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**THE ENERGY MARKET IN NIGERIA AND BUSINESS  
OPPORTUNITIES**

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<p>The aim of the thesis work is to carefully study how Finnish companies and businesses can be introduced and integrated into Nigerian market now and in years to come. With different views of market analysts and major players in the world economy, Africa is considered as one of the continents with great potentials and development possibility in the future. Nigeria, one of the West African Countries, giant of Africa alongside South Africa and the biggest African country (population wise) with about 150 million inhabitants is a major player in the continent. Nigeria is blessed with a lot of natural resources and these natural endowments are still not fully utilized towards the nation's growth. How these natural resources and the market potential of the country could be fully utilized by both Finnish and Nigerian government is the core focus of this thesis work. Many companies and industries both public and private failed to function well due to the fact that the country lack sufficient energy supply despite the rich crude oil, natural gas and sunlight and other flourish resources the country is blessed with.</p> <p>This thesis work will concentrate on how the energy capacity of the country could be improved by both Finnish and Nigerian government without violating all guiding rules of the International Energy Policy of clean energy investment as well as the living of Nigerians at large.</p> <p>Also, the role of Eximin project in making African dreams realizable will be emphasized in this thesis work.</p>		
<b>Key words</b> Business opportunities, energy potential in Nigeria, Eximin Project, Oil and gas and renewable energy.		

Table of Contents

Abstract

1	INTRODUCTION .....	1
1.1	Objective of the thesis .....	3
1.2	Thesis Methodology .....	3
2	BASIC FACTS ON NIGERIA .....	4
2.1	Nigerian business history and culture .....	4
2.2	Economic and political history of Nigeria .....	5
3	ENERGY RESOURCES IN NIGERIA.....	9
3.1	Nigeria’s energy resource endowment .....	9
3.2	Historical trends of energy demand in Nigeria.....	10
3.3	Trends in energy supplies in Nigeria.....	18
4	ENERGY POLICY IN NIGERIA .....	33
4.1	Oil and natural gas.....	34
4.2	Power policy.....	35
4.3	Bio-fuel policy.....	36
5	BUSINESS POSSIBILITIES IN NIGERIA .....	37
5.1	Non renewable energy .....	37
5.2	Renewable energy .....	37
6	CONCLUSION .....	40
	SOURCES.....	42

## 1 INTRODUCTION

Finland has recognized Nigeria since 7 October 1960 and established diplomatic relations with the country in 1963 and this relation still exists. The two countries' representatives have met a couple of times to discuss how these relations could be further strengthened as to increase their bilateral cooperation. Since inception of the new democratic government in Nigeria, Nigerian representatives have visited the Finnish government twice, President Olusegun Obasanjo in 2004 and the recent visit by Vice-President Goodluck Jonathan with other important dignitaries in 2009 to discuss how the Finland-Nigeria relationship could be improved on the basis of exchange of ideas which will better improve the two countries' economies.

Also, according to the Finnish President website "President Halonen met with President Umaru Yar'Adua on the first day of the official visit, Monday, 9 March 2009 in Abuja. President Halonen and President Yar'Adua discussed bilateral relations between Finland and Nigeria and especially Finnish clean technology expertise which Nigeria could benefit from. President Halonen noted that there is great interest in Nigeria in environmentally friendly technology and sustainable development. In the area of energy development, Nigeria is still lagging behind and without energy, there would be no development industrially and infrastructure wise in the country. Nigeria has been exploring and exploiting its crude oil since 1956 but until today the nation is still struggling with insufficient supply of energy to the citizenry as well as all other sectors of the country where energy is needed. It is not as if the nation is not endowed with enough energy resources, but the problem still lies on the nation's incapability to efficiently and effectively utilize its energy resources to have constant and sustainable supply of energy to the consumers.

According to the Nigerian National Petroleum Corporation (NNPC), Nigeria is ranked 7<sup>th</sup> in the world in the reserves of natural gas but the country is still unable to convert the resource for its energy supply. This is the reason why the bilateral agreement between Finland and Nigeria would be of help in exchange of advanced technologies that could assist the country in the proper use of energy resources. Nigeria needs the likes of Neste Oil, Wärtsilä and other energy sourcing companies in Finland for exchange of technologies

and development of ideas for growth and sustainable development of Nigeria's economy now and in the future (The Baker Institute Energy Forum USA 2006, 8).

Nigeria is an energy resource rich country blessed with fossil resources such as crude oil, natural gas, coal and renewable energy resources like solar, wind and biogas but still the country's industries are in shamble condition and almost all of them are at the stage of their final collapse. The energy supply to the companies and industries are not sufficient enough and many of them who could afford to buy energy from private sources spend a lot of money to acquire them and this has brought many problems for the companies and businesses in the long run.

For instance, since 1995 about 150 multinational companies of which include: Michelin, Dunlop, Pfizer, Aventis, GlaxoWellcome and SmithKline Beecham (now merged as GlaxoSmithKline), Hoechst and P&G. have left Nigeria because they could no longer meet up with their daily business responsibilities and Unilever Plc and Peterson Zochonis (PZ) Plc that are one of the giant manufacturing companies with over 5000 work force are planning to leave the country economy just because the country has failed to provide them with constant power supply and infrastructure that guarantee them successful operations. Peterson Zochonis (PZ) that has spent about 100 years in Nigeria is now planning its move to the neighbouring countries like Ghana to establish its new operation alongside Unilever because there is stable and efficient supply of power over there. According to them, Nigeria will still be their largest market but they just need to move elsewhere where they could be guaranteed of reduced production costs. Another case is Cadbury Plc that has not patronized Nigerian Government for its power supply just because it cannot risk the problem of epileptic power supply due to the nature of its operations and products. So, the idea behind this thesis is to examine and bring to light how Finland could collaboration with Nigeria in the area of energy and help to rebuild the country's economy by rebuilding the energy, industrial sectors and ensure sustainable development of the country (Kehinde, Adeleye & Edwards 2009).

## **1.1 Objective of the thesis**

This thesis work centred on the development of clean energy within the energy sector, energy market abounds in Nigeria and business opportunities in Nigeria. Energy has always been one of the basic requirements of human societies, and today its demand is far greater than ever in our high technology world. This is explained by the fact that energy is vital for human life and for technological advancement. Presently, major electricity generation takes place at central power stations which utilize coal, oil, water, gas or fossil nuclear materials as the primary fuel sources. There are problems facing the further development of generating methods based on any of these conventional fuels. Energy is considered as one of the most important resources of any country. It is a well known fact that high rate of industrial growth of any country is a function of the effective management of energy sector and the level of energy availability in that country and the extent to which this energy is utilized. The overall aim of this thesis is to introduce potential energy market and business opportunities in Nigeria to Finnish companies and also to further inform Finnish companies and business persons about the abound market possibilities in Nigeria and other African countries. Moreover, Seminar and Networking for Business Opportunities in Africa was held on the 15<sup>th</sup> January 2010 at Vaasa University of Applied Sciences to inform Finnish companies on the business possibilities in Africa ([www.eximin.eu](http://www.eximin.eu)).

## **1.2 Thesis Methodology**

All facts and figures used throughout the thesis are gathered from secondary data sources such as eBooks, materials from the library, internet, newspapers and couple of articles written by concern Nigerians and foreigners on energy issues of the country in the past and at present. Apart from the above mentioned sources, information used in this thesis was also obtained from official statistics of energy institutions in Nigeria, foreign energy journals and the institutions concern such as Power Holding Company of Nigeria (PHCN), Nigerian National Petroleum Corporation (NNPC), Energy Commission of Nigeria (ECN), National Bureau of Statistics (NBS) and other reliable sources in energy related issues.

## **2 BASIC FACTS ON NIGERIA**

Nigeria is a country with rich history and business culture because of its ethnicity and various tribal differences as well as past contact with the colonial master like Great Britain. Since independence in 1960, Nigeria is a recognized country in the African continent and also to those European and American countries that have traded with Nigeria. Apart from the above mentioned continents Nigeria has also witnessed a couple of Asian countries residing and doing business in the country and a few of these businesses formed are still functioning today though many of them have stopped their operations due to the political and economical problems the country encountered in the past. Nigeria's population, vast natural resource, seaport and its rich cultural background has brought Nigeria contact with foreigners from different continents from the time of slavery to present time.

### **2.1 Nigerian business history and culture**

A large number of international organisations and business people have been wary of doing business in Nigeria for many years. This may seem strange given that Nigeria is one of the most populated countries in Africa as well as being one of the most oil rich places in the world. With the fact that the country is abundant in many other natural resources and has good port facilities, one might think that international business would be fighting for a piece of the action in Nigeria. Nigeria is Africa's most populated country with a population of about 150 million. This makes one of every six Africans a Nigerian. It is also one of the largest oil producers on the continent creating huge inflows of foreign income. Without saying, Nigeria holds enormous commercial potential as recent administrations have focused on developing the oil and non-oil economy and tackling corruption and red tape. In attempt of the Federal Government to achieving these objectives many international agreements have been entered into by the Federal Government and Economic and Financial Crimes Commission (EFCC) was setup to fight the nation's long financial crimes and scams scaring many foreign and indigenous investors to invest in Nigeria's economy.

The explosion of industries such as the mobile telecoms market and the unparalleled success of foreign companies such as South Africa's MTN, Shell Petroleum Development of Nigeria, Chevron Nigeria, Mobil Producing Nigeria, AGIP Energy and Natural

Resources Nigeria, Total Upstream Nigeria, Texaco Nigeria and many more to mention have also demonstrated that potential could be turned into reality in Nigeria. However, despite persistent problems of corruption and bureaucracy, the international business community increasingly sees Nigeria as the central driver of a vast African market that remains the last under-developed commercial market in the world.

## **2.2 Economic and political history of Nigeria**

Nigeria is located in West Africa, bordering the Gulf of Guinea, between Benin and Cameroon. Nigeria also shares boundary with countries such as Lake Chad and Niger. Nigeria has 36 states plus the Federal Capital Territory and all the 36 states are shown on the map. The states in the north include Sokoto, Kano, Kaduna, Zamfara, Gombe and other depicted on the map whereas on the west we have Oyo, Ogun, Lagos, Ondo and others. The states in the South include: Abia, Anambra, Imo and others (Teach anywhere 2009).



