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## **SUSTAINABLE BIOFUELS IN CAMEROON**

THE INFLUENCE OF THE EUROPEAN UNION RENEWABLE ENERGY DIRECTIVE (EU-RED) ON THE PRODUCTION AND USE OF BIOFUELS IN CAMEROON.

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*God made Everything Beautiful in its Time (Ecc 3:11)*

### **List of Acronyms**

AED	-----	Agro Energy Development
CPO	-----	Crude Palm Oil
CSCPO	-----	Certified Sustainable Crude Palm Oil
EU	-----	European Union
EC	-----	European Commission
EU-RED	-----	European Union Renewable Energy Directive
FFB	-----	Fresh Fruit Bunches
FPIC	-----	Free Prior and Inform Consent
GHG	-----	Greenhouse Gas
IFC	-----	International Financial Corporation
ISCC	-----	The International Sustainability and Carbon Certification
MINEE	-----	The Ministry of Energy and Water
MOU	-----	Memorandum of Understanding
NGO	-----	Non-Governmental Organization
RSPO	-----	The Roundtable of Sustainable Palm Oil
RSB	-----	Roundtable of Sustainable Biofuels
SOCAPALM	-----	Société Camerounaise de Palmeraies
SAP	-----	Structural Adjustment Program
USA	-----	United States of America

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### **ABSTRACT**

There are a lot of debates surrounding the sustainability of liquid biofuel as a means of mitigating some global challenges like climate change and energy insecurity. The European Union (EU) for example has set up renewable energy targets and sustainability criteria. Biofuel is expected to contribute significantly to meet up with these targets.

Much of these targets will be met by importing liquid biofuel from developing countries. In Africa, Cameroon is selected as an empirical case to study the biofuel developments, the actors in these developments, the factors driving such developments, and the influence of the EU-RED in the production and use of liquid biofuels in Cameroon.

The study is a qualitative research with a case study design. Data collection was through semi-structured, one-on-one interviews with some government administrative officials of the Cameroon's Ministry of Energy and Water (MINEE) and some biofuel/feedstock economic operators in Cameroon. This was supplemented with review of relevant literature. The data is analyzed through thematic analysis and the lens of political ecology that mirrors out the diverse perspectives.

The findings demonstrate that liquid biofuel actors in Cameroon are the Cameroon government, some economic operators and NGO's. The factors driving biofuel developments in Cameroon is the desire to use energy crops for a dual purpose of fighting desertification and to put energy crops into economic use. Energy diversification, stimulating rural development, to meet the political ambitions of the state, external influences and economic factors are all driving the biofuel sector in Cameroon.

The EU-RED influences the Cameroon's biofuel sector through indirect means; like the application of EU-RED ideas as a guide or reference in drafting a legal framework for the biofuel sector in Cameroon, through trade, certification schemes, sustainability awareness and huge land acquisition.

In effect, this will enhance our understanding on the biofuel developments in Cameroon, add knowledge to the debates on the sustainability of biofuel and also provide empirical knowledge and pragmatic evidence to the EU-RED.

**KEY WORDS:** EU-RED, liquid biofuels, sustainable/sustainability, sustainability criteria/requirements, drivers, influence, Cameroon, feedstock, economic operators, Jatropha, palm oil.

## **1. INTRODUCTION**

The use of biofuel as a means of mitigating the global challenges of climate change, energy insecurity (evidenced in high fuel prices and imports) and as an opportunity to stimulate rural development has raised a lot of sustainability debates in recent times (Mol, 2007). Though biofuels are said to be environmentally friendly because it is renewable and emit fewer greenhouse gas (GHG), a wide range of potential risks are also associated with it (Fairhead et al, 2012).

Renewable energy targets are set up by the European Union (EU), United States of America (USA) and China to meet up with the above challenges. In EU for example, the Renewable Energy Directive (EU-RED) (2009/28/EC) has set mandatory targets for renewable energy use at 20% and 10% in the overall energy use and transport energy respectively by 2020. (Van Dam et al, 2010, Schlamann et al, 2013, German and Schoneveld, 2011, Di Lucia, 2010, Amigun et al 2010).

Biofuel will contribute a substantial share in the transport sector (German and Schoneveld, 2011). The UN energy of 2007 in Jumbe et al, (2009) states that biofuel will account for 25% in the overall world's energy needs in the next 15-20years. Due to these renewable energy mandatory targets, and the significant role biofuel is expected to play, anticipations are that, EU's demand for biofuel/ feedstock will increase to an estimated 38.3billion liters by 2020. The inevitable outcome is high levels of dependency on imported biofuels as non EU sources are expected to provide 41.5% of this demand. German and Schoeveld quotes from (Bowyer, 2010) that the EU is projected to become one of the largest importers of biofuel/feedstock by 2020 with an anticipated annual import of 15.9billion liters unlike 10.8billion liters for the United States (German & Schoeveld 2011). Clearly, the EU's demand for biofuel is on the increase and a substantial part will be met through imports.

Biodiesel is a popular biofuel in the EU, and some of the most favorable feedstock for biodiesel (palm oil, jatropha) are from the tropics. The EU does not have a conducive climate to grow these tropical feed stocks and the available arable land in the EU is insufficient to grow the raw materials or feedstock needed to produce biofuels in the medium and long term. This means much of this EU's high demand for biofuel will be met by expanding and importing large volumes of biofuel/feedstock from Africa including countries like Cameroon (Van Gelder & German, 2011, Duvenage et al, 2012).

This demand is considered one of the drivers of the scramble for arable land (land grabbing) in Africa and associated with further sustainability concerns like biodiversity loss, land use changes, food-fuel nexus and social imbalances (Fairhead et al, 2012). To ameliorate such controversies, EU-RED has placed sustainability standards on biofuel to ensure that the capacity to increase production is without unacceptable negative impacts on society and the environment. This is done with the use of EU-RED approved voluntary



certification schemes as a tool to make sure that the biofuel/feedstock of economic operators meets these sustainability requirements through certification.

This increase in demand and dependency on the importation of biofuel/feedstock from Africa urgently needs to be investigated in a case country; and so Cameroon is selected as an empirical case to represent Africa. Research on biofuel development in Cameroon is virtually none existing (Calcaterra & Ndongsok, 2013) although bioenergy at large is a substantial contribution to the energy mix. A major research gap exists on:

Whether biofuel developments in Cameroon is driven or influenced by the increasing demand and biofuel consumption needs of other countries (China, USA and EU).

Whether there are factors within Cameroon that could possibly drive the biofuel sector of the country; and the actors behind the drive.

Whether the sustainability criteria on biofuel put in place by supranational bodies like EU-RED are known and used in Cameroon and how these policies influence the biofuel arena in the country

Therefore, this study finds it urgently important to do a case study supported by field research in order to investigate on the biofuel drivers in Cameroon, so as to retrieve firsthand information on the prevailing situation of this sector. By so doing, our understanding will be enhanced on the biofuel developments in Cameroon and knowledge will be contributed to the ongoing process of laying down a legal regulatory framework for liquid biofuel by the Cameroon government.

The method of data collection in this qualitative case study was through semi-structured, interviews with government administrative officials of the Cameroon's Ministry of Energy and Water (MINEE) and some biofuel/feedstock economic operators in Cameroon. This was supplemented with a review of relevant literature. The data is analyzed through the lens of political ecology that mirrors out the diverse perspectives.

Furthermore, given that, this study will also discuss if and how the EU-RED and associated sustainability policies in practice influences biofuel production and development in Cameroon, knowledge will be added to the debates on the sustainability of biofuel and the results of this case-based research will provide empirical knowledge and pragmatic evidence to the broader implications of the EU-RED in none member countries.

## **1.1 Research Aims/Research Questions.**

The goal of this study is to explore the biofuel developments that are taking place in Cameroon in order to examine the driving force behind such developments. Another aim is to investigate how sustainability criteria put in place by supranational bodies like EU-RED affects the global South using Cameroon as a case country. That is, whether such policies are even known in Cameroon and their possible influence on the production and use of liquid biofuels in Cameroon. These overall aims are formulated in three research questions below:

### **Research Questions**

- What is driving liquid biofuel developments in Cameroon today?
- What liquid biofuel developments have taken place in Cameroon and by which actors?
- Does the EU-RED and associated sustainability criteria influence liquid biofuel developments in Cameroon? If so, in what ways?

## **1.2 Thesis Outline**

I started this thesis by introducing the missing knowledge that necessitates this research as well as a definition of basic but key concepts used in the paper. Then, a presentation of the country overview, a justification of why I chose Cameroon as a case country to represent Africa and the biofuel feed stocks in Cameroon. This is followed by a theoretical framework based on some political ecology perspectives that are relevant to this study. The method of data collection and analysis is also discussed. The research questions are then answered by presenting an overview of biofuel developments in Cameroon undertaken by the government and some economic operators in the biofuel domain of the country. From this discussion, the biofuel drivers in Cameroon are identified. The influence of the EU-RED on the biofuel developments in Cameroon is also examined. The study is then finalized with a discussion and a conclusion.

## **1.3 Research scope**

The study is limited in its scope to liquid biofuels particularly biodiesel with the feed stocks jathropha and palm oil. To investigate how the EU-RED affects countries in the global South, Cameroon is selected as an empirical case to represent Africa. Though there are other International sustainability policies and supranational bodies to ensure a sustainable production and use of biofuel, this study uses the EU-RED and its associated sustainability regulations to examine their influence on the biofuel arena in Cameroon.

The study does not have as its aim to study the actual production, processing and use of biofuel in the country. It is based on some biofuel initiatives that have taken place in Cameroon, the actors involved in such developments as well as the drivers and external policy influences.

## **2. CONCEPTS AND DEFINITIONS**

### **2.1 Renewable Energy**

This type of energy is non-depletable, naturally and constantly replenished, or restored over time. It is obtained from natural sources like wind, falling water, sunlight and biomass. Examples of renewable energy are solar energy, hydro-electricity, bioenergy, thermal energy and wind energy. They are assumed to be carbon neutral or do not produce carbon compounds and other greenhouse gases (The Renewable energy manual, Armstrong and Hamrin, 2000).

### **2. 2 Bioenergy**

It is a form of renewable energy that is obtained from biomass. Biomass refers to non-fossil material of biological origin like trees, plants, energy crops (a category where biofuel belong), agricultural and forestry waste, manure or debris (US Environmental Agency, 2009, Bioenergy and biofuels-sustainability pathways FAO, 2012).

### **2. 3 Biofuel**

Biofuel is a form of bioenergy derived from processing, upgrading or conversion of biomass into gas, solid and liquid fuels. Specifically, it is used to describe liquid bioenergy fuels such as biodiesel and bioethanol which is also the focus of this study. This type can be used in liquid transport fuels or petrol engines (vehicle engines, aviation, industrial machines) and in heating systems. Liquid bioenergy crops are grown for the production of liquid transport fuels.

Bio-ethanol is made from feedstock like sugar crops (sugar cane, sugar beets, and sweet sorghum), starch crops (corn, wheat, barley, cassava, and milo). On the other hand, biodiesel is made from oilseed crops - rapeseed, soybean, sunflower, palm, jatropha, castor, hemp seed (IUFoST Scientific Bulletin SIB-March 2010, Magdoff, 2008).

Biofuel is made by converting these feed stocks into energy; while bioethanol is made by fermenting the sugars and starch in these feed stocks into alcohol, biodiesel is made by reacting oils with alcohols in a process known as *esterification*. When used for transportation, they are blended with conventional fuel sources like gasoline and

petroleum diesel (IUFoST Scientific Bulletin SIB-March 2010). While bioethanol is a common biofuel in the United States, biodiesel is the case in Europe.

From the forgone, an important question to ask is *why biofuels?* Biofuel is a renewable energy that is replenished over time and it is easier to transport and deliver than other forms of bioenergy. It burns cleanly and it is assumed to be carbon neutral. The burning of fossil fuel for oil and gasoline emits stored carbon dioxide into the atmosphere while, biofuels are assumed to be more environmentally friendly as crops used for biofuels absorb carbon dioxide (CO<sub>2</sub>) from the atmosphere during their growing period released during burning. Besides, when used, the carbon dioxide that returns to the atmosphere is simply that which had recently been removed by plants (Magdoff, 2008).

## **2.4 Sustainable/Sustainability**

This term is synonymous with continuity, maintenance and the capacity to endure over time. Sustainability is made up of three pillars: Environmental, economic and social sustainability. With respect to liquid biofuels, sustainable/sustainability means biofuel activities will be done within the limits of these three pillars or without harmful effects to society and the environment and without jeopardizing the potential for future generations to meet their own needs (Ekins et al, 2008).

