



Strengthening Science, Technology and Innovation (STI) Institutional Mechanism for Poverty Reduction in Nigerian: Energy and Power*

By

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Contents



1. Introduction
2. Energy Resources in Nigeria
3. Energy Supply: Where are We and from Where?
4. Energy Supply: Where do We Want to Be?
5. Institutional Framework and Mechanisms in the Energy and Energy-Related Sectors in Nigeria
6. Challenges and Way Forward
7. Conclusion.

- Business Dictionary.com and many other schools of thought define poverty as condition where people's basic needs are not being met. Poverty may be classified into two:
- **Absolute poverty:** *“a condition characterized by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information”*
- **Relative Poverty:** *“occurs when people do not enjoy a certain minimum level of living standards as determined by a government that vary from country to country”*
- In economic terms people who earn less than US\$1.25/day are said to be poor. Poverty leads to hunger, inequality and dehumanization.
- Poverty is a state which has been identified as incompatible with development.
- Heads of Government of nations under the United Nations declared the Millennium Development goals in year 2000, and Sustainable Development Goals in 2015, as framework for development, in which ending poverty is one of the goals.

1. Introduction

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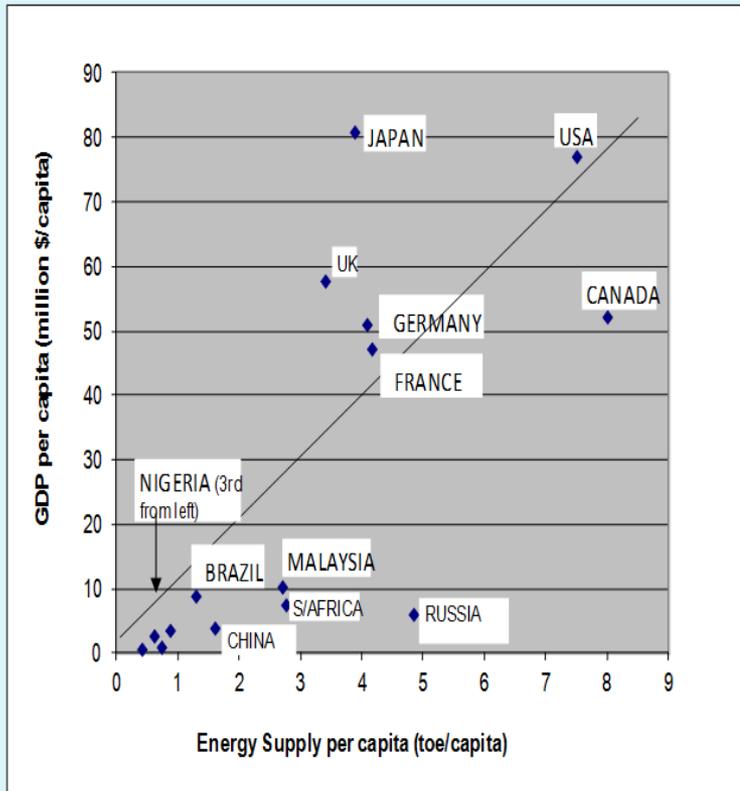
- The goal envisions to end poverty in all its forms everywhere.
- Attainment of this goal worldwide and in Nigeria will largely depend upon how well Science, technology and Innovation services are deployed.
- This fact is well articulated in the National Policy of Science, Technology and Innovation of 2012, in which it envisioned that
 - ***“by 2020, Nigeria will have a large, strong, diversified sustainable and competitive economy that effectively harnesses the talents and energies of its people and responsibly exploits its natural endowments to guarantee a high standard of living and quality of life for its citizens”*** through STI.

1. Introduction

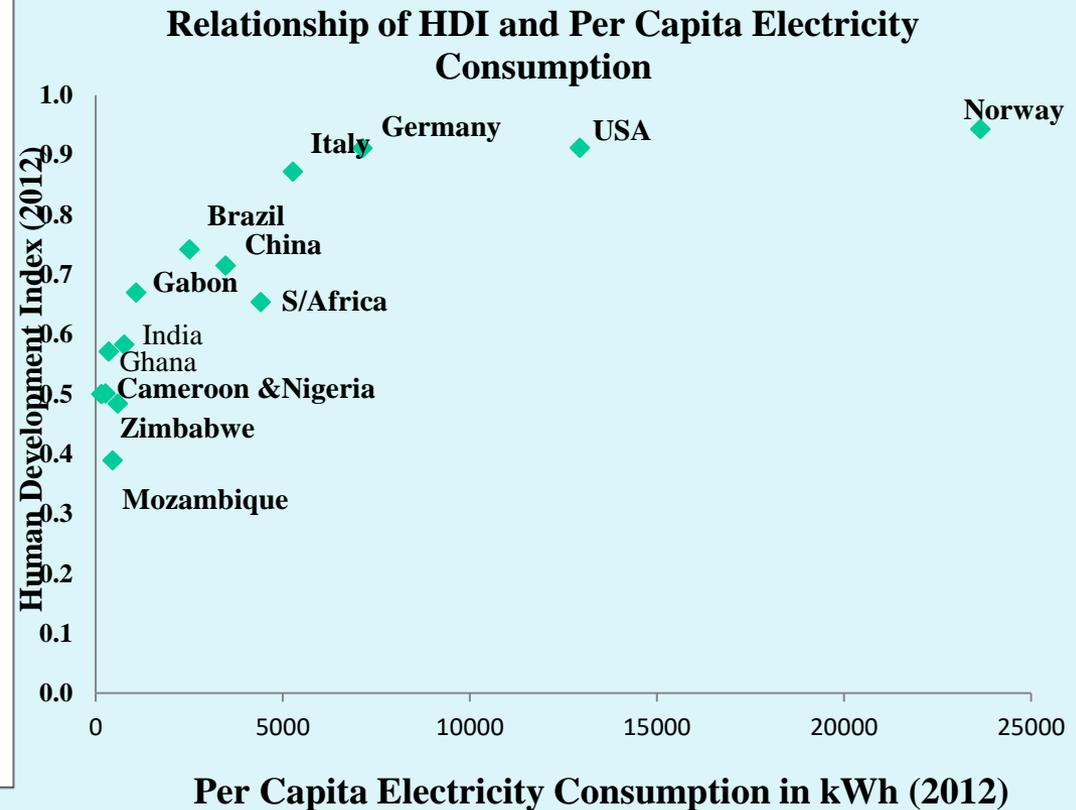
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Energy a product of STE services has been acknowledged since the time of industrial revolution to be very essential for economic development, improvement in human development and, of course, eradication of poverty.



Graphical representation of the relationship between Energy and the Economy (IEA, 2010)



Source: Human Development Report 2014 and IEA Key Energy Statistics 20



- It was in recognition of this and the fact that STE did bring out direct relationship between global warming/ climate change and fossil fuel utilization that the UN Secretary General, Banki-Moon, launched SE4ALL in 2011.
- Sustainable Energy for All initiative was also launched in Nigeria in 2012 in the State House by the then President of the Federal Republic of Nigeria in the presence of UNIDO Director General and Head of UN Energy, Dr. Kande Yumkella.
- Sustainable energy for all also became a goal in the 2015 Sustainable Development Goals agreed upon in COP21 in Paris.

1. Introduction

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- The Energy Commission of Nigeria a parastatal under the purview of the Federal Ministry of Science and Technology is charged with the responsibility for the Strategic Planning and Coordination of national policies in the field of energy in all its ramifications.
- It was established in 1979 but commence operation in 1989 after the decision of Heads of ECOWAS, in 1982 in Conakry, that each Member State should establish a government agency to be called Energy Commission and to be charged with the responsibility of coordinating energy functions of each Member State.
- This responsibility on Energy Commission and the fact that worldwide, energy – an element of Science, technology and Innovation, has over the years been associated with development, and indeed poverty reduction, may have informed the choice of the Director General of Energy Commission of Nigeria to be part of the discussion on this well-chosen topic – ***Strengthening Science, Technology and Innovation (STI) Institutional Mechanism for Poverty Reduction***, with due reference to Energy and Power.

