



Federal Republic of Nigeria

***DRAFT***

# **THE NIGERIAN POWER SECTOR INVESTMENT OPPORTUNITIES AND GUIDELINES**

**JUNE 2016**



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I also acknowledge the support, encouragement and contributions of the Permanent Secretary (Power) **Louis Edozien**, for his guidance, direction and editing of the document. This document is expected to close the information gap that had hitherto existed to prospective investors and will also be a marketing instrument to the Investment and Sector Development Department and the Ministry in general.

The Team expresses its gratitude to all relevant stakeholders and some selected investors, who supplied valuable and informative materials that made up this document. It is a real pleasure and treasured opportunities for the exchange of ideas and to learn from highly experienced representatives of the following stakeholders:

- Nigerian Bulk Electricity Trading Company (NBET);
- Transmission Company of Nigeria (TCN);
- Nigeria Electricity Regulatory Commission (NERC);
- Infrastructure Concession Regulatory Commission (ICRC);
- Nigerian Electricity Management Services Agency (NEMSA);
- Nigerian National Petroleum Corporation (NNPC);
- Energy Commission of Nigeria (ECN);
- Gas Association Company of Nigeria (GACN).
- Federal Ministry of Water Resources (FMWR);
- Federal Ministry of Solid Minerals Development (FMSMD); and
- Federal Ministry of Environment (FMEnv.)

Finally, I am particularly grateful to the Technical Departments of the Ministry and the Team members, who worked tirelessly to ensure that all corrections were effected.

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## **FOREWORD**

What you are holding in your hand is a document of many purposes and indeed some welcome coincidences.

It was conceived in January 2016, first as a document to guide the implementation of Nigeria's energy policy, and to optimize its many fuel sources of Hydro, Coal, Solar, wind and Gas for energy production.

In effect it was to help bring power production closer to fuel and feedstock sources in order to make power more affordable.

Secondly, it was to serve as a planning tool, not only to guide investment in power production and generation but to assist the Transmission Company plan and concentrate its evacuation resources and put an end to incidents of stranded power.

Between conception in January 2016 and conclusion in June 2016, our vulnerability to over dependence on gas had become apparent. 23 (twenty-three) out of 26 (twenty-six) power plants in the country depend on Gas.

Between February 14, 2016 and June 2, 2016, there have been 14 (fourteen) incidents of oil and gas pipeline and platform vandalizations.

Therefore, this document is also a solution to that vulnerability on the roadmap to energy diversity and security.

It reveals our alternatives to Gas and our commitment to pursue those alternatives.

I am delighted to contribute this foreword.

**Babatunde Raji Fashola, SAN**

Honourable Minister of Power, Works and Housing



## CHAPTER I

### **1.0 INTRODUCTION**

#### **1.1.1 Background**

Nigeria's Population is the seventh largest in the World with over 190 million people and still growing at an average of 2.5% per annum. By United Nations' statistics, Nigeria's population will reach nearly 230 million within the next 20 years. The largest country in Africa, accounts for nearly half the total population of West Africa and more than 15% of the total population of the entire African Continent. Nigeria represents over 65% of the effective West African market and remains the most competitive destination for the establishment of medium and large manufacturing industries.

#### **1.1.2 Geography and Population Distribution**

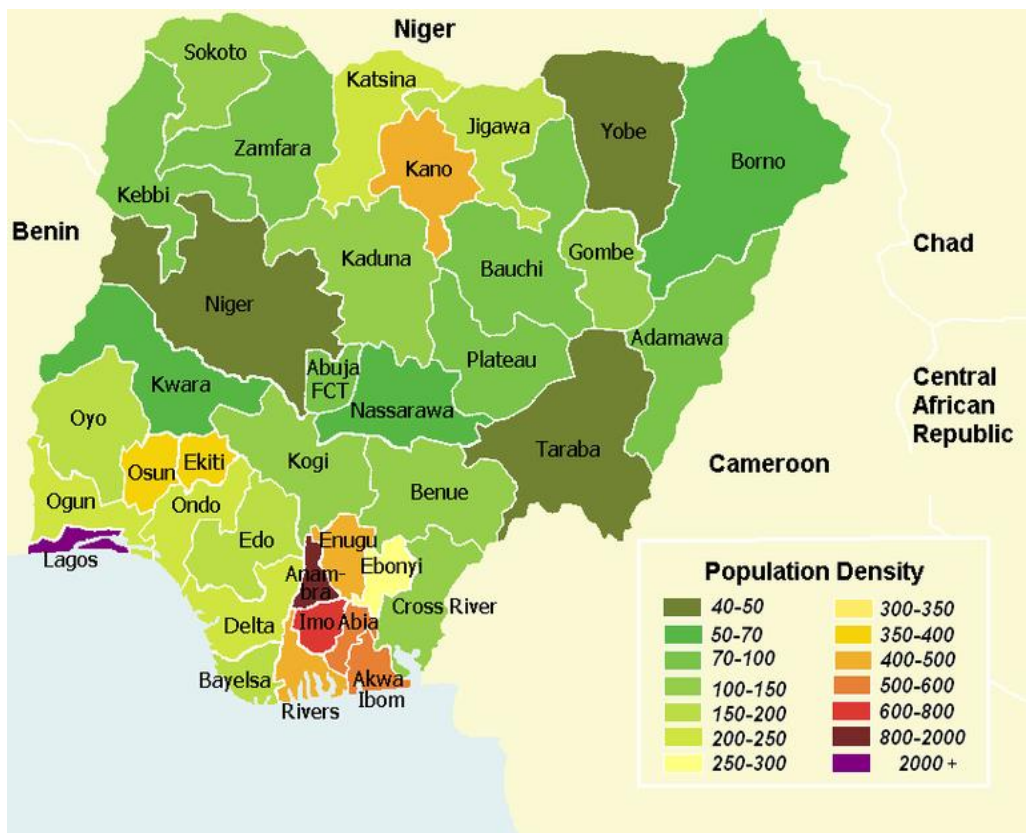
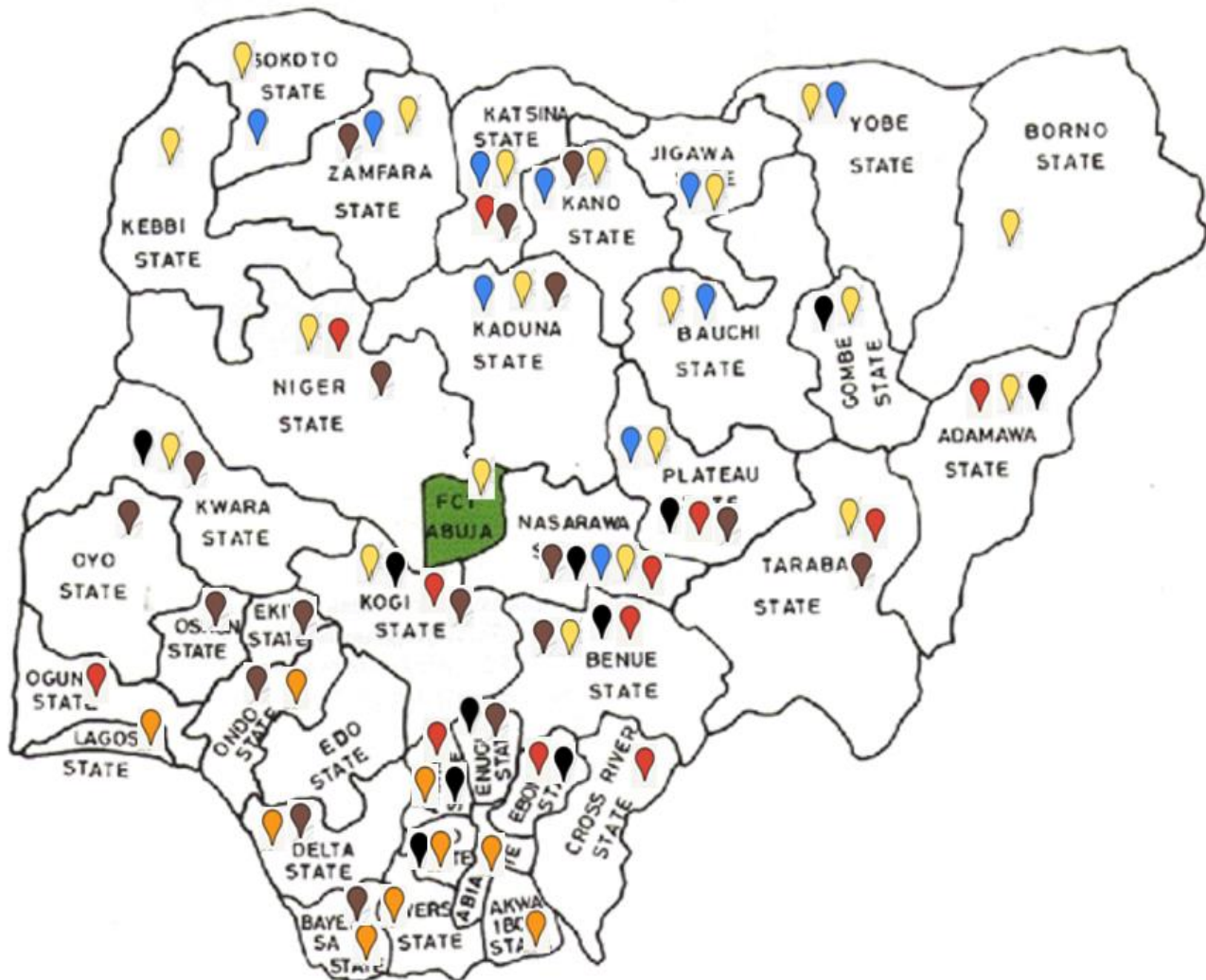


Fig. 1: Map of Nigeria showing geographical location and population distribution



Gas	Small Hydro	Coal
Solar	Wind	Large Hydro

Fig 2: Nigeria energy resources distribution map

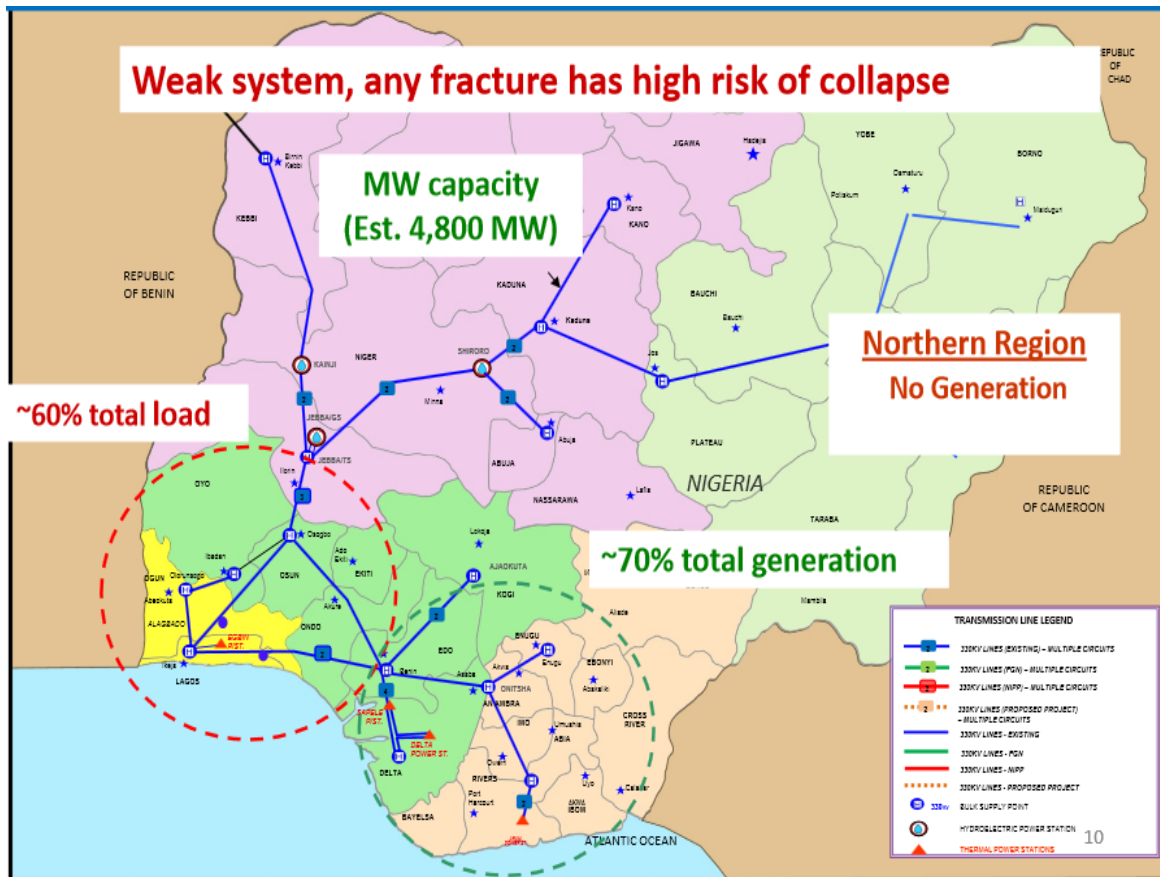


Fig 3: Map of existing power infrastructures between generation and transmission

### 1.1.3 Nigeria's Energy Statistics and Economic Indicators

Total Energy Consumption	1,259TWhr/annum	Area:	923,770sq. km
Total Electricity Production	19.78TWhr/annum	Rural Population:	52%
Energy consumption/capita	8.1 MWhr/head	GDP:	US\$262.6bn (2012)
Electricity Consumption	18.05TWhr	GDP Growth:	Ave. 7% for last 3yrs
Access to Electricity (National)	54 %	GND per capita:	US\$2,300 approx
Access to Electricity – rural	28%		

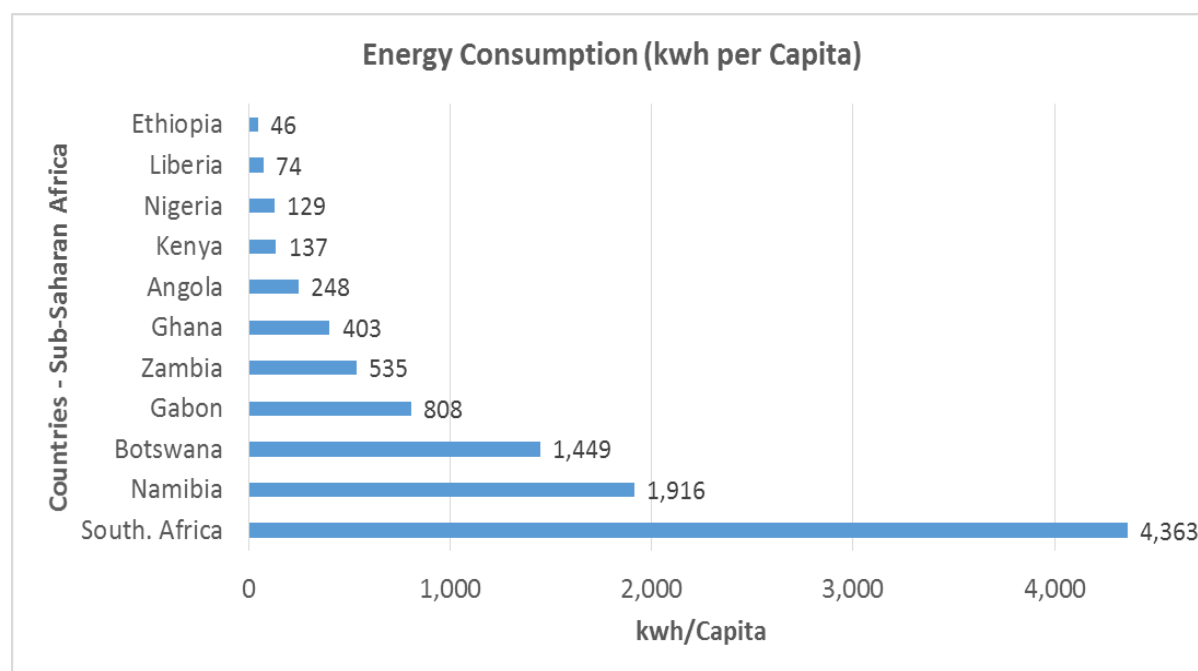
\*NBS 2012

### 1.1.4 Nigeria Energy Situation compared with selected countries

Table 1:

Country	Population (Million)	Generation Capacity (GW)	Energy Consumption (billion kwh)	Energy Consumption per Capita (kwh)
USA	321,368,864	1,053	3,883	12,083
Germany	80,854,408	178	583	7,204
UK	64,088,222	76	304	4,740
South. Africa	53,675,563	44	234	4,363
China	1,367,485,388	1,505	5,523	4,039
Brazil	204,259,812	119	479	2,344
Egypt	88,487,396	27	129	1,462
Indonesia	255,993,674	41	156	609
India	1,251,695,584	223	758	605
Ghana	26,327,649	3.0	11	403
<b>Nigeria</b>	<b>178,562,056</b>	<b>7.6</b>	<b>23</b>	<b>129</b>

\*CIA fact book, 2014



\*CIA fact book, 2014

Fig. 4: Nigeria Energy Situation compared with selected countries

## **1.2 Overview of the Nigerian Power Sector**

The Nigeria power system is characterized by huge gap between supply and demand; current power demand is estimated at 17,520MW including latent and suppressed demand, against 5,300MW peak generation. As a result, about 90 million Nigerians have been reported to have no access to electricity according to (African Progress Report 2015). Out of this non-electrified population, 17 million people live in urban areas, while 73 million live in rural areas. This means majority of the non-electrified live in off-grid areas where grid supply is not economical and may not be sustainable due to high cost of constructing transmission infrastructure.

To this end, the country targets of 10.2MW by 2019 and by 2030 including all energy mix for electricity generation. In order to achieve this, it is estimated that the country will require investments in power generating capacity alone of at least US\$ 3.5 billion per annum. Correspondingly, large investments are also required in the other parts of the supply chain (i.e. the fuel-to-power infrastructure, power transmission and distribution networks).

## **1.3 The Nigeria Power Sector Reform**

In order to attract required private investment to bridge the huge deficits of electricity demand and supply, the power sector has undergone series of transformation and reforms; a significant initiative was the enactment of the 2005 Electricity Power Sector Reform (EPSR) Act which laid a solid foundation for the federal government power sector reform and privatization programme.

The reform saw the liberalization and commercialization of the national utility company, leading to the unbundling of the National Electric Power Authority (NEPA), which became Power Holding Company of Nigeria (PHCN) consisting of 18 new successor companies including 6 generation companies, 1 transmission company and 11 distribution companies. So far both the generation and distribution assets are privatized and have been handed over to private owners. In August 2012, Transmission System Provider of Nigeria (TSP) was handed over to Manitoba Hydro International of Canada under a 3 to 5 year management contract agreement.

The EPSR Act of 2005 established the National Electricity Regulatory Commission (NERC), Nigerian Bulk Electricity Trading (NBET) the Rural Electrification Agency (REA) and other agencies as key institutional tools to drive the core objectives of the reform programme.