## **2. 5 THE European Union Renewable Energy Directive (EU-RED)**

The EU-RED is a governance mechanism with a set of legislative sustainability requirements for bioenergy to ensure that it is produced sustainably. These sustainability standards are designed to address sustainability concerns related to biofuels and especially at the supply chain. The brain behind this is to help reduce GHG emissions, to possibly encourage rural development and increase energy security. To an extent, the renewable energy targets set by EU-RED has promoted the use of liquid biofuels as an alternative renewable energy source to replace fossil fuels and mitigate climate change. The result is the increased use of liquid biofuels as a substitute to fossil fuel which has led to a lot of debates on the sustainability of the production and use of bioenergy (Mol, 2007, Fairhead et al, 2012). To safeguard the sustainability of bioenergy in the EU, different mechanisms have been put in place. One of such mechanisms is Directive 2009/28/EC which states that for bioenergy production and use to count towards member states renewable energy targets, it must comply with the sustainability criteria of the EU-RED (Schlamann et al, 2013). The extent to which this is implemented in Cameroon needs to be further examined.

The important Sustainability requirements according to (German & Schoneveld, 2011 and Schlamann et al, 2013) are as follows:

- The production and use of liquid biofuels should ensure that greenhouse gas emissions are reduced or better still there should be a greenhouse gas savings of at least 35%.
- The cultivation of energy crops on land with high biodiversity value or high carbon stocks should be avoided (primary forest, natural protected areas, high biodiversity grassland, forested land with high canopy, saturated wetlands, peat lands etc.)

German & Schoneveld pointed out three ways suppliers of biofuels to the EU can comply with the directive and the criteria if they want to sell to the EU. These are as follows: by applying to a national system, by fulfilling the criteria of a voluntary certification scheme approved by the EC and by making a bilateral or multilateral agreement (German & Schoneveld, 2011).

While the above criteria are mandatory, social sustainability requirements are non-mandatory. Such may include minimum demands on labor conditions, that feedstock should be available at affordable prices especially for the developing countries and land use rights should be respected. Worthy of note is the fact that sustainability criteria may apply irrespective of the geographical origin of feedstock.

The mandatory requirements are the conditions that biofuels have to fulfill in order to count towards national renewable energy targets and to be eligible for financial support. Failure to meet these criteria does not exclude them from use but such type will not count towards the 2020 renewable energy target and will not also be eligible for financial support (Schlamann et al, 2013). As of now, the non-mandatory requirements as the name implies are not a must or not very compelling to economic operators.

## **2. 6 Voluntary Certification Schemes**

The EU-RED uses voluntary certification schemes as co-regulation elements or tools which serve as a check to ensure that biofuels are produced sustainably and companies meet the RED sustainability criteria. Schlamann and others identified these schemes as the most effective means of putting EU-RED sustainability criteria into operation (Schlamann et al, 2013). Examples of EU-RED approved voluntary certifications schemes are: The Roundtable of Sustainable Palm Oil, (RSPO), and Roundtable of Sustainable Biofuels (RSB). These are multi-stakeholder associations with representatives from various interest groups. Others include: The International Sustainability and Carbon Certification (ISCC) and REDcert (German & schoneveld, 2011, Schlamann et al, 2013). Through membership

with these approved voluntary certification schemes; Companies importing or producing biofuels can demonstrate compliance with the sustainability requirements.

Some of these schemes like RSPO are frequently updated and grow in size and scope; an indication that they have the potential to become important in achieving positive change on a global scale. RSPO uses the process of traceability to guarantee that feed stocks are produced sustainably and respect sustainability regulations and best practice at the supply chain.

Schemes audit companies importing or producing biofuels by verifying if sustainability practices were met in the production and sale of biofuel. That is, they check if the entire production and supply chain of biofuels is sustainable. They audit the company's documents, the farmers, the mills and the traders (European Commission - MEMO/11/522 19/07/2011).

Geographically, some schemes apply globally while others focus on a specific region. Schemes with a specific region go further and formulate a more comprehensive criteria set of social and environmental requirements (contextualizing the criteria with respect to the setting of that region or country) (German & schoneveld, 2011).

### **3 THEORITICAL FRAMEWORK**

#### **4.1 A Political Ecology perspective of sustainable biofuels in Cameroon**

The most cited definition of political ecology is that of (Blaikie and Brookfield 1987, p.17). They stated that political ecology:

*“combines the concerns of ecology and a broadly defined political economy. Together this encompasses the constantly shifting dialectic between society and land-based resources and also within classes and groups within society itself”*

From this definition, other political ecologists have made some observations within its conceptualization that have relevance to sustainable biofuels in Cameroon. This is true in two observations made by (Walker, 2005). He argues that, human interaction with the physical environment is undergoing reshaping and destabilization which he attributes to forces like unequal power relations, conflict and cultural modernization under a global capitalist political economy. This he termed the structural political ecology. The focus of the structural political ecologist is on the role of political economy in reshaping the environmental decision-making of the “land user”.

It is important to note that, political economy refers to policies adopted by the governments, supranational bodies, institutions, relationship between individual and society and between the markets and the state using technics from economy, politics and society. This definition in itself has a lot in common with the research objectives of this study.

Another observation of Walker is what he termed post structural political ecology, wherein he focuses on the influence of politics on environmental change. This include: environmental movements, discursive and symbolic politics, institutional nexus of power, knowledge and practice and political influences on human environmental interactions and the resulting environmental change. That is to say:

*“The environmental actions of the 'land manager' [usually understood as rural land users in the third world], are shaped by economic, ecological and political [forces]... and flawed environmental data and policies.... [For instance], the increased integration of third-world land users into global markets under unequal relations of power was viewed as undermining these 'land users' keen localized environmental knowledge and long histories of successful adaptation to sometimes harsh and unpredictable environments...” (Walker 2005,p.74)*

According to (Robbins, 2012), political ecology is a field that seeks to unravel the political forces at work in environmental access, management and transformation. His observations in Blaike and Brookfield definition of political ecology also have relevance to this study. His arguments are based on how the effects of a global political economy have constrained local and regional production choices especially within third world and the rural context.

One of the dominant narratives Robbins pointed out is the conservation (“sustainability”) and control thesis are that:

*“The control of resources and landscapes has been wrested from producer groups ... through the implementation of efforts to preserve “sustainability”, “community”, or “nature”. In the process, local systems of livelihood, production, and socio-political organization have been disabled by officials and global interests seeking to preserve the “environment”... This definition is usually viewed as benign, efforts at environmental... (“sustainability”) are shown to have pernicious effects, and sometimes fail as a result.” (Robbins 2012, p.178).*

Both authors uses a critical approach with emphasis on political economy, political institutions, policies and control regimes, politicizing environmental issues, political-ecological interactions within specific geographic regions and the very relationship between politics, ecology and policy.

As it is often said, the way the researcher defines and perceive a certain problem will shape the political ecology perspective that will be used. This work will therefore draw on these

observations of political ecology to examine the driving force behind biofuel developments in Cameroon and how the influence from above as well as external and internal factors drive and affect the people's interaction with their physical environment and society.

Moreover, the influence of the EU-RED and its sustainability regulations will also be screened using these political ecology perspectives. That is to say, the influence of policies adopted by the governments, supranational bodies and institutions in the environmental decision making of the 'land user', in this case biofuel stakeholders in Cameroon will be discussed.

Though the policies are said to ensure a sustainable production and use of biofuel/feedstock, the political ecologist sees these policies and drivers as forces that reshape the human interaction with the environment, that push the decision making of the land user, and affects the local and regional production choices especially within third world and the rural context.

## **4. CAMEROON COUNTRY OVERVIEW**

### **4.1 Case Justification**

Cameroon is Africa in miniature, portraying all the diversity of the continent within her borders such as a varied climate. However, there are some peculiarities with respect to liquid biofuels that makes this country worthy of an empirical case to represent Africa.

Cameroon has a tropical climate suitable for tropical feedstock for biofuels. In the tropical zone of the country, there are already existing palm plantations; some of which are mapped out in this study. According to (MindBullet, 2009) there are favorable climatic conditions (abundant rainfall, sunshine and warm temperatures) in this country suitable for the cultivation of tropical feedstock like palm oil and jatropha.

**A promising region for biofuel:** Biofuel developments in the country are still at an embryonic stage but Cameroon is considered a promising region and some biofuel initiatives are taking place already. For example, jatropha has been growing in the wild in the Sudano-sahel and the Savanna zones of the country even before now. The economic operator Agro Energy Development has ambitions of setting a jatropha plantation in the former zone. In the Savanna Zone, a company called OmniVentures has acquired land for its jatropha plantation and in the North West; the NGO called GREENERY is undertaking jatropha agriculture for biodiesel. Also, this land is cultivable and suitable for large-scale plantations of biofuel feed stocks and there is relative abundance of water resources.



**Export potentials and labor:** There are large production and export potentials for biofuels in Cameroon. The country is an exporter of agricultural crops (Cocoa, coffee, rubber etc.) and so, biofuel feedstock like jatropha could be another export commodity while the already existing palm and other plantations could be expanded for agro-fuels. Agriculture is the backbone of the economy occupying over 80% of the population (Tolale and Ngnikan, 2009). The available cheap labor in the agricultural sector could be easily diverted for biofuel agriculture.

**Political Stability:** There is political stability in Cameroon (Hoyle & Levang, 2012) and Cameroon a stable country for investors.

*“There is political stability and peace in Cameroon. Cameroonians are a happy people, always smiling, they don’t like problems, they like but football, there are little or no strikes and they don’t think violence is a way to solve problems” (CX)*

## 4.2 Cameroon Country Characteristics

Cameroon is located in central and west Africa. It is in the extreme North- Eastern end of the gulf of Guinea between latitude 2° and 13° north and between longitudes 8° and 16° East. It is bounded in the South by the Equatorial Guinea and Congo, West by Nigeria, East by Central African Republic and Chad, and in the North by Lake Chad. Cameroon is in the Inter-tropical Zone with a varied climate. The Coastal, Southern and Eastern parts of the country and characterized by a tropical climate while the North is characterized by semi-arid and hot climate. The table below gives a vivid description of some of the peculiarities of Cameroon.

<i>Statistics</i>	<i>Indicator</i>	<i>years</i>
Location	Sub-Saharan Africa at the North-Eastern end of the gulf of guinea	/
Longitude	8° and 16° East	/
Latitude	2° and 13° North	/
Physical area	475,442km <sup>2</sup>	/
Total population	16 647 000	2003
	20 million	2012
Average annual temperature	25°C	/
Temperature increase	0.7 °C-2.9 °C	between 1960-2007
Average annual rainfall	1400mm	/

Rainfall decrease	2.2% per decade	Since 1960
Vegetation	Equatorial rainforest, savanna and desert	/
Literacy rate	47 % 68 %	1987 2001
GDP per Capita	USD 1,150	2012

**Table 1:** Cameroon country statistics: Extracted from (Tolale and Ngnikan, 2009, *Lighting Africa, 2012*), on the 25<sup>th</sup> April 2014.

As indicated on the table above, energy use in the country is dominated by biomass particularly fuel wood as well as hydroelectricity: 77% and 97% respectively (Lighting Africa, 2012). Due to the use of these renewable energy sources in the country, there is a low and stable CO<sub>2</sub> emission from the energy sector between 1990 and 2003.

There are planned investment in the countries energy sector of USD1, 745 million from (2005-2015) (Ngnikam and Tolale, 2009) more especially renewables of which biofuel is a sub set. Biofuel is expected to play an important role in the pursuit of sustainable energy options for the future. In addition, the population is also growing, and probably these sole fuel sources might be inadequate. This implies that, new sources of fuel might be needed in order to reduce energy dependence.

From 1987-2001 there was a 21% increase in the countries literacy level. However, general education is dominating in the country and there is a lack of technical training. It is therefore worthy to investigate whether with this low level of technical background Cameroon will supply biofuel feedstock or already processed biofuel into the international market.

Furthermore, it is estimated that there is an average increase of temperature by 0.15 °C per decade between 1960 and 2007 while there is an annual decrease of rainfall by 2.2% per decade since 1960 (Ngnikam and Tolale, 2009). Given this changes in temperature and rainfall, I will like to investigate if climate change mitigation is driving biofuel developments in Cameroon.

At the same time, Cameroon's agriculture is very sensitive to climate change (especially changes in rainfall); given its low level of mechanization and use of traditional methods Electricity is also generated from hydro schemes, very vulnerable to rainfall variations.

**Figure 1:** Location of Cameroon in Africa and the world

### **4.3 BIOFUEL FEED STOCKS IN CAMEROON**

Due to the varied climate and vegetation in Cameroon, the country has the capability of growing all the biofuel feedstock that can do well in Africa/the tropics. This includes: sugar cane, jatropha, palm oil, sunflower, soybean, castor, hemp, cassava, molasses etc. So far, the main biofuel feed stocks in Cameroon are palm oil and jatropha and this study will base on them. This decision is justified in the latter paragraphs.