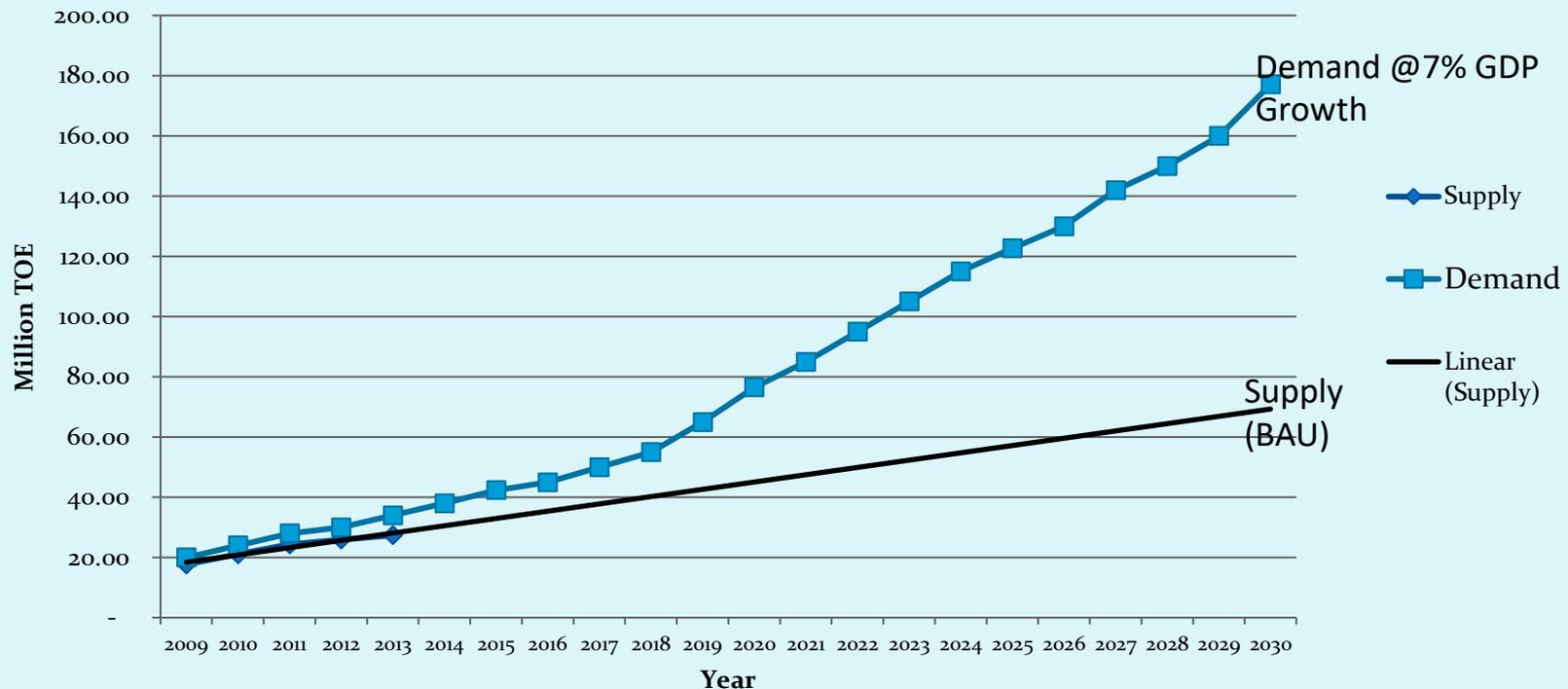
1. Introduction

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- It is imperative to re-emphasise the fact that the present and future prosperity of Nigerian will be challenged by the capacity to meet increasing modern energy demand.

Modern Energy Demand and Supply (Million TOE)



Source: ECN (2015)



- I would therefore like to take us through to appreciate the following in the course of this presentation with regards to energy and power:-
 - The energy resources and energy demand-supply situation in the country.
 - The institutional mechanisms and framework established to ensure that adequate, reliable, affordable and environmentally friendly energy is provided to drive development and eradicate poverty in Nigeria; and
 - How the institutions have fared with the view to highlighting the areas that need strengthening.

2. Energy Resources in Nigeria



a) Fossil Energy Resources and Nuclear Energy Sources

S/N	Resources	Reserves	Production (2014)	Domestic Utilization (2014)
1	Crude Oil	37.1 billion barrels	0.661 billion barrels	0.145 billion barrels
2	Natural Gas	188.7 Tscf	3.2 Tscf	88% : Utilized 12% : flared
3	Coal	2.7 billion tonnes	0	Negligible
4	Tar Sands	31 billion barrels of oil equivalent	0	18.25 million barrels
5	Nuclear	Yet to be quantified	0	30kW experimental nuclear reactor

Source: OPEC (2015)

2. Energy Resources in Nigeria



b) Renewable Energy Resources

S/N	Resource		Reserve	Utilization Level
1	Large hydro power		11,250MW	1,900MW
2	Small Hydro power		3,500MW	64.2MW
3	Solar Energy		4.0 kWh/m ² /day 6.5kWh/m ² /day	30MW solar PV stand-alone No solar thermal electricity
4	Wind		2-4m/s at 10m height	2x2.5KW electricity generator; 10MW wind farm in Katsina
5	Biomass	Fuel wood	11 million hectares of forest and woodlands	43.4 million tonnes of firewood/yr
		Municipal waste	- 18.3 million tonnes in 2005* & about 30 million tonnes/yr now	-
		Animal waste	- 243 million assorted animals in 2001	-
		Energy Crops and agric waste	- 72 million hectares of Agricultural land	28.2 million hectares of Arable land only 8.5% is cultivated

Source: Renewable Energy Master Plan (REMP)

3.

Energy Supply:

Where Are We And From Where?



Nigeria's Energy Supply and The Economy

S/N	ITEMS	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1.	Electricity generation (billion kWh)	22.03	23.9	24.22 (503)* (10,695)* *	23.8	23.3	21.27 (562)* (18,603)**	20.8	25.02	27.7 (619)* (20,407)* *	29.6
2.	Energy Consumption per Capita (kgoe/Capita)	151.3	125.5	132.6 (680)* (1,780)**	87.1	81.4	80.8 (670)* (1,830)**	83.1	77.8	73.6 (670)* (1880)**	65.7
3.	Electricity Consumption/capita (kWh/Capita)	174.6	176.4	181.4 (563)* (2596)**	167.6	161.2	142.9 (571)* (2782)**	135.2	157.1	165 (592)* (2933)**	175.9
4.	GDP/Capita (US\$/Capita)	620.7	658.0	826.3 (2314)* (8,492)**	1030.3	1223.5	1286.3 (2540)* (9550)**	1,106.8	1440.7	1470.6 (1281)* (7520)**	1513.4
5.	Energy Intensity (kgoe/ US\$)	0.244	0,191	0.161 (0.294)* (0.210)**	0.085	0.067	0.063 (0.264)* (0.192)**	0.075	0.054	0.050 (0.550)* (0.250)**	0.043
6.	GDP Growth Rate (%)	9.6	6.6	6.5	6.0	6.5	6.0	7.0	8.0	7.4	6.6

Sources: CBN (2005-2012), NCC, Osogbo (2009 -2012),

*Africa Average - IEA (2007, 2010, 2013)

**World Average - IEA (2007,2010, 2013)



- The Nigerian energy scene began, when in 1914, the Northern and Southern protectorates under the Colonial British Government were amalgamated to form the present state of Nigeria situated between latitudes 4° N and 14° N and longitudes 3° E and 14° E
 - a) **Petroleum (Oil and Gas)**
 - In 1914, the Minerals Oils ordinance of Nigeria was made by the Colonial Government, which ensured that all minerals oil under Nigeria soil a legal property of the Crown. Licenses for oil production were restricted to British Companies and individuals. In 1938, Shell D'Arcy company, a company jointly owned by Shell and British Petroleum (BP) was given exclusive exploration and production regions in Nigeria. In 1955 Shell D'Arcy's monopoly was reduced and concession area was granted to Mobil, an American Oil Company.

3. Energy Supply: Where are we and from where? Cont'd



Ceremony of starting the first oil flow from Nigerian soil into the vessel, February 17th 1958.

- In 1956, and in Oloibiri, about 90km West of Port Harcourt and now present Bayelsa State, crude oil in commercial quantity was first found in Nigeria by Shell D'ARCY.
- The first export of crude oil was in 1958 with export of 5,100 barrels per day (BPD). The 1959 Petroleum profit tax legislation made sharing of proceeds from oil on a 50:50 basis between the host country and foreign oil companies.

3. Energy Supply: Where are we and from where? Cont'd



- It may be recalled that Nigeria got independence in 1960, the same year Organization of Petroleum Exporting Countries (OPEC) was found in Baghdad, Iraq. OPEC's objective was to check concessioners from lowering prices, which they always specified or posted and to take control of their oil resources.
- By 1961 oil production stood at 46,000 bpd, while natural gas produced was about 11,500 standard cubic feet (SCF) per year.
- By 1962, Shell's arena of concession was further reduced to more promising areas, while more actors like Elf, Agip etc came into the scene in line with the 1962 Mineral Oils Act, which repealed the provision of the 1914 Act reserving concessions for oil exploration to only British subjects.

3. Energy Supply: Where are we and from where? Cont'd

- In 1964, Nigeria attended the first OPEC meeting as an observer.
- In 1965, the Bonny Island Export facility terminal was completed; and oil and natural gas production was about 272,000 bpd and 105,500 SCF/year, respectively.
- In the same year (1965), the Oil Pipelines Act of 1965 and the regulations made there under as well as the Hydro Carbon Refineries Act and the regulations there under were made.
- The establishment of the first refinery in Nigeria built at Alesa Eleme, Port Harcourt with a name plate capacity of 35,000 bpd, then was considered sufficient to meet domestic needs.
- It was build and operated by Shell, Government later acquired it (NNPC)

3. Energy Supply: Where are we and from where? Cont'd

- The population of Nigeria was then about 58.7 million.
- Then all Petroleum products consumed in the economy were all imported, and by the international oil companies (IOCs).
- In 1966, the first coup d'état occurred, which plunged the country into a civil war that lasted up to 1970. Within this period crude oil production dropped from 418,000 bpd in 1966, to 142,000 bpd in 1968; and then rose to 1,084,500bpd in 1970.
- In 1968, the Nigerian Company Decree compelled all companies operating in Nigeria to incorporate Nigerian entities; while the 1969 Petroleum decree and the Petroleum (Drilling and Production) regulation provided a comprehensive framework for administering the activities of the oil companies.
- These decrees provided Nigeria legal framework for participation in the oil companies, which commenced with 35% and later grew to 50%.