GRAPH 1 Map of Nigeria

The graph 1 shows the location of different States in Nigeria and more emphasis will be placed on the states in the South-South region of Nigeria because of their endow crude oil and these states include Delta, Bayelsa, Rivera, Akwa Ibom, Cross River and others called Niger Delta. According to statistics, about 150,000,000 people live in Nigeria making Nigeria become the most populated country in Africa. Life expectancy in Nigeria is around 47 years and literacy level is around 68 % (UNICEF).

In Nigeria, English is an official language and the other indigenous language includes Yoruba, Hausa and Igbo. Nigeria is composed of more than 250 ethnic groups. The following includes the most common recognise ethnic groups: Hausa and Fulani 29 %, Yoruba 21 %, Igbo 18 %, Ijaw 10 %, Kanuri 4 %, Ibibio 3.5 %, and Tiv 2.5 %. Nigeria religion setting comprises the following: Muslim 50 %, Christian 40 %, and Traditional belief 10 %.

## **Nigeria's political history**

Nigeria was established as a nation in 1914 when the southern protectorate was merged with the northern protectorate by Governor Lord Lugard, the area formerly separated and under control of different British Governor Generals. British influence and control over what would become Nigeria grew through the 19 century. Quite a number of constitutions after the end of the Second World War gave Nigeria a greater autonomy. Nigeria became independent on 1 October 1960 but still under British control until 1963 when Nigeria finally became a republican state. The control of government between 1960 and 1966 were in the hands of the civilians. Between this period, Nigeria was controlled by both Dr. Nnamdi Azikiwe who was the President and Sir Abubakar Tafawa Balewa who was the Prime Minister due to the Parliamentary System of Government practised. After this regime, Nigeria has witnessed 16 years of military intervention. In 1999, a new constitution was adopted and a peaceful transition into civilian government was completed for the second time in the country. Currently, Nigeria is experiencing its first longest period of civilian rule since independence in 1960. In April 2007, general election marked the first transition of government from civilian-to-civilian and that is what gave the incumbent Nigerian President the grace of being the Commander in the Chief of Armed Forces (President Umaru Musa Yar'Adua 29 May 2007). As part of Nigeria's political history, Nigeria also witnessed civil war (Biafra War) between 1967- 1970 and this led to the killing of many Igbo, Hausas and few Yoruba during this war.

## **Nigeria's Economy**

Nigeria has a dual economy with a modern segment dependent on oil earnings, overlaid by a traditional agricultural and trading economy. At independence in 1960 agriculture accounted for well over half of GDP, and was the main source of export earnings and public revenue. The oil sector, which emerged in the 1960 and was firmly established during the 1970, has made the nation to solely depend on the oil revenue for its survival. Oil provides 20 % of GDP, 95 % of foreign exchange earnings, and about 65 % of budgetary revenues. Since the discovery of oil in Nigeria, important sectors such as agriculture has been neglected and this has drawn Nigeria back from its cash and food crops production and the citizens now spend almost all their earnings in buying food and other necessities. So, the largely subsistence agricultural sector has not kept up with rapid population growth, and Nigeria, once a large net exporter of agriculture produce now

imports food. Based on GNP per capita, Nigeria is among the world's 20 poorest countries. Economic growth since the early 1970s has been unstable, caused primarily by the fluctuations of the global oil market. During the 1980s and 1990s Nigeria faced growing economic decline and falling living standards, a reflection also of political instability, corruption, and poor macroeconomic management, most notably the failure to diversify the economy. Proving this, in 2001, oil revenue alone accounted for about 98.7 % of exports and 76.5 % of total government revenue. Although, Nigeria is an oil and gas rich country, many of the citizens still live below the normal per capita earnings. This is because the nation's oil and gas generated revenue is not effectively disseminated; the nation has been struggling with long financial and economy corruptions from the past and current political leaders. Although, the long history of the country money laundering advanced fee fraud, failed banks and financial malpractices in banks have been reduced to their limit in the recent years due to the establishment of EFCC in 2004 under President Olusegun Obasanjo's administration (Nigeria Economy).

### 3 ENERGY RESOURCES IN NIGERIA

#### 3.1 Nigeria's energy resource endowment

As earlier mentioned, Nigeria is endowed with vast number of natural resources and these vast resources are deposited in different parts of the country. The country is blessed with the world's tenth largest reserves of crude oil and that is why Nigeria plays an important role in Organization of Petroleum Exporting important Countries (OPEC) which the country joined in 1971. In view of this fact, the different energy resources like tar sands, coal and lignite, natural gas and crude oil some States are endowed with plays crucial role in the revenue generated by the Federal Government in any fiscal year of the country and this contributed greatly to the country's Gross Domestic Product (GDP). Nigeria has also been described as more of a natural gas island than oil with an estimated endowment in 2006 put at about 166 trillion standard cubic feet (SCF). It is also in the government plan to increase the crude oil reserve of the country to 40 billion barrels by 2010 and potentially 68 billion barrels by 2030. With this fact, natural gas reserve would as well increase. Also, small and large hydropower potentials of the country are both estimated to be 734 MW and 10,000 MW respectively in 2006. Due to inadequate maintenance culture of Nigeria, the existing megawatt of electricity generation has been falling continuously and at the moment Nigeria is battling with power shortage problem. In the latest plan of the Federal Government, 6000 megawatt has been claimed being generated and further promise to increase the megawatt once the gas sector is fully in its full capacity (Guardian Newspaper Tuesday Dec. 8 2009). The table below demonstrates Nigeria's potential energy reserves as far back as 2006.

TABLE 1 Energy Reserves Table

<b>Resource Type</b>	<b>Estimated Reserves</b>
Crude Oil	36.2 billion barrels
Natural Gas	187 trillion SCF
Coal and Lignite	2.7 billion tonnes
Tar Sands	31 billion barrel of Oil equivalent

<b>Resource Type</b>	<b>Estimated Reserves</b>
Hydropower, Small Scale	734 Megawatt
Hydropower, Large Scale	10,000 Megawatt

Table 1 shows the estimated energy reserves of Nigeria with regard to crude oil, natural gas, coal and lignite, tar sands and small and large hydropower stations. However, coal is mentioned as of the sources of energy reserve in Nigeria but it contributes only a few quotas to the energy reserves. This is because coal is non-renewal energy and the quantity of it extracted in recent time is lower compared to when it was first discovered in Nigeria.

### **3.2 Historical trends of energy demand in Nigeria**

A sector approach is used in the discussion of the trend in energy demand in Nigeria during the period 1990 – 2005. The sectors of the Nigerian economy considered in this thesis include: agriculture, industry, transport, commercial, and residential sectors that are the major players in the economy of Nigeria. The table shows energy consumption on sector base and their level of consumption growth between the years 1990-2005. Residential energy consumption is higher than any other sectors because this sector engages more in the consumption of energy than other sectors. Though the residential sector energy sector increases over the 16 years period under consideration but the percentage growth of energy consumption in all the sectors fluctuate continuously over this 16 years period. This fluctuation is caused by failure of the Federal Government and the power sector to constantly supply power to the household and the firms who serve as the users. Also, fuel wood utilization in the residential and industrial sector as well as charcoal utilization in the household sector contributed to the constant fluctuation in the percentage growth of consumption of energy (FAOSTAT 2005).

TABLE 2 Energy Demand in Economic Sectors in Nigeria

Years	Sector Energy Consumption (PJ)					Total	% Growth
	Agric.	Industry	Transport	Commercial	Residential		
1990	7.13	240.48	287.34	6.99	735.70	1,277.64	
1991	7.18	248.67	260.07	6.48	717.30	1239.70	-3.0
1992	7.56	247.30	354.41	6.40	770.19	1385.86	11.8
1993	7.60	258.96	342.35	6.96	790.92	1406.79	1.5
1994	5.54	259.98	246.32	4.63	817.55	1334.02	-5.2
1995	5.38	261.75	278.76	7.00	810.18	1363.07	2.2
1996	5.71	277.79	241.36	8.01	849.98	1382.85	1.5
1997	7.17	311.97	272.58	7.74	918.19	1517.65	9.7
1998	6.09	355.75	272.34	8.16	1002.01	1644.35	8.3
1999	6.57	494.94	260.98	7.97	1074.93	1845.09	12.2
2000	8.65	466.64	357.21	7.19	1163.10	2003.18	8.6
2001	7.58	609.64	404.55	8.91	1274.81	2305.49	15.1
2002	8.04	683.79	414.95	8.54	1373.13	2488.44	7.9
2003	6.34	702.88	402.67	9.87	1462.67	2584.43	3.9
2004	3.28	771.88	350.39	9.70	1571.23	2706.49	4.7
2005	5.05	868.16	486.34	10.35	1758.40	3128.30	15.1

Table 2 depicts energy consumption in Nigeria over a 16 year period among various energy consumers as well as percentage increase or decrease of energy usage among various consumers and other end users (FAOSAT 2005).

### **Energy consumption in agricultural sector**

This is the oldest sector of the country that employs more than 70 % of the population work force, of which most of them are rural dwellers. This has been the sector that generated more revenue and GDP for the Federal Government before the discovery of crude oil in Oloibiri Niger Delta Nigeria in 1956. The energy consumption of the agricultural sector is relatively low compared with the other sectors because most of the farmers still adopt old farming methods which require little or no energy support. Subsistence agriculture characterized by high labour intensity, little or no irrigation and almost zero mechanized agriculture system is practiced among the Nigerian farmers. So, the potential of this sector has not been fully maximized because the oil booming sector has taken over the entire economy of the country. With affordable energy supply to this sector, both renewable and non-renewable energy, the sector will achieve better result than what it is doing presently in the economy. In 2002, the agricultural sector contributed about 17.3 % to the growth of the country's GDP compared to 53 % by industry and 29.5 % by the service sector. The contribution is low because agricultural work is almost abandoned and the little contribution to the GDP is the effort of the subsistence farmers. In the early 1990s to late 1990s many of the country's products are imported from the neighbouring African countries such as Benin Republic, Togo and Ghana and sometimes from Ivory Coast before new laws are made placing stiff restriction on the importation into Nigeria. The potential opportunities for clean energy investment targeted at the agricultural sector include: solar energy which has not been explored in Nigeria, irrigation water pumping and utilization of agricultural residues (by products) for electricity generation (Dayo 2008).