### **4.3.1 Palm Oil**

Two companies involved in this feed stock are Société Camerounaise de Palmeraies (SOCAPALM) and Company "X". SOCAPALM for example is the largest palm holdings in Cameroon. These feed stock and the two companies are selected due the possibility of expanding palm oil for liquid biofuels.

Palm oil as a biofuel feedstock has some very unique attributes .It has the highest yield per hectare of all biofuel crops (MindBullet, 2009). The palm tree is also a perennial crop that grows and reproduce all year round with a thick canopy and better vegetation structure.

Cameroon has a long history of palm plantations which started during the colonial period. Cameroon is currently among the leading palm oil producing countries of Africa (Gelder and German, 2011) with production estimates at 210,000 tons of Crude Palm Oil (CPO) in 2011 (Feintrenie, 2012).

Despite these figures, Cameroon still imports between 20-50,000 tons of palm oil each year for soap and vegetable oil. However, there are plans to expand production, with foreign investors currently negotiating over 1Million hectares of land with the Cameroon government (Feintrenie, 2012)

As of now, the use of palm oil for biofuel is controversial because of concerns that it is an edible crop, land use conflicts and because Cameroon has a net import of palm oil. However, Palm oil still remains and outstanding biofuel feedstock and some investors negotiating for land have biofuel related base activities at the back of their mind. Besides Company "X" business strategy is that of producing CPO for domestic use and for export and as long as it is exported, it is the buyers that will decide the end product.

### **4.3.2 Jatropha**

With respect to jatropha feedstock, the OmniVentures and Agro Energy Development are involved in this feedstock. For special reasons, an NGO involved in jatropha was also selected in this study.

There are no official figures of jatropha production in Cameroon as of now, but jatropha is a preferred biofuel feedstock in Cameroon. The arguments for this preference is because, jatropha is a familiar crop to the local people of Cameroon and as stated by economic operator OmniVentures, it grows in the wild already in Cameroon and sometimes used for livestock fencing in the North and North West region of the country. Secondly, there claims that jatropha can grow well on marginal and degraded lands and this could be used as a rehabilitation measure for degraded land. Thirdly biodiesel from jatropha can be used to

power generators for rural electrification. This together justifies the choice of jatropha in this study.

## **5 METHODOLOGY**

### **5.1 Research design:**

This thesis work is carried out according to qualitative research method applying a case study design. Researcher Robert K. Yin defines the case study research method as “an empirical inquiry that investigates a contemporary phenomenon with its real life context; when the boundary between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used” (Yin, 1984, p.23). The use of a case study design is because the research questions are exploratory in nature. Finding out what developments have taken place in the biofuel sector of Cameroon, the driving force behind such developments and as to whether the EU-RED and its sustainability criteria are even known or influence this sector can be explored best through a case study. According to (Yin, 2009), exploratory questions necessitate a case study. Besides, given that my aim is to have an empirically fieldwork based or pragmatic evidence of this complex phenomenon, and also to give an in-depth insight (Bryman, 2012) on what is actually happening in practice in the biofuel sector of the Cameroon, the research questions had to be explored within a bounded system (Creswell, 2007). This gives room for an intensive detailed examination of the case and there by provide deep understanding of this phenomenon within its real life context (Bryman, 2012). Thus, the ideal method to achieve this goal is through a qualitative research which gives the data wider significance to social research. However, since the issues explored also have to be explained, the case study is an exploratory type but also explanatory to an extent.

Cameroon serves as a single instrumental case study that represents Africa and this will give the research a focus and a bounded setting to illustrate or explore (Creswell, 2007) biofuel developments in the country and the possible influence of the EU-RED and associated sustainability precepts in these developments

### **5.2 Method of data collection:**

#### **5.2.1 Interviews**

To investigate on biofuel developments in Cameroon, I did a field research in Cameroon from January to April 2014. Before travelling to Cameroon I contacted a translated in the ministry of higher education who was also my research assistant. He made arrangements

with the director of MINEE. It was easier to this because i am a Cameroonian from the English speaking section and from the bakossi tribe. The director in question also hail from the same place and so there was a connect between us that aided the interviews.

The method of data collection in this study was through one-on-one semi-structured interviews but also supplemented with documents. Qualitative research emphasize on in-depth investigation and to achieve in-depth knowledge also means in-depth interviewing which refers to the building of relationships and exploring ideas within the individuals being interviewed (Ragin and Amoroso, 2011). In my case, such individuals were key informants that gave facts on this matter through guided conversations instead of structured queries (Yin, 2009). To apply Yin's idea during my field research, I used mostly open-ended questions. Though there was a consistent line of inquiry the questions were adjustable.

The use of semi-structured interviews was due to the need for follow up questions with respect to the interviewee's response. In addition, semi-structured interviews generate data interactively; they are fluid and ensure flexibility so that the researcher might dig deeper on particular areas (Lewis-Beck et al, 2004).

To explore the research questions guiding this study, I used what I titled *Questionnaire one* with 43 questionnaire questions and *Questionnaire two* with 41 questionnaire questions. The former was used with the Cameroon's Ministry of Energy and Water (MINEE) and the latter designed for the four economic operators mapped out for interview. These questions were administered through face to face interviews with the director and sub-director (government administrative officials) of MINEE and some officials of the companies involved in biofuel/feedstock production in Cameroon. The questionnaire questions were mostly open ended questions designed in sections A, B and C with sub themes and the aim of each section. *Questionnaire two* had an additional section on some personal data of the companies. According to (Bryman, 2012), a questionnaire is made up of questionnaire questions which the researcher uses as an instrument to help to implement what needs to be known to answer the research question that drove the project. However, apart from the questionnaire questions, additional questions were also asked depending on issues that came up during our conversations.



**Figure 2:** Interview sessions with administrative officials of the MINEE (27<sup>th</sup> /01/2014 and 5<sup>th</sup>/02/2014)

While in the field, I had five interview sittings with the MINEE, three interview sessions with Company “X” and a series of phone conversations and email responses to *Questionnaire two* from the Chief Executive Officer (CEO) of Omni Ventures. I also had a meeting with an official of SOCAPALM and email responses to *Questionnaire two* from this official. During the interviews, I took some notes in my research note book and at the same time recorded the interviews to make sure all the details are collected.

The choice of doing interviews at MINEE is because it is a government ministry responsible for overseeing the activities of the country’s energy sector and implements the national energy policy. Besides, the MINEE is responsible for formulating policy and regulations of this sector. It also provides administrative and technical oversight of the state and partially state-owned establishments in the energy sector (*Lighting Africa, 2012*).

There might be many more companies involved in this activity in Cameroon, but Four Companies engaged with liquid biofuel were mapped out in this study. The decision is due to some efforts they have done on liquid biofuels. These are the companies I got some information on and some were available for interviews. Above all, two of the companies will trade with the EU member states or will sell their biofuel/feedstock to the EU market and they are hence of course directly linked to my studies.

Overall, these stakeholders were interviewed in order to obtain an independent, unique, specific or Cameroon context base information so as to have an objective assessment of the liquid biofuel arena in Cameroon. This could only be achieved through field research work, wherein, I had the opportunity to obtain firsthand information and was provided insight on this issue. I think this will give the reader a picture of what is actually happening in the biofuel arena of Cameroon.

### 5.3 Method of data Analysis.

This refers to the way the data is being prepared and organized. The data is organized in themes, description of actors and their activities, tables, as well as images.

The table below is an illustration of my sources of primary data. It demonstrates the various actors interviewed and the dates these interviews took place.

In the results section, the primary data is presented with selected interview quotations. These quotes are represented with the following codes “GOV”, “CX”, “OMV”, “SP” which are interview codes from Government administrative officials (the MINEE), Company “X”, OmniVentures and SOCAPALM respectively as indicated in the table below.

<b>Respondent</b>	<b>Interview Dates</b>	<b>Code</b>
Government administrative officials (The MINEE)	25 <sup>th</sup> , 27 <sup>th</sup> & 29 <sup>th</sup> /01/2014 3 <sup>rd</sup> & 5 <sup>th</sup> /02/2014	GOV
Company “X”	12 <sup>th</sup> ,13 <sup>th</sup> , 16 <sup>th</sup> /02/2014	CX
OmniVentures (phones interviews & emails responses to the questionnaire)	24 <sup>th</sup> , 25 <sup>th</sup> ,26 <sup>th</sup> ,2 <sup>th</sup> /02/2014	OMV
SOCAPALM	14 <sup>th</sup> /02/ 2014 (one on one interviews) 22 <sup>nd</sup> /03/2014 (email responses to the questionnaire)	SP

**Table 2:** *Interview dates with biofuel actors in Cameroon and their respective codes.*

There is very limited research on liquid biofuels in Cameroon available in academic papers and hence identifying sufficient basic information on liquid biofuel developments was not easy. Therefore, my data is mainly analyzed inductively. The production and use of liquid biofuel is novel in Cameroon and as a matter of fact, I had to develop and elaborate new ideas as well as bring up new insights (Ragin and Amoroso, 2011) to enhance our understanding on biofuel developments in the country. Since the research questions are exploratory, an inductive approach is also exploratory and thus an ideal approach to answer these questions. Using a qualitative research approach as applied here, data is inductively built from particular to general themes and the researcher makes interpretations or meaning out of the data (Creswell, 2009).

However, since it is almost impossible to do research without some initial ideas (Ragin and Amoroso, 2011) the little that is known on the biofuel arena in Cameroon, was subjected to scrutiny (Bryman, 2012). This gave the analysis some elements of deduction. In my data analysis there is therefore interplay of induction and deduction a process which Ragin and Amoroso term “Retroduction” (Ragin and Amoroso, 2011)



From this, the linkages between the theoretical framework inspiring this study and the empirical findings will be cross-examine; wherein, the empirical findings are then fed back into the literature and the theoretical framework inspiring this study. According to (Creswell, 2009) in a qualitative research as this, a theoretical lens orientates the study, guides the researcher as to what to examine and provides a call for action or change.

### **5.3.1 Thematic analysis**

In this type of analysis, the primary data is grouped through the process of coding and analyzed in themes (Bryman, 2012). In the process of coding, the transcribed interviews and the summaries of my field notes were grouped into component parts and assigned a label (mostly one or two letters of the alphabet). In other words, the facts collected were assigned a code that reflected the content of that segment. While going through the field notes, similar ideas and those that occurred repeatedly had the same code and these types were interpreted as been more influential or given more priority. This helped to condense the data and make sense out of it because I now grouped them into sub-headings to make up the biofuel drivers and the influence of the EU-RED in the biofuel sector of Cameroon.

This process is what Creswell refers to as the core element in qualitative data analysis wherein; the coded data is reduced into meaningful segments and names are assigned for the segments while at the same time counting the frequency of the codes, combining the codes into broader categories or themes and noting relationships among the categories from whence the researcher can make comparisons, create a point of view and a stance that signals the theoretical perspective (Creswell, 2007).

I applied Creswell's idea by bringing out themes on the drivers of liquid biofuel in Cameroon and the possible ways the EU-RED and its associated sustainability criteria can penetrate and influence the biofuel arena in Cameroon. In some cases, I made direct interpretation by observing a single instance and drawing meaning from it. This idea is also applicable on the discussion section through comparisons between the biofuel drivers in the EU versus Cameroon.

### **5.4 Limitation of methods/ the study.**

Some companies like the Agro-Energy Development Company (AED) mapped out in this study could not be reached during the field research work. In fact, not even the snow ball sampling method could help reach them. This is because the case study was very broad and extensive since it covered the whole country and the said company is located right in the Far-north of the country.

The issue of the EU-RED and its sustainability policies was very sensitive, and almost interpreted as a political issue by some of the interviewees. This almost created tension during the interviews.

Responses from some informants such as (MINEE) could not be distinguished if they were personal ideas and views or those of the entire ministry and the state. Sometimes, the interviewee just said what the interviewer wants to hear. In some cases interviews were shallow due to scanty responses while others were partly done on phone and email. This impeded follow up questions. A common critique to interviews as a source of data is that they are bias and sometimes such bias voices influence the results (Yin, 2009). For example, qualitative findings rely on the researcher's judgment on what is significant or important; what to be included or excluded and on his or her personal relationship with the respondents as well as their responses (Bryman, 2012).

Also, there were difficulties to record the interviews. Interview sessions were always interrupted and getting the interviewee out of office was a bit tricky and costly. According to (Yin, 2009) recording in itself is a source of distraction during interviews. Generally, interviews take enormous time and energy especially in listening, taking down field notes and transcribing. This result in immense data, some of which are not even read (Yin, 2009) and very difficult to analyze.