3. Energy Supply: Where are we and from where? Cont'd

- It may be noted that Petroleum matters had been handled by the Hydrocarbon section of the Ministry of Lagos Affairs in the earlier fifties. It was the first statutory agency set up to supervise and regulate the Petroleum industry in Nigeria, which reported to the Governor General. The section was upgraded to Petroleum Division within the then Ministry of Mines and Power. The division, in 1970, became the Department of Petroleum Resources (DPR).
- In 1971, Nigeria joined OPEC, and in the same year the Nigerian National Oil Corporation (NNOC) was created to engage in commercial activities in an attempt to realize the indigenization of the oil industry in response to call by OPEC for member states to participate actively in their oil industry, while DPR continued to perform the supervisory and control duties in the oil industry. This direct participation by NNOC was done through joint ventures (JVS) and later in 1993 through PSCs in the deep waters. In 1974, Nigeria's participation in the oil companies had reached 55%.
- The DPR was in 1975 constituted into the Ministry of Petroleum Resources. In the same year 1975, the PPT reached 85% and remained there since.

3. Energy Supply: Where are we and from where? Cont'd



- In 1977, the MPR and NNOC were merged to form the Nigerian National Petroleum Corporation (NNPC), in a bid to optimize the utilization of the then scarce indigenous manpower in the public sector of the oil industry.
- The same instrument that created NNPC also established the Petroleum Inspectorate, which served as the regulator of the industry, which however, reported to the Minister of Petroleum. In 1978, Government began to build local refineries and distribution networks.
- In 1979 Nigeria participation in upstream oil companies had reached 60%.
- In 1985, a new Ministry of Petroleum Resources was again created, while the Petroleum Inspectorate remained in NNPC and as the regulator of the industry.
-

3. Energy Supply: Where are we and from where? Cont'd

- With the commercialization of NNPC in 1988 into twelve (12) strategic business units covering the entire spectrum of oil industry operations of exploration and production, gas development, refining, distribution, petrochemicals, engineering and commercial investments; the petroleum inspectorate was excised and merged with Ministry of Petroleum Resources but maintained its regulatory functions.
- By 1989, four (4) government owned and managed oil refineries with a total installed capacity of 445,000 bpd were installed, to meet domestic needs, when population was about 83.8 million. However, Since 1989 to date no new refinery has been added to meet the growing demand in Petroleum Product for automobile fuel, power generation, heating fuel, lubricants etc. for a population of about 170 million now and growing at 3.2% annually. Secondly, the capacity utilization of these refineries have been dropping to unacceptable levels.

3. Energy Supply: Where are we and from where? Cont'd

- For instance, the combined average refining capacity utilization for year 2012 was 21% and 26% in 2013. This has led to massive importation of products to meet domestic needs.
- Also, in 1989 the Nigeria Liquefied Natural Gas (NLNG) Bonny with Government take was incorporated; and ten (10) years later, NLNG commenced production for exports. More NLNG plants have since come on-stream
- Nigeria supplies natural gas to other West African countries through the West African Gas Pipeline (WAGP) conceived in 1982 and completed in 2006 with a capacity of 5bcm (185bscf) of natural gas per year (about 500 mmscf/day).

3. Energy Supply: Where are we and from where? Cont'd



Historical Evolution of Refineries in Nigeria with their Installed Capacity

Refinery	Year Commissioned	Capacity (Barrels/Day)								
		1965	1971	1978	1980	1987	1988	1989	1998	2014
P/H Refinery I	1965	35,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
P/H Refinery II	1989	-	-	-	-	-	-	150,000	150,000	150,000
Warri Refinery	1978	-	-	100,000	100,000	125,000	125,000	125,000	125,000	125,000
Kaduna Refinery	1980	-	-	-	110,000	110,000	110,000	110,000	110,000	110,000
Total		35,000	60,000	160,000	270,000	295,000	295,000	445,000	445,000	445,000

Source: NNPC

3. Energy Supply: Where are we and from where? Cont'd



- The challenges and inefficiencies in the operation of the joint ventures and the unsatisfactorily performance of the downstream public enterprises as well as complexity on the management of the NNPC, coupled with too many laws in the oil and gas industry necessitated calls for structural reforms in the Nigeria Petroleum industry to position it for greater benefits to the Nation in line with international best practices.
- Thus in 2000, Government incorporated the Oil and Gas sector Reform Implementation Committee (OGIC) to carry out far reaching reforms in the Petroleum industry. To evolve new National Oil and Gas Policy, which will ensure separation and clarity of roles, infuse strict commercial orientation in all relevant sections of the industry.

3. Energy Supply: Where are we and from where? Cont'd



- In 2003, the Petroleum Product Pricing and Regulation Agency (PPPRA) was established to regulate the downstream oil sector.
- In 2006, MPR and Ministry of Power were merged to form the Ministry of Energy. A year later, the Ministry of Energy was reverted back into MPR and Ministry of Power and remains so to this day, with DPR still under the MPR.
- In 2007, the Government inaugurated another 2nd OGIC committee to work on the National Oil and Gas policy produced by the 1st Committee with the view to bringing out new institutional framework for the industry. This produced Lukman Report of 2008, which went through another review before it was forwarded in 2012 to the National Assembly as the popular Petroleum Industry Bill (PIB).

3. Energy Supply: Where are we and from where? Cont'd



- In 2008, Nigerian Gas Master Plan was approved with the objective of transiting the Nigerian oil industry into an integrated oil and gas industry through:
 - Domestic gas supply obligations
 - Cost recovery gas pricing framework
 - Gas infrastructure blueprint
- In 2010, the Gas Aggregation Company of Nigeria (GACN) owned by the IOCs and NNPC was formed as a vehicle for the implementation of Nigerian Gas Master Plan framework
- In 2010 also, the Nigerian Oil and Gas Industry Content Development Act was made with the Primary objective of enhancing the level of participation of Nigerians and Nigerian Companies in the country's Petroleum Industry.

3. Energy Supply: Where are we and from where? Cont'd

b) Coal/Lignite, Tar Sands/Bitumen and Uranium (Solid Minerals)

i. *Coal/Lignite:*

- Organized mining began in 1903 when the Mineral Survey of the Northern protectorates was created by the British Colonial Government.
- A year later, the mineral survey of the Southern protectorate was founded.

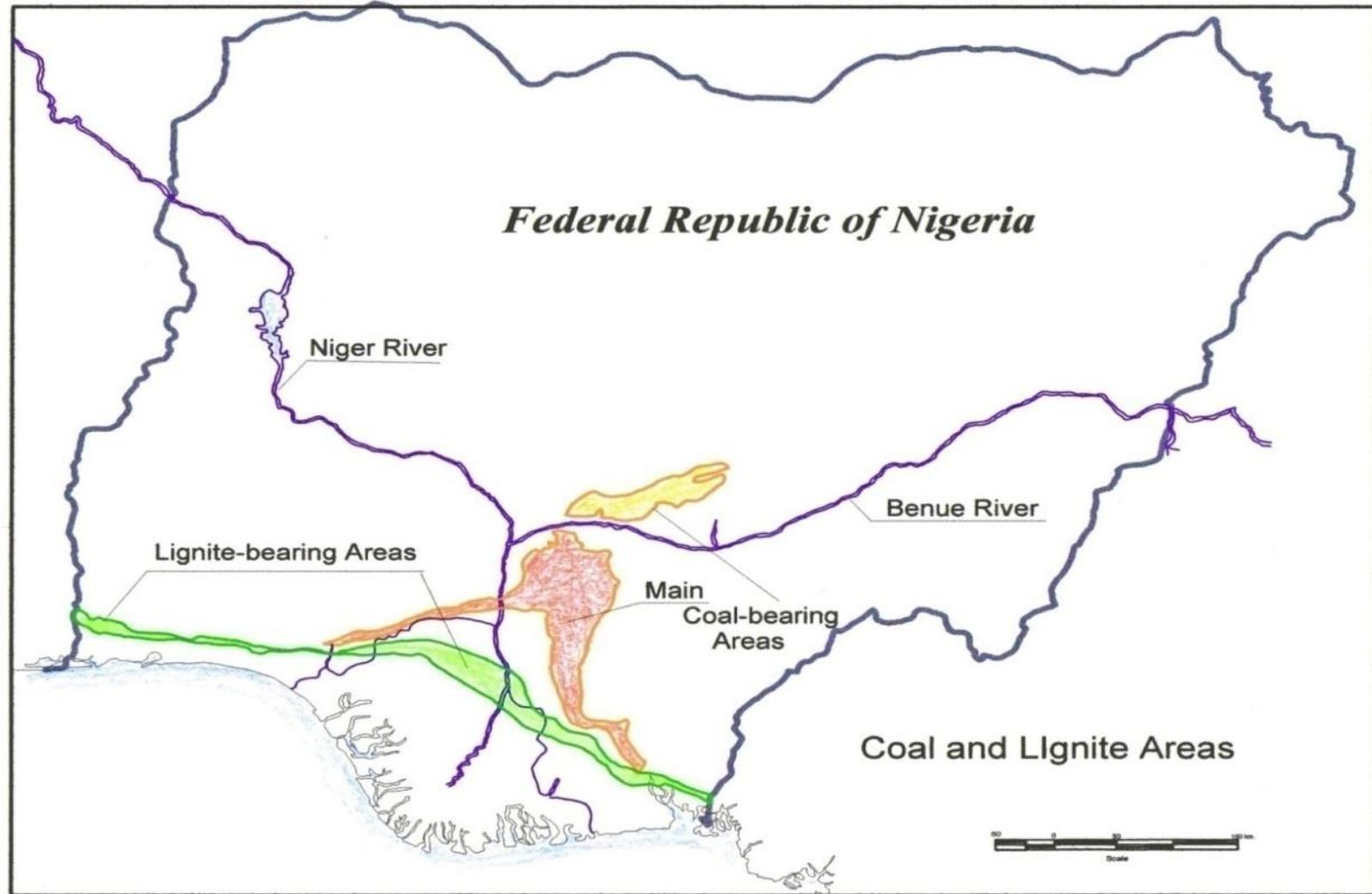
3. Energy Supply: Where are we and from where? Cont'd