### **Energy demand in industrial sector**

This sector consumes a considerable percentage of the country's energy but this is still below expectation because the industrial sector is not what it used to be. It is a fact that industrial sector of every country's economy dictates how successful the economy will be and this has been the problem facing Nigeria's economy since late 1980s. In early 1980s,

industries in Nigeria were doing quite good because energy supply to the sector is considerably constant and stable due to stable political system of the country but the early 1990s problem that almost befell the country economy affected the energy consumption in this sector and during this period many companies were forced to closed down operations because it costs more to operate these companies with huge success of being break-even not to even talk of making profit. Since the inception of new democracy in Nigeria, this sector has been picked up its strength and it is believed with constant energy supply to this sector Nigeria's full market potentials for the finished goods would be maximized. This sector needs the services of energy supply companies like Wärtsila Oy to supplement the provision of energy by the Power Holding Company of Nigeria (PHCN) and other organizations that are saddled with the provision of energy in the country. Furthermore, making full potential use of natural gas that is being flared by the oil companies operating in the country to generate clean energy for the sector in order to resuscitate the energy sector that is in shamble state now would play a big role in the energy sector. So, clean energy investment opportunities in this sector would involve efficient and effective use of the flare natural gas resulting from oil processing activity (Dayo 2008).

### **Energy consumption in transport sector**

It is obvious from the table that this sector consumes considerably more energy because transport sector in Nigeria is one of the very booming sectors. A large number of people both in the private and public sectors own cars, trucks, vans and trailers and many indigenous and foreign owned companies run a fleet of cars and buses to operate their day-to-day business activities and by so doing energy demand by these different classes of people increase on a regular basis. In all the years in consideration, transport sector has consumed the highest volume of fossil fuels used throughout the country. Petroleum products are consumed in the sector to provide the necessary energy for road, water, air and rail transport that is not in best shape at the moment in Nigeria. Nevertheless, based on evaluation, there are still a lot of potential for the supply of clean energy to this sector for its effective functioning. Some of the opportunities discovered include:

- ✓ The use of natural gas as a transport fuel: Following this thesis, it has been earlier mentioned that Nigeria is endowed with a lot of natural gas that is flared on regular basis in all the oil field throughout the country. The nation's demand for natural gas is very low and the exploration companies operating in the oil field have no idea of

what to do with the excess natural gas generation during the transformation processes of the crude oil to its various forms. This could be revived if there are companies willing to take their chances in taking part in the course of rebuilding Nigerian energy sector. Also, in the course of making the world free from global warming, this type of energy constitutes and contributes lower carbon dioxide release to the environment.

- ✓ The use of bio- fuel to generate energy: we need to make the environment friendly and worth living and as such bio-fuel should be considered as source of energy for the country transport sector. Also known as agro-fuel, these fuels are mainly derived from biomass or bio waste. These fuels could be used for any purposes, but the main use for which they have to be brought into use in the transportation sector is to avoid greenhouse gases because bio-fuels are the best way of reducing the emission of the greenhouse gases.
- ✓ Other opportunities in the transport sector include the use of bio-diesel as a source of energy for which the country is still lacking capacity to develop and explore.

### **Energy demand in commercial sector**

This sector's energy consumption is very low compared to sectors such as a transport, industrial, residential and transportation. Energy consumption is an essential part of this sector to execute all its day-to-day activities and the major form of energy consumption in this sector is electricity for lighting purpose and other appliances use to perform all these operations. The commercial sector needs more than electricity form of energy to fully realize its potentials. Millions and billions of naira is wasted by companies operating under this sector on a yearly basis since the country is incapacitated to generate enough megawatt of electricity from its power plants from Kainji Dam to smaller plants located across the country. The only choice is to spend millions and billions of naira on maintenance of generators and power plants used by these companies to generate electricity. The clean energy investment opportunities in this sector include an efficient use of natural gas, solar, wind, and biogas energy to run this sector. According to statistics, Nigeria needed 10,000 megawatt of electricity in order to guarantee constant supply of electricity. Apart from the export potential of Nigerian gas, local demand opportunities are power generation, cement

industry, iron and steel plants. The largest single consumer of natural gas in Nigeria is PHCN and it accounts for about 70 % of it uses to operate electricity generating gas plants at Afam, Ughelli, Sapele and Egbin. Nevertheless, a lot of investments opportunities in the clean energy generation through the natural gas are still abound in this sector. The table below shows the various electricity generations from various part of the country (Dayo 2008).

TABLE 3 Power generations in Nigeria

<b>Power Station/ Location</b>	<b>Type</b>	<b>Year of Commissioning</b>	<b>Generation Capacity (MW)</b>	<b>Remarks</b>
Lagos Station @ Egbin	Thermal (gas)	1985-1987	1, 320	6 x 220MW reheat steam turboelectric unit
Sapele Station @ Ogorode	Thermal (gas)	1978-1990	1,020	6 x 120MW steam and 4 x 75 MW
Delta Station @Ughelli	Thermal (gas)	1966-1990	832	Including 6 x 100 MW
Afam Station	Thermal (gas)	1975-1982	710	
Oji Station	Thermal (coal)	1956	30	Not functional
Ijora Station Lagos	Thermal (gas)	1978	60	3 unit x 20MW (2 units working)
Lagos IPP Enron/AES	Thermal		170	Maximum planned is 270MW
Abuja IPP	Thermal		30	
River IPP (Trans- Amadi Station)	Thermal	2000-2002	30	

<b>Power Station/Location</b>	<b>Type</b>	<b>Year of Commissioning</b>	<b>Generation Capacity (MW)</b>	<b>Remarks</b>
Kainji	Hydro	1968,1976,1978	760	Some Generators require major overhaul
Jebba	Hydro	1986	540	All units available
Shiroro	Hydro	1990	600	Some units require repairs

Table 3 shows the various power generations across Nigeria from different power plant stations between 1985 up to 1990 and how these power plants are being run. It is obvious that among the various energy sources in Nigeria, coal contributed the least in running these power plants and the reason being that coal is becoming energy resource of the past and more especially it is a non-renewable energy. Although many of these power plants are not in good shape now because of poor maintenance but few of them are still functional in providing electricity for the consumers and example is Kainji Dam Hydro Power Plant Station at Niger River in the western part of Nigeria. Moreover, the megawatt of electricity expected to be realized from the power plant is not enough to serve Nigeria with its energy demand on regular basis (Okoro, Chikuni, and Oluseyi & Govender).

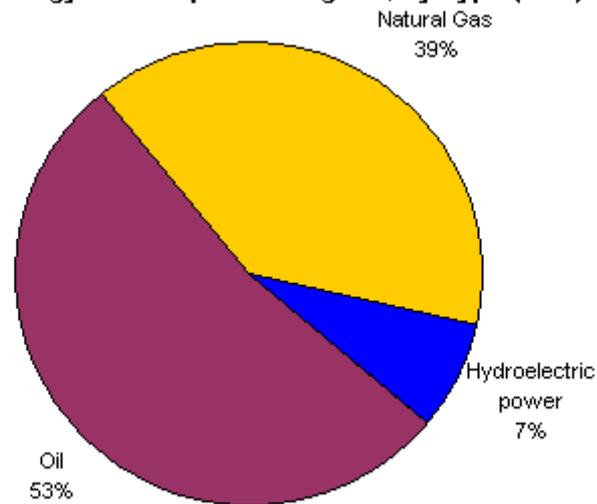
### **Residential energy demand**

The basic form of energy consumption here includes electricity, kerosene, and charcoal that are commonly used in all the rural areas of the country. Based on the population of the country, energy consumption by the residents form a substantial part of the energy consumption in Nigeria. In recent time, insufficient energy supply to the residents has been a problem the citizens are faced with. This is due to the fact that the country's energy generation from various sources of energy is not sufficient to serve all the sectors of the country. The opportunity to increase the household energy consumption could be generated from the biomass source of energy generation and the efficient use of natural gas that is

flare in the country downstream and upstream activities. The view that biomass and other renewable energy are usually underestimated in Nigeria energy database is caused by the fact that majority of the estimated 70 % of Nigerians who live in the rural areas depend almost on the fuel wood and other biomass energy forms to meet their residential energy demand. This is the reason why biomass forms of energy consumption hardly enter into the country's national statistics.

According to EIA analysis, the graph below shows total energy consumption in 2006:

**Total Energy Consumption in Nigeria, by Type (2006)**



Source: EIA International Energy Annual 2006

#### GRAPH 2 Energy consumption in Nigeria

In graph 2, energy consumption in Nigeria is expressed in percentage with oil contributing the highest percentage and follow by natural gas. The significant of both oil and natural gas are much in the energy realization and mix in Nigeria due to the fact that Nigeria is among the top ten countries in exploration and production of crude oil and natural gas in the world. Today Nigeria is ranked the 7<sup>th</sup> largest country with natural gas reserves in the world. Also, from the graph 2, non-renewable energy sources have not found their way into Nigeria energy mix because their contribution is still insignificant.