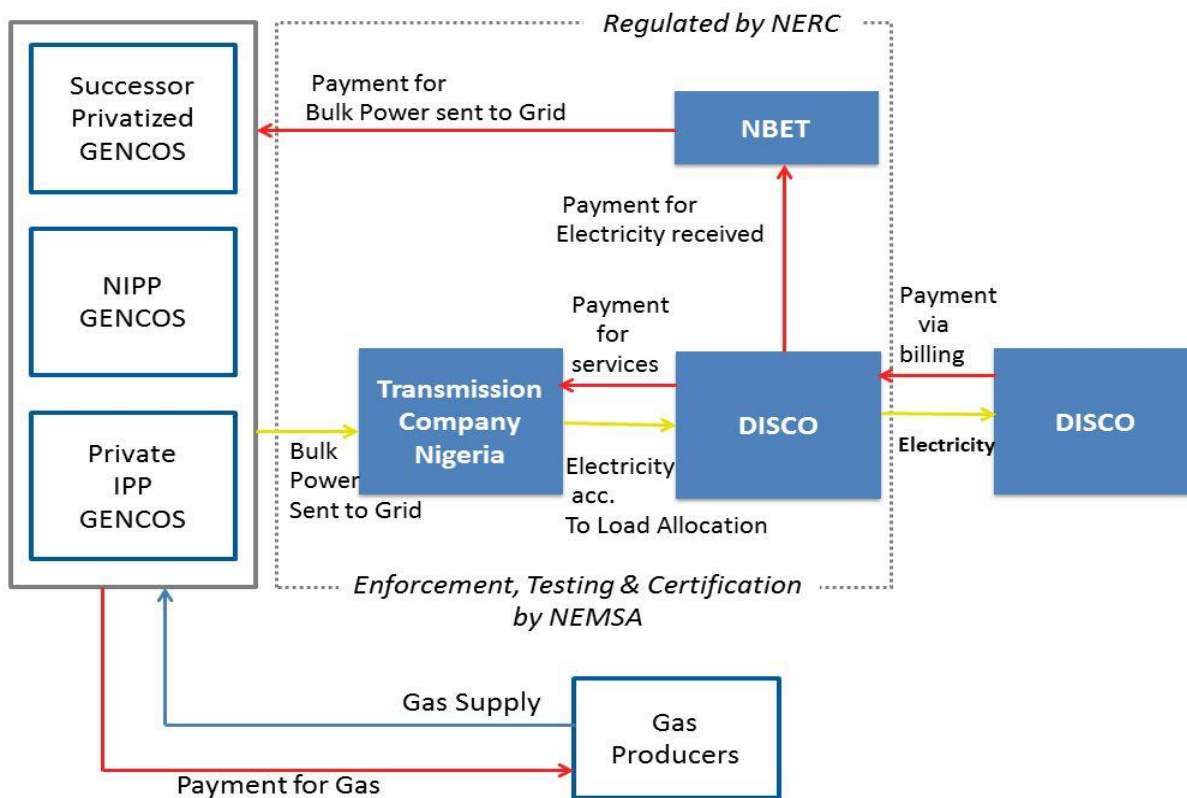


Fig. 5: Structure of the Power Sector – Post Reform

## 1.4 Nigeria's Power Sector Potentials

Nigeria is well endowed with resources in both renewable and non-renewable energies which constitute plausible solutions to address existing power shortages and promote the drive by the Federal Government to increase current installed capacity of the country significantly by the year 2030 and beyond. As it stands, Nigeria's main energy carrier is biomass (81.25%), followed by natural gas (8.2%), petroleum products (5.3%), crude oil (4.8%), hydropower (0.4%), and others (< 1%).

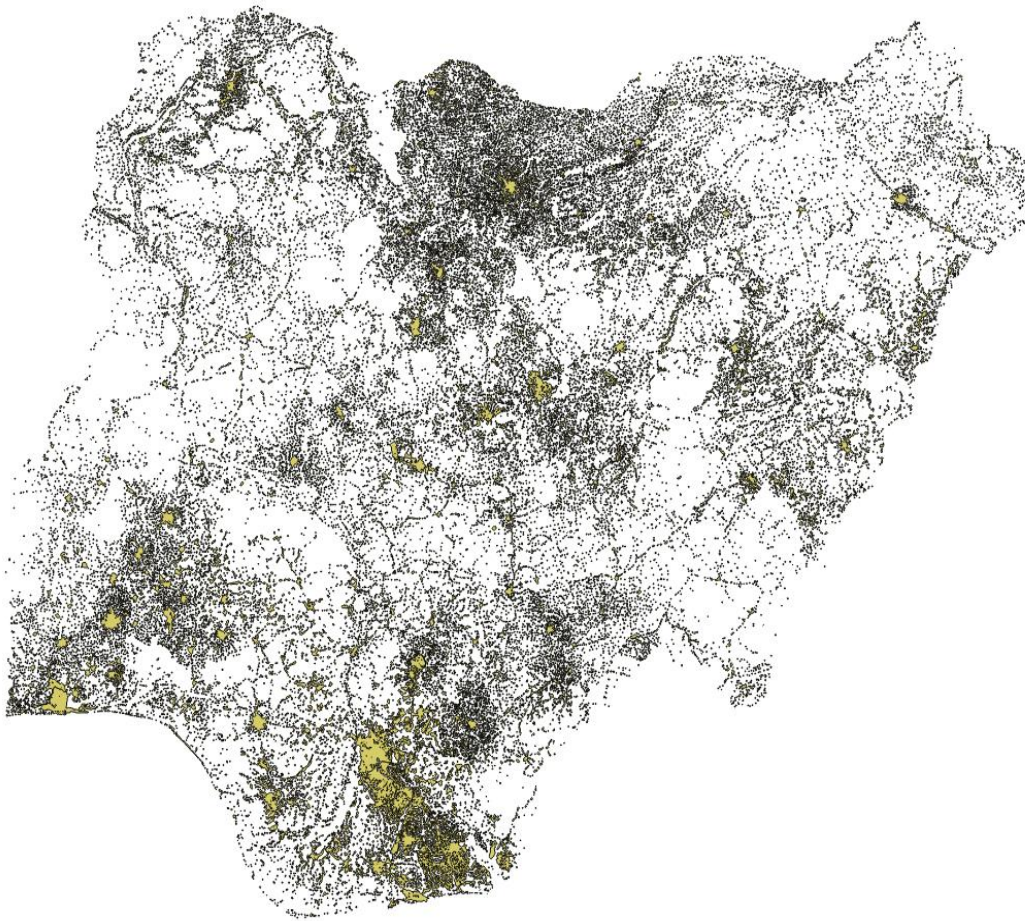


Fig 6: Geographical Distribution of Nigeria Population Clusters

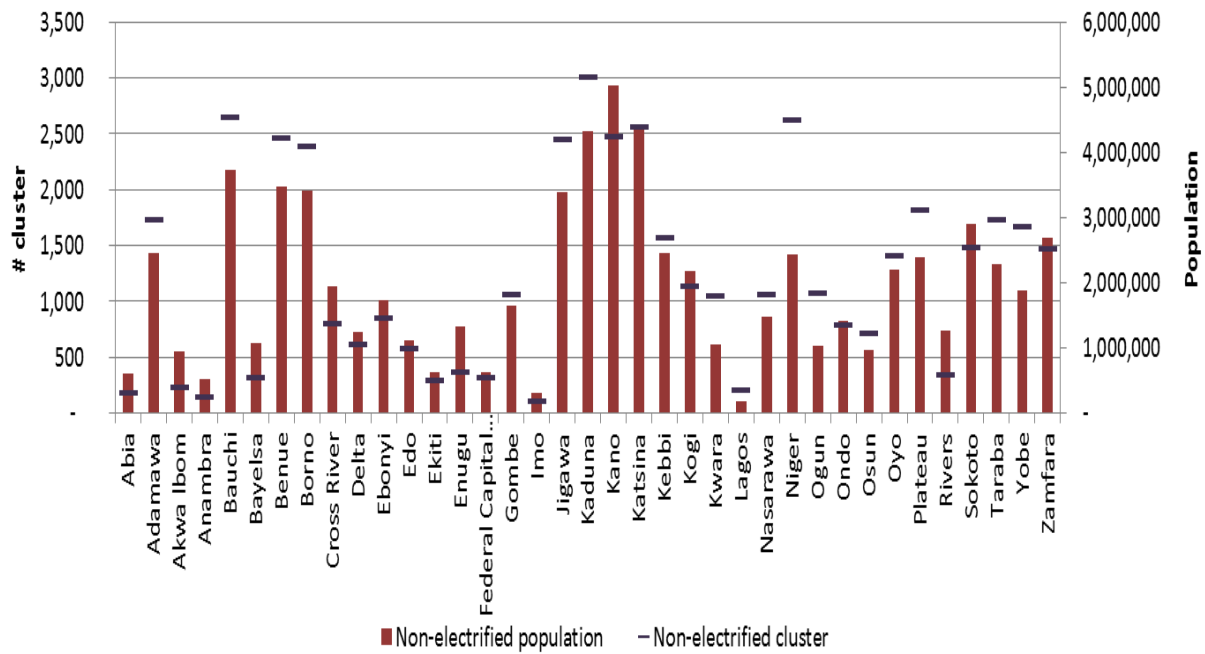


Fig. 7: Statistics of Non-electrification Population Clusters per State

A recent study by GIZ/FMoP identified a total of 47,489 population clusters spread across the country. It was also established that out of the population of about 193.4 million people (NPC 2016), 174 million live within the clusters. Also, about 10% of population is assumed to live in very small settlements or have no permanent settlement locations and so they cannot be assigned to a certain consumer cluster.

Of the identified clusters, a total of 45,456 clusters are considered to be non-electrified (95 %). Although this represents the vast majority of clusters, only 89 million people out 193.4 million people (46 %) live in the electrified area (including 10 % living outside clusters assumed to be non-electrified).

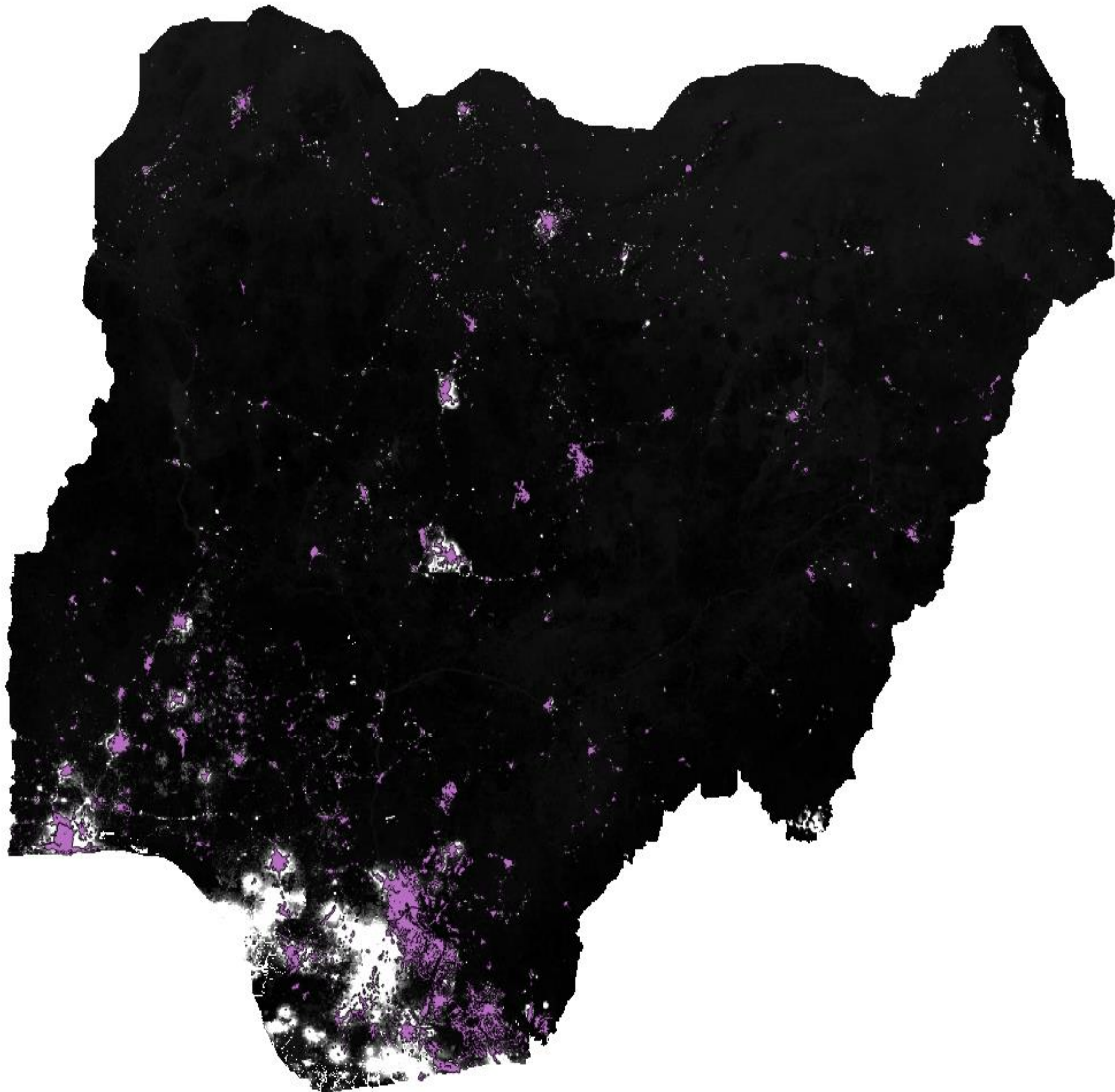


Fig. 8: Geographical Distribution of Electrification



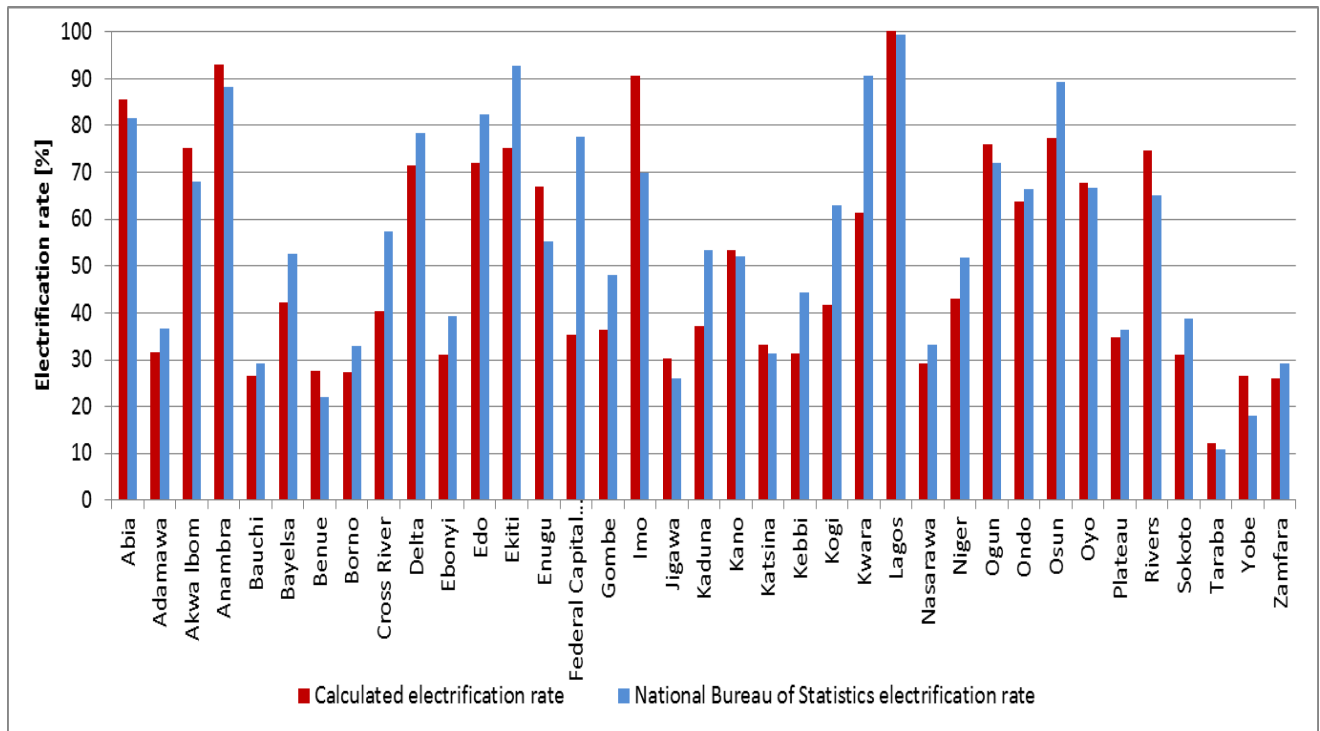


Fig. 9: Electrification Rates per State

- A total of 34,446 clusters referring to an overall population of 57.1 million people are assigned preferably for grid extension.
- The remaining clusters are to be electrified either by PV-hybrid mini-grids or SHS according to the population threshold of below 1,000 inhabitants.
  - 3,800 clusters with a population of 12.8 million are recommended for electrification using PV-hybrid mini-grids or other renewable energy sources if the potential exists.
  - 7,210 clusters with a population of 2.8 million recommended for electrification using SHS.

An extension of the main grid and connection of all consumers within a distance of 20 km would have the largest impacts in the states of Kano, Katsina and Kaduna. Whereas electrification by PV-hybrid mini-grids would have largest impacts in the states of Borno, Taraba and Plateau.

The 3,800 clusters assigned for electrification using PV-hybrid mini-grids result in an electricity consumption of 2,135 GWh/year with an accumulated peak load of 895 MW per year.