- Coal was first discovered in Enugu in 1909. Its production began as early as 1916, with an annual production output of 24,511 tonnes. In 1950, the Nigerian Coal Corporation (NCC) was established by Government and charged with the responsibility of exploring, developing and exploiting the country's coal and lignite resources.
- The production peaked in 1959 with an output of 905,397 tonnes per annum and seized during the 1966-1970 civil hostilities.
- After the hostilities, production peaked again, in 1972, at 323,001 tonnes per annum; there after, it began to decline.

3. Energy Supply: Where are we and from where? Cont'd

- Between 1988 and 1998, coal production generally continued to decline from an output of 82,490 tonnes to 21,940 tonnes per annum.
- The decline, in the 1970s in coal production was mainly due to the loss of its traditional market to newly found and more competitive fuel substitutes, e.g. diesel for locomotive engines and high pour fuel oil (HPFO) and natural gas for power generation.
- The contribution of coal in the nation's energy mix declined from 70% in the 60s to insignificant value now.
- However surface coal mining is now being carried out in Akko LGA of Gombe state where reserves of up to 20 million tonnes is estimated.
- Production at the site by Ashaka Cement Company is about 300 tonnes per day; and is expected to double so as to replace 90% of its total heat requirement, hitherto supply by fuel oil (black oil).

3. Energy Supply: Where are we and from where? Cont'd



Coal & Lignite Deposits of Nigeria

(MODIFIED AFTER BEHRE DOLBEAR, 2005)
Source: Nigerian Coal Corporation (2009)

3. Energy Supply: Where are we and from where? Cont'd

ii. Tar Sands/Bitumen

- Focused exploration of Bitumen began in 1905. Tar Sands deposits are found in Osun, Ondo and Edo States axis. Tar sands production is yet to commence.

iii. Nuclear Energy

- The Nigeria Uranium Mining Company (NUMCO) was established as a public private partnership with Total Compagnie Miniere of France for the exploration and mining of uranium in Nigeria. In 1989 Total pulled out and in 1993, government transferred Numco's responsibilities to the Nigerian Geological Survey. Some studies have found traces of nuclear minerals in Cross Rivers state, North-West and North-East of the country.
- Nuclear implementation and regulatory institutions, Nigeria Atomic Energy Commission (NAEC) and Nuclear Regulatory Authority (NNRA) were established in 1976 and 1995 through their enabling Acts, respectively. However, NNRA commenced operation in 2001, while NAEC commenced operation in 2006.

3. Energy Supply: Where are we and from where? Cont'd

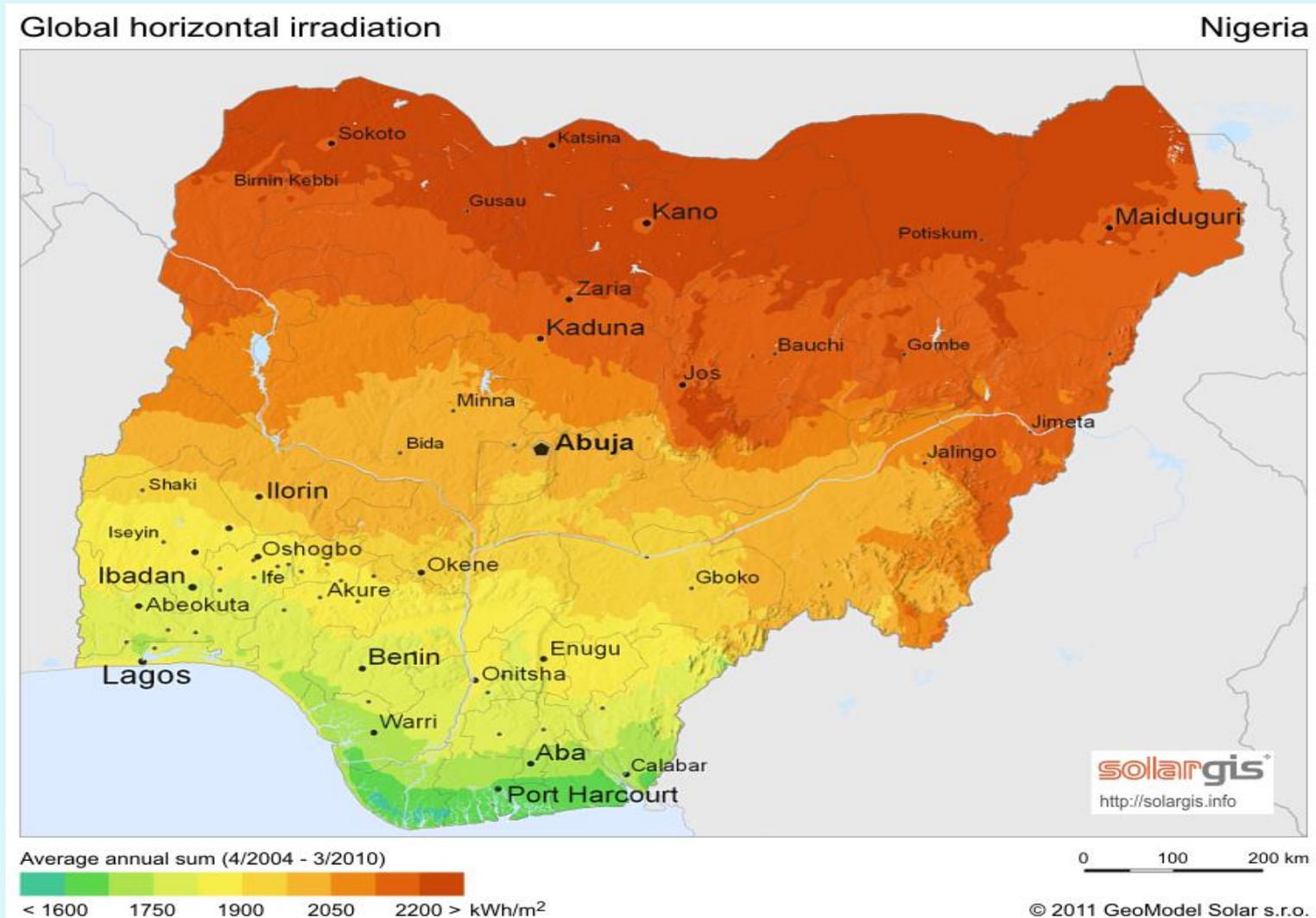
- In 2007, FGN approved the National Nuclear Power Roadmap for the National Power Programme (NPP) to be implemented within 10 – 12 years.
- The Roadmap anticipate 1,000MW by 2020 and 4,000MW by 2030 through Built Own Operate and Transfer (BOOT) with Russian Federation.
- Preliminary sites in Kogi and Akwa Ibom States have been selected.
- The Nuclear Energy Research & Training Centres in Zaria and Ile-Ife were established by the NAEC Act of 1976 and started operations in 1979. With the re-activation of NAEC in 2006, two new nuclear research centres have been established at the Universities of Maiduguri and Port Harcourt. It should be noted that a 30kW nuclear research reactor is in CERT, Zaria. Other supporting institutions for the NPP are SHETSCO, Sheda, National Environment Standards and Regulations Enforcement Agency (NESRA) and National Emergency Management Agency (NEMA)
- All developments are being carried under the watch of the International Atomic Energy Agency (IAEA).

3. Energy Supply: Where are we and from where? Cont'd

c) Renewables

- Renewable Energy sources such as Solar, Wind and Biomass have been used as traditional rather than commercial energy sources until of recent. Hydropower, a renewable energy source, however, has been utilized since 1929 by NESCO in Bukuru, Jos for off-grid electricity generation. About 2000 MW of hydropower has been installed mainly in Niger state (Kainji, Jebba and Shiroro). New installations of about 3,300 MW capacity are on the way at Zungeru and Mambilla as well as 30MW Gurara I, 40MW Kashimbila Dam, 150kW Waya Dam, 400kW Tunga Dam etc. There is also a 5MW Biomass (Rice Husk) fired power plant for Ebony State on the drawing board by UNIDO.

