
in MT(fresh)	5,016	6,022	7,268	8,638	10,227
in Hectares*	418,000	501,833	605,667	719,833	852,250

BIOETHANOL DEMAND PROJECTION					
	2010	2011	2012	2013	2014
Bioethanol in MT	50	110	220	220	220
in Hectares*	4,167	9,167	18,333	18,333	18,333

Source: Philippine Tapioca Producers and Processors Association(PhilTAPP, 2010)

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BRIEF BIODATA

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