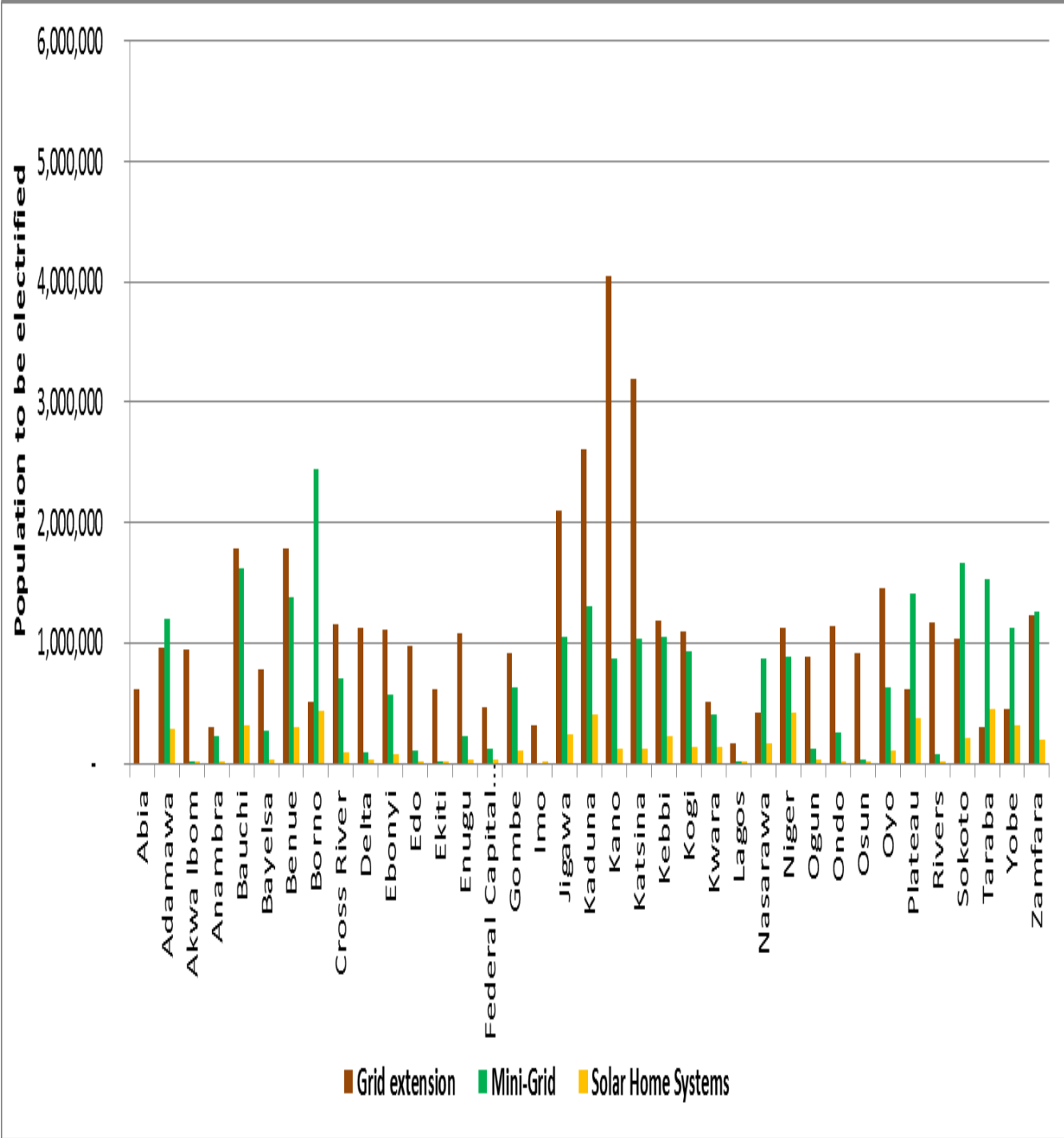


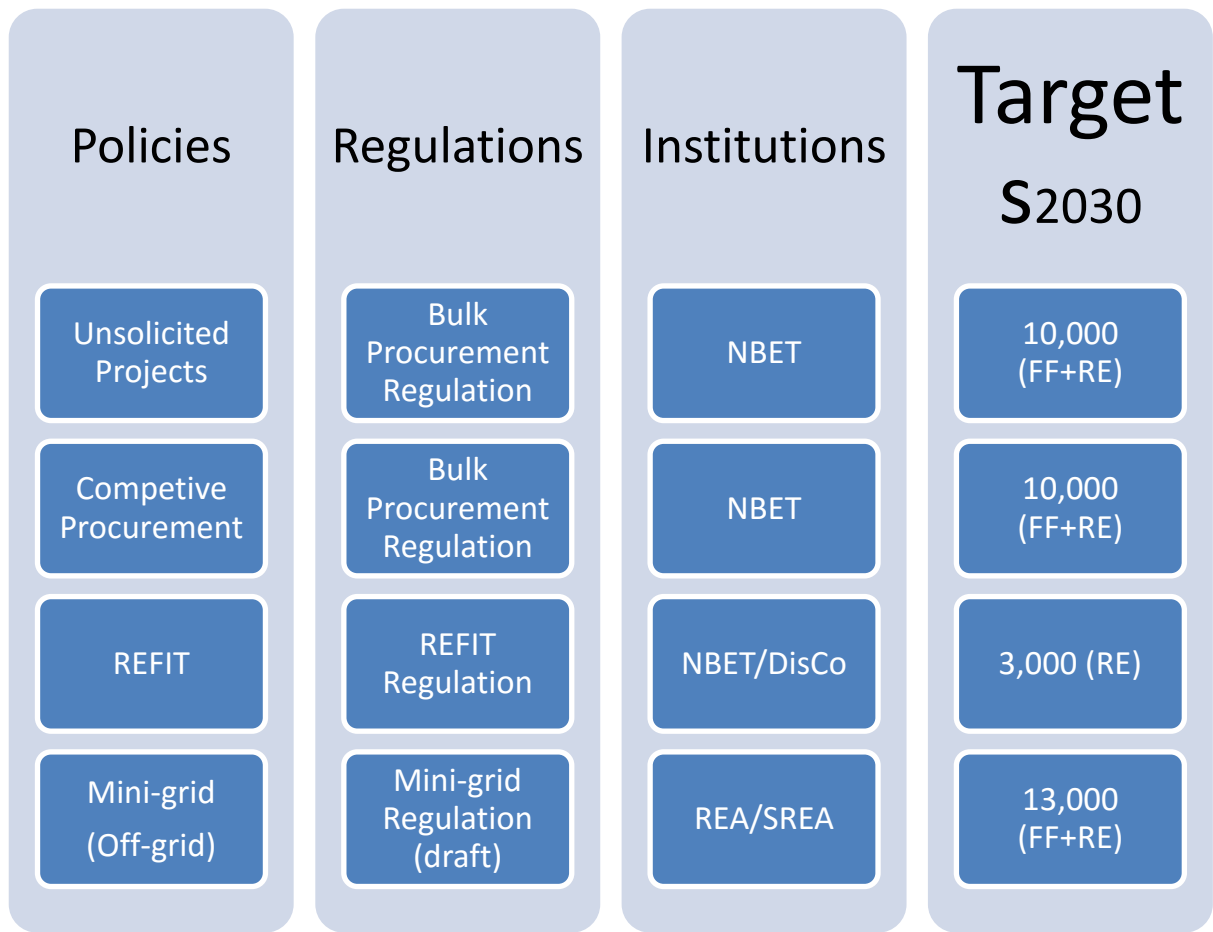
Fig.10: Electrification Options per State

## 1.5 HIGHLIGHTS OF ENERGY POLICIES IN NIGERIA

The approved and draft Energy Policies are stated below for harnessing the Nigeria energy potentials:

Table 3 - showing approved and draft energy policies in Nigeria

Approve National Energy Policies	Draft Energy Policies
National Electric Power Policy (NEPP) – 2001	Renewable Energy Master Plan (REMP) 2013
Nigeria Energy Policy (NEP) - 2003	National Renewable Energy Action Plan (NREAP) 2015
Electric Power Sector Reform Act (EPSR) – 2005	National Energy Efficiency Action Plan (NEEAP) 2015
Rural Electrification Policy Paper (REPP) – 2009	Sustainable Energy for All - Action Agenda (SE4All-AA) 2015
The Roadmap for Power Sector Reform 2010	
Nigeria Electricity Management Services Act - 2015	



## CHAPTER II

### 2.0 CURRENT STATUS OF ELECTRICITY AND DESIRED ENERGY MIX

#### 2.1 Present Energy Mix (MW) - Generation

On average, the nation has generation capability of 5,700MWH/H, 86% of this capability is from gas-fired thermal power stations. The remaining 14% is from the three large hydroelectric power stations. The figure below shows the present capacity.

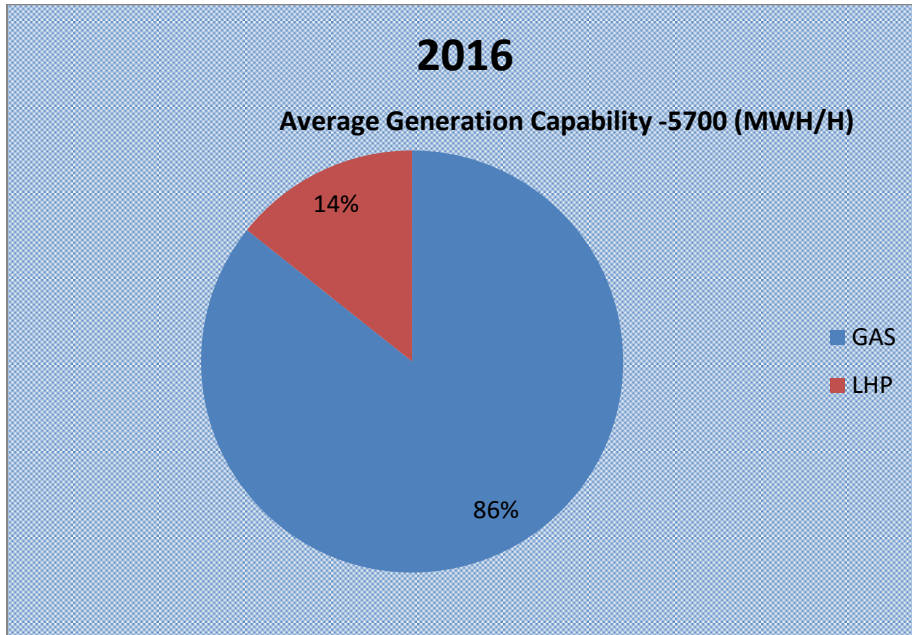


Fig. 1: Current Energy Mix (MW) - Generation

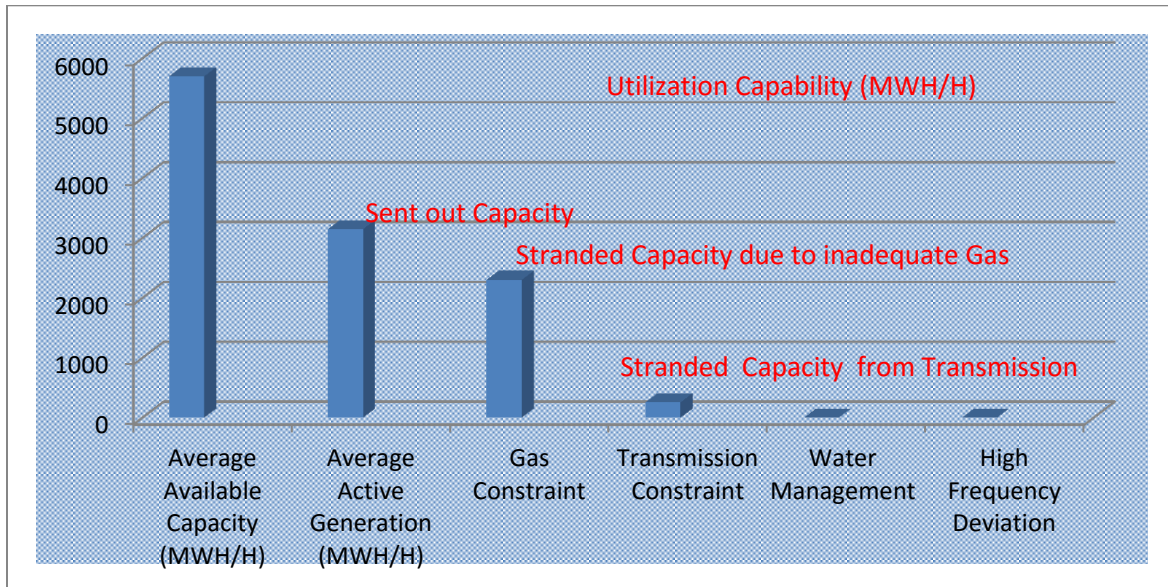


Fig. 2: Average Utilization Capability

## 2.2 Energy Mix Target.

To make electricity supply less vulnerable to disruptions, more affordable, available and reliable Federal Government of Nigeria has set targets for the country`s energy mix to exploit Nigeria potential for coal, solar, wind, biomass, large and small hydroelectric power generation.

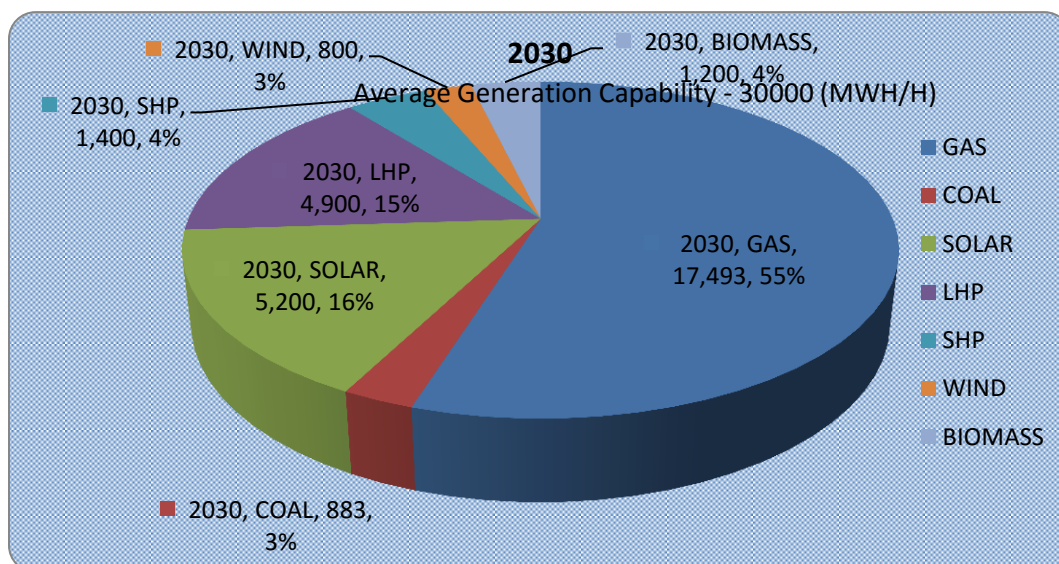
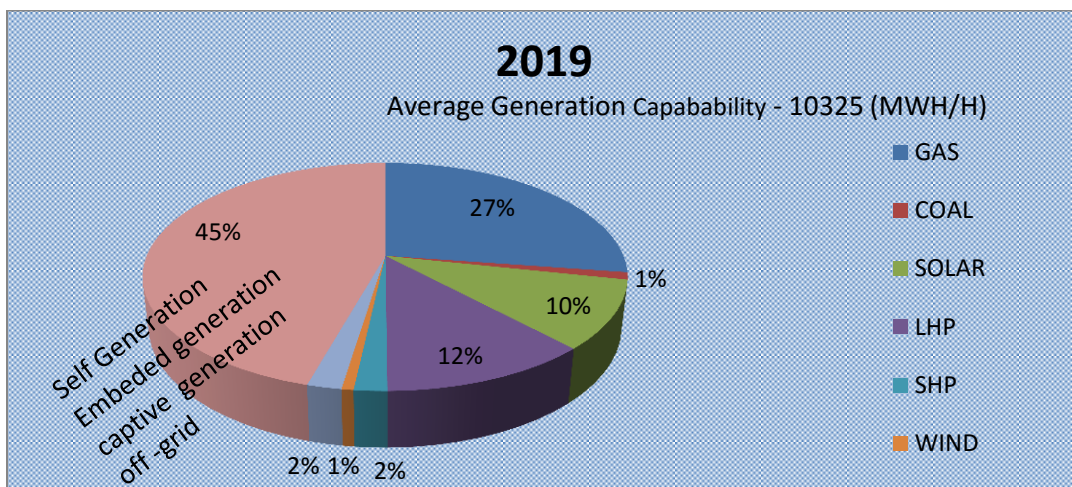
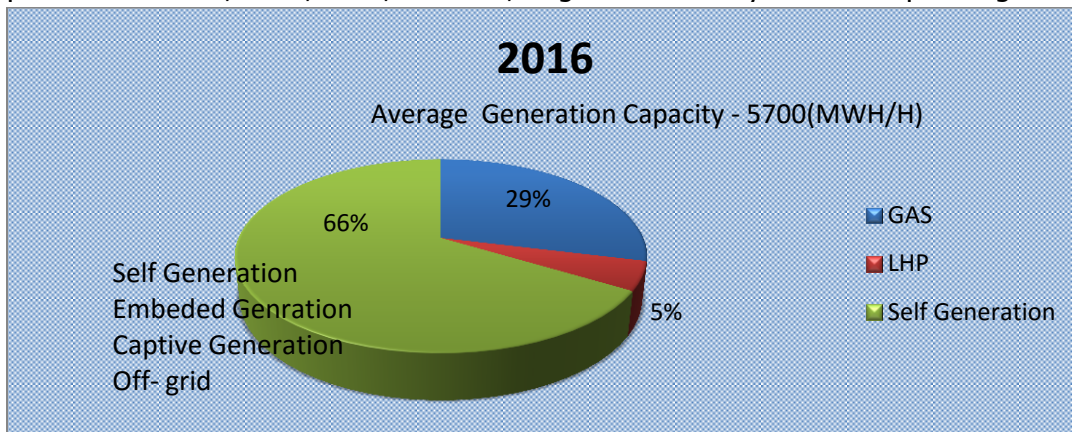


Fig 3: Target Energy Mix

The growth in energy mix would depend on the completion of various hydroelectric power projects funded by the Federal Government of Nigeria and those that are coming under the Private-Public – Partnership arrangement. The large proportion of the energy mix growth would come through other generation arising from already signed number of Power Purchase Agreements (PPAs) with Bulk Trader as well as those coming through new competitive bulk procurement process by electricity producers to meet expected target.

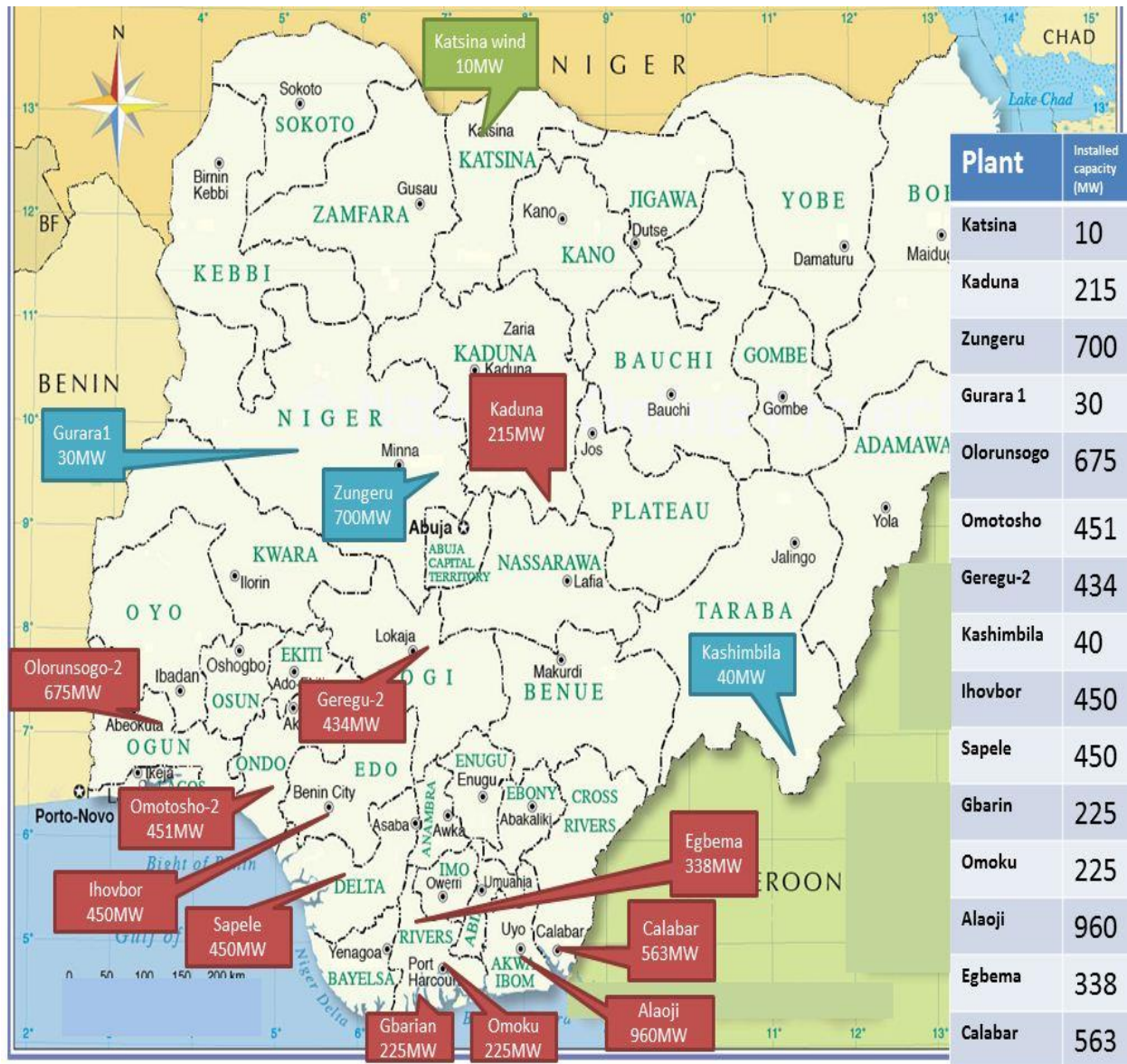


Fig 4: Newly completed/on-going Power Plants for Increased Generation

### 2.3 Current Transmission Status

The transmission sub-sector comprises of 6,680 km of 330kV lines with substation capacity of 10,238 MVA and 9,161 km of 132 kV lines with substations capacity of 11,721 MVA. The total transmission wheeling capacity is 5,300MW this as against 6,600MW capacity that is presently required.