3. Energy Supply: Where are we and from where? Cont'd



Solar Map GIS

3. Energy Supply: Where are we and from where? Cont'd

d) Electricity/Power

- 1914 – 1960 (Colonial Era)
 - Public Works Department (PWD) of the Colonial Administration commenced operating electricity industry in Nigeria since 1896 with 60kW diesel generators;
 - In 1951, the Electricity Corporation of Nigeria (ECN) was established to take over from PWD & continued to supply Administrative centres and industrial areas ;
 - About 50MW was put in place by 1960 mainly distributed generation using diesel fuel.
- 1960 - 1990 (Civilian Systems & Military Rules)
 - About 67% of this period was under Military rule;
 - 1960 – 1966 (Civilian Parliamentary System); 1966 – 1979 (Military); 1979 – 1983 (Civilian Presidential System); and 1983 – 1990 (Military)
 - While ECN continued to expand, Niger Dam Authority (NDA) was established in 1962 to cater for hydropower development;
 - ECN and NDA were merged in 1972 to form National Electric Power Authority (NEPA), a vertically integrated electricity company;
 - The electricity industry grew from about 50MW in 1960 to about 6000MW in 1990 with an average capacity growth rate of about 200MW/year

3. Energy Supply: Where are we and from where? Cont'd



Government Own Power Stations before Reforms

S/N	Plant	Year Commissioned	Fuel Type	Installed Capacity (MW)
1	Kainji	1968	Hydro	760
2	Jebba	1986	Hydro	578
3	Shiroro	1990	Hydro	600
4	Egbin	1985	Thermal Steam/NG, HPFO	1320
5	Sapele I	1978	Thermal Gas Turbine/NG	720
6	Sapele II	1981	Thermal Gas Turbine/NG	300
7	Ijora	1978	Thermal Gas Turbine/NG	60
8	Delta	1975	Thermal Gas Turbine/NG	912
9	Afam	1963	Thermal Gas Turbine/NG	711
10	Oji	1956	Coal	30
Total				5991

Source: ECN

3. Energy Supply: Where are we and from where? Cont'd

d) Electricity/Power

- 1990 – 1999 (Military)
 - Industry still managed by NEPA
 - National population grew and demand for electricity continued to grow
 - No new power plant was added to the grid within this period and there was decline in funding and performance
 - By the end of this period available power was below 2000MW
- 1999 – 2007 (Democracy under Presidential System)
 - Private sector driven economic policy initiated in 1999
 - In 2001, private sector driven electric power policy evolved
 - In 2005, the Electric Power Sector Reform Act was enacted that deregulated and liberalized the electricity industry in the country
 - With the ACT, NEPA was reformed into Power Holding Company of Nigeria (PHCN), which was unbundled into 18 sisters companies; 6 generation companies, 1 transmission company and 11 distribution companies in preparation for privatization.

3. Energy Supply: Where are we and from where? Cont'd

- Nigerian Electricity Regulatory Commission (NERC), regulator of the industry was established. Also, the Rural Electrification Agency (REA) was established. In order to fast track increase in generation, transmission and distribution capacities, government initiated the National Integrated Power project (NIPP) in 2005;
- By the end of this period, installed grid generation capacity was raised to 7777.4MW with an average availability of 4156.19MW
- 2007 – 2010 (Democracy under Presidential System)
 - Power reforms implementation was sluggish within this period
 - Cost reflective electricity tariff referred to as the Multi Year Tariff Order (MYTO) was established by NERC
 - PHCN was the major driver of the electricity industry
 - At the end of this period, grid generation capacity increased to 8425.4MW with average availability of 4212.7MW

3. Energy Supply: Where are we and from where? Cont'd

- 2010 – Date (Democracy under Presidential System)
 - Power reforms got pursued with vigour within this period
 - Road Map for power sector reform was established and lunched in 2010 by the Presidential Action Committee on Power (PAC) to fast track the implementation of the power reforms through:
 - Removing obstacles to private sector investment
 - Clarifying government's strategy on the divestiture of PHCN successor companies and
 - Reforming the fuel – to – power sub-sector
 - The Nigerian Bulk Electricity Company referred to as the bulk trader was established as a transition instrument to go into power purchase agreement

3. Energy Supply: Where are we and from where? Cont'd

- The Nigerian Electricity Liability Management Company (NEMCO) was also established to assume and manage extant assets, liabilities, and other obligations that could not be easily transferred from PHCN to any of the successor companies
- Economic Tariffs (MYTO) established by NERC
- Feed-in Tariff (FiT) for renewables established by NERC to facilitate penetration of electricity from renewables
- By end of 2012, grid connected generation capacity was 9955.4MW with an average availability of 5516.38MW
- By end of 2013, all the 18 PHCN companies were transferred to core investors, while the Transmission company was given to a Management Contractor;
- The generation plants of the NIPPs (10 No) are also being privatized through due process to core investors. Financial bids for the 10 power plant was opened on March 7th, 2014.
- Nigeria exports electricity to Benin and Niger Republics. For example, out of 29.6TWh of electricity generated in 2012, Benin and Niger Republics received 4.02% and 1.99%, respectively.

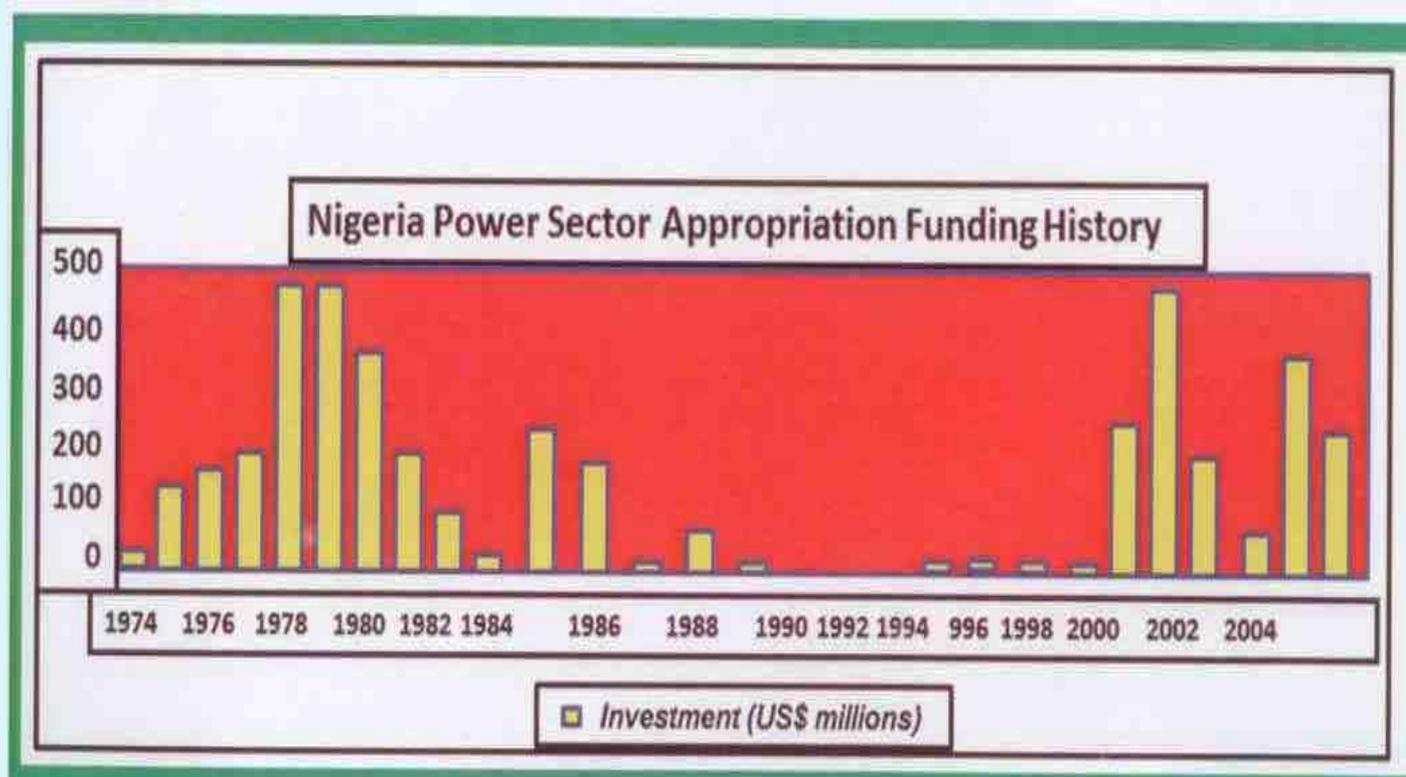
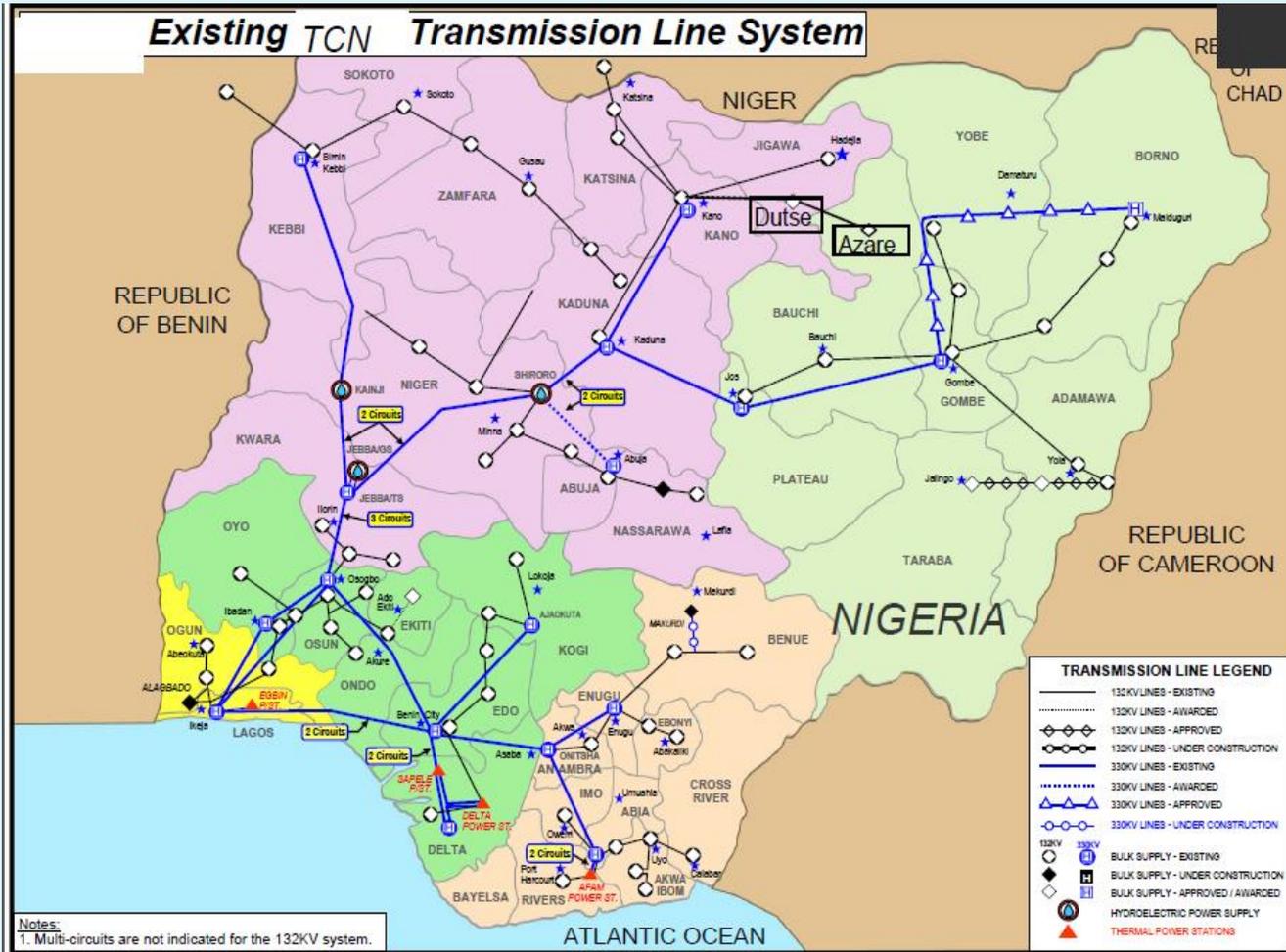