### **3.3 Trends in energy supplies in Nigeria**

Considering the energy supply trends of the country, emphasis will be laid on the primary and the final energy point of view. This will include crude oil, natural gas and electricity sources of energy supply to the country's sectors and in the later part of this thesis, emphasis will be laid on other sources of energy such as: biomass, solar, wind and nuclear and hydropower energy generation in Nigeria

#### **Crude oil reserves, production and exports trends**

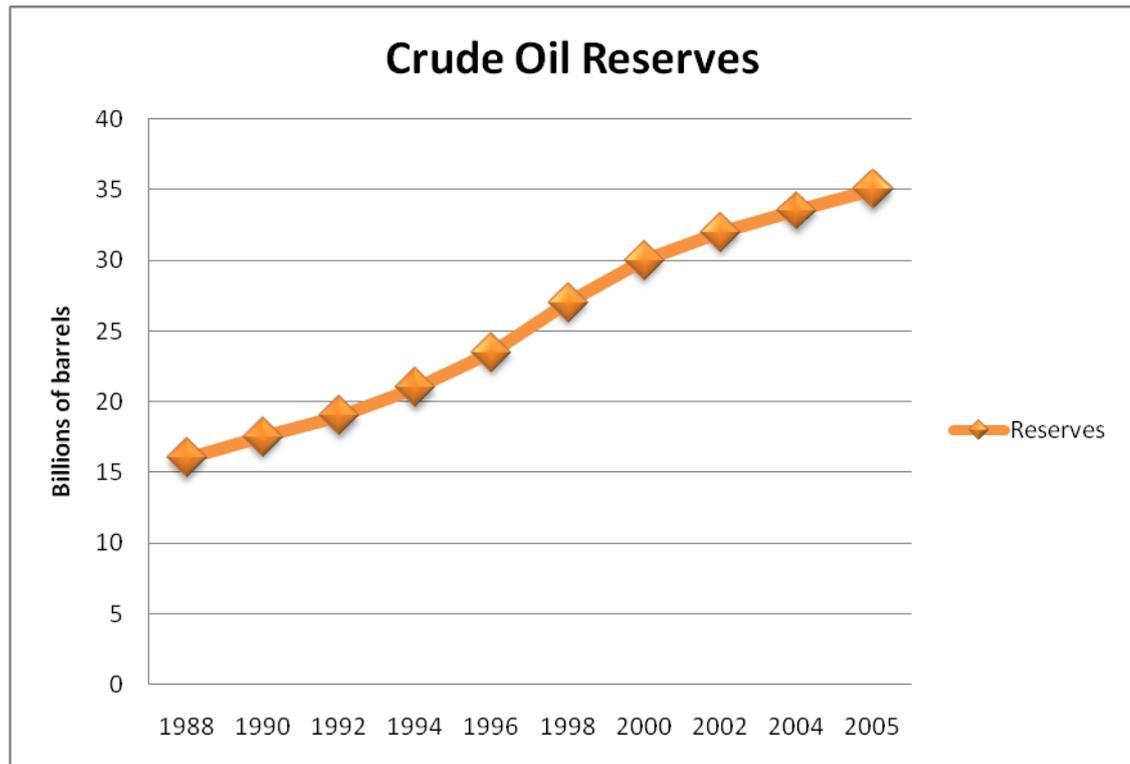
The country's crude oil reserves are found along the country's coastal Niger River Delta and in recent time many places have been discovered with large reserve of crude oil and among which include Ondo State, Ogun State and Osun State but estimated reserves in these states have not been disclosed. According to NNPC the nation's major petroleum products distributor, crude oil reserves were put at 34 billion barrels of oil in 2003 and 2006 estimate showed recoverable crude oil reserves at 36 billion barrels. The reserve base is expected to increase due to additional exploration and appraisal drilling. Already, over 900 million barrels of crude oil of recoverable reserves have been identified.

The government has also set a target to achieve a reserve of 40 billion barrels by 2010 through the major joint venture companies that operate in both the upstream and downstream sectors of the economy as well as the smaller companies that play significant role in the oil and gas ventures of Nigeria. Since inception of drilling activity for oil discovery, Nigeria oil reserves has been on its increase and this is because more oil rigs are discovered on regular basis by the country major oil companies such as Shell Petroleum Company, Mobil and Chevron oil companies. The table below demonstrate the trends of Nigeria oil reserves between 1988 and 2005.

TABLE 4 Crude oil reserve estimates in Nigeria 1988-2005

<b>Years</b>	<b>Crude oil reserves (Billions of barrels)</b>	<b>Years</b>	<b>Crude oil reserves (Billions of barrels)</b>
1988	16.0	1997	25.0
1989	16.0	1998	27.0
1990	17.5	1999	28.0
1991	18.5	2000	30.0
1992	19.0	2001	30.5
1993	20.5	2002	32.0
1994	21.0	2003	33.0
1995	23.0	2004	33.5
1996	23.5	2005	35.0

Table 4 shows the crude oil reserves over an 18 years period. The reserve increases as the year goes by and this is because more new oil rigs are discovered by the joint venture companies such as Shell, Mobil, Texaco and other joint venture companies.



GRAPH 3 Nigeria's crude oil reserves

Graph 3 shows the crude oil reserves trends from 1988 up to the year 2005. The up raising of the graph demonstrated increment in Nigeria's oil reserves based on the fact that oil exploration and production has been of increase since its inception in 1958 at Oloibiri Niger Delta Nigeria.

### Crude oil production trends

According to the NNPC, the average daily crude oil production in Nigeria was 2.10 million barrels per day in 2008 compared to the 2.20 million barrels achieved in 2007. The production of crude oil in Nigeria is mostly by joint venture companies that have been operating in Nigeria for many years. At present, Nigerian Government holds 60 % of the participating shares of these joint venture companies. They include: Shell, Chevron, ExxonMobil, AGIP, Elf, Texaco and Pan Ocean and of all the multinational companies listed, Shell Petroleum Company contributes more quota of the oil production on daily basis and follow by Chevron and others on the list. Shell has been there since the first discovery of the "Black Gold" but its impact is yet to be felt by the Nigerians and more especially in terms of its social responsibility in the Niger Delta region where most of its operation is situated. The largest Joint Venture operated by Shell produces nearly 50 % of

the Nigeria's Crude Oil. The table below shows the production trends of crude oil in Nigeria for the years under consideration and their daily average production per day.

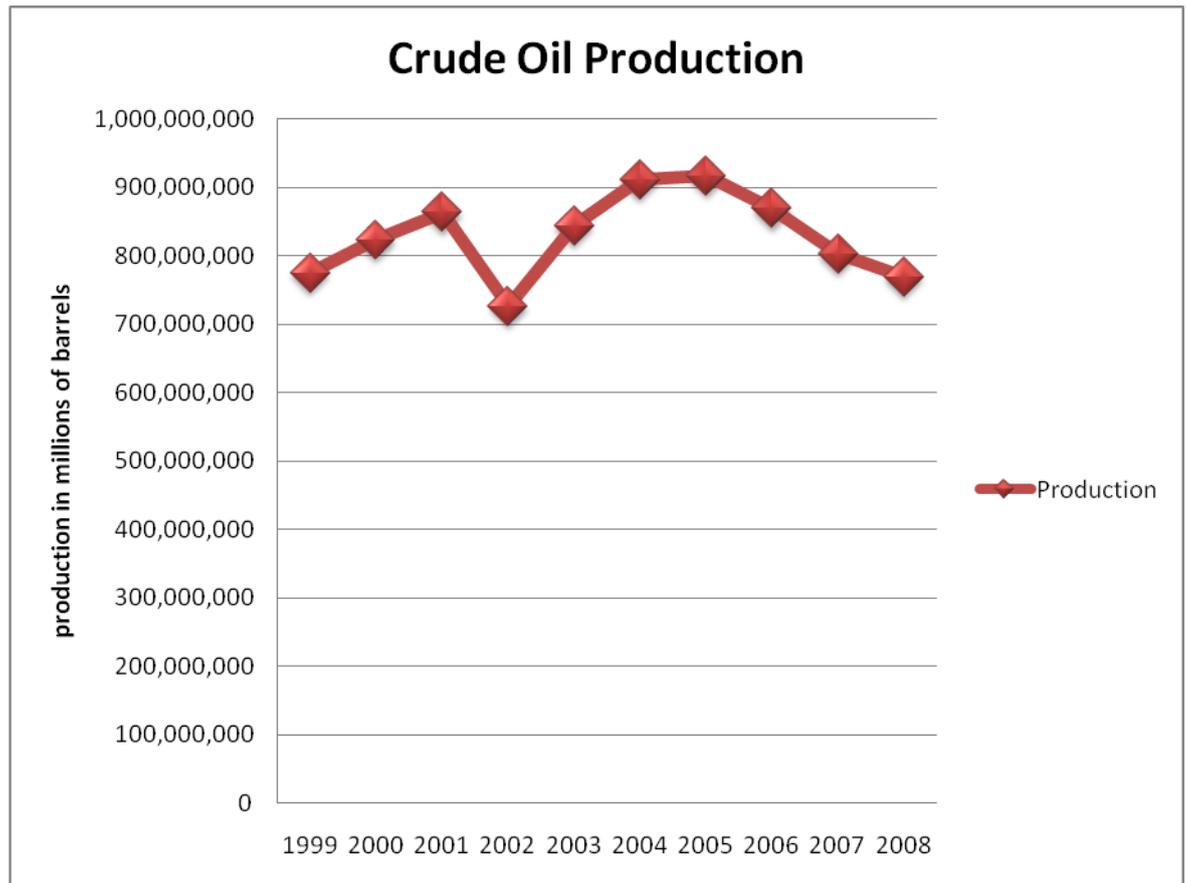
TABLE 5 Crude oil production

<b>Years</b>	<b>Production (Millions of barrels)</b>	<b>Average daily production (Millions of barrels)</b>
1999	774,703,222	2.12
2000	823,031,182	2.25
2001	863,744,500	2.37
2002	725,859,989	1.99
2003	844,100,267	2.31
2004	911,044,764	2.50
2005	916,861,981	2.51
2006	869,196,506	2.38
2007	803,000,708	2.20
2008	768,745,932	2.11

Table 5 shows the fluctuation in crude oil production trend as a result of unstable political situation of the Niger Delta region where the joint venture companies' operations are situated. The reduction first happened almost at the end of the first term of President Olusegun Obasanjo's regime. Less than a year before Nigeria holds its third national elections since the end of military rule in 1999, tensions are running high in the southern Niger Delta. A number of militant groups have begun allying themselves to local politicians with electoral aspirations. These groups and others continue to use legitimate grievances, such as poverty, environmental destruction and government corruption, to justify increasingly damaging attacks against government and oil industry targets. Removing the incentives for violence will require granting a degree of resource control to local communities.