NIGERIAN MAP SHOWING THE EXISTING 330KV & 132KV LINES AS AT MAY 2015

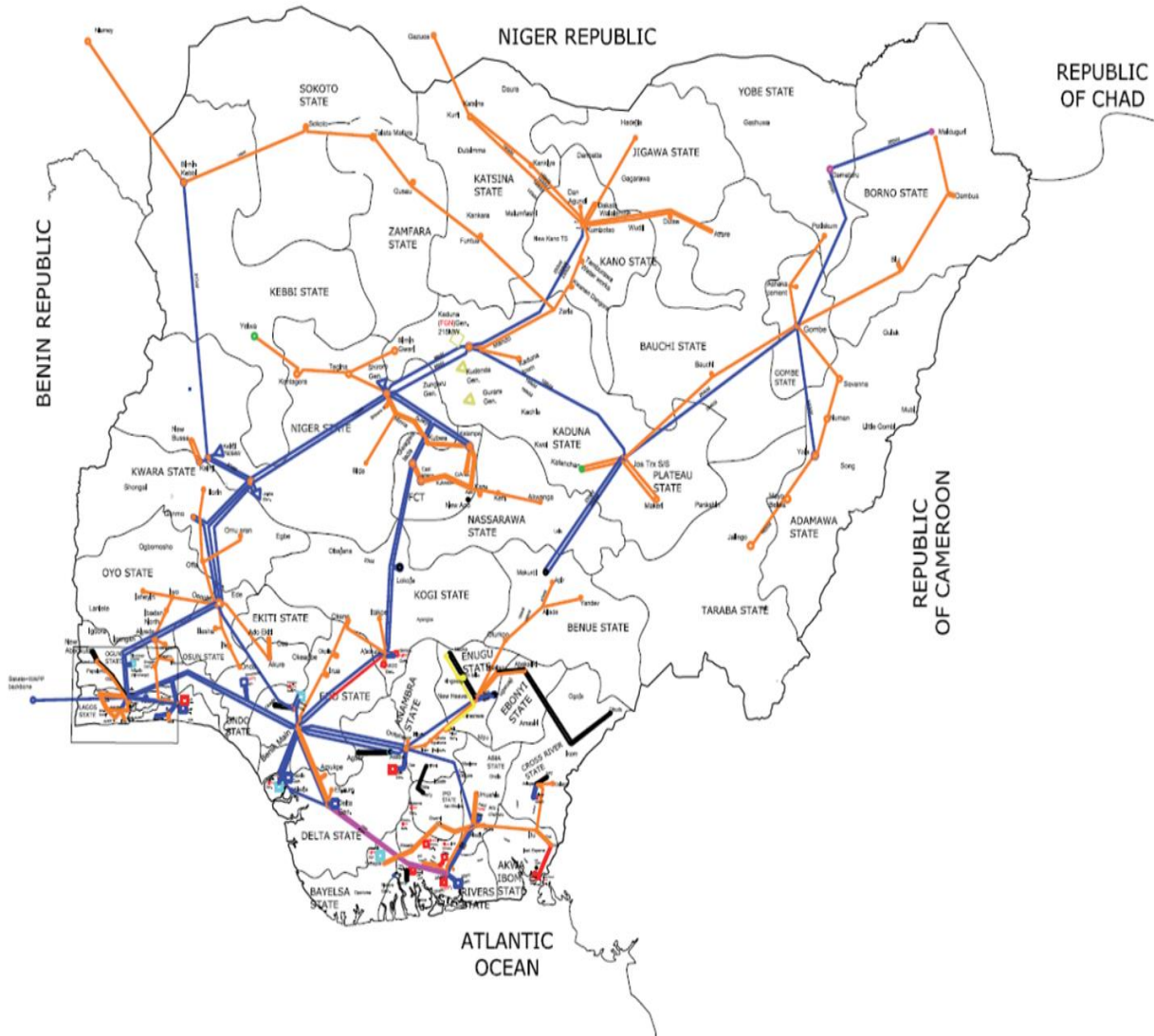


Fig 5: Map of existing transmission lines

6,680 km of 330 kV lines

9,161 km of 132 kV lines

38 no. 330 kV substations

126 no. 132 kV substations

330/132 kV transformer capacity: 10,238 MVA

132/33 kV transformer capacity: 11,721 MVA

Wheeling Capability: 5,300 MW

## 2.4 Transmission Expansion Plan

The Transmission Company of Nigeria has developed a 5- year transmission system expansion plan that covers the period of 2016-2022 and this plan is meant to bring the wheeling capacity of 5,300MW to 20,000MW by 2022 at first instance as part of short term measure and to urgently address the shortfall in transmission sub-sector of electricity supply industry (ESI).

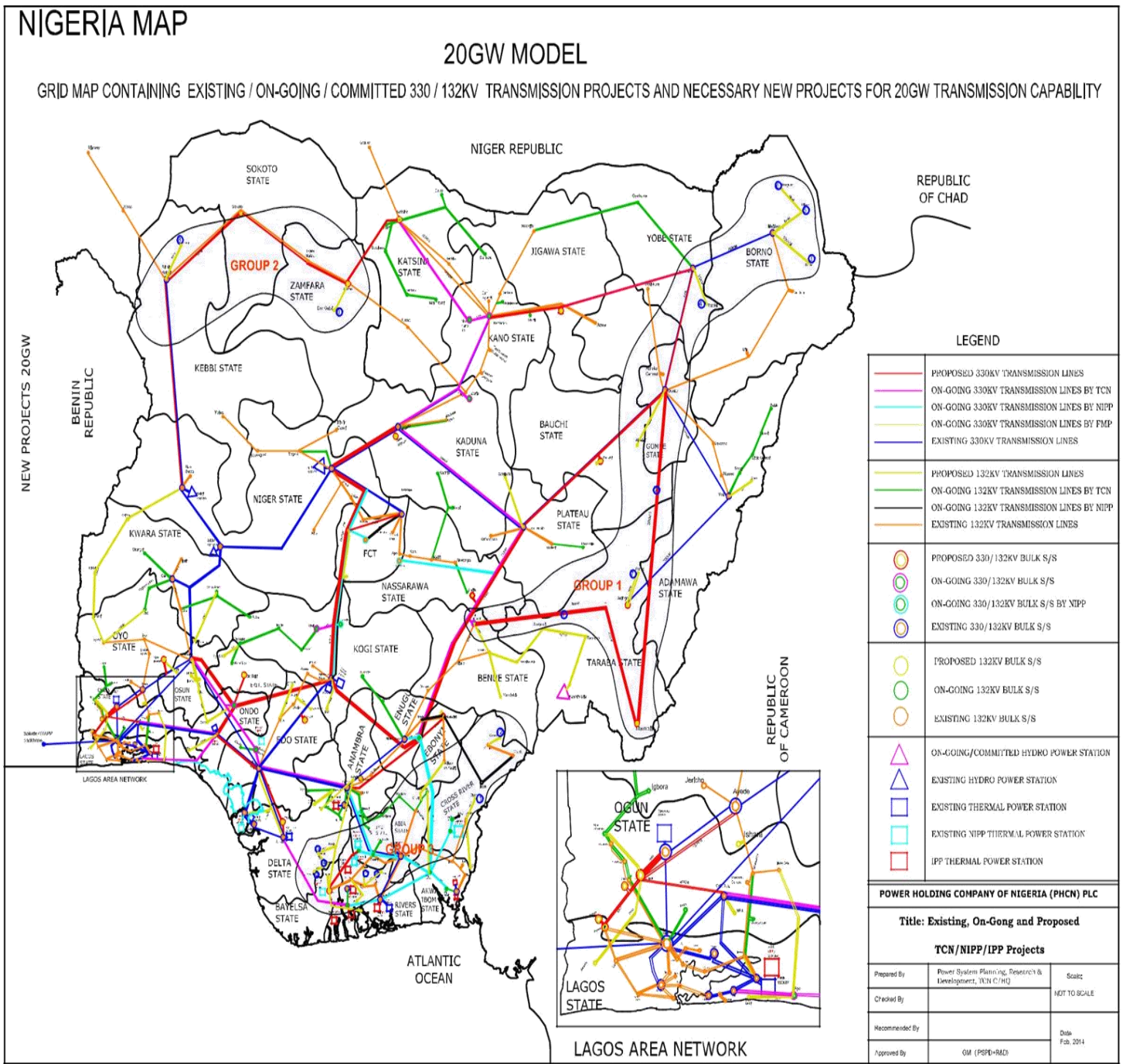


Fig 6: Map of projected Transmission plan



## **CHAPTER III**

### **3.0 INVESTMENT OPPORTUNITIES**

Investment in Nigeria power sector is very attractive due to the growth opportunities in the Nigerian electricity market where demand far outstrips current supply. The potential for strong economic growth is high with population advantage of over 193.4 million. This chapter enumerates in details the investment opportunities, the guidelines, requirements and relevant agencies responsible for issuance of licenses and permits.

#### **3.1 GENERAL REQUIREMENTS FOR INVESTORS**

The following steps are required for investors in the Power Sector:

1. Investors should identify the type of Generation that is, gas fired (thermal), Coal fired Plant, Renewable Energy, including small, medium, and large Hydro, Solar, Wind.
2. Investors must acquire the necessary land for location of their Plant (Site Location)
3. Investors must perform Environmental Impact Assessment (EIA) studies and be fully certified by the Federal Ministry of Environment for environmental Compliance and during the period it is expected that the issues of land acquisition and ownership, Community related issues would have been solved.
4. Investors will perform Power evacuation studies in liaison with the Transmission Company of Nigeria (TCN) to ensure that there is adequate Power evacuation infrastructure. The investor proposing to connect to the National grid operated by the Transmission Company of Nigeria (TCN), either through a new substation, a modification of an existing substation, or in an existing substation has to apply to the Transmission Service Provider (TSP) of TCN. If these requirements for the new connection fall outside, or the timing does not align with the approved Long Term Transmission plan of TCN, the cost for such work shall be borne by the investor.
5. Investors will be required to firm up and prepare their Business plan, to include Capital investment, Operation & Maintenance cost including fuel costs, etc. and come up with a total financial model for their plant.
6. Investors can now engage the Nigeria Electricity Regulatory Commission (NERC), for the issuance of a license. Licenses can be for grid operation or off-grid depending on the off taker involved. The License is required for Generation from 1MW and above.

7. Investors will commence a Power Purchase Agreement (PPA) negotiation with an identified off-taker, or the Nigerian Bulk Electricity Trading Company (NBET) where a total package on a PPA will be negotiated and signed. To do so, an Investors has to meet the following criteria
  - a. For grid-connected generation, PPA with Nigerian Bulk Electricity Trader is required
  - b. For Independent Electricity Distribution Network (IEDN), NERC License is required.
  - c. For embedded generation where the power to be generated is within the network of a particular distribution company, PPA has to be signed with the Distribution Company, with eligible customers or with captive customers, as the specifics of the project dictates.
8. Submission of Outline Business Case (OBC) to Infrastructure Concession Regulatory Commission (ICRC) through the Federal Ministry of Power (FMP) for Unsolicited proposal, while for Solicited proposal FMP to appoint a Transaction Adviser (TA) who will prepare the OBC of the project in-question for onward submission to ICRC for issuance of Certificate of compliance for Federal Executive Councils approval for competitive bidding for Public Private Partnership (PPP).
9. In case an Investor is interested in Engineering Procurement Contracts (EPC) the Ministry's procurement process is in accordance with the Public Procurement Act 2007 through open competitive bidding. Hence, Investor may wish to tender for projects of interest when next the Ministry advertises for procurement in the Federal Tenders Journal and other National Dailies.
10. Investor to be driven by the principle of "closeness to fuel" in order to drive the energy mix and achieve accessibility and sustainability ie. 'Gas' as fuel for southern base Power plants, 'Coal' as fuel for North Central and parts of South East; while 'Solar' and 'Hydro' for many parts of the North and North Central. This does not exclude the use of other fuel for powering electricity in any part of the Country.
11. Investor Builds its plant, and Commissions it in line with the licensing conditions.
12. In line with the provisions of the NEMSA Act 2015 and Statutory Regulations, it is mandatory that All Electrical Installations in Power Plants/Stations, Transmission Networks/Systems, Distribution Networks/Systems, and other Allied Industries and Workplaces where Electricity is used; as well as All Electric Meters and Instruments to be deployed in NESI, are duly Inspected, Tested and Certified fit and safe by electrical inspectors of NEMSA and NEMSA National Meter Test Stations before they can be put to use in Nigeria.

## **3.2 Investment Opportunities in Generation**

### **3.2.1 Gas**

- Gas Gathering opportunity for Domestic and export use: Current estimates show that about 187Tscft of associated and non- associated gas reserve exist in the country, making Nigeria the 9<sup>th</sup> largest gas reserve holder in the world with Associated gas making up about 88.8Tscft or 49.2%, while Non – Associated gas make up of 91,7Tscft or 50.8% of gas reserve in Nigeria. Nigeria gas production is about 8.5bscft/day. (41%) of this is exported, 2.3bscft/day (28%) is used domestically for power and industries, 1.2bscft/day (15%) is used upstream for gas re-injection, while the balance 0.8bscft (10%) is flared.
  
- Gas Transportation: Presently there is grossly inadequate pipeline infrastructure, most especially to the newly developed power plants and upcoming IPPs as well as industries. Several thousands of kilometres of pipelines would be needed to meet present gas use. This includes:
  - a. Over 5,000km of new gas pipelines to be laid
  
  - b. About 5000km of existing lines to be replaced
  
- Provision of surveillance of pipeline against vandalism: Real time system monitoring of pipeline, detecting, locating and quantifying pipeline leakages.

### **3.2.2 Gas Fired-Power Plant**

Currently, the Nigerian gas-to-electricity has over 1,000km of pipelines supplying about 600mmsf/day to power stations, while the gas requirement is about 2,699mmscf/day and pipeline of about 5000km for existing power stations, this shows a wide shortfall of gas to generate electricity. Based on the above gas power expansion plan to year 2020 is part of overall energy mix to increase generation from current 5,000MW gas thermal plants to above 15,000MW of gas fired plant.

# GAS WELL LOCATIONS AND TRANSPORTATION INFRASTRUCTURE

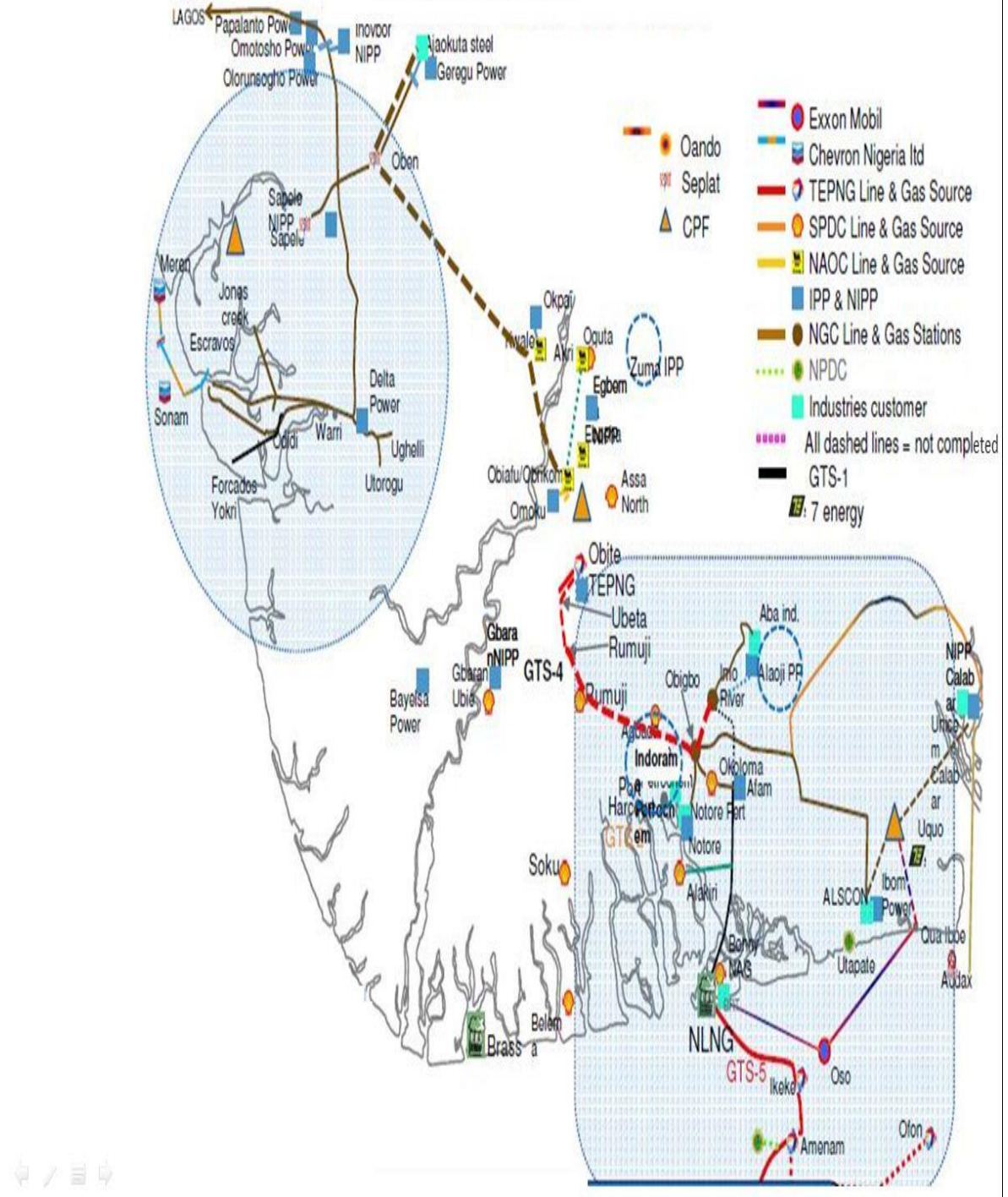


Fig. 1: Map of showing Gas locations, existing and planned pipeline infrastructure

Table 1: Gas requirement for existing power stations

<b>GAS REQUIREMENT FOR EXISTING POWER STATION</b>					
<b>S/N</b>		<b>STATIONS</b>	<b>INSTALLED CAPACITY (MW)</b>	<b>NO. OF UNITS</b>	<b>GAS REQUIREMENT (MMSCF)</b>
1	<b>PRIVATISED PHCN COMPANIES</b>	EGBIN	1,320	6	352
2		SAPELE	720	10	192
3		DELTA	765	18	204
4		AFAM IV-V	300	8	80
5		GEREGU GAS	435	3	116
6		OMOTOSHO GAS	337	8	90
7		OLORUNSOGO GAS	336	8	90
8	<b>NIPP</b>	GEREGU NIPP	435	3	116
9		SAPELE NIPP	500	4	133
10		ALAOJI NIPP	504	5	134
11		OLORUNSOGO NIPP	750	6	200
12		OMOTOSHO NIPP	500	4	133
13		ODUKPANI NIPP	625	5	167
14		IHOVBOR NIPP	450	4	120
15	<b>IPP</b>	OKPAI	480	3	128
16		AFAM VI	695	4	185
17		IBOM	198	3	53
18		A.E.S	224	9	60
19		ASCO	110	2	29
20		OMOKU	150	6	40
21		TRANS AMADI	136	4	36
22		RIVERS IPP	150	6	40
		<b>TOTAL</b>	<b>10,120</b>	<b>129</b>	<b>2,698</b>
<b>3.75MW IS EQUIVALENT TO 1MMSCF</b>					

### **3.2.3 Gas Investment Requirement**

Apart from General requirements, the investment in gas fired power plant or gas processing require the following statutory documents namely:

- Gas aggregate Supply Agreement (GSA) with, Nigerian National Petroleum Company (NNPC), IOCs and Gas Aggregation Company of Nigeria
- Gas Transportation Agreement with Nigeria Gas Company (NGC): Letter from a potential fuel supplier and transporter indicating the inclusion of the fuel needs of the applicant in the supply plans of the fuel supplier and transporter.