Figure 5. Power Sector Appropriation (1974 – 2007)

Source: FMP, 2014

3. Energy Supply: Where are we and from where? Cont'd



3. Energy Supply: Where are we and from where? Cont'd



Grid Connected Power Plants 2010

SUMMARY OF GENERATION CAPABILITIES OF PHCN POWER STATIONS AS OPERATED IN THE YEAR 2010(JANUARY - DECEMBER)

POWER STATION	AVAILABILITY FACTOR (MW)	AVERAGE AVAILABILITY (MW)	INSTALLED CAPACITY (MW)
KAINJI HYDRO	0.54	412.55	760.00
JEBBA HYDRO	0.75	431.83	578.40
SHIRORO	0.65	390.21	600.00
EGBIN STEAM	0.62	819.55	1320.00
AJAOKUTA	0.00	0.00	110.00
A.E.S (GAS)	0.69	208.20	302.00
SAPELE ST	0.17	125.17	720.00
OKPAI GAS/	0.92	441.57	480.00
AFAM (I-V) (GAS)	0.04	21.56	516.00
AFAM VI (GAS)	0.67	435.64	650.00
DELTA (GAS)	0.38	342.95	900.00
GEREGU (GAS)	0.50	208.69	414.00
OMOKU GT	0.53	80.18	150.00
OMOTOSHO	0.36	118.93	335.00
TRANS-AMADI	0.33	32.63	100.00
IBOM	0.53	82.89	155.00
OLORUNSOGO	0.18	60.13	335.00
TOTAL	0.50	4212.70	8425.40

Source: National Control Centre, Osogbo (2010), Annual technical report

3. Energy Supply: Where are we and from where? Cont'd



Grid Connected Power Plants 2012

SUMMARY OF GENERATION CAPABILITIES OF PHCN POWER STATIONS AS OPERATED IN THE YEAR 2012(JANUARY - DECEMBER)			
POWER STATION	AVAILABILITY FACTOR (MW)	AVERAGE AVAILABILITY (MW)	INSTALLED CAPACITY (LESS DE-COMMISSIONED UNITS) MW
PHCN - HYDRO STATIONS			
KAINJI HYDRO	0.39	295.38	760.00
JEBBA HYDRO	0.72	414.42	578.40
SHIRORO	0.83	497.46	600.00
SUB TOTAL	0.62	1207.26	1938.40
PHCN - THERMAL STATIONS			
EGBIN STEAM	0.77	1022.56	1320.00
AFAM (I-V) (GAS)	0.27	95.32	351.00
DELTA (GAS)	0.27	246.23	900.00
SAPELE ST	0.14	98.52	720.00
GEREGU (GAS)	0.66	274.96	414.00
OLORUNSOGO I	0.64	214.39	335.00
OMOTOSHO	0.34	113.02	335.00
SUB TOTAL	0.47	2064.99	4375.00
NIPP - THERMAL STATIONS			
OLORUNSOGO II	0.66	496.20	750.00
OMOTOSHO NIPP	0.29	144.73	500.00
SAPELE NIPP	0.58	218.26	375.00
SUB TOTAL	0.53	859.20	1625.00
IPP - THERMAL STATIONS			
RIVERS IPP	0.20	35.12	180.00
OMOKU GT	0.26	38.53	150.00
TRANS-AMADI GT	0.31	30.65	100.00
OKPAI GAS	0.92	440.86	480.00
IBOM	0.21	32.08	155.00
AFAM VI (GAS)	0.93	603.70	650.00
A.E.S (GAS)	0.68	203.99	302.00
SUB TOTAL	0.69	1384.93	2017.00
GRAND TOTAL	0.55	5516.38	9955.40

Source: National Control Centre, Osogbo (2012), Annual technical report

3. Energy Supply: Where are we and from where? Cont'd



Grid Connected Power Plants 2013

Summary of Generation Capabilities of PHCN Power Stations as Operated in the Year 2013 (January – December)

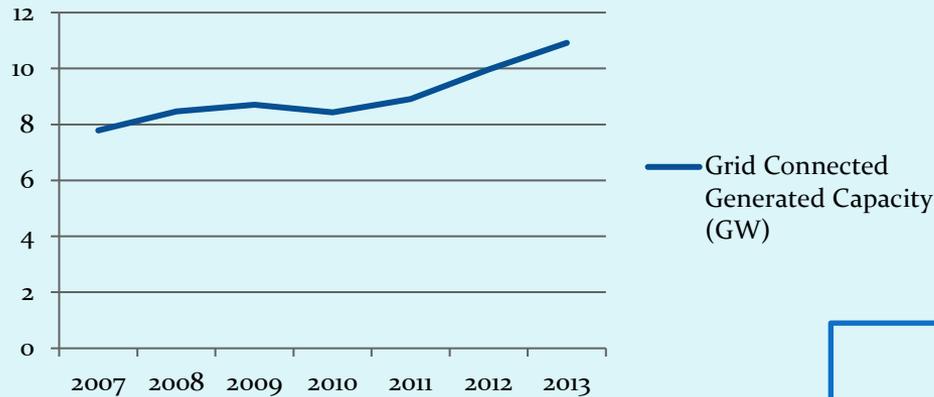
POWER STATION	AVAILABILITY FACTOR (MW)	AVERAGE AVAILABILITY (MW)	INSTALLED CAPACITY (LESS DE-COMMISSIONED UNITS) MW
PRIVATISED COMPANIES - HYDRO STATIONS			
KAINJI HYDRO	0.22	170.44	760.00
JEBBA HYDRO	0.66	381.39	578.40
SHIRORO	0.77	462.21	600.00
SUB TOTAL	0.52	1014.04	1938.40
PRIVATISED COMPANIES - THERMAL STATIONS			
EGBIN STEAM	0.74	976.77	1320.00
AFAM (I-V) (GAS)	0.17	58.57	351.00
DELTA (GAS)	0.27	246.78	900.00
SAPELE ST	0.13	94.32	720.00
GEREGU (GAS)	0.55	226.65	414.00
OLORUNSOGO I	0.43	144.34	335.00
OMOTOSHO	0.31	103.90	335.00
SUB TOTAL	0.42	1851.33	4375.00
NIPP - THERMAL STATIONS			
OLORUNSOGO NIPP	0.46	342.34	750.00
ALAOJI NIPP	0.00	0.00	150.00
GEREGU NIPP	0.42	189.74	450.00
IHOVBOR NIPP	0.08	20.11	250.00
OMOTOSHO NIPP	0.37	186.80	500.00
SAPELE NIPP	0.68	254.49	375.00
SUB TOTAL	0.40	993.49	2475.00
IPP - THERMAL STATIONS			
RIVERS IPP	0.51	91.81	180.00
OMOKU GT	0.00	0.00	150.00
ASCO	0.00	0.00	110.00
TRANS-AMADI GT	0.00	0.00	100.00
OKPAI GAS	0.85	409.70	480.00
IBOM	0.18	27.57	155.00
AFAM VI (GAS)	0.72	468.24	650.00
A.E.S (GAS)	0.65	194.82	302.00
SUB TOTAL	0.56	1192.14	2127.00
GRAND TOTAL	0.46	5050.99	10915.40