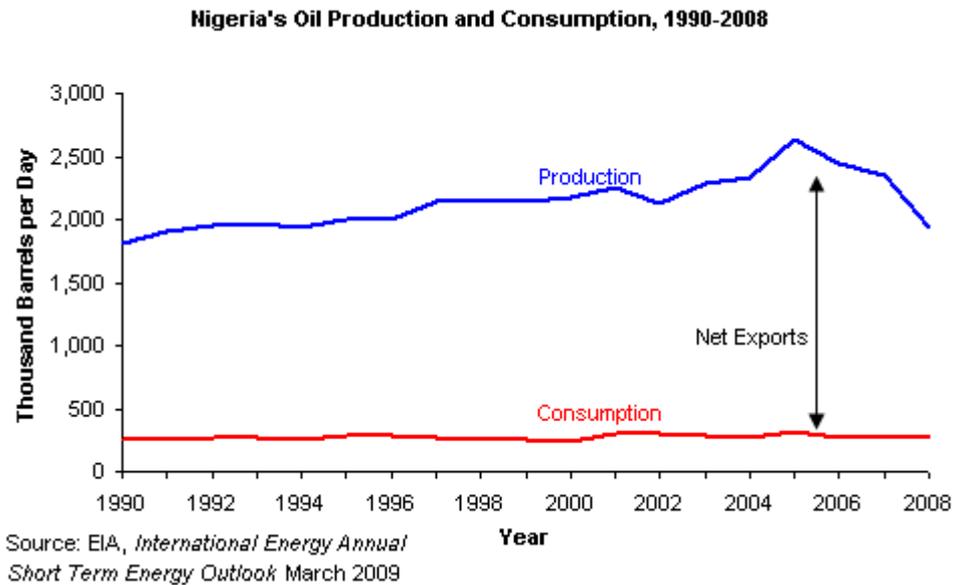
Engaging Delta groups in sustained, transparent dialogue also remains critical to finding a solution to the militant puzzle. Equally important, credible development efforts must be supported and stiff penalties for corruption imposed upon those who embezzle and squander funds. Crisis group's first report on the Niger Delta examined the historical and societal underpinnings of the growing insurgency. This report focuses on more recent developments. It examines the often hazy overlap between the militant Niger Delta cause, criminal and political motives, and identifies the steps required to defuse the conflict. Demands from militants have included the creation of additional states for Ijaws, amenities and jobs for rural communities, contracts and oil concessions for faction leaders and even calls for independence. The spokesman for the Movement for the Emancipation of the Niger Delta (MEND), the most vocal and best organised of the militant organisations to emerge in 2006, says his group's goal is to achieve resource control concessions or wreak "anarchy". Attacks since December 2005, including a spate of oil worker kidnappings, have at times forced oil production shutdowns of up to 800,000 barrels per day, threatening Nigerian government plans to nearly double production to four million barrels a day by 2010. Only some of those production losses have been offset by recent offshore developments. Two companies with foreign shareholders signalled in August 2006 that they would be withdrawing from the Niger Delta due to security concerns. (African Report No.118 28 September 2006).

The militant activity contributed to continuous fall of crude oil production since 2002 to the present time but negotiation is still going on between Federal Government and the militant group so that the oil companies and their exploration activity could go back to normal.



GRAPH 4 Nigeria's crude oil production

From graph 4, the sharp fall of crude oil production between 2001 and 2002 was as a result of the Niger Delta crisis that makes major joint venture companies such as Shell and Mobil to cut down their operation in oil exploration fields in the Niger Delta regions. Shell and other stakeholders have been accused of all forms of pollution and neglect of their social responsibilities within Niger Delta areas where most of their operations are situated.



GRAPH 5 Nigeria's oil production and consumption

Graph 5 shows the relationship between production and consumption of Nigerian oil. In all the years under consideration, the graph shows the gap between production and consumption of oil and this gap is what is termed net exports. The gap or net exports account for the oil export of Nigeria to countries like US, UK, India and other countries that will be mentioned later in this thesis.

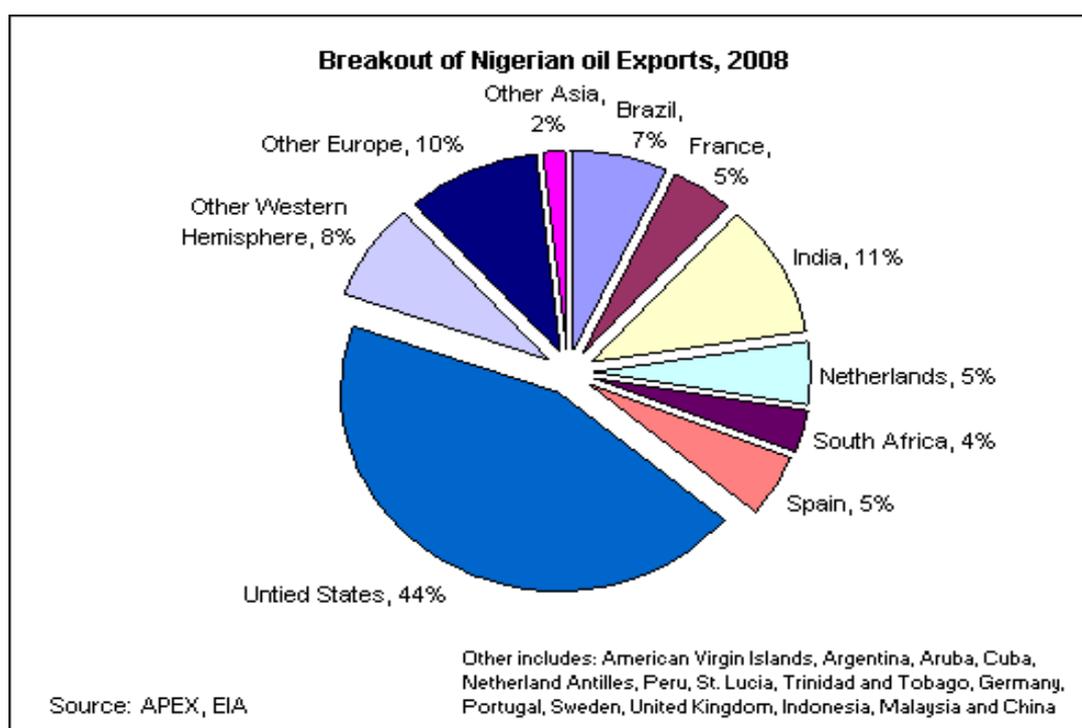
### Crude oil export trends

Nigeria exports its oil to almost all the continents of the world due to the regular demand and the light quality of the oil has made United State to demand for more of Nigeria's oil production. According to NNPC, a total volume of 724,479,796 barrels of crude oil was exported in 2008 to different destination such as North America, Europe, Asia and Far East, South America, Central America and Africa and this export volume is against what the country exported in 2007 (791,826,522 barrels). The following table demonstrates oil export of Nigeria to various destinations in the world since 2002.

TABLE 6 Crude oil exports

Years	Crude oil export (Millions of barrels)
2002	610 500 725
2003	791 016 260
2004	871 286 594
2005	843 533 331
2006	817 388 227
2007	791 826 522
2008	724 479 796

Table 6 depicts volume of crude oil in millions of barrels exported to various parts of the world by Nigerian government between 2002 to year 2008. The fluctuations of crude oil exports over the years under consideration are due to the Niger Delta crisis earlier discussed in this thesis.



### GRAPH 6 Nigeria's oil export to different countries

Graph 6 describes various percentage of Nigeria's crude oil exported to various countries of the world with the United States taking 44 % followed by India. This is because Nigeria has long relationship with the United States and India. Also, US takes the largest percentage because of its economy and energy need that relies majorly on oil compared with others European Countries such as France, the Netherlands, Spain and others with a lower percentage share of Nigeria's exports.