### **3.2.4 Names of the Relevant Agencies, Contact address and documents required**

#### **3.2.5 Nigeria National Petroleum Company (NNPC) - Responsible for Gas Supply Agreement**

Address: NNPC Tower, Herbert Macaulay,  
Central Business District, Central, Abuja,  
Website: [www.ngc-nnpcgroup.com](http://www.ngc-nnpcgroup.com)

#### **3.2.6 Gas Aggregation Company of Nigeria - Responsible for Gas Supply Agreement**

1 B Malcolm Fraser Street,  
Asokoro, Abuja: Website: [www.ngc-nnpcgroup.com](http://www.ngc-nnpcgroup.com)

#### **3.2.7 Nigeria Gas Company (NGC) – Responsible for Gas Transportation Agreement**

NNPC Towers, Central Business District,  
Herbert Macaulay Way,  
P.M.B. 190, Garki, Abuja.  
[webmaster@nnpcgroup.com](mailto:webmaster@nnpcgroup.com)

### **3.3 Investment in hydropower generation**

According to Energy Commission of Nigeria (ECN) and Transmission Company of Nigeria (TCN), the hydro power potential of Nigeria stands at about 14,000MW. This comprises of large, medium and small scheme hydropower across the length and breadth of the country.

#### **3.3.1 Investment in Large Hydropower**

Feasibility studies on Hydro power in Nigeria have shown the massive investment potential dormant within the nation's rivers and estuaries site as itemized in the table below.

**Table 2: Identified Large Hydropower Potential Sites in Nigeria**

S/No	Site	River	Technical Feasible Capacities (MW)	Average Annual Energy(GWH)	Category
1	Mambilla	Donga	3600	17,342	Large
2	Lokoja	Niger	1,950	8,540	"
3	Onitsha	Niger	750	3,250	"
4	Markudi	Benue	600	4,750	"
5	Ikom	Cross	400	1,750	"
6	Yola	Benue	350	1,530	"
7	Katsina-Ala	Katsina-Ala	260	1,140	"
8	Beli	Taraba	240	1,050	"
9	Donka	Niger	225	984	"
10	Karamti	Taraba	200	875	"
11	Amper	Amper (Plateau)	200	-	"
12	Afikpo	Cross	180	790	"
13	Atan	Cross	180	790	"
14	Garin Dali	Taraba	135	590	"
15	Gembu	Donga	130	570	"
16	Manyo yin	Taraba	65	284	"
17	Kam	Taraba	60	220	"
18	Suntai	Donga	55	240	"
19	Su	Taraba	45	200	Medium

20	Sakin Danko	Suntai	45	200	''
21	Gudi	Mada	40	180	''
22	Kiri	Gongola	40	150	''
23	Richa I	Mosari	35	150	Medium
24	Kombo	Gongola	35	150	''
25	Gwaram	Jama`are	30	130	''
26	Ifon	Osse	30	130	''

*Source: 25 years NEPA power system Dev. Study by Oladipo Illumoka and Associate Tractebel Engineering International, Belgium, 1988 and NWRMP Study.*

Note: For Mambilla hydropower scheme: The bankable feasibility study has been completed by Lahmayer International of Germany for Federal Ministry of Power, Works and Housing.



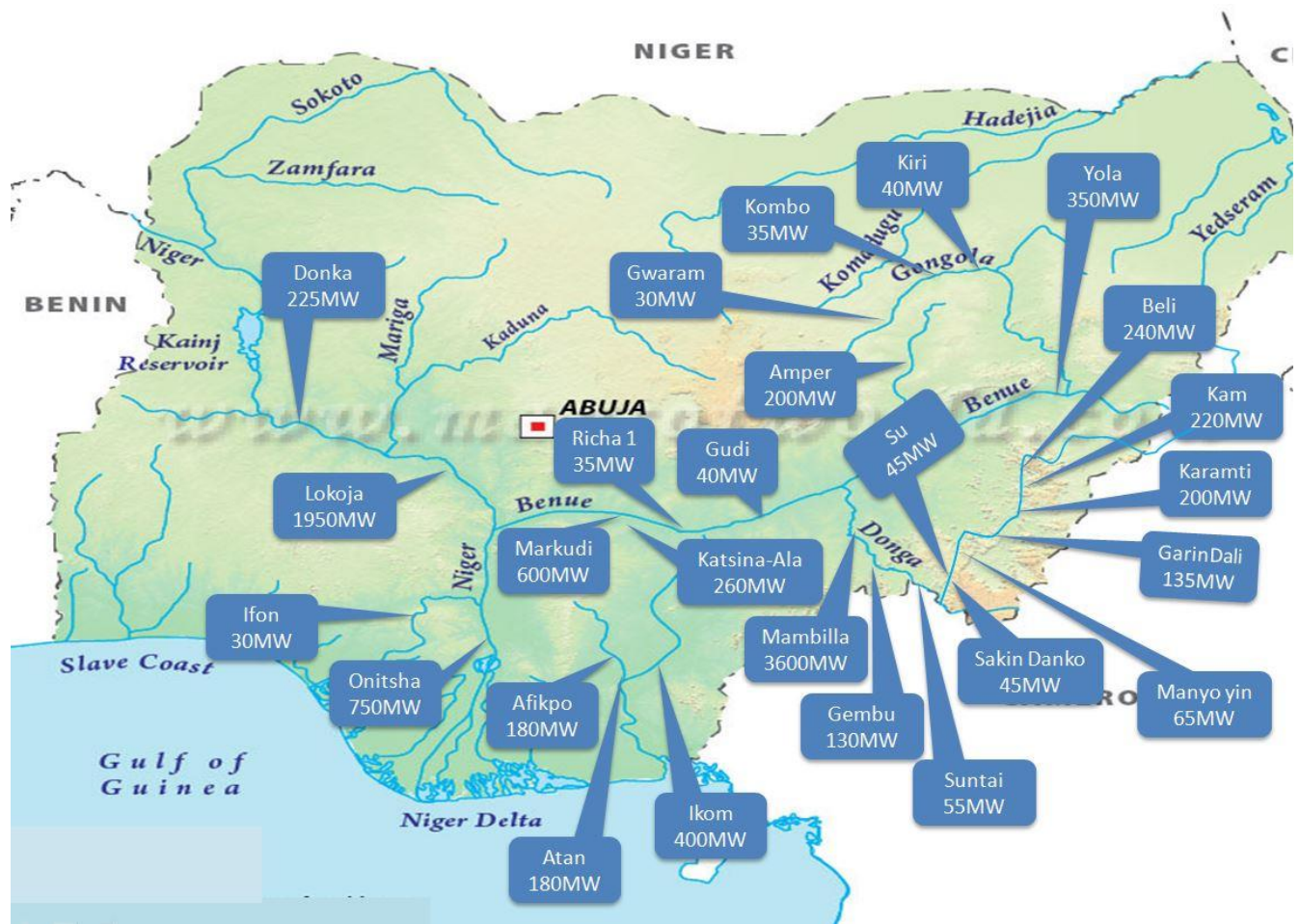


Fig 2: Map showing the Identified Potential Large and Medium hydropower Sites for Investment in Nigeria

### 3.3.2 Investment in Small Hydropower Generation

The fastest way to investing in small hydro in Nigeria lies with converting existing dams to hydro power stations. To this end, there are already over 25 small dams distributed across Nigeria capable of generating about 30MW if converted to hydro power plants. These plants have the capability of feeding into the embedded generation methodology, providing additional power to the distribution companies within their locations.

### 3.3.3 Investment in Eco System

Another investment opportunity is the ability to create a whole new eco system built on the ability to irrigate agricultural produce. Private investors are to work with the Government in securing viable sites, enabling the legal framework, and most importantly liaising with the State Governments where these stations will be situated to have a cohesive strategy towards water and agricultural management. The scope exists for private investors to cooperate with the Ministry of Power, Works

and Housing, the Ministry of Water Resources, the Ministry of Agriculture and the Ministry of Industry, Trade and Investments and Federal Ministry of Environment. Such coordination can lead to a holistic framework that provides power for processing agriculture while creating paying customers that generate the revenue stream that makes the investment more remunerative.

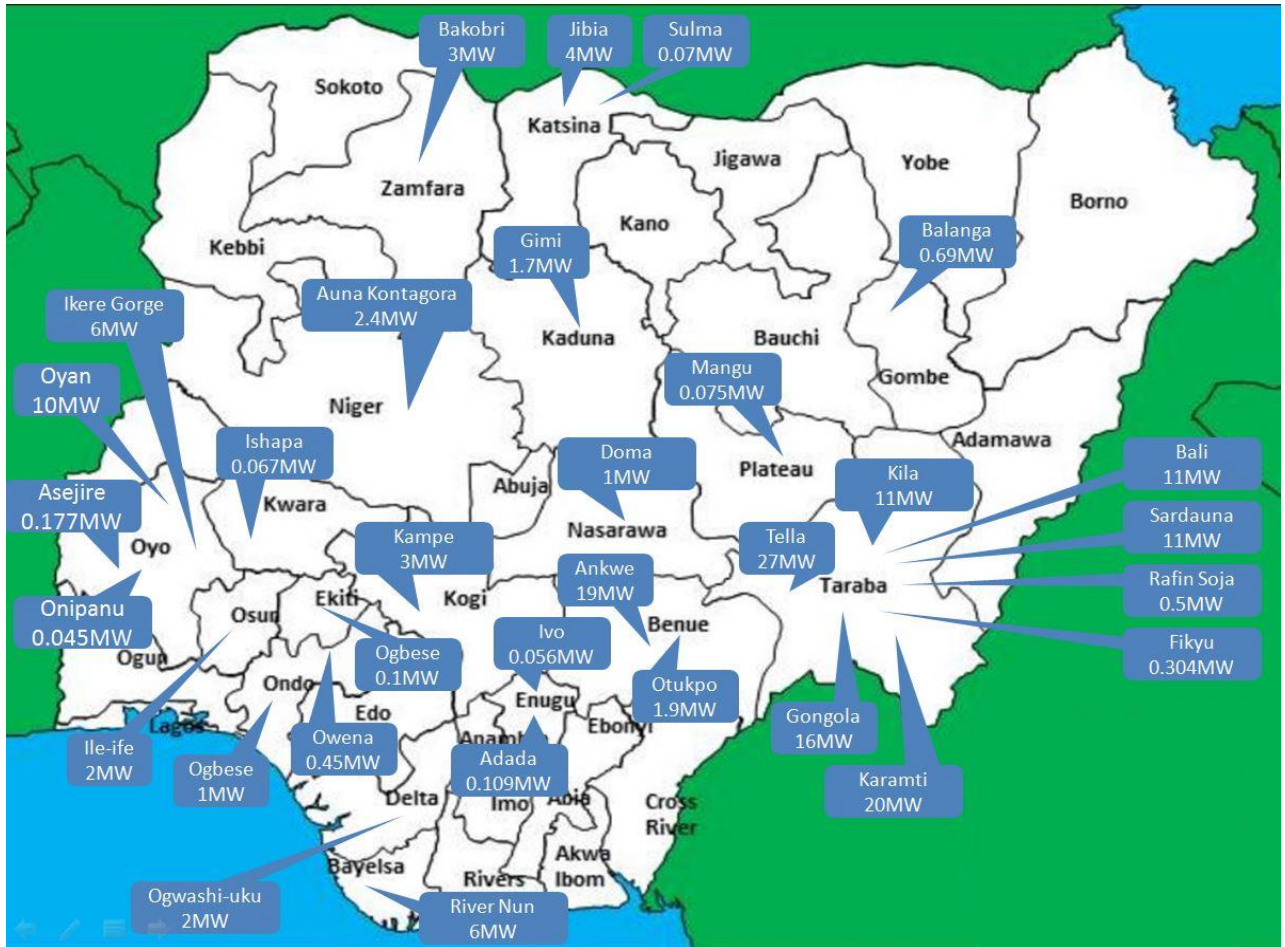


Fig 3: Map showing location of small hydropower potential across Nigeria.

Table 3: Identified Small Hydropower Potential Sites with Population around location

S/N	DAM	CAPACITY(MW)	STATE	POPULATION
1	Oyan	10	Oyo	7,840,864
2	Ikere Gorge	6	Oyo	7,840,864
3	Bakobri	3	Zamfara	4,515,427
4	Kampe	3	Kogi	4,473,490
5	Owena	0.45	Ondo	4,671,695
6	Doma	1	Nassarawa	2,523,395
7	Jibia	4	Kastina	7,831,319
8	Gimi	1.7	Kaduna	8,252,366
9	Ile-Ife	2	Osun	4,705,589
10	Ogbese	1	Ondo	4,671,695
11	Ogwashi-uku	2	Delta	5,663,362
12	AunaKontagora	2.4	Niger	5,556,247
13	Kila	11	Taraba	3,066,834
14	Karamti	20	Taraba	3,066,834
15	Bali	11	Taraba	3,066,834
16	Sardauna	11	Taraba	3,066,834
17	Tella	27	Taraba	3,066,834
18	Ankwe	19	Benue	5,741,815
19	Gongola	16	Taraba	3,066,834
20	Rafin Soja	0.5	Taraba	3,066,834
21	Sulma	0.07	Kastina	7,831,319
22	Balanga	0.69	Gombe	3,256,962
23	Ishapa	0.067	Kwara	3,192,893
24	Onipanu	0.045	Oyo	7,840,864
25	Mangu	0.075	Plateau	4,200,442
26	Ogbese	0.1	Ekiti	3,270,798
27	Adada	0.109	Enugu	4,411,119

28	Ivo	0.056	Enugu	4,411,119
29	River Nun	6	Bayelsa	2,277,961
30	Otukpo	1.9	Benue	5,741,815
31	Asejire	0.177	Oyo	7,840,864
32	Fikyu	0.304	Taraba	3,066,834

**Table 4 - Technical Parameters of Some Identified Small hydropower sites.**

S/N	PROJECT/ LOCATION	TECHNICAL PARAMETERS												
		DAM						POWER PLANT					POWER EVACUATION PLAN	
		PRIMARY PURPOSE	RESERVOIR CAPACITY	MAX. HPP WATER DEMAND (MCM)	DESIGN FLOW (m3/sec)	HEAD	DAM STATUS	TURBINE TYPE/NO.	GENERATOR VOLTAGE (kV)	PLANT OPERATION (ADD) (hrs)	POWER	ENERGY	OFF GRID	ON GRID
(MCM)	(min - max) (m)		(kW)			(kWh)								
1	Rafin Soja Dam Taraba State	Irrigation	0.3	Pumped Storage	2	20	Under Construction	Ossberger Crossflow /2	0.415	NP	500	1,600,000		Yes
2	Sulma Dam Katsina State	Irrigation, Water Supply	4.3	N/P	1.003	10	Under Construction	Kaplan Horiz. Turbines /2	0.4	24	70.22	251,579	Yes	
3	Balanga Dam	Irrigation, Water Supply	72.6	N/P	5	19.7	Completed	Francis (No. 2)	0.4	24	690	4,539,000	N/P	N/P
4	Gimi Earth Dam Kaduna State	Irrigation	54.52	N/P	4.1	13	Existing	Kaplan /5	0.415	24	1,672	12,096,132	Yes	
5	Ishapa Dam Kwara State	Water Supply	2.5	1.4	1.1	8	Completed	Francis (No. 1)	11	NP	67	44.6	N/P	N/P
6	Onipanu Dam Oyo State	Water Supply	1.5	N/P	0.75	5	Completed	Francis (No. 1)	11	NP	45	29	N/P	N/P
7	Mangu Dam Plateau State	Irrigation, Water Supply, Flood Control, Fishing	9.1	4.1	1.2	7.6	Under Construction	Crossflow /2	0.415	NP	70	5,518,800	Yes	
8	Ogbese Dam Ekiti State	Water Supply	307	223.8	10	6.6	Under Construction	Kaplan Horizontal /3	0.4	NP	1000	N/P	Yes	
9	Ogwashe Uku Delta State	Water Supply	469.25	394.1	14.38	11.5	Under Construction	4	11	21	2000	9,198,000	Yes	
10	Adada Dam Enugu State	Water Supply, Irrigation	3	N/P	1.45	14	Under Construction	Kaplan/2	N/P	NP	109	954,840	Yes	
11	Ivo Dam Enugu State	Water Supply, Irrigation	3	N/P	1.7	6	Under Construction	Kaplan/2	N/P	NP	56	490,560	Yes	
12	Auna Kontagora Dam, Niger State	Irrigation	300	N/P	15.58	18	Under Construction	Kaplan /4	6.3	NP	2,384	21,024,000		Yes
13	River Nun (Run-off) Bayelsa State	Power Generation	No Dam (Run-off River)	7.98	23.26	10	No Dam	Kaplan	11	NP	6,000	175,250,000		Yes
14	Otukpo Dam Benue State	Water Supply, Irrigation	132.4	N/P	20	13.74	Under Construction	Kaplan/3	6.3	NP	1,900	4,940,000		Yes
15	Asejire Dam Oyo State	Domestic Consumption	32.58	N/P	1.55	13	Completed	Horizontal Francis/No. 1	11	NP	177	630,000		Yes
16	Fikyu Dam Taraba State	Irrigation, Water Supply	48.9	N/P	4.9	18	Under Construction	Kaplan /2	11	24	304.5	1,025,576	Yes	
17	Ile-Ife Dam Osun State	Water Supply	28.7	N/P	13.06	20	Under Construction	Kaplan/2	11	NP	2000	60,000,000		Yes

### **3.3.4 Investment Guideline and Requirements for Hydropower Generation**

After meeting up the general requirements, the following steps are required:

- All water ways belong to the Federal Government of Nigeria and Federal Ministry of Water Resources (FMWR) is the custodian.
- FMWR is vested with the responsibility of issuing Water Rights to investors for Hydropower generation, fisheries etc.
- Investors interested in Small, Medium and Large Hydro power projects after completing their Feasibility Studies, are expected to apply for water usage rights from the Federal Ministry of Water Resources or any of its Agencies or Commission empowered to do so.
- Investors interested in Small, Medium and Large Hydro require Water Concession Agreement for water right.