Source: Transmission Company of Nigeria, Annual Technical Report 2013

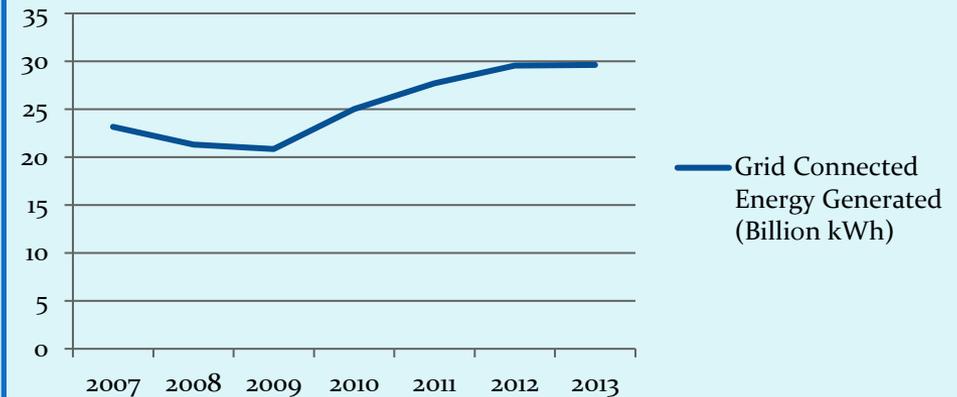
3. Energy Supply: Where are we and from where? Cont'd



Grid Connected Generated Capacity (GW)



Grid Connected Energy Generated (Billion kWh)



3. Energy Supply: Where are we and from where? Cont'd



PHCN Successor Distribution Companies and their Core Investors

S/N	DISTRIBUTION COMPANY	STATES COVERED	CORE INVESTOR
1	Port Harcourt Electricity Distribution Company	Bayelsa, A/Ibom, C/River, Rivers	Power Consortium
2	Abuja Electricity Distribution Company	FCT, Nasarawa, Niger, Kogi	KANN Utility Consortium Nig. Ltd
3	Benin Electricity Distribution Company	Ekiti, Edo, Ondo, Delta	VIGEO Power Consortium
4	Ikeja Electricity Distribution Company	Alimosho, Ikeja, Ikorodu	KEPCO Consortium
5	Enugu Electricity Distribution Company	Abia, Ebonyi, Anambra, Enugu, Imo	InterState Electrics Ltd
6	Ibadan Electricity Distribution Company	Ogun, Oyo	Integrated Energy Distribution Making Company
7	Jos Electricity Distribution Company	Bauchi, Gombe, Plateau, Benue	Aura Energy Limited
8	Kaduna Electricity Distribution Company	Kaduna, Zamfara, Sokoto	Yet to be sold
9	Kano Electricity Distribution Company	Kano, Katsina, Jigawa	Sahelian Power SPV Ltd
10	Eko Electricity Distribution Company	Festac, Ijora, Lagos Island, Ajah, Agbara/ Badagry District	West Power and Gas Ltd
11	Yola Electricity Distribution Company	Yobe, Taraba, Bornu, Adamawa	Integrated Energy Distribution & Marketing Ltd

3. Energy Supply: Where are we and from where? Cont'd



PHCN Successor Generating Companies & Core Investors

S/N	Name	Capacity (MW)	Core Investor
1	Afam Power Plc	987.2	Not yet finalized
2	Egbin Power Plc	1,320	Not yet finalized
3	Kainji Hydro Electric Plc	760	Mainstream Energy Solutions Ltd.
4	Sapele Power Plc	1,020	CMEC/EURAFRIC Energy Ltd.
5	Shiroro Hydro Electric Plc	600	North-South power Company
6	Ughelli Power Plc	942	Transcorp Ughelli Power PLC
Total		5,629.2	

3. Energy Supply: Where are we and from where? Cont'd



NIPP Generating Companies for Privatization

S/N	Name	Location	Capacity (MW)	Core Investor
1	Alaoji Generating Company Ltd	Aba, Abia State	831.3	Yet to be sold
2	Benin Generating Company Ltd	Benin City, Edo State	507.6	Yet to be sold
3	Calabar Generating Company Ltd	Calabar, Cross River State	634.5	Yet to be sold
4	Egbema Generating Company Ltd	Owerri, Imo State	380.7	Yet to be sold
5	Gbarani Generating Company Ltd	Yanegoa, Bayelsa State	253.8	Yet to be sold
6	Geregu Generating Company Ltd	Ajaokuta, Kogi State	506.1	Yet to be sold
7	Ogorode Generating Company Ltd	Sapele, Delta State	507.7	Yet to be sold
8	Olorunsogo Generating Company Ltd	Olorunsogo, Ogun State	754.0	Yet to be sold
9	Omoku Generating Company Ltd	Port Harcourt, River State	264.7	Yet to be sold
10	Omotosho Generating Company Ltd	Okiti Pupa, Ondo State	512.82	Yet to be sold
Total			5,153.12	

3. Energy Supply: Where are we and from where? Cont'd

Independent Power Plants (IPPs)

S/No	Name	Capacity	Location	Remarks
1	AES, lagos	300MW	Lagos State	grid connected
2	AGIP, Okpai	480MW	Delta State	grid connected
3	Obajana	350MW	Kogi State	self generation
4	Akute, lagos	12.5MW	Lagos State	self generation
5	Island, Lagos	10MW	Lagos State	self generation
6	Alausa, Lagos	10MW	Lagos State	self generation
7	Ibom Power	188MW	Akwa Ibom State	grid connected
Total		1,350.5MW		

3. Energy Supply: Where are we and from where? Cont'd



New FGN Power Plants

S/No	Name	Capacity	Location	Remarks
1	Zungeru Hydro	700MW	Niger State	On-going
2	Gurara I Hydro	30MW	Kaduna State	Completed
3	Gurara II Hydro	300MW	Niger State	Under Study
4	Kalamkasi hydro	40MW	Taraba State	On-going
5	Kaduna Thermal Power	200MW	Kaduna State	On-going
6	Mambila Hydro	2,600MW	Taraba State	Under study
7	Tunga Dam	400kW	Taraba State	On-going (UNIDO)
8	Waya Dam	150kW	Bauchi State	Completed (UNIDO)
9	Ezioha-Mgbowo	30kW	Enugu State	Completed(UNIDO)
Total		3,870MW		

4. Energy Supply: Where Do we Want to Be?



- The Energy Commission of Nigeria, which I head, was established in 1979 by law. It however commenced operation in 1989 after the meeting of the Heads of ECOWAS on 29th May 1982 in Cotonou, where a decision was taken that each member state should establish by law, a body within the machinery of government, to be charged with the responsibility for coordinating and supervising all energy functions and activities within each Member State and may be called ENERGY COMMISSION of each Member State.
- The primary legal mandate of the ECN is to produce strategic plans and co-ordinate national policies on energy in all its ramifications.

4. Energy Supply: Where Do we Want to Be? Cont'd



- The National Energy Policy was produced under the arrow-head of Energy Commission between 1993 and 2003 after due consultation with stakeholders.
- It was approved by Federal Executive Council (FEC) in 2003 and reviewed in 2013. NEP has the following objectives:
 - (i) To ensure the development of the nation's energy resources, with diversified energy resources option for the achievement of national energy security and an efficient energy delivery system with an optimal energy resource mix;
 - (ii) To guarantee increased contribution of energy productive activities to national income.
 - (iii) To guarantee and efficient and cost effective consumption pattern of energy resources.
 - (iv) To guarantee adequate, reliable and sustainable supply of energy at appropriate costs and in an environmentally friendly manner, to the various sectors of the economy, for national development;
 - (v) To accelerate the process of acquisition and diffusion of technology and managerial expertise in the energy sector and indigenous participation in energy sector industries, for stability and self-reliance.
 - (vi) To promote increase investments and development of the energy sector industries with private sector leadership
 - (vii) To ensure a comprehensive, integrated and well-informed energy sector plans and programmes for effective development.