## **6 RESULTS**

### ***6.1 AN OVERVIEW OF BIOFUEL DEVELOPMENTS AND BIOFUEL ACTORS IN CAMEROON.***

This section primarily answers the second research question; *“What biofuel developments have taken place in Cameroon and by which actors”*

It provides the back cloth or stage curtain on which the biofuel drivers and the EU-RED influences are brought to lamp light. It gives some clarity and basic background knowledge to the study. Without any biofuel actors or initiatives, there will be no factors driving biofuel developments in Cameroon neither will there be any EU-RED influence. Discussing these actors and their biofuel initiatives brings out the bigger picture of the liquid biofuel sector in Cameroon. Jumping into the biofuel drivers and the influence of the EU-RED without actually knowing what is going on (prospects, projects, plans, studies, liquid biofuel activities, actors etc.) in the biofuel sector of the country as a whole will give a blur picture of the sector.

In this study, the biofuel actors include: the Cameroon government, represented by the MINEE and also four selected economic operators in Cameroon. In addition to this, an NGO is also included because it is down to earth to the rural people and plays a significant role in stimulating rural development; one of the drivers of liquid biofuel developments in Cameroon. MINEE is representing the state because it is often mandated to take most of the state's responsibility on energy matters.

## **6.2 GOVERNMENT ACTION ON LIQUID BIOFUELS IN CAMEROON**

Biofuel initiatives started in Cameroon in 2004/2005, with the first initiatives undertaken by OmniVentures and the Bolloré group respectively. By 2008, there was an influx of both national and foreign economic operators tendering their applications to the government for investment. However, up till date, about a decade of biofuel activities in Cameroon, the government is still to lay down a legal framework to govern this arena.

The president of Cameroon is quoted to have stated in his 2010 “end of year address” to the nation that, he has mandated the ministry of water and energy to explore renewable energy alternatives like biofuels (Ngalame, 2012). The government administrative officials interviewed claim that, the Cameroon government is currently working on a legal framework which will govern the biofuel sector.

The government is also granting major tax breaks and land concession to companies. Furthermore, there is the Department of Renewable Energy in the University of Maroua in the Far North Region in charge of research on renewable energy and biofuel is a subset. Examples of some biofuel research undertaken by the government is a feasibility study in 2008 to examine which energy crops are best for Cameroon and will not compromise with food and land.

*“Biofuel in Cameroon is still a virgin domain and that is why the government started this process through feasibility study to see which of the inputs could be better maximized. Which of the feed stock: palm oil, jatropha, and cassava will be feasible for Cameroon and will not compromise with land, food crops or for whatever purpose or which of the biofuel technologies will not compromise our food needs. The compromises are in two categories,  
-transforming food crops into biofuel  
-Using cultivable land for biofuel cropping” (GOV).*

The feasibility study was not only on the commercialization of biofuel but also to: address some of the conflicts associated with energy crops, understand their potential and inform the strategy development in order to maximize economic benefits of biofuel without harming the environment.

However, it is important to stress that despite these efforts, there are no specific policies or legal references on biofuel in Cameroon. The importance of a legal framework for biofuel is pointed out by Jumbe & Mkondiwa from three dimensions. It lays down rules and regulations to govern the biofuel sector in a country like coordinating biofuel research and development activities; stipulate the states commitment, project the vision of the sector and the nation at large. Secondly, a good policy environment will make this sector appealing; attract organizations, donors, and the international community as well as increase private and or foreign investment in technological development and infrastructure. Lastly, it will also lay down the implications of embarking on the biofuel program and will reconcile the international interest with the countries targets and interest (Jumbe & Mkondiwa, 2013).

Field evidence demonstrates that, the biofuel sector in Cameroon is still at infancy. Relatively little effort has been done in promoting the biofuel sector by both the Cameroon government and the economic operators. The nonexistence of a legal framework for biofuel in Cameroon is a possible reason why this activity is still at an embryonic stage in the country.

### **6.3 ECONOMIC OPERATORS-COMPANIES INVOLVED IN THE BIOFUEL DEVELOPMENTS IN CAMEROON.**

The following companies were mapped out in this study.

- OmniVentures Sarl
- Bollore Group (SOCAPALM)
- Agro Energy Development
- Company “X”

The table below is an illustration of the companies mapped out in this study, their location in Cameroon and the biofuel feedstock they are engaged in.

<b>Company</b>	<b>Feedstock</b>	<b>Location in Cameroon</b>
OmniVentures Sarl	Castor, Hemp and Jatropha	Ngoundere
Bolloré Group (SOCAPALM)	Palm Oil	Douala
Agro Energy Development	Jathropha and sunflower	Maroua
Company “X”	Palm oil	Limbe

**Table 3:** Location and Feedstock of some biofuel economic operators in Cameroon

Source: Author’s Elaboration

### **6.3.1 OmniVentures.**

It is a foreign private enterprise located in Ngoundere in the northern part of Cameroon. The headquarters of this company is in Los Angeles in the USA. It has been operating in Cameroon for 10years, that is, since 2004.

*“We have secured over 100,000ha of land in Mayo Rey in the area of Touboro and Gop Rey just outside Ngaoundere. Our business plan is to grow Jatropha, Castor and possibly Hemp for biofuel but the Cameroon government contended that Hemp is a drug” (OMV).*

The main feed stocks of this company are castor and jatropha but most preferably jatropha. The arguments raised by this company for this preference is because jathropha is non-edible. They also claim that food products such as sugar cane and palm oil, if used for biofuel would drive up food prices and using land for biofuel that can be used to grow food would affect the world food supply.

Through interview responses, I was made to understand that; as of now, there is little or no production, but 5-10years from now, their business plan calls for 5 farms each producing 5000ha of jatropha interplanted with castor bean in between the jatropha trees. Crop rotation with fallowing after 2years is assumed to be their sustainability practice.

Jatropha from this company will be sold in the form of already processed biofuel or in the form of biofuel raw material (feedstock). According to the CEO of this company, only 20% of their product will be sold in Cameroon precisely to large trucking companies, bus companies and taxis and the rest to the EU and the USA; their main markets. Even this 20% may be due to the fact that Cameroon has a policy of satisfying domestic demand first before any exportation. The EU market for instance involves a contract to OmniVentures to supply the British Airways and Virgin Airlines with liquid biofuel and or feedstock. The respondent argued that, the aviation companies have been using biofuel for over 15years and it is considered profitable because this is said to cut their fuel costs.

### **6.3.2 The Bolloré group (SOCAPALM)**

Due to the Structural Adjustment Program (SAP), much of the plantations in Cameroon were privatized and SOCAPALM was privatized in 2000 (Nguiffo 2010). As such, this group owns 80% of the palm plantations in Cameroon. These plantations include: SOCAPALM, SAFACAM and FERME SUISSE. In 2005, the Bolloré group established a pilot biofuel program with current rates at 100,000litters (Ngalame, 2012, Pibasso, 2010) and it plans to boost its production of biofuel beyond this rate.

From this group, SOCAPALM is mapped out in this study. The company is an old government company that has been operating in Cameroon since 1968. It was privatized to

the Bolloré group in the year 2000. It is the largest oil palm plantation in Cameroon with 78,528 hectares of land. There is a multiple location of its palm plantations in the country but the headquarters is in Douala. It has palm plantations in other countries like Indonesia, Nigeria and The Democratic Republic of Congo.

Field interviews conducted with an administrative official of SOCAPALM reveal that, the company uses fibers and shells from fresh fruit bunches (FFB) of CPO to produce biodiesel. However, the respondent emphasized that, this biodiesel is for the company's internal use only.

#### **6.3.4 COMPANY "X"**

According to the (SG Sustainable Oils Cameroon Report, February 2011), this company was established in 2009 by an American multinational, a subsidiary of Herakles Farms. The company and its plantations are found in the South West Region of Cameroon. While its headquarters is in Limbe the palm plantations are in Ndian and Kupe Muanenguba divisions bordering the Korup National Park and Bayang Mbo Wildlife Sanctuary, a rainforest region rich in biodiversity

Through interviews, the sustainability manager of this company disclosed their intention to sell CSCPO both domestically and internationally to other African countries, China, America and the EU. He assumed that, since the EU has attractive prices and a high demand, the EU will likely be the ideal market for its company. The company anticipates supplying CSCPO into the market and buyers will decide either to use it for vegetable oil, soap or biodiesel. In other words, they will supply biofuel feedstock (Palm oil) to the international market.

This company owns 19,843 hectares of land and they anticipate having an additional 10,000 hectares from small holders through partnership with them. According to their projection best practice management, they will produce 20 tons of fresh fruit bunches (FFB) of palm oil per hectare per year on 16,000 hectares giving a total of 320,000 tons of FFB per year.

During interviews, I was made to understand that, they have membership affiliations with the Roundtable of Sustainable Palm Oil (RSPO). To demonstrate that they are sustainable, they claim to have ambitions of producing and selling with they called sustainable palm oil. This to them will not just enhance the credibility of the company but the company will also gain a premium from certification. They also respect the International Financial Corporation (IFC) for sustainability and the Equator Principles.

The supply of biofuel feedstock- palm oil and Jetropha by Company "X" and OmniVentures into the international market affirm to Gelder and German who observes that, most developing countries will play a significant role in supplying biofuel feedstock to the global

market. They argue that, in most African countries, the biofuel feedstock they produce (palm oil and Jatropha) will be exported directly and processed into biodiesel in foreign consumer markets. They estimate that, 5% of Europe's feedstock demand for biodiesel is covered by palm oil and there are forecast that, this percentage will increase over the years. (Gelder and German, 2011)

### **6.3.5 AGRO ENERGY DEVELOPMENT (AED)**

Due to time and resource constraints, this company was not interviewed during the field work. Therefore the data below is secondary data that is, a review of relevant literature. It is a French bioenergy company that presented its project in 2008 to the Cameroon's Ministry of Industry, Mines and Technological Development (MINIMTD). It plans to produce biodiesel from Jatropha and Sunflower by cultivating 350,000 hectares of land to produce 665 million liters of biodiesel annually in Maroua in the far North Region of Cameroon (Ngalame, 2012, Calcaterra & Ndonsok, 2013). Jatropha is favorable to the cultural geography of this locality because the local people are familiar with this crop locally termed *kogolondje* in the Fulfulde dialect. The company argues that, its sustainability concern is to diversify biomass use in the country.

### **6.4 A Non-Governmental Organization (NGO)-GREENERY & ROUX.**

As earlier noted, this NGO is included amongst the actors and biofuel initiatives in Cameroon because of the role it is anticipated to play in stimulating rural development, which is a call for concern to the Cameroon government. Just like AED, the data here is also secondary data. This NGO is located in Kumbo in the North West region of Cameroon and legally registered in 2007. As of now, it partners with Roux a private investor from Switzerland. Unlike the plantation scheme applied by most companies, this NGO uses an out grower scheme or a participatory rural approach in the commercial production of oil from jatropha; a non-edible poisonous shrub often used as natural fence. It has set up a 5 year program to create a plantation of 100ha divided between 50 farmers who are anticipated to cultivate a minimum of 2ha of jatropha. Greenery claims to provide financial and technical assistance to these farmers who will in turn sell their output to the BioCam Energy Oil Company which this NGO intends to create. As pointed out by (Calcaterra & Ndonsok 2013), BioCam Energy will promote rural development through energy autonomy in Northwest Cameroon.

## 7 BIOFUEL DRIVERS IN CAMEROON.

The classification of liquid biofuel drivers in Cameroon is in order of importance depending on issues more demanding and of high priority to the state. These drivers are organized in themes as follow:

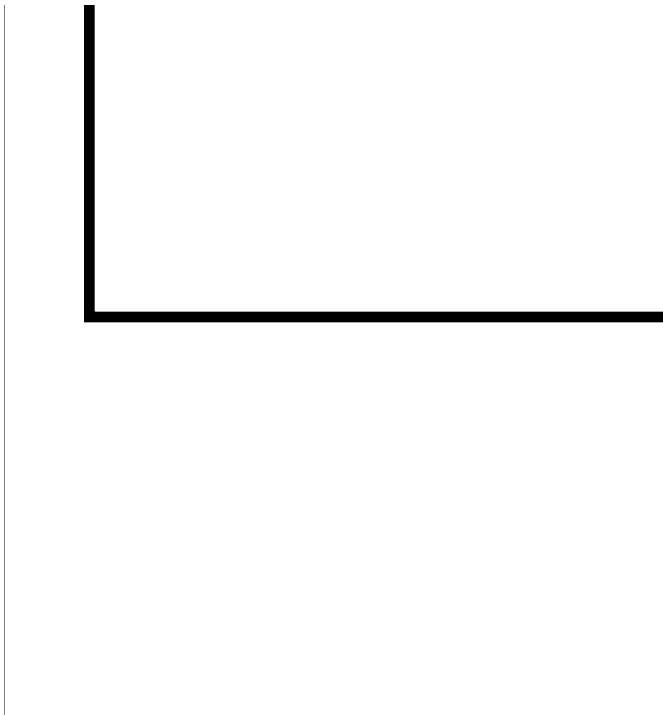
- Environmental concerns
- Energy diversification
- Stimulating rural development
- Political Factors
- External influences and or economic reasons.