### **3.3.5 Name of the Agencies, Contact address and required documents**

Federal Ministry of Water Resources -Responsible for Water License

Federal Ministry of Water Resources

Old Secretariat

Area I, Garki Abuja;

Website: [www.waterresources.gov.ng](http://www.waterresources.gov.ng)

### **3.4 Investment in Coal – Fired Power Generation**

Nigeria is endowed with an estimated Coal reserve of over two billion metric tons. 12.8 million tons of sub-bituminous coal that can power 10,000 MW power plant for 30 years. There are existing coal mines in the country, most of which are under concession by the Federal Government. The Ministry of Solid Minerals has covered 100 Cadastral Units each for the identified Ashokpa – Odolu coal block in Idah Local Government Area of Kogi State and Kumuyel - Futuk Coal block in Gombe States/Bauchi State for the proposed Coal to Power project investments. However, detailed exploration is needed to be executed on both locations/deposits. Interested investors are to liaise with Federal Ministry of Solid Minerals Development for further details of project implementation. The table below shows the locations of the coal mines with the type of coal and the estimated amount of deposits which are suitable locations for coal power plants.

Table 5: Potential Coal Block

S/N	MINE LOCATION	STATE	TYPE OF COAL	PROVEN RESERVE (MT)	BORE-HOLE RECORDS	COAL OUTCROP SEAM THICKNESS (M)	DEPTH OF COAL (M)
1	Okpara Mine	Enugu	Sub-bituminous	24	20	Many(1.5M)	180
2	Onyeama Mine	Enugu	Sub-bituminous	22.4	20	Many (1.5M)	140
3	Ihioma	Imo	Lignite	N.A	Nil	Many	20-80
4	Ogboyaga	Kogi	Sub-bituminous	107	31	17(0.8-2.3m)	20-100
5	Ogwashi-saba Obamkpa		Lignite	63	7	4(3.5M)	15-100
6	Ezimo	Enugu	Sub-bituminous	56	4	(1.3m)	80
7	Inyi	Enugu	Sub-bituminous	20	4	(0.9-2.0)m	25-27
8	Lafia/Obi	Nassarawa	Bituminous (Cokable)	21.42	123	(1.3m)	80
9	Obi/Nnewi	Anambra	Lignite	N.A	3	N.A	20-100
10	Afikpo/Okigwe	Ebonyi/ Imo	Sub-bituminous	N.A	Nil	N.A	20-100
11	Amansiodo	Enugu	Bituminous	N.A	3	N.A	563
12	Okaba	Kogi	Sub-bituminous	73	Many	(0.8-2.3m)	20-100
13	Owukpa	Benue	Sub-bituminous	57	Many	(0.8-2.3m)	20-100
14	Maiganga	Gombe	Sub-bituminous	>50	Many	0.1-6.1m	10-60
15	Doho/Molko	Gombe	Lignite/ Sub-bituminous	NA	7	0.1-1.3m	20-30
16	Omelewu (Imane)	Kogi	Sub-bituminous	25	25	0.1-5.2m	4-60
17	Lamza-Chikila	Adamawa	Sub-bituminous	NA	NA	Nil	NA

18	KurumuPindiga	Gombe	Sub-bituminous	NA	NA	Nil	NA
19	GindiAkwati	Plateau	Sub-bituminous	NA	NA	Nil	NA
20	Janata Koji	Kwara	Sub-bituminous	NA	NA	Nil	NA
21	Enugu Ezike	Enugu	Sub-bituminous	NA	NA	NA	NA
22	Akpanya-Ogboligbo (Igalamela LGA)	Kogi	Sub-bituminous	NA	NA	NA	NA
23	Akunza-Duduguru C	Nasarawa	Sub-bituminous	NA	NA	NA	NA
24	Akpuneje/Onyagede	Benue	Sub-bituminous	NA	NA	NA	NA
25	Janata Koji	Kwara	Sub-bituminous	N.A	N.A	Nil	N.A
26	Ashokpa-Odolu	Kogi	Sub-bituminous	N.A	N.A	N.A	N.A
27	Ebeje-Irabor	Kogi	Sub-bituminous	N.A	N.A	N.A	N.A
28	Akpacha-Ajadoma C	Kogi	Sub-bituminous	N.A	N.A	N.A	N.A
29	Ikpo-Abacha	Kogi	Sub-bituminous	N.A	N.A	N.A	N.A

Ministry of Solid Minerals

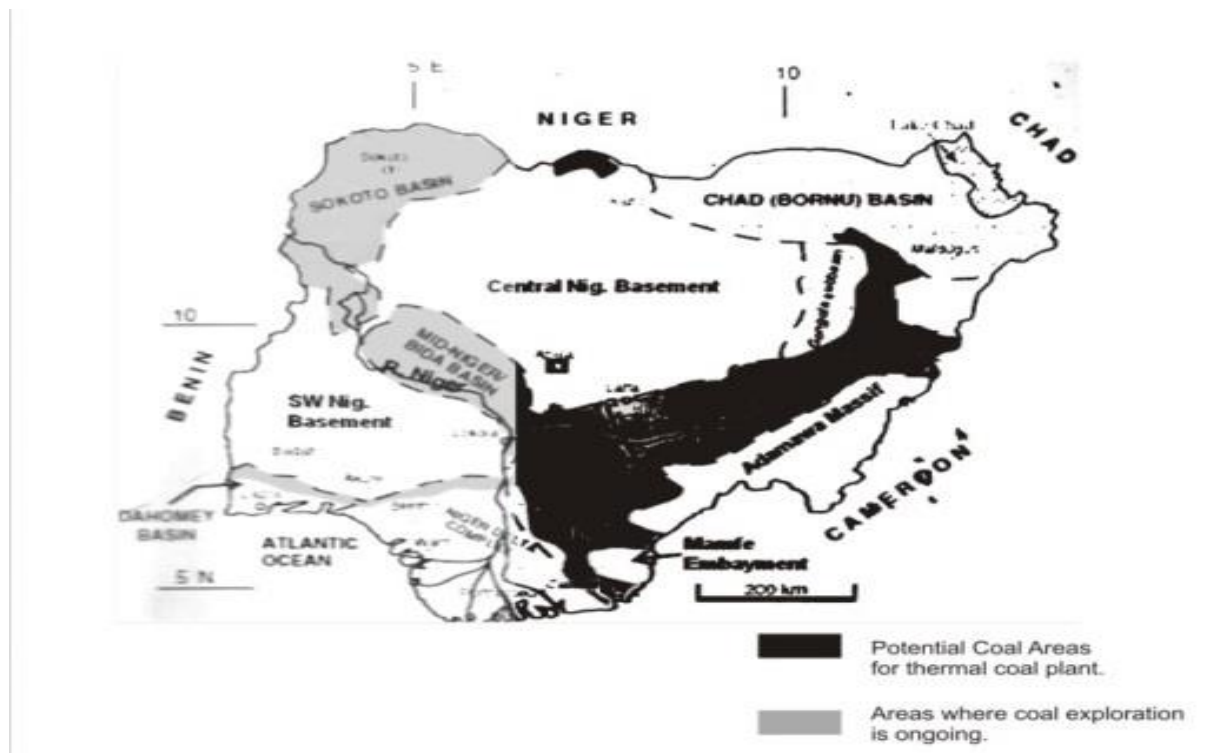




Fig 4. Map showing coal belt distribution in Nigeria

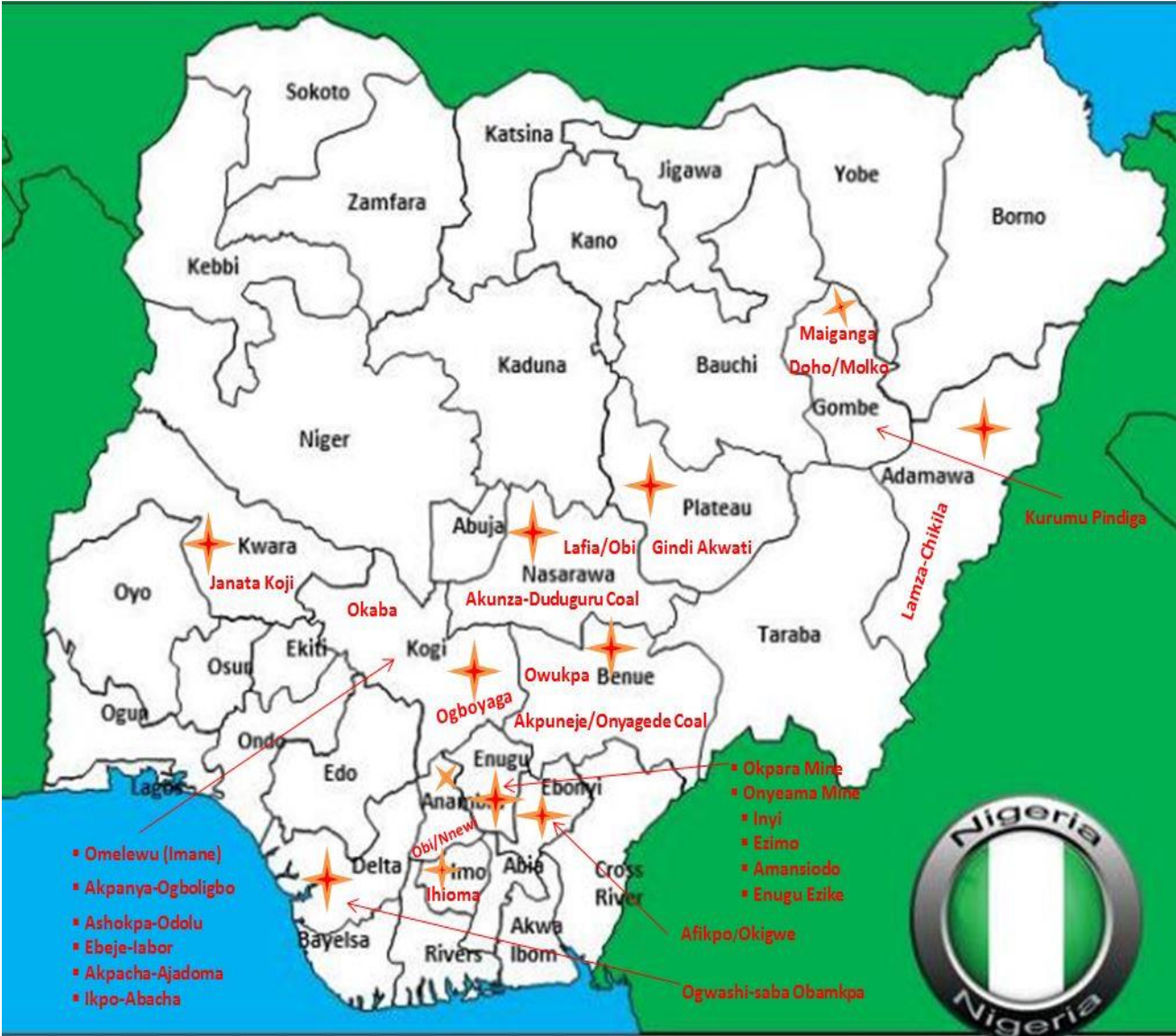


Fig. 5: Map showing various coal blocks across Nigeria

**3.4.1 Investment Guideline and Requirements for Coal- Fired Generation**

After meeting up the general requirements, the following steps are required for Coal – Fired power generation:

- Coal Blocks Concession Agreement and Transportation Agreement from Federal Ministry of Mines and Steel Development; or with Private owners of Coal Block
- Analysis by a reputable Independent Company of the Coal site intended to be developed; or

- Development of the deposit for commercial exploitation.

### **3.4.2 Name of the Agencies, Contact address and required documents**

Federal Ministry of Solid Minerals Development- Responsible for Coal Block concession Agreement and Transportation Agreement

Federal Ministry of Solid Minerals Development  
2 Luanda Crescent, Plot 360, Adetokumbo Ademola Crescent  
WuseII, Abuja

Website: [www.mmsd.gov.ng](http://www.mmsd.gov.ng)

OR National Steel Raw Materials Exploration Agency,  
18 Rahab Road, Malali Village, Kaduna

## **3.5 Investment opportunities in other Renewable Energy.**

### **3.5.1 Solar**

Northern Nigeria has some of the highest solar irradiation in the world. Solar power plants are environmentally friendly as they emit no carbon into the atmosphere. They have a much shorter construction time than conventional plants. The technologies involved in developing a solar plant have been evolving rapidly reducing the cost over a short period of time.

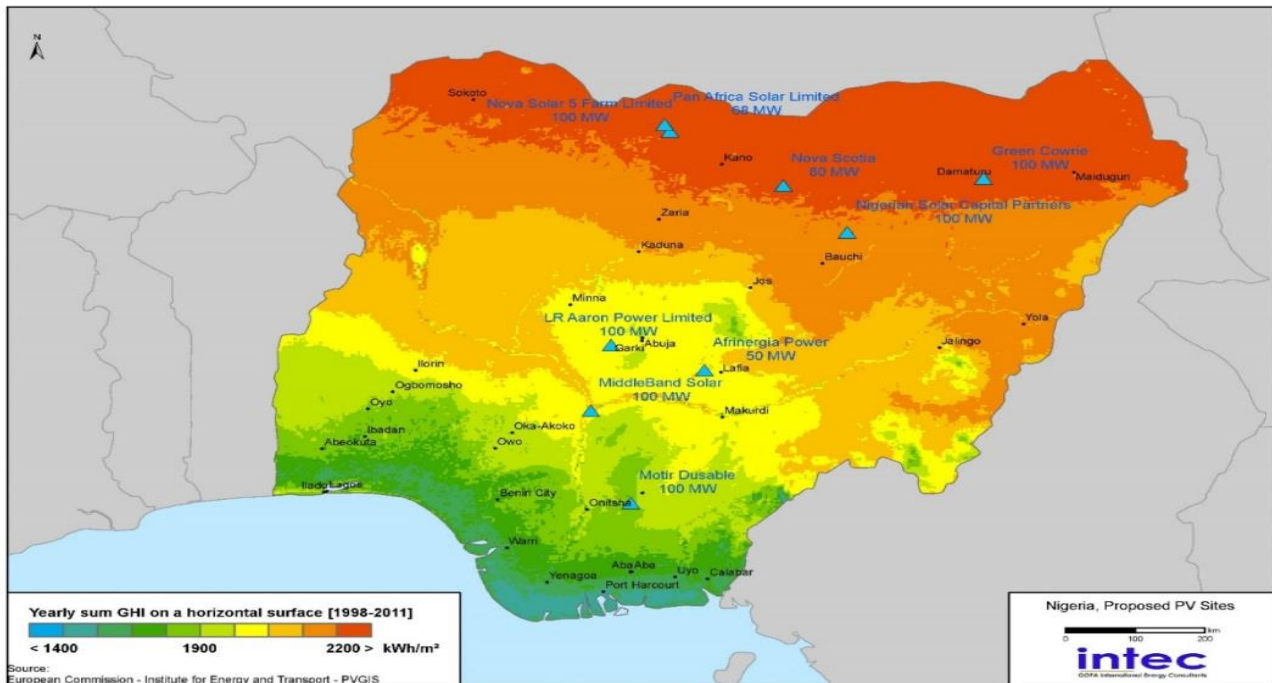


Fig .6: Nigeria’s Solar Global Horizontal Irradiance and Potential Power Generation Projects

Quite a number of feasibility studies that have been done on the solar space in recent years and they are available for investors’ perusal. Fig. 4 show cases some of the proposed location for solar PV power plants. As shown, the best yields are in the northern part of the country where the irradiation exceeds 2200KWh/m<sup>2</sup>, the southern part of the country also have good yields at some certain area.

Investments in the solar space would mainly focus on building power plants and feasibility studies on areas with good yields. The procurement of solar power is moving to the competitive stages whereby the capacity is competitively procured. This would enable more players to participate and ultimately make it more popular in Nigeria by driving down the cost.

### **Preliminary Designs for Identified Solar Projects**

#### **(a) Preliminary Design for Solar 5 MW power project in Taraba State**

The proposed Solar PV Power Plant in Wukari Town Taraba State is located at Latitude 7°53’42” N and Longitude 9°47’59”E on a 2,250,000m<sup>2</sup> (1.5 x1.5km) parcel of land privately owned.

#### **(b) Preliminary Design Report for Solar 5MW power project in Bida- Niger State**

The proposed Solar Power Plant in Bida Town is located along Km8 Bida – Lemu road on latitude 9° 52’ 20” N and longitude 6° 16’ 98” E with an available land mass of 1.8 x 1.8km (3,240,000m<sup>2</sup>). The proposed technology to be deployed is PV Solar modules (Mono Crystalline Type).

### 3.5. 2 Wind

Nigeria has good wind resources in certain states that stretch from the middle belt to the Northern plains. Currently, there is a 10MW wind power plant under development in Katsina which is near completion and will be commissioned soon. NBET is in negotiations with JBS Wind power for the construction of a 100MW Wind-power farm in Plateau State.