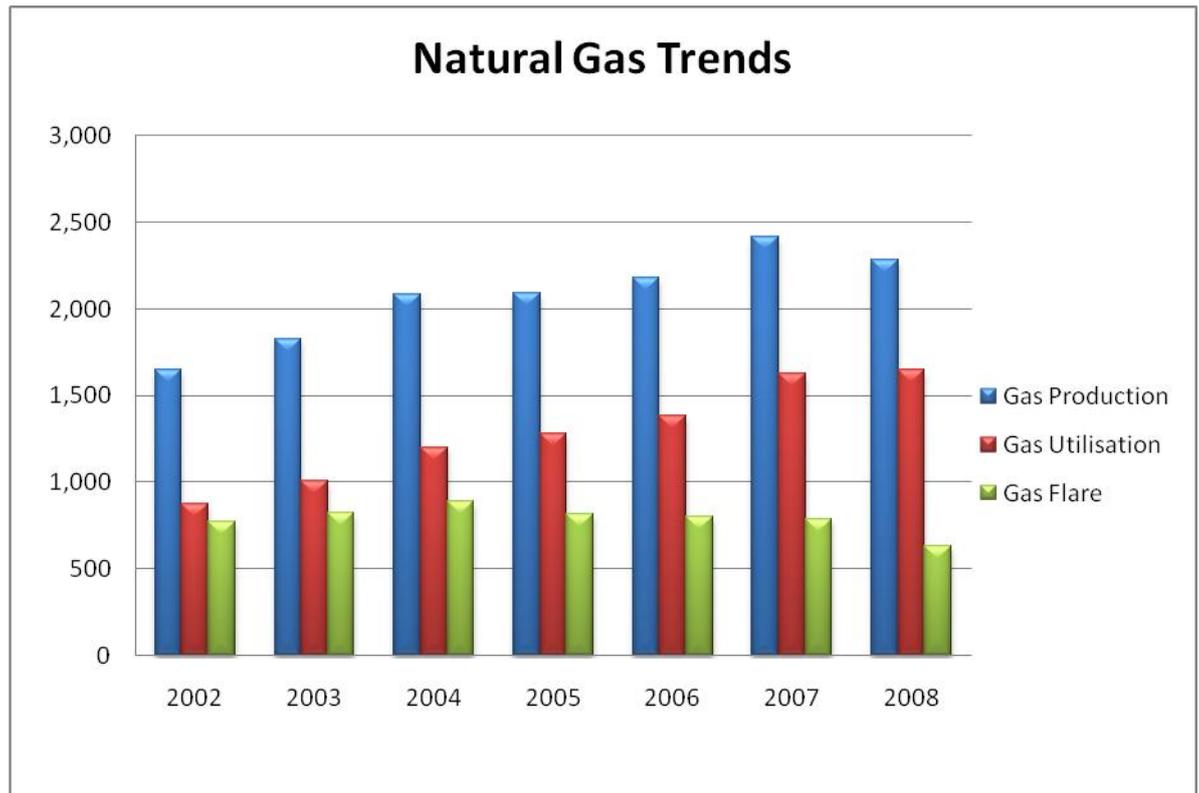
### **Natural gas trends**

According to NNPC and Gas Journal, Nigeria had 187 trillion cubic feet of proven natural gas reserves resulting from the oil exploration activity of the seven joint venture companies that operate in Nigeria. In the speech delivered by Engr. F.M Kupolokun May 2006 in the United States, he also stressed that Nigeria has the 7<sup>th</sup> largest natural gas reserves in the world. However, five major barriers facing the gas sector of the country as highlighted in the speech are as follows: pricing, fiscal terms, infrastructural and institutional arrangement, legal and regulatory framework and financing. It is understandable that these are the problems the sector is faced with, that is why the country's energy sector needs to collaborate more with Finnish companies such as Neste Oil, Wärtsila Oy and many more Finnish companies yet to visit Nigeria for great investment opportunities and mutual development of the two countries. The summary of the gas production, utilization and gas flared are provided in the table below.

TABLE 7 Gas production, utilization and flare

<b>Years</b>	<b>Gas production (Billion SCF)</b>	<b>Gas utilization (Billion SCF)</b>	<b>Gas flare (Billion SCF)</b>
2002	1,652	877.89	774.11
2003	1,828.54	1,004.44	824.10
2004	2,082.28	1,196.52	885.76
2005	2,093.63	1,281.30	812.33
2006	2,182.43	1,382.43	799.99
2007	2,415.65	1,626.10	789.55
2008	2,282.44	1,651.25	631.19

Table 7 shows the comparison of gas utilization and gas flare with regard to gas production in Nigeria. It is clear that so much gas is flared in oil fields in Nigeria because better advantage of this resource has not been taken in Nigeria. Nevertheless, it is the plan of the Federal government to ensure that gas flare in all oil fields becomes something of the past. This contributed majorly to the building of Trans Saharan Gas Pipeline project from Nigeria via Chad and Algeria to European countries which will be completed in 2015 to transport gas from Nigeria to Europe.



GRAPH 7 Comparison of gas production, utilization and flare

The volume of gas flare by joint venture companies is gradually decreasing compared with the previous years' operation of these companies. This is as a result of the plan of the Federal Government and its decision to fully utilize all natural gas production resulting from exploration activity of the joint venture companies in the Niger Delta region and other oil exploration fields by the year 2010. More especially, part of the Federal Government plan is to make sure that gas production and its proceeds is incorporated into the nation's source of revenue and energy grid. Federal Government also signed an agreement with Algeria and Niger for the building of the Trans Saharan Gas Pipeline which will run through Algeria and Niger so as to have direct distribution of gas to the European countries. On July 3, 2009 Algeria, Nigeria and Niger signed an intergovernmental agreement for the development of a 4,128 km gas pipeline that will send gas from the Niger Delta through Niger to Algeria's export terminals (Hocine 2008).

The project is estimated to cost around \$12 billion and will supply up to 30 billion cubic meters of natural gas per year to Europe; in addition, it will enable Nigeria to increase its share of natural gas exports, while helping make Algeria one of the major energy hubs in the region, catering mainly to the European market. Furthering the success of this project

the European Union supports the program and considers the building of the TSGP crucial to the diversification of its energy resources. The pipeline would enable European countries to tap directly into Nigeria's 5 trillion cubic meters of natural gas and reduce its reliance on Russia and Algeria (although Algeria's Sonatrach and, potentially, Russia's Gazprom will also be involved in the TSGP project). Unsurprisingly, various European energy companies have already expressed their interest in the project; France's Total, Russia's Gazprom, Anglo-Dutch Shell and Italy's ENI have indicated that they are ready to take part in the project. (El Watan, July 29). The gas pipeline is expected to be opened for use in 2015 and the major stakeholders in the pipeline project are Nigeria NNPC and Algeria Sonatrach with 90 % ownership and the remaining 10 % goes to the Niger Republic. It is believed with this, the country's foreign reserves would increase by exporting its gas to the European countries where the demand of gas is higher and also it will assist the country in its energy supply to all the sectors where there is insufficient energy availability. All these are achievable when the energy sector has access to good facilities as well as qualified manpower to operate at its fully capacity.

### **Electrical supply trends**

The electrical trend of Nigeria could be traced back to the early stage of the nation's pre-independent development plan. During 1950s, as part of the government plan toward generating electricity for the nation to survive within its various sectors, Niger Dam Authority (NDA) was established. In 1990 most electricity was supplied by NEPA currently called Power Holding Company of Nigeria (PHCN) Plc. This agency was established in 1972 as a semi-autonomous government activity through the merger of the Electric Corporation of Nigeria (ECN created by the government in 1950 to generate and transmit power nationally) and the Niger Dam Authority (NDA set up in 1962 to develop the economic potential of the Niger River). As part of its mandate, the NDA had constructed the Kainji Dam and an associated hydroelectric plant, which began operations in 1968.

Until the late 1970s, the plant was the principal source of Nigeria's electrical power before other plants at Ijora, Delta, Sapele, and Egbin are launched. This extension is necessary because as the population of the country is rapidly growing, the nation needs more watt of

electricity to complement the growing population. In early 1990s, power supply became the nation's pathetic problem and the situation still remains the same as of today. This is because the country's power sector has failed to generate up to 10 000 megawatt that the nation needs to have a constant power supply. According to the Energy Commission of Nigeria, "An estimated 60 million residents use generators of varying sizes and in the last one year, average residential expenditure in fuelling power generators climbed to an all-time high of N1.56 trillion, about \$13.35 billion per annum". This power problem is not only limited to the residents but also all types of firms in Nigeria experience power outages and 85 per cent of them own generators as alternative source of power generation. In the end, many of these companies are forced to close down their operations due to high cost of maintenance of their facilities.

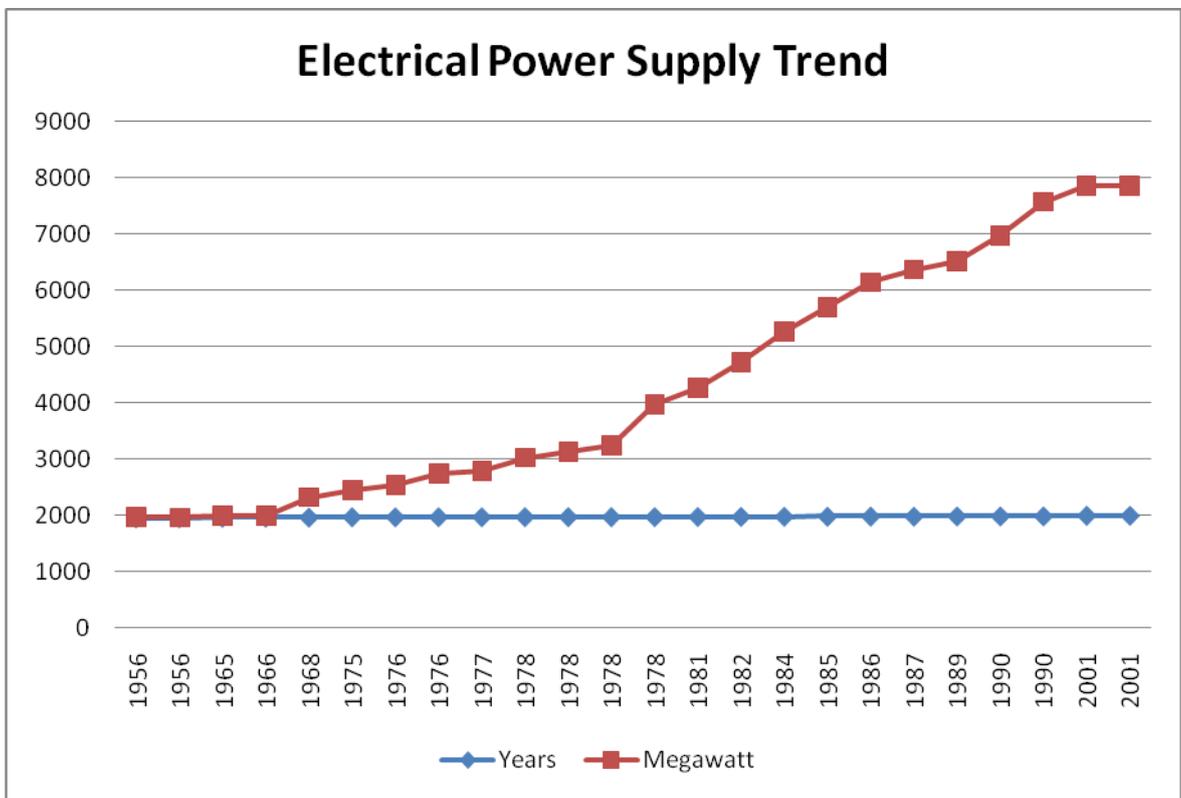
Also according to the Energy Commission of Nigeria, "Electricity is a form of energy, which enjoys considerable and diverse applications because of its flexibility and ease of transmission and distribution. Availability of electricity remains a major factor in the location of industries and a strong instrument of social development. Its supply is however still inadequate in the country. Commercial electricity is generated mainly from hydropower, steam plants and gas turbines in Nigeria. The installed capacity for electricity generation, which is 98 % owned by the Federal Government, increased by a factor of 6 over the period 1968 to 1991 and by 1991, stood at 5881.6 MW. No further addition to generating capacity was experienced over the subsequent decade. Over the years, the availability varied from about 27 % to 60 % of installed capacity, while transmission and distribution losses accounted for about 28 % of electricity generated. In December 2001, the available generating capacity was raised to 4000 MW, but this soon dropped to 2,600 MW within the first quarter of 2002. The annual consumption of electricity has been increasing very rapidly over the last three decades. It increased from 1,273 GWH in 1970 to 13,700 GWH in 2001. This however represents a suppressed demand caused by inaccessibility to the national grid and inadequacies of the electricity supply. One consequence of this is that various industries and other consumers have installed generators whose total capacity is estimated to be at least 50 % of installed capacity of the national grid". With this, Nigeria needs to attract foreign investment fund to rebuild her power sector. The table below demonstrates the megawatt of electricity generated at the nation's major power plants.