### 7.1 Operation Green Sahel

From the interviews with the administrative officials of the MINEE, feedstock production for biofuels in Cameroon is driven by desertification; because it is assumed that energy crops could serve a dual purpose. That is, it can be put into economic use and at the same time help to curb desert advancement. This development is planned for the Northern and North West Region of the country. Cameroon is located south of the Sahara desert (Sub Saharan Africa) and there is strong evidence of desert encroachment in the Northern parts of the country (Maroua, Garaoua and Ngoundere) known as the Sahel region found around the Sahara desert. To fight desertification, a government policy of tree planting known as “*Operation Sahel Vert*” translated in English as “*Operation Green Sahel*” has been going on in this region for many years. Similarly, the North West region of the country with fragile savanna vegetation and patches of montane gallery forest also suffers from desertification.

*“Environmental concerns are driving Cameroon’s venture into biofuel. Reforestation is going on in the northern part of the country. While producing the biofuel, it could also help us fight desertification in this region. Instead of planting trees for planting sake, biofuel crops will play a dual role of fighting desertification and at the same time biofuel crops will be put into economic use.” (GOV)*





**Figure 3:** *The effects of desertification in the Sahel Region of Cameroon*

Desertification in these areas affects the agriculture of the local people especially cattle grazing. In the dry season there is a high mortality among cattle due to high temperatures and little or no water for the cattle. The strong Hamatan winds in this region contributes to soil erosion by removal of the top soil and this together with prolonged droughts has affected crop farming and this region is repeatedly struck by famine.

There are claims by the MINEE that the cultivation of agrofuels in these zones might likely play a significant role in dealing with desert encroachment. For instance, it is assumed that, since jatropha is already growing in the wild in these regions as compared to even some traditional crops, its expansion might help reduce biodiversity loss. At the same time, it can also help to reclaim degraded land and constrain soil erosion thereby combating desertification. This idea is supported by (Jumbe et al, 2009) who noted that; jatropha crops can be interplanted with other annual crops without actually changing the traditional agricultural production system.

## **7.2 Energy Diversification**

Another major driving force behind Cameroon's venture into liquid biofuel is the need to modernize the energy sources of the country. There is a desire to shift from traditional sources of energy like crude oil, fuel wood as well as hydroelectricity with its frequent power cuts. It is assumed that this can be achieved by introducing modern sources of

energy like liquid biofuel which might serve as a good substitute to avert some of these energy crises. There is an over dependence on conventional fuels especially for transportation thus placing oil imports at 961 million USD (22.4%) according to (IRENA, Cameroon).

*“In terms of order of priorities, one of the first priorities that is driving biofuels in Cameroon is to diversify the source of fuel in Cameroon and as a result some sought of reduce our total dependence on conventional fuels (petrol, fuel wood) as well as hydroelectricity. The sole transport energy source in Cameroon is fossil fuel all of which is almost always imported even though we claim to have the SONARA oil refinery. We want to have other alternatives to fossil fuel, we want to substitute the importation of fossil fuel and have energy security. Also, we want to see if it can be used to run cars. This is now driving the government to test these new ideas and technologies”. (GOV)*

Furthermore, the constant increase in the prices of petroleum related products is increasing the consumption of fuel wood which in effect increases deforestation in the country. This is driving biofuel in Cameroon because anticipations are that, energy crops can play a great role in diversifying energy sources and complementing fossil fuel, fuel wood and electricity in the country. Amigun and others argue that, the production and commercialization of bio-biodiesel will be very instrumental in achieving this goal of energy diversification (Amigun et al, 2011).

Moreover, the desire for a cheaper substitute to the generators currently running on diesel (which is very expensive) is another driving force behind liquid biofuels in Cameroon.

*“One of the concerns that is also pushing the government to venture into this domain is because the electricity consumed in some parts of the country is running on diesel fueled generators which is very expensive. If we are successful in this domain of biofuel, most of it will be used in running these diesel generators particularly in the Eastern Region of the country where almost all the electricity there is from these generators” (GOV).*

The national survey conducted in 2006 indicated that out of a total of 1,919 stationary generators, 1,864 use diesel generators and 6 use steam turbines operating with biomass (Ngnikam and Tolale, 2009). Biodiesel is foreseen to act as a good alternative to run these generators.

### **7.3 To stimulate rural development:**

The liquid biofuel sector in Cameroon is driven by the promises of biofuel especially to the local people. It is anticipated that biofuel agriculture will curb rural exodus, enhance

farmer's income and the use of biodiesel to power stationary generators for rural electrification might in the long run serve as a catalyst to economic growth. However, there are some fears if these promises will actually materialize in Cameroon.

In the Northern and North West regions of Cameroon, a venture in biofuel cropping can provide sustainable income generating opportunities for rural communities. Where *Jatropha* is interplanted with other annual crops, it might not only provide additional seasonal income to the farmers but also increase the income of the rural communities as a whole and in effect aid in poverty alleviation. According to (Amigun et al 2011), most poverty reduction strategy papers in Africa reveals a strong correlation between energy and poverty reduction.

*“Biofuel plantations, production and most of its activities will take place in the rural milieu and not in the city center. Therefore, this is going to curb rural exodus because the villagers will have to stay and work in the biofuel plantations and industries. Income, social amenities, health centers, schools, portable water, rural electrification with generators powered by biodiesel from biofuel will follow suit. On the contrary, we are skeptical if some of these promises of biofuel will actually work well in Cameroon and so, they have to be localized and tested” (GOV).*

The respondent believes that, liquid biofuel activities are a job creation opportunity that can employ the rural people and therefore prevent migration to the city. Besides, the provision of social amenities might also improve the quality of life. For example, in the North West region of Cameroon, the use of GREENERY'S BioCam Energy for rural electrification could stimulate rural development and economic growth. This view is supported by (Jumbe et al, 2009, Acheten et al 2010) who observe that, increased access to affordable energy sources for domestic and industrial use are vital services to prosperity and economic development.

It is expected that, when used as a diesel substitute for transportation, the movement and the transportation of agricultural crops from farm to market would be easy and also secure energy. Jumbe and Mkondiwa stress that, biofuel developments represent an opportunity to boost rural economies in Africa due to its capacity to improve the lives and livelihood of the rural people and thus the potential to serve as a catalyst for economic growth (Jumbe and Mkondiwa, 2013)

## **7.4 Political Factors**

There are hopes that, liquid biofuel developments will assist in Cameroon's dreams of becoming an emerging economy by 2035 colloquially termed *“Cameroun des grandes*

*ambitions*” translated in English as “the Cameroon of great ambitions”. This is driving liquid biofuel developments in that, the energy sector is expected to play a significant role in realizing these dreams and coupled with the fact that, biofuel is a subset of renewable energy.

In 2005, the National Energy Action Plan was launched. It is geared towards integrating all energy sources in the country. In 2009, a policy called “Vision 2035” was put in place to promote the use of renewable energy in the country (IRENA, Cameroon) and biofuel is a subset. The energy sector is an engine in the country and so the desire to promote renewable energy is driving Cameroon’s venture into biofuel in order to stimulate foreign investors. According to the (Renewable energy action potential-Country report, 2005), the MINEE since 2005 has been interested and active in attracting foreign investors to assist in the high investment capital needed for a kick off and also contribute in bringing in new technologies. In this light, the energy sector has also been liberalized. Given that, Cameroon is presently going through Structural Adjustment Program (SAP) the state is not very viable financially and so, it encourages Public Private Partnership (PPP) in the biofuel domain, wherein the state will cover 15% and the investor 85% of the investment and also sign a sovereign guarantee to guarantee the investments of investors (Field research work).

Furthermore, the international political engagement of the state is also driving the liquid biofuel arena in the country.

*“If the government is going into biofuel now, it is due to our international engagements like with the IRENA and the Kyoto Protocol. The government has ratified a convention with IRENA to promote the development and use of renewable energy in the country” (GOV)*

In 2011, Cameroon ratified the International Renewable Energy Agency (IRENA) and so the pursuit of biofuel in a way is to fulfill these obligations since biofuel is not decoupled from renewable energy.

## **7.5 Increase in EU’s demand /reliance on the importation of biofuel/feed stocks.**

The renewable energy mandatory targets of the EU-RED is driving and influencing biofuel developments in Cameroon. According to (Schut et al, 2014), the EU-RED has triggered investments in biofuel across the globe, especially in developing countries.

It should be recalled that, EU’s demand for liquid biofuel/ feedstock will increase to an estimated 38.3billion liters by 2020 and non EU sources are expected to provide 41.5% of this demand, making the EU one of the largest importers of biofuel/feedstock by 2020 with an anticipated annual import of 15.9billion liters. EU’s importation of feedstock in

developing countries like Cameroon is inevitable due insufficient arable land and climatic lapses to grow tropical feedstock like Palm oil and jatropha for biodiesel, a common biofuel in the EU.

This has driven biofuel developments in Cameroon from two levels.

- At the Economic Operator Level
- At the state level.

**At the Economic Operator level** biofuel initiatives started in Cameroon in the 2000s with an influx of many companies who showed interest or declared their ambitions on biofuel. While some did so by tendering their applications to the government, others did it by negotiating with chiefs and land owners directly for land leases. Presently most of them are working hard to realize this dream while new ones are still coming in.

Some of these companies were driven by the need to export liquid biofuel/feedstock to EU countries. As noted earlier, Company “X” intends to export palm oil into the EU which can be processed into biodiesel by their buyers, while the Omni Ventures Company also has a contract with British Airways and Virgin Airlines to supply biodiesel/feedstock from Jatropha.

Company	Feedstock	Year of biofuel related activity	Quantity
<i>Omniventures Sarl</i>	Castor, Hemp and Jatropha	2004	/
Bolloré Group (SOCAPALM)	Palm Oil	2005	100,000liters as of 2005
Agro Energy Development	Jathropha and sunflower	2008	665millions litters of biodiesel
Company X	Palm oil	2009	320,000tons of FFB per year

**Table 4:** *Influx of biofuel economic operators in Cameroon in the 2000s*

*Source: Field research (Author’s elaboration).*

**At the state level**, since the increase in EU’s demand and reliance on imported biofuel/feedstock stimulated the biofuel arena in Cameroon in the 2000s, the state reacted to this trend.

*“Government engagement or venture in the biofuel sector started effectively in 2009/2010. There has been an influx of economic operators showing interest on biofuel in Cameroon. This prompted a prime ministerial degree to set up a Renewable Energy Task Force in 2008 to examine the possibility of developing biofuel in Cameroon and to govern the renewable energy sector in the country. This was followed by the lunching of the first study on the commercialization of biofuel by the MINEE in the same year. A consultancy firm [Planet*

*Integrated Consultant] was consulted and did feasibility study on biofuel in Cameroon from whence the country will lay down a law that will guide the investors in this sector” (GOV6).*

In addition to the above government reaction, Memorandums of Understanding (MOU) were also signed with investors to define the modalities of their operation as well as permits and land concessions to set up feedstock plantations or biofuel establishments.

The driving force behind the renewable energy task force and the feasibility study is the influx of economic operators in Cameroon who are also driven by EU's increase in demand /reliance on the importation of biofuel/feed stocks. This has also engineered ongoing efforts to draft a legal regulatory framework which will govern this sector.

Through this influx and other initiatives, the Cameroon government anticipates a very bright future for the biofuel sector by 2020.

*“The curve for biofuel developments in Cameroon is a progressive one just that the process is slow especially at the implementation phase due to complex procedures. However, by 2020, Cameroon will have a legal code for renewable energy and biofuel will be a subset. This will give a clear vision or motivation to the investors. There will be a subvention in some projects. An agency will be created for renewables. By 2020 the jetropha planted now in jetropha farms will be mature and processed into biodiesel. There will be a follow up effect. The renewable energy department in Institute Sahel in the University of Maroua will train a lot of renewable energy engineers by then. The research results for studies carried out for biofuel in Cameroon will be out. Therefore there will be a brighter biofuel sector in Cameroon by 2020 and an exponential growth of this sector” (GOV).*

A possible legal code, a motivational atmosphere for investors and such a promising biofuel sector in Cameroon by 2020 will likely encourage both domestic and foreign investment and to an extent contribute to the EU's Renewable Energy Targets by 2020. In effect, the visions of the biofuel arena of Cameroon by 2020 are not too far with EU-RED's vision by 2020.

## 8 THE INFLUENCE OF THE EU-RED ON THE LIQUID BIOFUEL SECTOR IN CAMEROON

There is no direct influence of the EU-RED on the liquid biofuel sector in Cameroon because the EU does not have jurisdiction to enforce compliance in Cameroon neither is Cameroon a signatory of this directive and its policies. Any influence is possible only through some indirect ways. One major indirect way this might happen is through trade between the EU member states and Cameroon. That is, when EU imports biofuel/feedstock from Cameroon or where Cameroon Supplies feedstock to the EU Market.