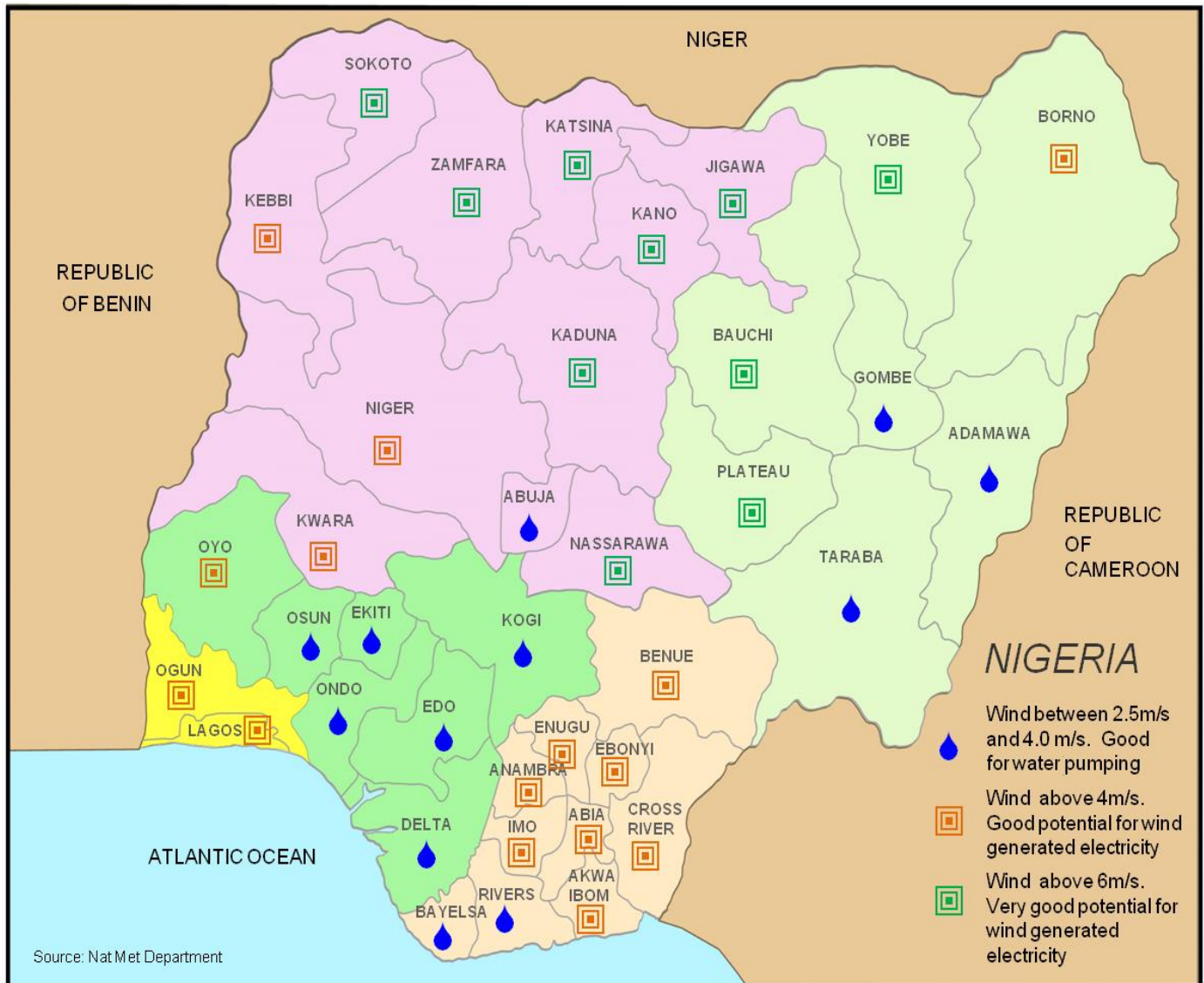


Fig. 7: Map of wind Potential Distribution in Nigeria

Wind power has little or no emissions; it does not require fuel to power its turbines. It has a shorter construction time when compared to other technologies of power generation and it also has very low maintenance cost. The northern states in Nigeria have best potentials for wind generation. Investors can key into the high wind potentials indicated in Fig. 5 and vast land area in the northern part to set up wind power plants.

### 3.5.3 Biomass

Nigeria has a population of 193.4million people and generates waste on a daily basis. Biomass power plants are especially useful for waste that is not bio-degradable which make up most of the waste in landfills. It serves areas with high population density that generates the most waste by transforming the waste generated into energy used to power homes and businesses. Fig. 6, pg.7 shows the population density and clusters in Nigeria. As shown above, Lagos state is obviously the most populated with over 15 million residents which in turn generates the most waste. These wastes can ultimately be harnessed into electricity through a biomass power plant, production bio-fuel and ethanol. Other states with adequate population to generate waste for biomass power are Anambra, Kano, Imo, Enugu, Osun and Ekiti States.

### 3.5.4 Investment Guideline and Requirements for solar, Wind and Biomass Generation

After meeting up the general requirements, the following steps are required for Solar and Wind:

- Investors interested in either Solar or Wind Power projects require Energy Yield Report with on-site measurement by a reputable Independent Company (Micro sizing);
- Proof of minimum of six (6) months on – site measurement for Solar and wind
- Proof of Waste Supply Agreement and transportation agreement for Biomass generation.

### 3.5.5 Name of the Agencies, Contact address and required documents

#### 3.5.6 Federal Ministry of Power, Works and Housing

Federal Secretariat Complex Phase 1 Annex 3  
Shehu Shagari Way P.M.B 278,  
Central Business District, Abuja, FCT

#### **NERC Headquarters**

Adamawa Plaza,Plot 1099, First Avenue  
Off ShehuShagari Way, Central Business District  
P.M.B. 136, Garki, Abuja, F.C.T,Nigeria  
+234-9-4621400; +234-9-4621410  
Email: [info@nercng.org](mailto:info@nercng.org); <http://nercng.org>

- ii. **Federal Ministry of Environment** – Responsible for Environmental Impact Assessment.

Block C, Mabuchi,  
FCT, AbujaNigeria

+234-09-5233611 ; +234-09-5233611

### 3.6 INVESTMENT OPPORTUNITY IN TRANSMISSION AND DISTRIBUTION

The national grid, which comprises of 330 kV and 132 kV networks currently, has a wheeling capability of 5,300 MW under constrained loading conditions. The network lacks adequate redundancy, which creates instability and frequent outages. Due to the paucity of fund through the Federal Government Budgetary funding, the sector is seeking for different models of financing through contractor finance of new transmission projects, Rehabilitate Operate and Transfer (ROT) and Management Contract. The expected Grid development plan is shown in table below

Table 6: Expansion plan

Year	Expected Grid Capacity MW
2016	6,600
2018	10,000
2020	13,000
2021	16,000
2022	20,000

Investments are expected on refurbishing existing facilities, restoring the network to its original capacity, completing on-going projects in various stages of construction, initiating the construction of over 120 newlines and substations, and many new voltage control facilities and expand the network.

#### 3.6.1 Name of the Agencies, required documents and Contact address

Direct discussion with Transmission Company of Nigeria

441 Zambezi Crescent  
Abuja, Nigeria

**Website:**

### **3.6.2 INVESTMENT OPPORTUNITIES IN MANUFACTURING OF POWER EQUIPMENT**

- Repair and Maintenance Transformer workshops
- Meter manufacturing
- Manufacturing of electrical cables
- Manufacturing of solar panels
- Billing systems
- Automation of electrical procedures
- Fraud detection and reduction of commercial loss

## CHAPTER IV

### 4.0 **GUIDELINES AND INCENTIVES**

A prospective investor in the Sector would have to pass through the under-listed Agencies for various certification and licenses:

#### 4.1 **Nigerian Electricity Regulatory Commission (NERC)**

The Nigerian Electricity Regulatory Commission (NERC) is an independent regulatory agency which was inaugurated on 31st October 2005 as provided in the **Electric Power Sector Reform Act 2005**.

The Commission is mandated to carry out:

- The monitoring and regulation of the electricity industry
- Issuance of licences to market participants, and
- Ensure compliance with market rules and operating guidelines.

#### **Contact Detail**

Corporate Headquarters  
Adamawa Plaza,  
Plot 1099, First Avenue,  
Off ShehuShagari Way, Central Business District  
Abuja F.C.T, Nigeria

Tel: +234-09-462-1400, 09-462-1401.

[info@nercng.org](mailto:info@nercng.org)

#### 4.2 **Nigerian Bulk Electricity Trading Plc (NBET)**

**Nigerian Bulk Electricity Trading Plc (NBET)** is a Federal Government of Nigeria (FGN) owned public liability company. It was incorporated on July 29, 2010 as the SPV for carrying out, under license from NERC, the bulk purchase and resale function contemplated by the EPSRA. NBET was set up to engage in the purchase and resale of electric power and ancillary services from independent power producers and from the successor generation companies.

**NBET's** power purchase agreements (PPAs) with independent power producers are backed by credit enhancement instruments offered by the FGN. It purchases electricity from the generating companies through **Power Purchase Agreements (PPAs)** and sells to the distribution companies through Vesting Contracts. The Generating companies



include the recently privatized PHCN successor companies, the **Niger Delta Power Holding Companies (NDPHC)**, the already existing Independent Power Producers (IPPs) and the new IPPs.

**NBET's mandate among others includes:**

- To put in place an effective transaction environment that minimizes risk and allocates it fairly to the parties best able to manage it.
- To implement procurement process that is transparent and will result in the economic procurement of needed power.
- To enter into contracts that are well structured and managed in a manner that precludes recourse to any credit guarantee instrument.

**Contact Detail**

8th Floor, Bank of Industry Building,  
Off Herbert Macaulay Way,  
Central Business District,  
FCT, Abuja.  
**Telephone:** +23494605630, +23494605630  
**Email:** [info@nbet.com.ng](mailto:info@nbet.com.ng)

4.3 **Transmission Company of Nigeria (TCN)**

Transmission Company of Nigeria (TCN) was incorporated in November 2005. Being one of the 18 unbundled Business Units under the Power Holding Company of Nigeria (PHCN), the company was issued a transmission License on 1st July, 2006. TCN licensed activities include: electricity transmission, system operation and electricity trading which is ring fenced.

The aim of the Company is to improve on the quality of power it delivers to its customers, practice good corporate governance and ensure its services are accessible, reliable and affordable.

**Contact Detail**

**Headquarters**

441 Zambezi Crescent  
Abuja, Nigeria **Website:** <http://www.tcng.org>

#### 4.4 **Nigerian Electricity Management Services Agency (NEMSA)**

Nigerian Electricity Management Services Agency (NEMSA) was set up by NEMSA Act No. 6 of 2015 to carry out the functions of enforcement of Technical Standards and Regulations, Technical Inspections, Testing and Certification of All Categories of Electrical Installations, Electricity Meters and Instruments to ensure the Efficient Production and Delivery of Safe, Reliable and Sustainable Electricity Power Supply and Guarantee safety of Lives and Property in the Nigerian Electricity Supply Industry; and for Related Matters. Its Mandate includes the following:

1. To ensure that :
  - Electrical materials/equipment/ instruments used in the Nigerian Electricity Supply industry (NESI) are of the right quality, standards and specifications.
  - the power systems and networks put in place have been properly planned, designed and executed before use to ensure that such systems are capable of delivering safe, reliable and regular electricity supply to the consumers nationwide;
  - the safety of lives and property within the grid and off-grid networks is guaranteed; and
  - that electric meters and instruments are of the right type, class and accuracy for proper accountability of energy produced, delivered, supplied and utilized by the consumers.
2. Certification and advancement of the skills and expertise of all technical personnel engaged in the practice of electrical installations along the value chain and utilization in Nigerian Electricity Industry (NEI).
3. Provide other professional technical services in the NESI: including Research & Development transformer testing/repairs, Electricity Information Management System (EMS), specialized healthcare services, etc.
4. Provide data, information and library services for stakeholders' investors, Researchers, academia, etc. through the proposed Electricity information management System (EIMS).

#### **Contact Detail**

Corporate Headquarters  
4 Dare-re-salaam Street,  
off Aminu Kano Crescent, Wuse 2, Abuja  
Federal Capital Territory(FCT)  
Nigeria, Tel: 07010000102, 08036745149;  
[info@nemsa.com.ng](mailto:info@nemsa.com.ng)

#### 4.5 **Nigerian Investment Promotion Commission (NIPC)**

Nigerian Investment Promotion Commission (NIPC) was established to encourage, promote and co-ordinate investment in the Nigerian Economy. Pursuant to this, Commission's functions include the following: -

- ❖ Registration of Enterprises.
- ❖ Provision of supports Services to Existing and potential Investors.
- ❖ Provision and dissemination of up-to-date information on incentives available to investors.
- ❖ Investment Promotion and Monitoring Activities.

#### **Contact Detail**

Plot 1181, Aguiyi Ironsi Street,  
Abuja, Federal Capital Territory,  
Nigeria

Telephone : **+234-9-290-4882, +234-9-290-4706, +234-9-290-4829, +234-8097701602**

E-mail: **osicinfodesk@nipc.gov.ng, infodesk@nipc.gov.ng or nipc@nipc.gov.ng**

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

#### 4.6 **Federal Ministry of Water Resources**

The Department of Dams and Reservoir Operations in the Ministry of Water Resources is mandated to undertake the planning, designing, supervision of construction and regulating of all dams and reservoirs in Nigeria. In line with the policy directive of government to increase energy supply to meet the nation's energy demands, Federal Ministry of Water Resources is collaborating with the Federal Ministry of Power on the aspect of handling the area of power generation component, while the Ministry handles the aspect of civil works in all the dam projects with hydropower potentials. Small hydropower schemes have been integrated into some dam projects across the country in order to increase the energy supply of the nation.

To date, the Department has identified and carried out studies on some of the completed and on-going dam projects for hydropower, nineteen (19) of which have the potentials for hydropower generation with a total capacity of 3,557 MW. These dam include; Gurara, Oyan, Ikere Gorge, Bakolori, DadinKowa, Tiga, Kiri, Jibiya, Challawa Gorge, Owena, Doma, Waya, Mgowo, Zobe, Kampe, Kashimbilla, Ogwashiku, Zungeru, Mambilla and the completed 30MW Gurara Hydropower Station.

## **Contact Detail**

Resources & Rural Development  
P.M.B. 159, Block 'A',  
Old Secretariat Area I  
Garki, Abuja  
Tel: 09-2340206; 2342684; 2342376

### **4.7 Federal Ministry of Environment**

The main function of the Ministry revolves around the following key environmental issues, especially, in the area of policy awareness, enforcement and intervention:

- Desertification and Deforestation;
- Pollution and Waste Management;
- Climate change and clean Energy;
- Flood, Erosion and Coastal Management (Shoreline Protection)
- Environmental Standards & Regulations

### **Mandate**

- Securing a quality environment conducive for good health and well being of fauna and flora.
- Promoting sustainable use of natural resources.
- Restoring and maintaining the ecosystem, ecological process and preserve biodiversity.
- Raising public awareness and promoting understanding of linkages of the environment.
- Cooperating with relevant Ministries/ Departments/ Agencies, the private sector, NGOs, and International organizations on environmental matters.

### **Environmental Assessment**

There are four (4) Divisions in the Environmental Assessment Department of which one is the Impact Assessment Department. The Environmental Assessment Department in the Ministry of Environment is to ensure environmentally sustainable development through regulation of activities within the oil and gas industry, environmental impact assessment (EIA) of development projects and development of guidelines and standards for environmental quality monitoring.


## **Environmental Impact Assessment Division**

The Division is charged with the mandate of implementing the provisions of the EIA Acts No. 86 of 1992. The Act requires that proponents (public or private) of major development projects should subject their projects to the provisions of the EIA Acts.

The EIA Division is made up of three branches and their activities are as follows:

- a. Verification and Registry Branch is responsible for the registration of new projects, EIA revenue recording, co-ordination of training, Workshops, conferences, seminars, EIA Budget and the site verification of new projects, etc.
- b. Evaluation and Analysis Branch (EA) is responsible for EIA scoping, Risk Assessment and the review/evaluation of terms of references and EIA reports.
- c. Impact Mitigation Monitoring (IMM) Branch is responsible for conducting Impact Mitigation Monitoring of approved projects, EIA Auditing and the post Impact Assessment of projects.

### **Contact Detail**

Federal Ministry of Environment Headquarter,  
Block C, Mabuchi,  
FCT, Abuja, Nigeria  
+234-09-5233611, +234-09-5233611

## **4.8 Nigerian National Petroleum Corporation (NNPC)**

The Nigerian National Petroleum Corporation (NNPC) was established on April 1, 1977. It is the Oil Corporation through which the Federal Government of Nigeria regulates and participates in the country's petroleum industry.

### **Contact Detail**

Headquarters, NNPC Towers,  
Herbert Macaulay Way, Central Business District, Abuja, Nigeria

## **4.9 Federal Ministry of Solid Minerals Development**

Address	Plot 360, Adetokunbo Ademola Crescent Wuse II, P.M.B.107
City	Abuja
Phone	+234 95239064 Email: <a href="mailto:info@mmsd.gov.ng">info@mmsd.gov.ng</a> <a href="http://www.mmsd.gov.ng">http://www.mmsd.gov.ng</a>

#### **4.10 Rural Electrification Agency (REA)**

Sections 88 (1) & (13) of the Electric Power Sector Reform Act, EPSRA 2005 established the Rural Electrification Agency (REA) to promote and co-ordinate rural electrification programmes in Nigeria, administer the Rural Electrification Fund (REF) to promote, support and provide rural electrification programmes through Public and Private Sector Participation to

- ❖ Achieve more equitable regional access to electricity;
- ❖ Maximize the economic, social and environmental benefits of rural electrification subsidies;
- ❖ Promote expansion of the grid and development of off-grid electrification; and
- ❖ Stimulate innovative approaches to rural electrification provided that no part of the Rural Electrification Fund shall be used as subsidies for consumption

#### **Contact Details**

Rural Electrification Agency,  
No. 22 Freetown Street,  
Wuse II, Abuja FCT  
Email: [info@rea.gov.ng](mailto:info@rea.gov.ng)  
Website: [www.rea.gov.ng](http://www.rea.gov.ng)

#### **4.11 Infrastructure Concession Regulatory Commission (ICRC)**

ICRC is the Federal Government's Agency charged with regulating PPP processes in infrastructure provision. It also promotes the development of a sustainable PPP framework towards the development of Brownfield and Greenfield infrastructure for the benefit of Nigerians. Key functions of the Commission include.

- i) Provide general policy guidelines, rules and regulations;
- ii) Take custody of every concession agreement;
- iii) Ensure efficient execution of any concession agreement of contract entered by the Federal Government and monitor compliance with the terms and conditions of such agreement

#### **Contact Details**

Plot 1270 Ayangba Street  
Area 11, Garki, Abuja  
Tel: +234 9 460 4900  
Email: [infor@icrc.gov.ng](mailto:infor@icrc.gov.ng)

#### **4.12 INCENTIVES FOR INVESTORS**

1. Large internal market.  
193.4 million Nigerians and possible export to West African market – over 250 million people in 15 Countries.
2. Huge deposit of Natural Gas – 1.84 trillion cubic feet
3. Youthful population – about 60% of population
4. Robust and Virile Private Sector
5. Free market – easy entry and exit procedures
6. Free transferability of profit, dividends.

Under the provisions of the Foreign Exchange (Monitoring & Miscellaneous provision Act No. 17 of 1995), foreign investors are free to repatriate their profits and dividends net of tax through an authorized dealer in freely convertible currency.

7. Income Tax is at a Competitive rate of 30%.

Applicable tax rate which is the same as the Company income tax is currently at 30%, capital allowance is at the rate of 20% per annum in the first four years, 19% in the fifth year and remaining 1% in the books. Investment tax credit at current rate of 5% and royalty at the rate of 7% on shore and 5% off shore.

8. 5 years Income Tax holiday under the Pioneer Status.

This is a tax granted to industry making a reasonable level of profit within its formative years, the profit is expected to be ploughed back into the business. Qualified or eligible industries located in economically disadvantage local areas of the Federation are to benefit from seven years tax holiday.

- Manufacture of electrical appliances, equipment and parts like Transformers, Meter control panels, switch gears, cables and other electrical related equipment.
- Manufacture of Gas and distribution

9. 0% Import Duty on Power Generation equipment meant to use Nigerian Gas as source of Power
10. Very low Vat regime – 5%

11. Investment in Infrastructure – 20% of cost per annum for 5 years to industries that attain the minimum level local raw materials sourcing and utilization. 60% to the Engineering sector and 70% to the Petrochemicals.