TABLE 8 Megawatt of electricity from different power plants

Year	MW Added	Location	Remarks	Cummulative MW
1956	20	Ijora	Stopped	
1956	10	Oji	Stopped	
1965	25.5	Afam	Stopped	
1966	36	Delta	stopped	36
1968	80	Kainji		356
1975	20	Delta		476
1976	23.5	Afam		570
1976	100	Kainji		770
1977	20	Ijora	Stooped	810
1978	120	Kainji		1050
1978	25	Afam		1150
1978	20	Delta		1270
1978	120	Sapele		1990
1981	75	Sapele		2290
1982	75	Afam		2740
1984	90	Jebba		3280
1985	220	Egbin		3720
1986	220	Egbin		4160
1987	220	Egbin		4380
1989	150	Shiroro		4530
1990	150	Shiroro		4980
1990	100	Delta		5580
2001	138	Afam		5856
2001	4	Calabar		5860

Table 8 shows different power plants located across Nigeria, from Western part of Nigeria to South and the Northern part of country as well as their accumulated megawatt of electricity generated from various power plants. Egbin power plants contribute more

megawatt of electricity and follow by Shiroro and Afam power plants. Kainji and Sapele are among the oldest power plants which are still functional but not as much effective like they were 15 years ago because of poor maintenance. From table 8 above, the biggest power plant in Nigeria are those at Egbin with 660MW in addition and the total capacity of all power plants in Nigeria is 5860MW compare to country like South Africa with about 30,000MW of electricity (Energy Commission of Nigeria). This is an area of opportunity for Finnish companies to explore energy market in Nigeria because the recent plan of the Federal Government to generate 6,000MW of electricity failed ( Hassan 2009).



GRAPH 9 Power supply trend in Nigeria

From graph 7, the up raising of the curve is as a result of the construction of new and bigger power plants such as power plants in Egbin and Shiroro (Energy Commission of Nigeria).

#### 4 ENERGY POLICY IN NIGERIA

As far back as 1979, Nigeria has been very dynamic in its energy policy especially in the area of deregulation of the various sub-sectors geared principally at better management and delivery of services to the consumers. In 1979, The Energy Commission of Nigeria was established by Act No.62 of 1979, as amended by Act No.32 Of 1988 and Act No.19 of 1989, with the statutory mandate for the strategic planning and co-ordination of National Policies in the field of Energy in all its ramification. By this mandate, the Energy Commission of Nigeria is the apex government organ empowered to carry out overall energy sector planning and policy implementation, to promote the diversification of the energy resources through the development and optimal utilization of all, including the introduction of new and alternative Energy resources like nuclear, biomass, wind and solar energy. Since the inception of the Energy Commission, Nigeria has not witnessed constant supply of energy in any form to the consumers. The motive of the Commission when it was established in 1979 was to ensure that energy resources such as Fossil Fuel, Nuclear, Solar and Wind are effectively utilize to supply the required level of energy needed by the society, but the story is not the same as of today. Less than 20 % of Nigerians have access to constant energy supply and those that even have access to it expend huge amounts of naira to make it available at their disposal. With all its plans and budget allocation and projects, the Energy Commission of Nigeria has failed to live up to the expectation of the Nigerians (Energy Commission of Nigeria). In compliance with the development of Nigeria's energy sector, the table below shows the renewable energy projects of the ECN:

TABLE 9 Energy Commission Projects

S/N	Project	Location	State
1	Solar Based Rural Electrification	Oproma, Ekawe	Bayelsa
2	Solar Based Rural Electrification	Oproma, Ekawe	Bayelsa
3	Solar Based Rural Electrification	Okokolo	Benue
4	Solar Based Rural Electrification	Evwreni, Ughelli North	Delta
5	Solar Based Rural Electrification	Sakura	Jigawa
6	Solar Based Rural Electrification	Kurmin Sata, Chikun	Kaduna
7	Solar Based Rural Electrification	Kanokafur Rd Malumfasi	Katsina

S/N	Project	Location	State
8	Wind Energy for Electric Power Gen.	Kebbi	Kebbi
9	Solar Based Street Lighting	Mafoluku Oja Road	Lagos
10	Solar Based Rural Electrification	Old Muri and Environs	Taraba
11	Solar-Powered Borehole& Street Lighting	Malarin Gamma Village	Jigawa
12	Solar Based Rural Electrification	Ibuza	Delta
13	Solar Based Rural Electrification	Itumbuzo	Abia
14	Solar Based Electricity and Street Light	Ini LGA Secretariat	Akwa Ibom
15	Solar Based Rural Electrification	Filin-dabo, Abuja	FCT
16	Solar Pilot Project	Malam Inna	Gombe

Table 9 shows various energy projects carried out with the use of renewable energy sources in Nigeria by the Energy Commission of Nigeria. The different small energy projects spread across the country comprises solar and wind energy and of this two, solar energy has dominated the new energy mix of the country. Although, the solar energy projects are of small sizes but this shows that Nigeria is prepared to develop its potential of the use of renewable energy such as solar. Wind energy is among the new energy mix but a project on this energy has only been implemented once in the northern part of Nigeria compared with solar that has already been spread across the country. Biomass as another form of renewable energy has also not been explored at all (Energy Commission of Nigeria).

#### **4.1 Oil and natural gas**

The Federal Government oil policy is to engage intensively in crude oil exploration and development with a view to increase the reserve base to the highest level possible, internal self-sufficiency in export of petroleum products, encourage ingenious and foreign companies to fully participate in both upstream and downstream activities of the oil industry and to adopt environmentally friendly oil exploration and exploitation methods. This is to ensure that oil exploration in Nigeria comply with the internal standard and avoid contributing to the damage of the ozone layer through gas flaring and other form of carbon

dioxide resulting from oil exploration. Also, part of the Federal Government policy on energy is to engage intensively in gas exploration and development in order to increase the nation's revenue as well as the GDP, put in place all necessary infrastructure and incentives to encourage indigenous and foreign companies to invest in the industry and at large to ensure development of natural gas in Nigeria. With this, Federal Government would ensure elimination of gas flaring by the year 2008 (Nigerian National Petroleum Corporation).

#### **4.2 Power policy**

Part of the government plans to increase the efficiency of power supply by the Power Holding Company of Nigeria (PHCN) established in 2005 (formerly called National Electric Power Authority) is to embark on its reform. The reform of the Nigerian Electricity Industry became important due to the high inefficiencies, strategic problems and constraints facing the industry as well as the government inability to meet the huge capital requirement needed to run the power sector. The reform policy is necessary to attract and encourage private investors to participate in the reform and development of Nigeria's energy sector and also one of the motives of the government reform policy is to facilitate more rapid and efficient provision of power services throughout Nigeria (Power Holding Company of Nigeria).

#### **Rural electrification Policy**

According to the Federal government, the term reform program of the power sector as contained in the approved National Electric Power Policy covers a rural electrification with the motive of expanding access to affordable and reliable electricity to rural community in a cost effective way. Most rural communities in Nigeria are left with no power supply and that is the more reason why nothing seems to be working in this region of the country. So, as part of the Federal Government power policy is to ensure that State government also pay attention to the development plan of bringing electricity closer to the rural dwellers at affordable cost.

### **4.3 Bio-fuel policy**

According to the ECN “Organic, non-fossil material of biological origin is called biomass and the biomass resources of Nigeria can be identified as wood, forage grasses and shrubs, animal waste and wastes arising from forestry, agricultural, municipal and industrial activities, as well as aquatic biomass”. The biomass energy resources of Nigeria have been estimated to be significant in reshaping the energy problem of the country if it is well utilized because all attention of the Federal Government is centered on the old form of power generation which has failed to constantly supply electricity to all sectors where it is needed in the country. Apart from the fact that this is a renewable energy, it would also add more to the various ways in which Nigeria could generate its energy for consumption. The abundant energy available from biomass could be introduced into the nation’s energy mix through the development of a comprehensive programme which would include exchange of foreign technology, research and manpower training and development so that this could be sustained for long term by the country for its energy generation.

## **5 BUSINESS POSSIBILITIES IN NIGERIA**

Nigeria is a land and home for many businesses and investment opportunities considering its population, large seaports, and vast available number of natural endowment. We cherish investors and their investments and this contributed largely to the establishment of a couple of small and large multinational companies doing their business as far back as 1960s in Nigeria. Example includes Peterson & Zochonis (PZ 1899) Plc and Shell Petroleum Companies. Early this year, about 150 multinational companies left Nigeria because of its economic and infrastructural problems and many are still doing their businesses because they want to be part of development and sustainability of Nigeria's economy in the future. Although these companies claimed that the country is facing infrastructural barrier and epileptic power supply which direct consequence is high costs of production. With regard to these problems Nigeria needs development in its energy sector and infrastructures that would facilitate effect production and at large bring development to Nigeria's economy. The investment opportunities in Nigeria based on this thesis will be streamlined to the energy sector but there are opportunities abound other sectors of the economy. So, the focus point on the investment opportunities in Nigeria within the energy sector will be on the downstream and upstream section of oil and gas and the power sector.

### **5.1 Non renewable energy**

According to NNPC, "with proven oil and gas reserves of 32.5 billion barrels and 187 trillion cubic feet respectively, numerous investment opportunities abound in upstream and downstream operations of the Petroleum industry" (Nigerian National Petroleum Corporation).