### 8.1 In-Cameroon biofuel policy development.

The application of the ideas of this directive in laying down a legal regulatory framework for the liquid biofuel sector of Cameroon is a possible influence. Cameroon is in the process of laying down laws to guide liquid biofuel investments in the country. Field evidence indicate that in laying down these laws knowledge from the EU-RED will serve as a guide and a reference point of experience.

*"Yes of course; we are familiar with the EU-RED and we will like to know more about it. This directive is very important to Cameroon because we are in the process of putting up biofuel and renewable energy technologies and laying down a law to govern production, consumption and marketing of this product. A better understanding of this directive can guide us to see how to put in place our own system. Directives are developed from practical experience and not "parazar" and so, we can learn from other people's experience. This directive as the name implies will give us some direction, some guidelines on how to put in place our own policies in the implementation of this biofuel and renewable energy technologies and to avoid the fact that it may fail or something. This directive can be used for referencing and then coined in a Cameroon context because we are not going to create something from space. It is very important for us to integrate it in the proposed renewable energy law" (GOV).*

The informant is saying that, more awareness and enlightenment on the EU-RED could likely create an impact on the liquid biofuel arena in Cameroon. Given that, the biofuel domain in the country is still to be fully exploited; a communicative approach through voluntary participation and mutual learning is not a bad idea.

According to *(Di Lucia, 2010)*, EU policies can affect non-member states like Cameroon if they regard the policies appropriate in the light of their values and norms. In this case, the policy can penetrate in Cameroon through institutionalized organizations, intergovernmental interactions and transnational processes through various actors in the

society. This will give room for dialogue, communication and policy learning between the EU policies and the actors (economic operators, the state, local land users) in charge of the biofuel arena in Cameroon. The EC in itself recommends that the EU should improve the dialog with the government and private actors of developing countries when advancing policy proposals with an international dimension.

## **8.2. Through the sale of biofuel/feedstock in the EU Market**

Through trade between the EU member states and the biofuel economic operators in Cameroon; EU-RED sustainability standards will penetrate into the liquid biofuel sector of the country. There are very high chances that, trade will definitely take place between them. Field interviews with some economic operators states it clear that, it is almost impossible to sell all their feedstock/biodiesel domestically. The OmniVentures will sell just 20% of its output in Cameroon while the sustainability manager of Company “X” states:

*“There is just no way we can sell our CPO only in Cameroon, neither is it possible to sell it only internationally. So, it must be sold both domestically and internationally (CX)*

An illustration of how the EU-RED may influence sustainable biofuels in Cameroon through the sale of biofuel feedstock to the EU market is as follows:

*“Most of the processors of the end product of CPO are in Europe. Most of the international buyers of our CPO are from EU. Since most of them are in the EU supply chain, they might not buy from us if we do not meet with their standards. However, if these policies are too stiff, then we won’t sell to the EU because we have other markets” (CX).*

The interest to participate in the EU market might promote the application of the EU system. Since most of the company’s feedstock is assumed to be bought or processed into biodiesel by customers from EU, the buyers in the supply chain will make sure the company is respecting the sustainability criteria. In effect, before any buyer in the EU for example covert the CPO or jatropha of any of these companies into biodiesel, they must ensure that their feedstock was produced sustainably. As pointed out by (Schlamann et al, 2013), the EU-RED serves as a policy instrument to ensure best practice for environmental, economic and social sustainability purposes, along the supply chain.

**Another illustration is through EU’S attractive prices, demand and market:** The EU as of 2009 is a large market, a major importer and it is expected to be the most important market for biodiesel by 2020. The EU offers high prices and has high levels of demand for imported biofuels. The attractiveness in terms of prices and volumes compared to alternative markets might influence some industries in the European market. Economic Operators for instance could benefit through improved access to EU market. Through



market access, voluntary application of the EU sustainability system by economic operators participating in the EU market might possibly be promoted.

### **8.3. Through some of the EU-RED approved voluntary certification schemes.**

Trade between the EU and Cameroon on the one hand, and EU-RED approved voluntary certification schemes on the other hand do not work in isolation; they are inseparable. This is because certification scheme is one of the best ways most economic operators in Cameroon can comply with the directive and the criteria if they want to sell to the EU market. The EU-RED could possibly influence Cameroon's liquid biofuel arena through Voluntary Certification Schemes via trade. As observed by (Schlamann et al, 2013), private sector certification scheme is one of the ways of implementing the EU-RED; especially as schemes apply globally or irrespective of geographical origin.

Some economic operators in Cameroon like "Company X" has membership affiliations with the Round Table of Sustainable Palm Oil (RSPO) one of the EU-RED's approved voluntary certification schemes. As noted earlier, this company claims that one of its major goals is to produce Certified Sustainable crude Palm Oil (CSPO) and with this aim, the criteria of the scheme might likely reflect in the company's activities.

*"We intend to sell CSPO and this will be achieved by committing to the national and international sustainability standards for the production of palm oil. We will achieve this through membership with a voluntary certification scheme. Already, we have been a member of RSPO and we hope to update our membership with them. We also respect the International Financial Corporation IFC for sustainability and the Equator principles. To know if we actually implemented these standards or if our CPO is a green product, processors or second buyers uses the concept of traceability. RSPO uses this method to trace our source base and know if we respect Best Practice and sustainability in producing our CPO" (CX).*

The said certification scheme (RSPO) is one of EU-RED's approved voluntary certification schemes which it uses as a tool to ensure that its sustainability criteria are respected by companies involved in biofuel/feedstock. This therefore demonstrates that, the EU-RED to an extent might likely influence some economic operators in Cameroon and the biofuel arena in the country at large.

Certification is not only a prerequisite for access to EU market, but also a requirement for these economic operators to be eligible for funding and a demonstration that, they have meet EU-RED sustainability criteria which apply regardless of the origin of the biofuel/feedstock. By so doing, they might possible count towards national targets and sustainability (Schlamann et al, 2013, (German and Schoneveld, 2011).

#### 8.4. Sustainability awareness and the concerns among biofuel actors in Cameroon.

Another way to illustrate the influence of the EU-RED on Cameroon is through the sustainability awareness and the concerns among biofuel actors in Cameroon. This is linked with the important sustainability concerns among biofuel actors in Cameroon and the EU-RED sustainability requirements. I made this up from the responses from the MINEE and two of the 4 economic operators (OmniVentures, company X) mapped out in this study. It is important to note that of the four economic operators, one didn't answer this section, while the other company could not be reached for interviews.

<b>Indicator (Important sustainability concerns)</b>	<b>score</b>
Apply socio-economic principles like providing jobs, social amenities, road construction, or other types of facilities for the local communities in the impacted areas	3
Land use Changes/ Effects on land use and soil productive capacity	2
Competition for food	2
-Livelihood impacts and rural development	2
-Biodiversity/ Exclusion of biofuel plantations on land with high biodiversity (respect of biodiversity)	2
Air pollution	1
Energy Security	1
Water use and quality	1
Lower greenhouse gas emissions	1

**Table 5:** Indicators and scores of important sustainability concerns among biofuel actors in Cameroon

Source: Author's Elaboration

The scores 3, 2 & 1 are the number of respondents that consider each of these sustainability requirements important in the pursuit of biofuel activities in Cameroon. The

respondents selected this from a group of sustainability concerns presented in the questionnaire. They were asked to select four out of the list.

Socio-economic concerns have the highest score of three; meaning all the three respondents sees it as a very important aspect to be taken into consideration in undertaking biofuel activities. This is followed by the sustainability aspects of food competition, livelihood impacts and rural development with a score of two, indicating that two respondents are concerned with this aspect. These responses can be interpreted to mean that, social sustainability is of utmost importance in the biofuel arena in Cameroon. The government for instance is so concerned on how biofuel agriculture might not compromise the food needs of the country.

Ironically these are the non-mandatory requirements of the EU-RED. One of EU's justifications for extending its operation in the global south is rural development (German and Schoneveld 2011), yet nothing within the Directive itself currently holds economic operators accountable to social sustainability

Land use changes and biodiversity also have a score of two, unlike the above, these are environmental sustainability concerns. Biodiversity concerns for example are mandatory sustainability requirements of the EU-RED. The MINEE is concerned with the sustainability aspect of land use changes (using cultivable land for biofuel cropping) while Company "X" wants to understand the land use pattern of the local people.

Neither the government nor company "X" is interested in lowering greenhouse gas emissions in biofuel activities but for OmniVentures because of its business agenda of selling Carbon Credits, not necessary because of mitigating climate change.

EU-RED sustainability requirements are reflected in the biofuel arena of Cameroon, but whereas Cameroon emphasizes social sustainability issues, EU emphasis is more on environmental sustainability as indicated by the mandatory nature of this type.

## **8.5 Huge land acquisition.**

Even though land use change is an important sustainability concern, one will not remain blind to the fact that; the mandatory blending of biofuels with fossil fuels by industrialized countries has created the demand for land in Cameroon for the growing of energy crops with a rising tendency. The table below is an illustration of land acquired and plans for more acquisition for land for biofuel feedstock.

<b><i>Economic Operator</i></b>	<b><i>Land Ownership in hectares</i></b>
<i>OmniVentures Sarl</i>	100,000
Bolloré Group (SOCAPALM)	78,529
Agro Energy Development	Plans to cultivate 350,000
Company "X"	19,843, and also plans to acquire an additional 10,000hectares from small holders.

**Table 6:** *Land acquisition of economic operators.*

Some of these companies argued that, this land was acquired through land leases from chiefs or through a Memorandum of understanding (MOU) from the chiefs in their respective areas or by obtaining Free Prior and Inform Consent (FPIC) wherein, a community willingly gives their consent to a company accepting both the negative and positive effects of the company.

In signing these deals, the community is represented by chiefs. The sustainability manager of company "X" claims that, during land negotiations, they come into a consensus wherein the company assures the chiefs that they will provide pipe borne water, roads, electricity, schools and jobs to the people of Ndian Division for instance, where its plantation farms are located. He argues that, they agree on a certain timeline that these amenities will be provided. After this, an MOU is then signed between them. This MOU is then taken to government authorities who now give the company the right to acquire such land but within a given time period that I renewable.

*"At the beginning, land lease is for a three year period. Then it proceeds to a permanent lease hold that will last from 25-30 years and then it is renewable to another 25-30years" (CX).*

In other words, land leases are renewable after a period of 20-30years. They claim that, this renewal is on condition that they were faithful to the agreements during land lease negotiations.

## **9. DISCUSSION AND CONCLUSION**

In this section critical thinking is applied on the results of the three research questions guiding the study. That is, an overview of biofuel developments in Cameroon, biofuel drivers (with a comparison between biofuel drivers in Cameroon versus the EU-RED) and finally the EU-RED influence on the liquid biofuel sector in Cameroon.

### ***9.1 An overview of biofuels developments in Cameroon***

Biofuel activities have been prevailing in Cameroon for over a decade but the biofuel sector in Cameroon is still at infancy. Relatively little effort has been done by both the Cameroon

government and the economic operators in promoting the liquid biofuel sector. The nonexistence of a legal framework for biofuel in Cameroon is a possible reason why biofuel developments in the country are still at an embryonic stage. However, the Cameroon government is working on a legal framework to govern this sector and there are hopes that, by 2020, the liquid biofuel sector will be booming in Cameroon.

Moreover, there are some controversies and skepticism surrounding this activity in Cameroon. It is true that energy crops will serve as an export commodity, but Cameroon is a net importer of some biofuel feedstock like palm oil; and the top priority is to meet up with the national demand rather than exporting; (Cameroon has a policy of meeting domestic demand first before exporting) and worst of all, the biofuel sector is still a virgin domain with threats of food-fuel conflicts and land-fuel conflicts.

The preferred feedstock for liquid biofuel in Cameroon is jatropha since it is not edible and could thrive well even on semi-arid and arid lands. However, the Cameroon government is skeptical on what will happen to the huge tracks of land devoted for jatropha, if in the near future there is a change in technology and jatropha is no longer needed for biodiesel. As a result, they are questioning if there are alternative uses of jatropha.

Cameroon's participation in the international scene will be through the supply of biofuel feedstock and Cameroon might likely not supply already processed biofuel into the international market due to low level of technical background with general education dominating the educational system of the country. The exception to this could be through off-shore technology by foreign economic operators/ foreign multinationals. Therefore, much of the biofuel from Cameroon to the EU market for example will be in the raw material form (biofuel feedstock).

It is important to point out that, the issue of importation and exportation is very tricky in Cameroon. Cameroon is importing and exporting palm oil and crude oil at the same time.