12. Transparent and predictive tariff adjustment mechanism for full cost recovery.

- **Tax relief for Research and Development.** Industries establishments are expected to engage in Research and Development (R&D) for improvement of their processes and products. Up to 120% of expenses on (R&D) are tax deductible, provided that R&D activities are carried out in Nigeria and connected with the business from which income or profit is derived.
- **Investment in Infrastructure.**
- **Labour Intensive mode of production.** Industries with high labor/capital ratio are entitled to tax concessions. These are Industries with plants, equipment and machinery, which are operated with minimal automation, the automation should not be more than one process in the course of production. Industries employing 1,000 persons or more will enjoy 15% tax concession, 200 persons will enjoy 7% and 100 persons will enjoy 6%.

#### **4.13 FEED IN TARIFF FOR 2016 BASE YEAR**

<b>YEAR</b>	<b>DESCRIPTION</b>	<b>UNIT</b>	<b>SOLAR</b>	<b>WIND</b>	<b>SHP</b>	<b>BIOMASS</b>
FIT 2016 (Naira)	Capital Cost	Naira/MWh	35,370.05	24,791.55	30,887.43	22,400.51
	O & M	Naira/MWh	29.49	302.73	55.92	8,541.11
	<b>Total</b>	<b>Naira/MWh</b>	<b>35,399.54</b>	<b>25,094.28</b>	<b>30,943.35</b>	<b>30,941.62</b>
FIT 2016 (US \$)	Capital Cost	S/MWh	176.85	123.96	154.44	112.00
	O & M	S/MWh	0.15	1.51	0.28	42.71
	<b>Total</b>	<b>S/MWh</b>	<b>177.00</b>	<b>125.47</b>	<b>154.72</b>	<b>154.71</b>



## CHAPTER V

### APPENDIXES

#### APPENDIX 1

### **REQUIREMENTS FOR NIGERIA ELECTRICITY REGULATORY COMMISSION (NERC) GENERATION LICENSE**

1. Completed Application Form;
2. Certificate of Incorporation and Memorandum and Articles of Association, **or** Deed of Partnership, or Deed of Trust, etc (as applicable);
3. Registered Title Deed to Site, or Sale Agreement or Deed of Assignment/Gift, or evidence of submission of a title deed to a relevant land processing agency (as applicable);
4. Tax Clearance Certificate for immediate past three (3) years;
5. Ten-year Business Plan;
6. Off-take Agreement or Arrangement;
7. Environmental Impact Assessment (EIA) Approval Certificate, or Proof of submission and acceptance for processing of the Reports on EIA to the Ministry of Environment, Housing & Urban Planning, or Details on how effluents and discharges will be managed (if proposed capacity is less than 10MW);
8. Fuel Supply Agreement, or Letter from a potential fuel supplier and transporter indicating the inclusion of the fuel needs of the applicant in the supply plans of the fuel supplier and transporter;
9. MoU with or Letter of intent from Engineering Procurement Contract (EPC) Contractor (if applicable);
10. MoU with or Letter of intent from the technical partner (if applicable);
11. Financing Agreements or Letter to fund the project from bank(s);
12. Timelines for commissioning of the Power plant and the date when different capacities of the plant will come into operation, relative to date of issuance of a License.

13. Certified Audited Financial Statements and Accounts for immediate past three (3) years;
14. Detailed CVs of managerial and technical staff of the Power plant;
15. Location Map;
16. Single Line Diagram;
17. Power Plant Design (only for application for Generation Licenses)
18. Site Plan Drawings;
19. Agreement/Approval with Ministry of Water Resources (where applicable);
20. Letter of intent from the technical partner;
21. Evidence of confirmation from Transmission Company of Nigeria that proposed connection point has capacity to take load which will be fed to it (only for application for Generation);

#### **CONTACT ADDRESS AND WEBSITE**

Nigeria Electricity Regulatory Commission (NERC),  
Adamawa Plaza, Plot 1099, First Avenue,  
Off Shehu Shagari Way,  
Central Business District, Abuja  
Website: [www.nercng.org](http://www.nercng.org) or  
<http://www.nercng.org/index.php/industryoperators/licencing-procedures>

## APPENDIX 2

### **REQUIREMENTS FOR POWER PURCHASE AGREEMENT (PPA) FROM NIGERIAN BULK ELECTRICITY TRADING COMPANY (NBET)**

- A. Corporate Information of Project Company
  - 1. Certificate of incorporation from CAC, including certified copies of incorporation documents;
  - 2. Shareholding structure and allotments;
  - 3. Board resolutions approving project;
  - 4. Evidence on the track record of project company or its sponsors in delivery of a similar project where no track record, evidence of a credible technical partnership (Ex. Letter of intent);
- B. Project Description
  - 1. Summary of the Project;
  - 2. Project Delivery Timescales;
  - 3. Initial preliminary project engineering designs;
  - 4. Operations and Maintenance Plans.
- C. Permits, Licenses, Evacuation Study and Environmental Impact Assessment
  - 1. Notarized copy of the License  
& Letter from NERC that proves that License application has been received and is at the status of evaluation
  - 2. Completed report of "Evacuation Study" signed by TCN;  
& Confirmation letter by TCN stating that the Evacuation Study is under progress;
  - 3. Registered Title Deed to Project Site Land;
    - Notarized Sale Agreement of the Project Site Land;
    - Deed of Assignment/Gift of the Project Site Land;
  - 4. Single Line Diagram of the Power Plant;
  - 5. Environmental Impact assessment (EIA) Approval Certificate; & Prove of submission and acceptance of Ministry of Environment, Housing & Urban Planning Certified ESIA, ESIA must also meet IFC/World Bank Standard/Equator Principles;

6. Fuel Supply Agreements.

D. For Gas Fired Power Plants

1. Gas Supply Agreement and Gas Transport Agreement – Letter from a potential fuel supplier and transporter indicating the inclusion of the fuel needs of the applicant in the supply plans of the fuel supplier and transporter.

E. For Hydro Power Plants

1. Agreement/Approval with Ministry of Water Resources

F. For Coal Fired Power Plants

1. Coal Supply agreement;
2. Analysis by a reputable independent company of the coal site intended to be developed.

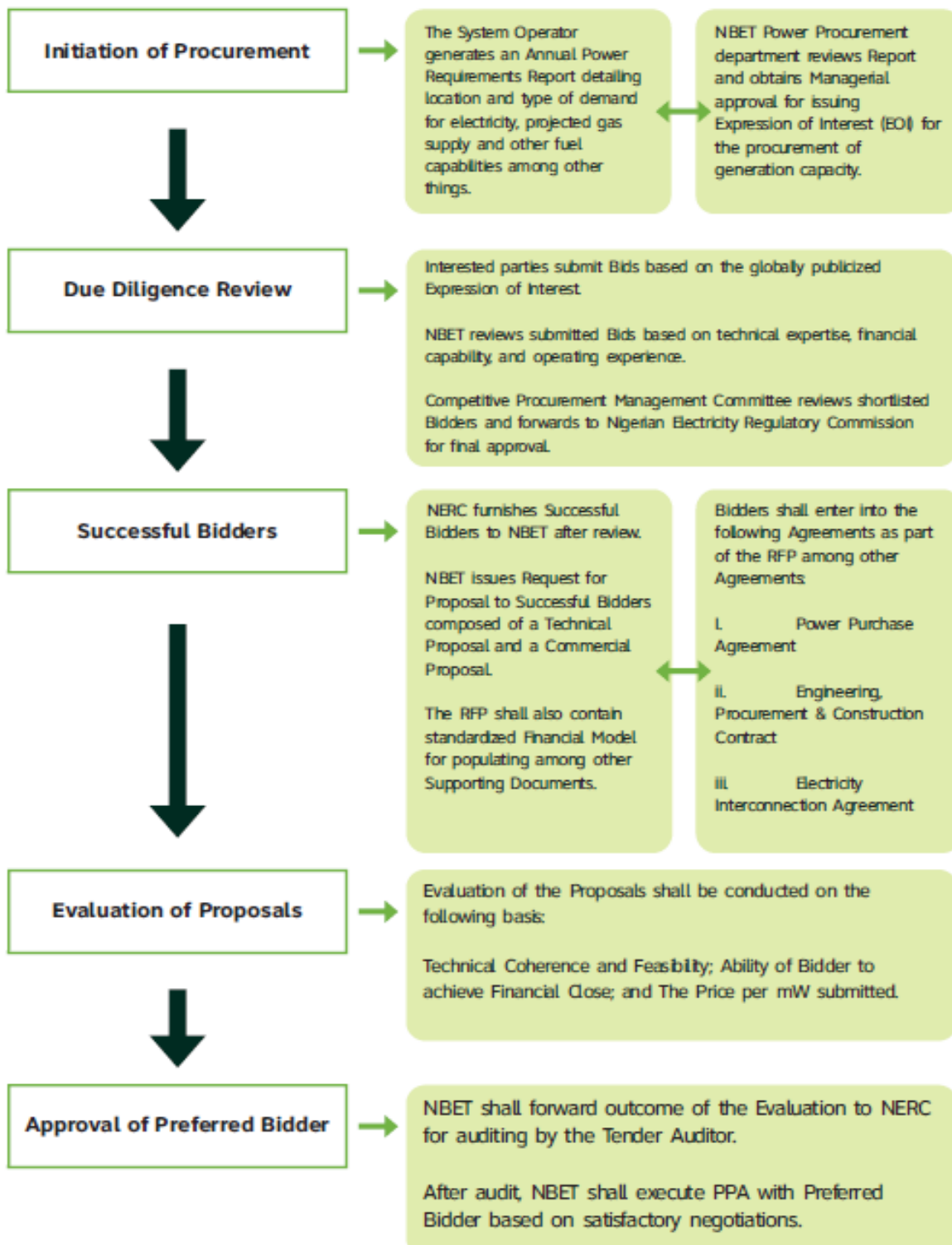
G. For Solar & Wind Power Plants

1. Energy Yield Report with on-site measurement by a reputable independent company;
2. Proof of minimum of six (6) months on-site measurement

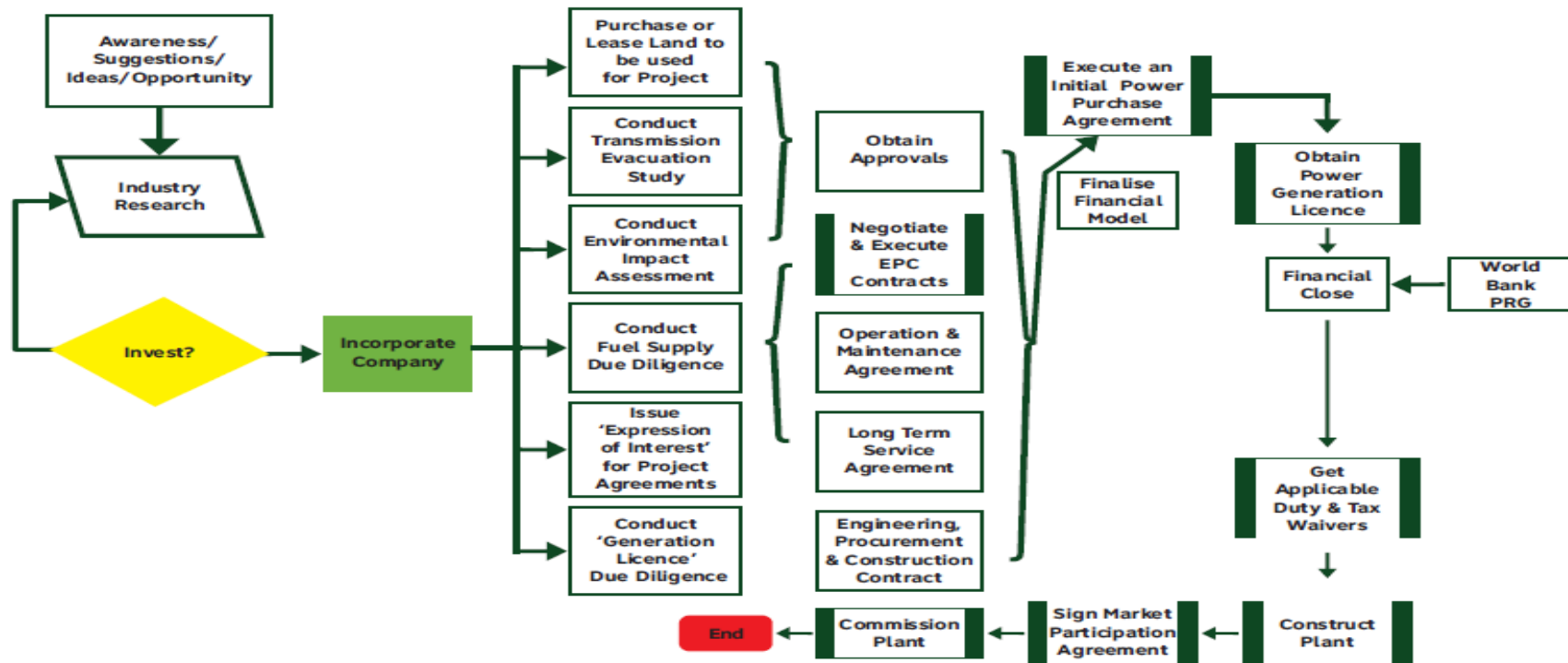
H. Optional Documents

1. Last 3 years historic record of Audited Balance Sheet, Profit and Loss Accounts and Cash Flow Statements;
2. Financial plan (including planned debt/equity ratio, involvement of Multilateral Agency support, etc)
3. EPC Contracts

## Process Flow for Competitive Procurement



Process Flow for Unsolicited Bid



CONTACT ADDRESS AND WEBSITE

Nigerian Bulk Electricity Trading Company  
 Bank of industry Building  
 Central Area, Abuja. Website: [www.nbet.com.ng](http://www.nbet.com.ng)

**REQUIREMENTS FOR GRID CONNECTION FROM TRANSMISSION COMPANY OF NIGERIA (TCN)**

Users proposing a connection to the Transmission System, either through a new substation, a modification of an existing substation, or in an existing substation shall send an application to the TSP. If this demand for new connection falls outside the approved Regulatory Long Term Transmission Plan, the cost for such works shall be borne by the User.

Application information: Users shall submit the application on an application form for a connection to the Transmission System. Amongst other information, the application form shall include:

- (a) A description of the Plant or Apparatus to be connected to the Transmission System or, the modification relating to the User's Plant or Apparatus already connected to the Transmission System;
- (b) Confirmation that the User's Plant and Apparatus at the Connection Point will meet the required technical standards in this Grid Code, as agreed with the TSP where appropriate;
- (c) Confirmation that User's Plant, Apparatus and procedures will meet the safety provisions in Section 25 of the Grid code;
- (d) The technical data as stipulated in Appendixes 5, 6 (of the Grid Code) anticipated for the User's modified or new Plant or Apparatus, specifying the Load characteristics and other data. The TSP shall compile a standard list of details required from the User;
- (e) The desired connection date and operational date of the proposed User's Development;
- (f) A proposed commissioning schedule, including commissioning tests, for the final approval of the System Operator and the TSP.

**CONTACT ADDRESS AND WEBSITE**

Transmission Company of Nigeria

## **APPENDIX 4**

### **REQUIREMENTS FOR PPP FROM INFRASTRUCTURE CONCESSION REGULATORY COMMISSION (ICRC) FOR PPP PROJECT IDENTIFICATION PHASES**

A PPP over Federal Government Infrastructure would typically follow the Phases and steps below:

#### **PPP Project Identification Phase**

1. Project identification by Ministries, Departments and Agencies (MDA)
2. MDA's should involve and engage with the Infrastructure Concession Regulatory Commission (ICRC) prior to commencing PPP to ensure viability and bankability of proposed projects.
3. MDA's should consult and engage with the Federal Ministry of Finance (FMOF) prior to commencing PPP projects, in order to minimize the risk and contingent liabilities arising from such projects.

#### **PPP Project Development and Preparation Phase**

1. A **Transaction Adviser (TA)** would be engaged by the MDA through competitive bidding process as required under the Public Procurement Act of 2007, to produce the report that would show the bankability of the project. This report is called an **Outline Business Case (OBC)**.
2. The MDA would thereafter forward the OBC to the ICRC for review. Subject to assessment, ICRC would issue an OBC Certificate of Compliance to the MDA or decline issuance and advise the MDA accordingly.
3. The MDA would then submit the OBC along with ICRC OBC Certificate of Compliance to the federal Executive Council (FEC) through the line Minister for Approval.

#### **PPP Procurement Phase**

1. If the project is approved by FEC, the MDA's Technical Adviser would commence a procurement process leading to a competitive bidding process from which a preferred PPP Project Proponent (Investor) will emerge.



2. Negotiations would thereafter ensue, leading to the conclusion of a Full Business Case (FBC) 2 document and submission of the FBC to ICRC for review. Subject to assessment, ICRC would issue an FBC Certificate of Compliance to the MDA or decline issuance and advise the MDA accordingly.

3. The MDA would again submit the FBC along with the ICRC Certificate of Compliance to FEC through the line Minister, for Approval.

4. If the FBC is approved by FEC, this would be followed by the signing of a contract between the MDA and the preferred PPP Project Proponent (Investor). ICRC will thereafter take custody of the contract as required under the Section 20 of the ICRC Act.

### **PPP Implementation Phase**

1. Eventually, for the project to take off, the preferred PPP Project Proponent (Investor) must achieve Financial Close<sup>3</sup>

2. The MDA is required under Section 12 of the Act to supervise the project diligently. On the other hand the ICRC and the MDA are required, under Section 10 of the Act, to conduct regular joint Inspections of the Project until the end of the contract.

### **CONTACT ADDRESS AND E-MAIL**

Infrastructure Concession Regulatory Commission (ICRC)

Plot 1270 Ayangba Street, Area 11 Garki, Abuja.

[info@icrc.gov.ng](mailto:info@icrc.gov.ng)

## **APPENDIX 5**

### **LIST OF PHOTOVOLTAIC (PV) APPROVED BY STANDARDS ORGANISATION OF NIGERIA**

- (i) NCP 031:2010ET, Code of practice for the deployment of outdoor solar systems
- (ii) NIS IEC 61215:2005, Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Designed Qualification and Types Approval
- (iii) NIS IEC 61646:2008, Thin-film Terrestrial Photovoltaic (PV) Modules - Designed Qualification and Type Approved
- (iv) NIS IEC 62109:2010, Safety of Power Converters for use in Photovoltaic Power Systems - Part 1: General Requirements
- (v) NIS IEC 62109:2010, Safety of Power Converters for use in Photovoltaic Power Systems - Part 2: Particular requirements for inverters
- (vi) NIS IEC 61427:2005, Secondary cells and batteries for Photovoltaic Energy Systems (PVES) - General requirements and methods of test
- (vii) NIS IEC 60364-7-712, Electrical installations of buildings - Part 7 - 712: Requirements for special installations or locations - Solar Photovoltaic (PV) power supply systems
- (viii) NIS IEC 61730:2004-1, Photovoltaic (PV) Modules safety qualification - Part 1: Requirements for construction

- (ix) NIS IEC 61730:2004-2, Photovoltaic (PV) module safety qualification  
- Part 2: Requirements for testing
- (x) NIS IEC 61683:1999, Photovoltaic systems - conditioners -  
Procedure for measuring efficiency.