### **5.2 Renewable energy**

In Nigeria, investment and business opportunities are not only limited to sources of energy such as oil and gas but also renewable energy. Though, this might proven the biggest within the context of the energy sector but considerable amount of energy could still be realised from the renewable energy sources. The available renewable energy sources in Nigeria include: biomass, wind, solar and hydropower. In today's world, the common

world phenomenon is global warming and of which the direct consequence is greenhouse gases such as the release of carbon dioxide (CO<sub>2</sub>) and loss of forest that will store the CO<sub>2</sub>. The planet is affected by gases that come from combustion of fossil fuels in cars, factories and electricity production. So, for Nigeria to be part of solution to the global warming phenomenon, there is a need to develop the non-renewable sources that are still underutilised across the country. According to the Energy Commission of Nigeria (ECN), utilisation of renewable energy is presently very minimal in the country and plenty of investment opportunities are still abound here.

### **Investment in wind energy**

A Couple of research work and projects have been carried out in some states of Nigeria using the wind power. Currently, the country is not at its full capacity in the use of wind power to generate electricity and of all the wind electricity project, the only functional wind pump in the country is the Sayya Gidan Gada Village in Sokoto State. This pump has a capacity of 5.0 KW and it was built at a cost of about 5 million naira (US\$40,000) by the Energy Commission of Nigeria (ECN), the Government Agency responsible for development and implementation of energy policy issues in the country. In 2007, report of ECN indicated that Sokoto and Jigawa States are currently making efforts to install other wind pumps for small scale irrigation and generation of power. It shows clearly that this sector is still underutilising its potential because only 5.0 KW of electricity is being able to be generated from the wind energy.

### **Investment in biomass energy**

Most of the existing biomass/biogas plants in Nigeria are either demonstration or pilot projects. They are being funded by the Sokoto Energy Research Centre (SERC), Sokoto and the National Centre for Energy Research and Development (NCERD), Nsukka under the supervision of the Energy Commission of Nigeria. As part of the biomass energy program of SERC, 200 units of improved woodstove were disseminated in Danjawa, Sokoto State while 8 units were disseminated in Kuje Prison, Abuja plants of capacity sizes of 10 m<sup>3</sup> and 20 m<sup>3</sup> have also been disseminated in Kaduna, Ogun, Lagos, Borno, Anambra, Enugu and Imo States (Energy Commission of Nigeria 2007). One of such is the Achalla-Nru Nsukka Biomass Plant located at Achalla-Nru in Nsukka Local Government Area of Enugu State was built in 1999 with a capacity of 10 m<sup>3</sup> at a cost of 300,000 naira

(US\$ 2,400). The plant which is to produce gas for cooking is to demonstrate the benefit of biomass or biogas technology and the immediate beneficiaries are members of the community engaged in Gari (cassava product) processing. Considering the ECN statistics on the use of biomass in supply of energy to the people, biomass electricity is yet to be part of the energy mix of Nigeria; hence, a lot of investment possibilities are still open for the investors within the energy context of Nigeria (Energy Commission of Nigeria).

### **Investment in solar energy**

Solar among the list of renewable energy is now beginning to flourish in many part of the world especially in the advanced countries like the USA in order to diversify their energy sources. This suggest that if a country like USA could add solar energy to its energy mix, solar energy should be an important energy source in Africa but the reverse is the case despite the availability of sunlight in Africa. In Nigeria little has been explored within the solar energy context and few projects have been commissioned in the country with the use of solar energy but it is believed a lot more could still be realised from this energy source. In Nigeria, various applications of solar energy include solar electrification particularly in rural areas and this includes: Solar water pumps and solar street lighting. According to the ECN and the solar energy projects already carried out in the country are financed by various bodies including the Energy Commission of Nigeria (ECN), Sokoto Research Centre and National Centre for Energy Research and Development, Nsukka and other States Government such as Jigawa and Ondo and many more States are willing to invest in this energy. With the current growth in the research and development of solar energy in the world, one would believe that part of Nigeria's daily energy need could be met with the solar energy in the future and with the new development, we do not have to depend so much on oil and gas to generate all the country's energy grid. All the country needs is committed investors that would make this new dream become achievable within a couple of years to come (Energy Commission of Nigeria).

## 6 CONCLUSION

As it was earlier mentioned in this thesis work, Nigeria has the market potential and the country is willing to diversify its mono-economy system that has been ineffective since the commercial discovery of crude oil in early 1960. Nigeria abandoned its agricultural and industrial sectors that served the country before discovery of the black gold called oil in 1956 at Oloibiri Delta State and since then a greater percentage of the country's GDP and exports rely on the production and the selling of oil. Nigeria has lost many of its industries just because of the country energy barrier and the state of its infrastructural facilities. It was mentioned in the thesis that about 150 multinational companies left Nigeria basically because the country could not offer these producers and investors constant power supply and infrastructure. Many job opportunities have been lost due to these barriers facing the industrial sector of the economy (Kehinde, Adeleye & Edwards 2000).

At present, the only sector making some little growth within the economy apart from the oil sector is the banking sector and yet this sector still encounter its own power and infrastructural problem. It is clear that in Nigeria not only the energy sector requires rehabilitation but also all other sectors where Nigeria use to flourish before the discovery of crude oil. There is a lot of business and investment possibilities that are abound in Nigeria and according to the research carried out on the market possibilities in Africa, more attention was placed on Nigeria because it has a market known as having a population and a lot of business opportunities. As part of the conclusive part of this thesis work and based on my findings, I would like to disclose some of the business opportunities abound within the Nigeria energy market and more information about these business opportunities could be obtained from the home page of the country's websites as well as from the organisers of the eximin project ([www.eximin.eu](http://www.eximin.eu)).

- ✓ Surveying - tropical and plan metric; and sea bottom survey
- ✓ Civil Works- mud pit construction, concrete works at rig sites
- ✓ Seismic data acquisition and interpretation and The Nigeria Liquefied Natural Gas (NLNG) Projects.
- ✓ Drilling operations and domestic Production and Marketing of Liquefied Natural Gas (LPG)

- ✓ Establishment of chemical industries e.g. distillation units for the production of Naphtha and other special boiling point solvents used in food processing.
- ✓ Crude oil refining with efficient export facilities. Companies with technology can undertake turn around maintenance of refineries.

In view to encourage and make investment possibilities more reachable by the investors within the oil and gas sector, Federal Government made the following provisions:

- ✓ Applicable tax rate under the Petroleum Profit Tax (PPT) Act to be at the same rate as company tax currently at 30 %
- ✓ Investment Tax Credit of the current rate of 5 %
- ✓ Royalty at the rate of 7 % on shore and 5 % offshore

According to market experts, after Asia market growth Africa would be the next continent to witness market growth and already countries like China has started exploring this great business opportunities. In essence, my recommendation is that Finnish companies should not delay their visit to Nigeria and other African countries for the great business opportunities yet to be explored; though, the short-run prospects might be slow but the long-run opportunities and prospects are brighter. The good news is that Finnish companies such as Wärtsila, Nokia Group and Abloy Oy are already in Nigeria and Large, medium and small enterprises are welcome to do a successful business in Africa.

Finally, chances of entering Nigeria market are bright and wishing you all successful business strips to the biggest African market. Nigeria and Africa at large are calling.

## SOURCES

Dipo Kehinde, Segun Adeleye & Segun Edwards 200. Panic as Unilever, PZ threatens to leave Nigeria. Available at:

<http://www.nigeriavillagesquare.com/forum/archive/index.php/t-29404.html>. Accessed 2 June 2009.

Doing Business in Nigeria. Available at:

[http://cms.privatelabel.co.za/pls/cms/iac.page?p\\_t1=2464&p\\_t2=0&p\\_t3=0&p\\_t40&p\\_dyn\\_amic=YP&p\\_content\\_id=738508&p\\_site\\_id=126](http://cms.privatelabel.co.za/pls/cms/iac.page?p_t1=2464&p_t2=0&p_t3=0&p_t40&p_dyn_amic=YP&p_content_id=738508&p_site_id=126). Accessed 15 January 2010.

Engr.Kupolokun F.M. 2006. Nigeria and the Future Global Gas Market. Available at:

[http://www.rice.edu/energy/publications/docs/NIGERIA\\_FutureGlobalGas\\_Speech.pdf](http://www.rice.edu/energy/publications/docs/NIGERIA_FutureGlobalGas_Speech.pdf). Accessed 9 May 2009.

Felix B. Dayo 2008. Clean Energy Investment in Nigeria. Available:

[http://www.iisd.org/pdf/2008/cei\\_nigeria.pdf](http://www.iisd.org/pdf/2008/cei_nigeria.pdf). Accessed 12 June 2009.

Hassan T. 2009. Government may sanction oil firms over power target miss. Guardian Newspaper Publication December.

Hassan T. 2009. NNPC lists objectives in industry reform, proposes new legislation for extractive industries. Guardian Newspaper Publication December.

Hocine Chekired 2008. Second Conference of Africa- Latin America and the Caribbean Energy Ministers. Available at:

<http://www.olade.org.ec/documentos2/afrolac/2-02%20Argelia%20pipeline.pdf>. Accessed 20 September 2009.

Ogbonnaya I. Okoro, E. Chikuni, Peter O. Oluseyi & P. Govender. Conventional Energy Sources in Nigeria. Available:

<http://active.cput.ac.za/energy/web/DUE/DOCS/284/Paper%20-%20Okoro%20O.pdf>.

Accessed 19 July 2009.

[www.cacnigeria.org](http://www.cacnigeria.org)

[www.eia.doe.gov](http://www.eia.doe.gov)

[www.energy.gov.ng](http://www.energy.gov.ng)

[www.eximin.eu](http://www.eximin.eu)

[www.nigerianstat.gov.ng](http://www.nigerianstat.gov.ng)

[www.nipc.gov.ng](http://www.nipc.gov.ng)

[www.nnpcgroup.com](http://www.nnpcgroup.com)

[www.phcnonline.com](http://www.phcnonline.com)