## **9.2. Biofuel drivers**

Though the biofuel driver "operational green Sahel" seems to be promising, the fact that desertification is the brain behind this drive exposes the whole idea to more screening. If desertification in the Northern and North West Region of the country is driving biofuel agriculture in Cameroon; then, the dominant discourse in political ecology is playing out in practice in Cameroon. Desert advancement in these zones is due to the spread effect of climate change into sub-Saharan Africa. This is true with the observations of the political ecologist (Robbins, 2012) with respect to the expansion of drought in sub-Saharan Africa due to climate change and its effects. He pointed out that these effects originate from the burning of fossil fuel by industrialized economies yet the regional distribution and vulnerability to these impacts is uneven.

*“The economies and communities that benefit from a regime that thrive on combustion of fossil carbon are often not those at greatest risk for the impacts of their effects. The unevenness of these impacts in terms of geography and (vulnerability)... includes ... the expansion of drought in sub-Saharan Africa, where subsistence population depends on rain fed agriculture... The politics of mitigating climate change... [does] not challenge the regime of accumulation that produce the climate crisis in the first place ... agrofuel initiatives sit at the heart of mitigation plans. These purport to offset petroleum use and production with renewable energy sources, but only reinforce already burdensome inequalities in the agro-industry, and substitute and “environmental fix” for substantive changes in the economy, resulting in new ways for investors to produce profits [especially in processing] at the cost of rural residents and livelihoods” (Robbins, 2012, p. 249)*

However, it is important to note that desertification in the Northern and North West Region of Cameroon is not only due to climate change effects but also through anthropogenic actions like over grazing, over exploitation of resources and bush fires from slash and burnt farming (Binyuy, 2007).

Furthermore, the issue of skepticism is prevalent among biofuel drivers in Cameroon. There are doubts if some of the biofuel expectations will be met or whether what is written on paper could be pragmatic and contextualize in a typical Cameroon setting. That is, the fact that they might apply in other countries especially in the western world does not necessary mean it will be the case in Cameroon. For instance, as far as stimulating rural development is concerned in Cameroon, there is skepticism on whether Cameroons venture into energy crops could actually stimulate rural development or will instead create new problems. This therefore indicates the need for sustainability criteria.

As indicated in *Figure 1*, there are cases of climate change in the country, but climate change mitigation is not a driver of liquid biofuel in Cameroon. Evidence of climate change in the country include prolonged drought in the north, an estimated reduction in annual rainfall by 2.2% per decade and temperature increase of 0.15°C per decade (Ngnikam and Tolale, 2009).

The arguments why Cameroon is not motivated by climate change mitigation to venture into biofuel is because, there are claims that Cameroon is not a polluting country since the countries major sources of energy are mainly renewables (hydroelectricity and fuel wood). Even if the burning of fuel wood is polluting the atmosphere, they claim this merely returns the sequestered carbon into the atmosphere. Besides, the energy sector could engage in biofuel in order to have stocks of carbon credits to sell in the global market, but the complexity, complicated procedures and a fall in the prices of these carbon credits in the global market are all discouraging factors for Cameroon’s energy sector to be driven by climate change mitigation.

On the contrary, climate change mitigation is a major driver of biofuel in the EU system. The release of greenhouse gases into the atmosphere through the burning of fossil fuels is already causing global warming evidenced in increasing temperatures (Mol, 2007, German & Schoneveld, 2011). In Cameroon, climate change mitigation is not an issue at all, interviews with government officials stress how climate change mitigation a pivotal issue in the EU, is not a call for concern in the Cameroon's biofuel arena.

*"Climate change is not a principal element as far as our venture into the biofuel domain is concerned. It is just a secondary matter. Cameroon is not really concerned with climate change mitigation in going out for biofuel because Cameroon is not a polluting country. We have more important issues to worry about; like the conflict between large-scale production of biofuel with competition for land and food crop production and not climate change mitigation" (GOV)*

Another driver also worthy of some discussion is energy security. The pursuit of national energy sovereignty due to the depletion of fossil fuel (Duvenage et al, 2012), high and fluctuating oil prices (Di Lucia, 2010, Jumbe et al, 2009, Amigun et al, 2011, German and schoneveld, 2011) is a global issue. Biofuel agriculture in both EU-RED and Cameroon is driven by the need to substitute the importation of fossil fuel, lower their dependence on it; thereby achieve energy security.

Cameroon's venture into biofuel is driven by the desire to substitute the importation of fossil fuel and reduce their total dependence on conventional fuels especially for transportation. On the other hand, increased demand for biofuels to power plant, machinery and automobiles, instability of oil supplies and the dwindling oils reserves is a major driver of biofuel in the EU and the global North at large. Import substitution and energy diversification away from crude oil, together with the need to mitigate the impact of high fuel prices were the major drivers that championed investments in biofuels coupled with the instability in fossil fuel producing and exporting nations (Mol, 2007). Therefore, while energy security as a liquid biofuel driver is applicable to both EU and Cameroon, Climate change mitigation is moving in opposite directions between them.

However, the introduction of new sources of energy due to modernization will reshape and destabilize the local people's interaction with their physical environment. This so called new technologies will also constrain local and regional production choices especially as the local people are not use to such technologies and perhaps unable to afford them because fuel wood for example is merely gathered from the forest. In effect, this will undermine the environmental actions of these rural land users, their keen localized environmental knowledge and long histories of successful adaptation to their traditional sources of fuel.

A concordance does not exist only in terms of energy security, but also with respect to the visions of Cameroon's biofuel energy sector by 2020 and EU-RED's targets by 2020. EU's

Renewable Energy targets by 2020 in itself is a driving force behind biofuel developments in Cameroon but at the same time this tallies with the visions of the biofuel arena of Cameroon. As earlier noted, the Cameroon government is currently working on a law to govern this sector and they are hopeful that by 2020 this law will be operational. Also, Cameroon foresees a bright future and some reasonable growth in this sector by 2020 this is the same year EU-RED has set its targets.

### **9.3. The RED'S Influence on production and use of liquid biofuel in Cameroon.**

While posing the research question pertaining to this issue, it was doubtful if the EU-RED sustainability requirements are even known in Cameroon. From field research, this directive is known in Cameroon and it indirectly influences biofuel developments in the country. However, the RED's influence on Cameroon's biofuel sector is not without lapses.

In most cases, EU-RED policies were made within a European context and this might not be the case in Cameroon. A case in point is the controversial climate change issue as indicated above. Complex and complicated procedures, lack of mastery of these policies, less informed, unaware or uneducated on these policies and contextualizing international policies in a Cameroonian milieu together complicates EU-RED influence on Cameroon's biofuel sector. Moreover, the international standards for biofuel production particularly biodiesel are difficult to achieve due to current low state of technologies for biofuel production in Cameroon.

Sustainability frameworks like the EU-RED are developed by the EU because it has an interest in pursuing renewable energy options (Devenage et al, 2012) and the use of biofuel is one of them. It is clear that biofuel/ feed stocks will be imported from developing countries like Cameroon yet these frameworks were drawn without necessarily involving the countries that will be affected by land use changes. The North is seemingly imposing their interest on Cameroon, an interest which developed in the absence of the latter. The conceptualization of biofuel as a global issue is important, but it is also necessary to recognize the distinct regional patterns (Hollander, 2010) that surround the various aspects of the biofuel arena and the peculiarities from one country to another.

Trade between Cameroon and the EU is the major means via which EU policies can influence Cameroon. Issues of unequal power relations and terms of trade are debatable. For instance, it is questionable whether biofuel raw materials (feedstock) like jatropha and palm oil will be priced as another agricultural crop like cocoa and coffee or if these energy crops could be ranked and priced like crude oil or as a raw material for fuel. From a political ecology perspective, in some cases, biofuel feed stocks are produced under constrained local and regional production choices; local systems of livelihood, production, and socio-political organization are at times disabled by officials and global interests



seeking to pursue biofuel agriculture in the name of preserving the environment and this have pernicious effects on the local people in the localities where biofuel agriculture is taking place. Besides by integrating economic operators and land users of third-world into global markets under unequal relations of power is viewed by political ecologist as exploitative.

Furthermore, Social sustainability requirements are non-mandatory requirements according to the EU-RED standards. Paradoxically, this type has a higher score in Cameroon than even the mandatory requirements. This is another parallel between the EU systems and Cameroon just like the climate change mitigation.

With respect to the certification schemes, most standards were developed without the participation of all relevant stakeholders. It is important to make sure that, schemes can be contextualize in country by country case especially those outside the EU. That is, a broadly shared understanding (a consensus) of schemes is very necessary. Some economic operators in Cameroon are threatening that, if these standards are too stiff, then they won't sell to the EU market. So therefore, external rules that restrict the economic activities of actors or that have a negative impact on their economic competitiveness, might be contested and rejected.

Some economic Operators in Cameroon do not use the EU-RED approved certification schemes. This is true with the OmniVentures Company that will use the Chicago Carbon Exchange for the sustainability of its feedstock (jatropha and Castor). There is no doubt that, this company is an American Multinational company and it is natural to use American standards but there is some controversy in that, this company will sell its biodiesel to some European companies like the British Airways and the Virgin airlines, but at the same time employing American sustainability checks. It is questionable if the EU-RED is not applicable to the aviation.

Furthermore, it is important to discuss the issue of huge land acquisition. It is questionable if these companies actually kept such promises of social amenities especially in a case where such companies go bankrupt after already acquiring this land. The community is represented by their chiefs during land lease negation and this in itself is highly unlikely a bad idea. Political ecologists see chiefs as weak players in the biofuel chain of explanation. Where chiefs are given the customary right to lease out land or transfer permanent land ownership, irregularities like bribery might be common. Some chiefs can be carried away such promises of developmental projects (pipe borne water, roads, electricity, schools and jobs) some of which never materialize.

*“In practice, chiefs lack political know-how and skills to negotiate favorable terms when swayed by promises of “development” and although powerful relative to the people in their*

*chieftdom, chiefs remain weak players in the biofuel chain of explanation” (Duvenage et al 2012: 169).*

Moreover, there is a shift in ownership or use right. Even if land leases do not always involve a total alienation of land from the former landlords, there is a restructuring of rules and authority over the access, use, management, human-ecological relationships (Fairhead et al, 2012) and land use changes. For instance, in the case of Company “X”, a secondary forest is replaced with a palm plantation, while OmniVentures claims the land was formerly an idle land which will also be replaced with a jatropha plantation. Such changes of course make the land alien to the former local land users or land owners.

On the other hand, the increase in the demand for land for biofuel plantations by the EU can likely help to put the said idle land into economic use and in other areas in Cameroon where land has remained uncultivated for many years. As earlier noted, planting jatropha on such land might help reclaim land and contain soil erosion

However, the issue of marginal or idle land is a controversial one. This so called marginal land, or idle land, when taken over for other uses like biofuel cultivation, the rural people in the impacted areas will be deprived of their source of livelihood. According to (Singh, 2006) the villagers use such lands for herding, fruit and nut gathering, hunting, a source of water, fuel wood, herbs, medicinal plants, thatches for housing, group farming, life support system and to sustain the ecology or provide green cover for the villages.

Still from another perspective, even though the land is very crucial in the biofuel cropping debate; Jumbe and others argue that just about 14 million hectares of land or 1% of the world’s currently available arable land are now used for growing energy crops (Jumbe et al, 2009)

In conclusion, the liquid biofuel arena in Cameroon is surrounded with some controversies and skepticism. While some biofuel drivers are parallel between Cameroon and the EU system others concur and the indirect influence of the EU-RED on Cameroon could bring some positive change in the Cameroon’s biofuel arena. Overall, even though the liquid biofuel sector in Cameroon is at an infancy stage, currently, some measures are put in place to lay down a law that will guide and guard this sector. They anticipate realizing this by 2020, and therefore, Cameroon foresees a booming biofuel sector by 2020.

## **9.4 Recommendations**

This study calls for further research on sustainable biofuels in Cameroon and the RED’S influence on the production and use of biofuels in Cameroon. This is due to the fact that,

some companies mapped out in this study were un-reachable for interviews while at the same time new companies not mapped out for interviews were discovered during the research process. The CEO of Omni Ventures made mention of a Spanish company already in production but due to limited resources and time, the researcher was unable to go a step further.

In investigation EU-RED, s targets by 2020 and how its policies will affect the global south, Cameroon foresees a utopian biofuel sector by 2020. Follow up is needed on what developments will take place in Cameroon by 2020, how the EU-RED will actually influence the legal code and whether the 2020 targets of the EU-RED will in practice marry with the visions of this sector in Cameroon by 2020.

Furthermore, the EU-RED does not have the climate nor the land needed to grow some of the feedstock needed to meet their targets. A 41.5% import is anticipated, and it is expected that some of these imports will come from Africa and Cameroon is not left out. At the same time, a lot of resources (technical and research) are invested on biofuel within EU member states. I think Cameroon need such technical and research resources to improve on this sector so that both the EU and Cameroon will benefit from this activity. If biofuel policy makers are seriously intending to make this sector sustainable, and at the same time fight climate change, I think the south represented by Cameroon in this case, should not be left out in the biofuel debates especially as the south is more or less a source base.

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## **Appendix**

### **QUESTIONNAIRE NO 1**

#### **SUSTAINABLE BIOFUELS IN CAMEROON**

This research seeks to collect information on the developments made so far in the biofuel sector in Cameroon. The data will serve as a basis to investigate on biofuel drivers in Cameroon and the implication of the global biofuel boom on Cameroon. It will also assess how international sustainability policies put in place to guard biofuel controversies play out in practice on the ground using Cameroon as a case country. That is, whether such policies are known and used and how they influence the biofuel arena in Cameroon. This will help

inform and extend knowledge or enhance our understanding on biofuel developments in Cameroon, and contribute in the global discourse on the sustainability of biofuels. This questionnaire is well supervised by my supervisor and the data will be used for academic purposes only.

## **INTERVIEW WITH THE MINISTRY OF ENERGY AND WATER**

### **SECTION A: Ground work on Biofuel in Cameroon**

*The aim of this section is to investigate on the ongoing ground work in this sector in Cameroon, how the biofuel sector has been growing over the years and future plans for this sector.*

1. When was the first biofuel initiative launched in Cameroon?
2. What type of biofuel raw materials is the state interested in?
3. Why the preferred raw material?
4. What is motivating Cameroon to engage in biofuel activities? (National drivers of biofuel) *(biofuel potentials in the country, alternative to fuel wood and electricity, rural development, to boost the economy etc.)*
5. Are biofuels in Cameroon targeting the export market or mainly for domestic market and use)
6. Why or why not?
7. What are the main initiatives at the national level promoting biofuels? (policies, land and tax concession, biofuel activities)
8. It is stated that, this ministry has a Renewable Energy Task Force. What are the main tasks of this force? (more about this task)
9. In 2001, the government launched the modernization of agriculture program to boost palm oil production by 250,000tons and to increase plantation area by 5000 hectares per year. In what ways is the program linked with the biofuel ambitions of the state?
10. Is the plan of increasing the plantation area by 5000 hectares per year actually going on?
11. If no, in what other ways are the plantations expanding?

### **SECTION B: Biofuel Investments in Cameroon.**

*The aim of this section is to have an insight on the investments made so far on the biofuel sector in Cameroon (the activities of economic operators)*

12. Are there investors of Cameroon nationality engaged in biofuel activities?



13. Can you recall some of these national investors?
14. What important biofuel initiatives are undertaken by these national investors?
15. When did foreign investors start demonstrating their interest on biofuels in Cameroon?
16. Can you recall some of these foreign investors?
17. In what ways did they show this interest? (*Negotiations with government for land, Demand for raw materials, Partnership with the government, Other examples*)
18. Do these investors originate from within or outside the EU?  
(*Examples of countries where they originate*)
19. Do you find these investors important?
20. Why or why not?
21. How has the trend in the number of these foreign investors been over the years?  
(Changes over time) (What about the trend in national investors?)
  - a. Before 2005
  - b. 2005 – 2010
  - c. 2010 till present
22. Why such a trend? (*Possible reasons for such an influx of these foreign investors in Cameroon?*)
23. From the trend of economic operators applying for biofuel activity, how do you foresee the future of biofuel in the country by 2020?
24. What measures are put in place to encourage outside investors in the country?  
(*Land concessions, a conducive political climate, tax concessions, and other examples*)
25. What are the possible hindrances these investors are facing in trying to carry out biofuel activities in Cameroon?

## **SECTION C: The Sustainability of biofuels**

***The aim of this section is to investigate how global sustainability concerns play out in practice at the micro level.***

26. Are the investments and initiatives on bioenergy in Cameroon an important part of climate change mitigation?
27. Why or why not?
28. What aspects do you consider most important to avoid the negative effects of biofuel?  
**Choose four from the list below.**
  - a. Lower Greenhouse Gas emissions (fight against climate change)
  - b. Energy Security
  - c. Air Pollution
  - d. Biodiversity
  - e. Water use and quality
  - f. Effects on land use and soil productive capacity

- g. Economic efficiency/ Economic equity
  - h. Competition with food
  - i. Labor and human rights
  - j. Livelihood impacts and rural development
29. Which of the following environmental sustainability concerns do you find most important if biofuel has to be produced sustainably?
- a. Exclusion of biofuel plantations on land with high biodiversity (respect of biodiversity)
  - b. Land use changes
  - c. Creation of buffer zones
  - d. Respect socio-economic values of the impacted areas
  - e. Compensations to the former land owners
  - f. Apply socio-economic principles like providing jobs, social amenities, road construction or other types of facilities for the local communities in the impacted areas
  - g. other

## **SUSTAINABILITY FRAMEWORK AND CERTIFICATION SCHEMES**

30. There is an international sustainability framework called the European Union Renewable Energy Directive (EU-RED) which has set up sustainability criteria to help ensure that biofuels are produced sustainably. Is the ministry aware of this directive?
31. There are also some certification schemes which ensure that biofuels are produced in a way that negative environmental, social and economic effects are reduced. They do so by tagging certified on companies product which meet up with the minimum sustainability requirements. Can you recall any you know of?
- (Possible examples: Roundtable of Sustainable Palm Oil (RSPO) Round Table of Sustainable Biofuels (RSB), Roundtable for Responsible Soy (RTRS, Biomass Biofuels sustainability Voluntary Scheme (2BSvs) etc.)*
32. How did you become aware of these sustainability framework (EU-RED) ( internet, other countries, investors, friends etc.)
33. How did you become aware of these certification schemes? ( internet, other countries, investors, friends etc.)
34. The European Union Renewable Energy Directive has set out sustainability requirements to secure energy, fight climate change and boost rural development. Are you familiar with any of their objectives?
35. If yes, in what ways are you familiar with them?
36. Would like to know more about the EU-RED and their objectives?
37. Why or why not?

38. If you would like to know more do you know where to go?
39. Assuming you know about them now, would you like to work with them or even in the future to ensure biofuels are produced sustainable in the country?
40. Why or why not?
41. How do you think this sustainability framework and their certification schemes can influence the production of biofuel in Cameroon or biofuel plans of the future?
42. What is your opinion towards these sustainability frameworks and their certification schemes?
43. Are you aware that, the European Commission has been discussing on setting values for Indirect Land Use Change and to encourage 2<sup>nd</sup> generation biofuels?

**QUESTIONNAIRE NO 2**  
**SUSTAINABLE BIOFUELS IN CAMEROON**  
**INTERVIEW WITH STAKEHOLDERS IN CAMEROON**

This research seeks to collect information on the developments made so far on the biofuel sector in Cameroon. The data will serve as a basis to investigate on the biofuel drivers in Cameroon and the implication of the global biofuel boom to Cameroon. It will also assess how international sustainability policies put in place to guard biofuel controversies play out in practice on the ground using Cameroon as a case country. That is, whether such policies are known and used and how they influence the biofuel arena in Cameroon. This will help inform and extend knowledge or enhance our understanding on biofuel developments in Cameroon, and contribute in the global discourse on the sustainability of biofuels. This questionnaire is well supervised by my supervisor and the data will be used for academic purposes only.

**Personal Data**

Respondent name/ name of the organization / company.....  
 Location of the plantation or firm.....  
 Headquarters of the company.....  
 Years of operation.....  
 Country of origin.....  
 Respondent age

**SECTION A: Investors Background**

***This section is intended to have an insight on the biofuel activities of Economic operators in Cameroon and to know what is driving their involvement in this activity in Cameroon***

1. What form of ownership is this Company?
  - a. Foreign private entrepreneurs
  - b. domestic government
  - c. Foreign governments
  - d. domestic private entrepreneurs
  - e. Public private partnership
  - f. other
2. What type of biofuel raw materials are you engaged or interested in?
3. Why the preferred raw material?
4. Which other countries is your company active in the production of biofuel or biofuel raw materials?
5. What attracted your involvement in the production of this raw material in Cameroon?
6. What do you find as the most discouraging factors or problems encountered in the pursuit of this activity in Cameroon?
7. As of now, what is the estimated quantity of feed stock your company produces per year?
8. What is the quantity you intend to produce 5-10years from now?
9. How do you intend to meet up with the increase? *(acquire more land, improvements from the technical department etc.)*
10. What is your agenda with this raw material as far as biofuel is concern?  
*(Process its feedstock in Cameroon or abroad or no intension to process feedstock; sell this product in the form of already processed biofuel or in the form of biofuel raw material (feedstock) like crude palm oil and or Jatropha)*
11. As an economic operator which of the following market are you or will you like to trade with?
  - a. The European Union (EU)
  - b. Non EU
  - c. United States of America
  - d. China
  - e. Cameroon (domestic market).
  - f. other
12. What are the possible reasons for such a preference?
13. In what ways does the Cameroon government encourage your activities?

## **Section B: Sustainability issues**

***This section has three aims:***

***-To investigate on the sustainability concerns economic operators find most important as far as biofuels are concerned.***

***-Sustainability concerns on the ground tied to land issues.***

***-Whether international sustainability policies and their certification schemes are known and used in this sector in Cameroon.***

14. What aspects do you consider most important to avoid the negative effects of biofuel?

Choose four from the list below.

- a. Lower Greenhouse Gas emissions (fight against climate change)
- b. Energy Security
- c. Air Pollution
- d. Biodiversity
- e. Water use and quality
- f. Effects on land use and soil productive capacity
- g. Economic efficiency/ Economic equity
- h. Competition with food
- i. Labor and human rights
- j. Livelihood impacts and rural development

15. Which of the following environmental sustainability concerns do you find most important if biofuel has to be produced sustainably?

- a. Exclusion of biofuel plantations on land with high biodiversity (respect of biodiversity)
- b. Land use changes
- c. Creation of buffer zones
- d. Respect socio-economic values of the impacted areas
- e. Compensations to the former land owners
- f. Apply socio-economic principles like providing jobs, social amenities, road construction or other types of facilities for the local communities in the impacted areas
- g. Other (with examples)

## **Land Issues**

16. How do you acquire land for feed stock plantations in Cameroon?

- a. Buy from the local people in areas of location
- b. Rent

- c. Negotiate with the government
  - d. Other examples like:
17. For how long are the land contracts?
18. What occupied the land (land cover) before your activity?
- a. Forest
  - b. Farms
  - c. Idle land
  - d. Buildings
  - e. Other examples like:
19. What amount of land does your plantation occupy presently?
20. What quantity of land do you intend to occupy 5-10years from now?
21. What requirements do you have to fulfil in order to acquire land?
22. Which authority demands such requirements?
- a. Government
  - b. international sustainability organizations like the RSPO, EU-RED
  - c. Local authorities (chiefs)
  - d. Other examples like:
23. How do you implement these requirements?
24. How does this instruments shape the practice of feedstock growing?

## **EUROPEAN UNION RENEWABLE ENERGY DIRECTIVE (EU-RED) AND THE CERTIFICATION SCHEMES**

25. There is an international sustainability framework called the European Union Renewable Energy Directive (EU-RED) which has set up sustainability criteria to help ensure that biofuels are produced sustainably. Is your company aware of this directive?
26. There are also some certification schemes which ensure that biofuels are produced in a way that negative environmental, social and economic effects are reduced. They do so by tagging certified on companies product which meet up with the minimum sustainability requirements. Can you recount any you know of? *(Possible examples: Roundtable of Sustainable Palm Oil (RSPO) Round Table of Sustainable Biofuels (RSB), Roundtable for Responsible Soy (RTRS, Biomass Biofuels sustainability Voluntary Scheme (2BSvs) etc.)*
27. Is your company affiliated to any of them?
28. Which of them precisely?
29. Do they influence how you plan for which market you choose to export your fuel/feedstock?
30. In what ways?

31. How did you become aware of these sustainability framework (EU-RED) (*internet, other countries, investors, friends etc.*)
32. How did you become aware of these certification schemes? (*internet, other countries, investors, friends etc.*)
33. The European Union Renewable Energy Directive has set out sustainability requirements to secure energy, fight climate change and boost rural development. Are you familiar with any of their objectives?
34. If yes, in what ways are you familiar with them?
35. Would you like to know more about the EU-RED and their objectives?
36. Why or why not?
37. If you would like to know more do you know where to go?
38. Assuming you know about them now, would you like to work with them even in the future?
39. Why or why not?
40. What is your opinion towards these sustainability frameworks and their certification schemes?
41. Are you aware that, the European Commission has been discussing on setting values for Indirect Land Use Change and to encourage 2<sup>nd</sup> generation biofuels?