4. Energy Supply: Where Do we Want to Be? Cont'd



- (viii) To foster international co-operation in energy trade and projects development in both the African region and the world at large.
- (ix) To successfully use the nation's abundant energy resources to promote international co-operation
- (x) To promote research and development in, and adoption of, sustainable low carbon and clean energy technologies to mitigate environmental pollution and climate change.
- (xi) To promote gender sensitivity and special attention to rural energy needs.
- (xii) To promote efficiency, conservation and carbon management best practices in the nation's energy supply chain.
- (xiii) To ensure comprehensive and up-to-date availability of energy sector data and information
- (xiv) To ensure effective coordination of national energy planning, programmes and policy implementation.

4. Energy Supply: Where Do we Want to Be? Cont'd

Rise of the MINTs (\$ trillions)



Source: World Bank, Goldman Sachs

Nigeria's Ranking in the World based on GDP

4. Energy Supply: : Where Do We Want to Be? ... Cont'd



- The Nation's vision is to be amongst the 20 large economies in the world by 2020. Nigeria was number 39 in 2012. However with the rebasing in 2013, we jumped to number 26. This upwards movement requires adequate, reliable and cost effective supply of electricity, fuels and process heat in the economy.
- This however must be done in a responsible and sustainable manner i.e the energy trilemma must be faced squarely - energy security, energy equity and environmental sustainability
- A study conducted by Energy Commission of Nigeria on Nigeria's long term energy demand and supply using IAEA energy planning tools of MAED and MESSAGE predicted huge amount of energy requirements. The model has the economy, demography, life style and envisaged path for of industrialization as inputs, amongst others

4. Energy Supply: : Where Do We Want to Be? ... Cont'd



a) Petroleum

- To have a conducive business environment for petroleum industry operations
- Have enhanced exploration and exploitations of petroleum resources for the benefits of Nigeria
- Optimized domestic gas supplies particularly for power generation and industrial development and end gas flaring by 2020.
- Have a progressive fiscal framework that encourages further investment in the petroleum industry, while optimizing the revenue accruing to government
- Established commercially oriented and profit driven O/G entities
- Deregulated and liberalized downstream petroleum sector
- Efficient and effective regulatory agencies
- Openness and transparency in the industry
- Enhanced local content in the petroleum industry.
- Oil reserves of 40 billion barrels and production of 4mb/d by 2020

4. Energy Supply: : Where Do We Want to Be? ... Cont'd



Projected Total Energy Demand for Fuel Petroleum Products for Nigeria

Year	PMS (Million litres)		DPK (Million litres)		AGO (Million litres)		Fuel Oil (Million litres)		LPG (Thousand tonnes)	
	7%	13%	7%	13%	7%	13%	7%	13%	7%	13%
2009	5096.9	5096.9	356.1	356.1	565.6	565.6	120.0	120.0	74.2	74.2
2010	6180.0	8890.0	464.0	902.0	791.7	1177.9	160.0	270.0	93.2	132.9
2012*									120	
2014*									250	
2015	14460.0	19510.0	3788.0	7039.0	2301.9	3651.0	1800.0	3380.0	1107.0	1871.2
2016*									500	
2020	28170.4	35587.1	9038.7	22704.5	4176.8	6270.8	4632.1	9277.9	2862.5	5733.5
2025	39769.4	55459.4	15084.9	44285.4	6231.8	11408.4	7806.1	20797.4	4824.0	12852.3
2030	56457.2	88369.2	22064.9	77255.7	8902.4	21349.7	11374.6	45443.4	7029.2	22903.7

Source: Energy Commission of Nigeria (2010)

* Punch 29th June 2014, pg 25

4. Energy Supply: : Where Do We Want to Be? ... Cont'd



b) Coal/Lignite, Tar Sands/Bitumen and Nuclear Energy

- i) Coal and Lignite
 - To have a resuscitated coal industry through active private sector participation and with high local content
 - Adequate funding of coal to meet the energy and power requirement of the country in a cost effective and sustainable manner
- ii) Tar Sands/Bitumen
 - To have the tar sands/bitumen reserves explored and exploited through active private sector participation and high local content in an environmentally friendly manner for domestic and international markets
- iii) Nuclear Energy
 - To have nuclear energy utilized for peaceful purposes
 - To have requisite manpower for peaceful use of nuclear power
 - To have adequate storage and disposal of nuclear waste in an safe and sustainable manner



c) Renewables and Energy Efficiency

- To have renewable energy mainstreamed into the nation's commercial energy mix through active participation of private sector and high local content
- To have renewables to contribute about 20% in meeting the electricity demand by 2030
- To have energy efficiency and conservation best practices promoted and its effect doubled by 2030

4. Energy Supply: : Where Do We Want to Be? ... Cont'd

Renewable Electricity Supply Projection in MW (13% GDP Growth Rate)

S/N	Resource	Now	Short	Medium	Long
1	Hydro (LHP)	1938	4,000	9,000	11,250
2	Hydro (SHP)	60.18	100	760	3,500
3	Solar PV	15.0	300	4,000	30,005
4	Solar Thermal	-	300	2,136	18,127
5	Biomass	-	5	30	100
6	Wind	10.0	23	40	50
	All Renewables	2025.18	4,628	15,966	63,032
	All Energy Resources	8,700 (installed Gen Capacity)	47,490	88,698	315,158
	% of Renewables	23%	10%	18%	20%
	% RE Less LHP	0.4%	1.3%	8%	16%

Short – 2015
 Medium – 2020
 Long – 2030

Source: ECN

4. Energy Supply: : Where Do We Want to Be? ... Cont'd



(ii) Bio fuels Targets (Million Litres per Annum) for 13% growth scenario.

S/N	Item	Timeline/Quantity		
		Short	Medium	Long
1	Bio Ethanol (E10)	1951	3559	8837
2	Biodiesel (B20)	730	1254	4270

Source: ECN

4. Energy Supply: : Where Do We Want to Be? ... Cont'd



d) Power

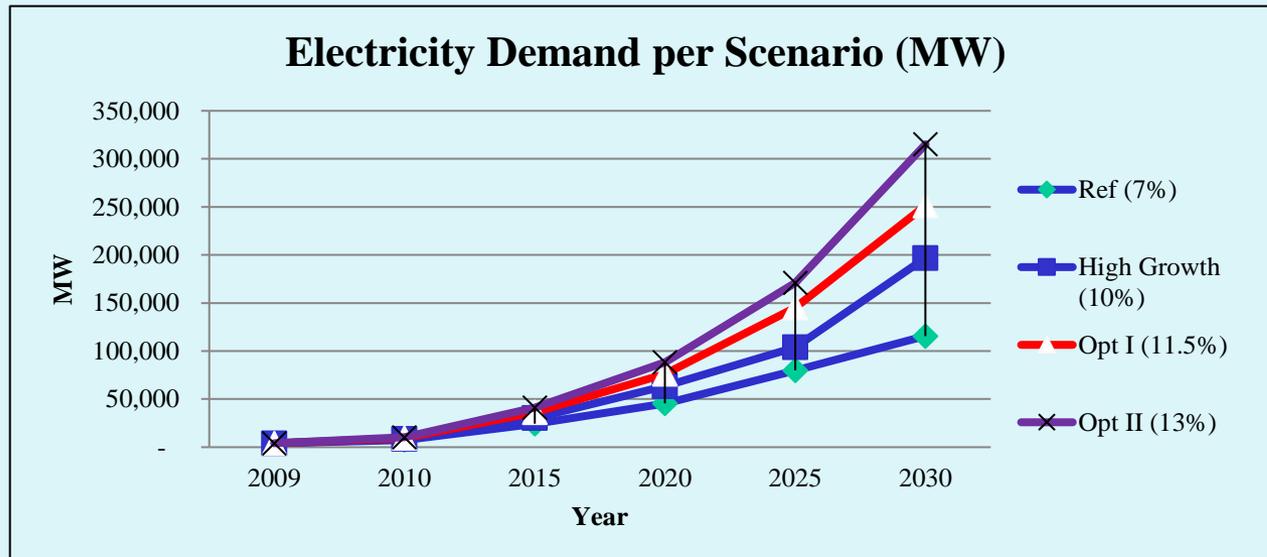
- That power contributes immensely to a double digit growth of the economy such that Nigeria becomes within the 20 largest economy in the world by 2020 or thereabout, through active private sector participation with high local contents and in an environmentally friendly manner. Projected power demand and supply for various scenarios from MAED and MESSAGE studies conducted are as shown in the following tables:

4. Energy Supply: : Where Do We Want to Be? ... Cont'd

Electricity Demand Projections for Nigeria under various Economic Scenarios

	2009	2010	2015	2020	2025	2030
Ref (7%)	4,052	7440	24380 (14,000)*	45490 (40,000)**	79798	115674
High Growth (10%)	4,052	8420	30236	63363	103859	196875
Opt I (11.5%)	4,052	9400	36124	76124	145113	251224
Opt II (13%)	4,052	10230	41133	88282	170901	315113

*Power Roadmap Target (PRMT) by 2014 ** PRMT by 2020

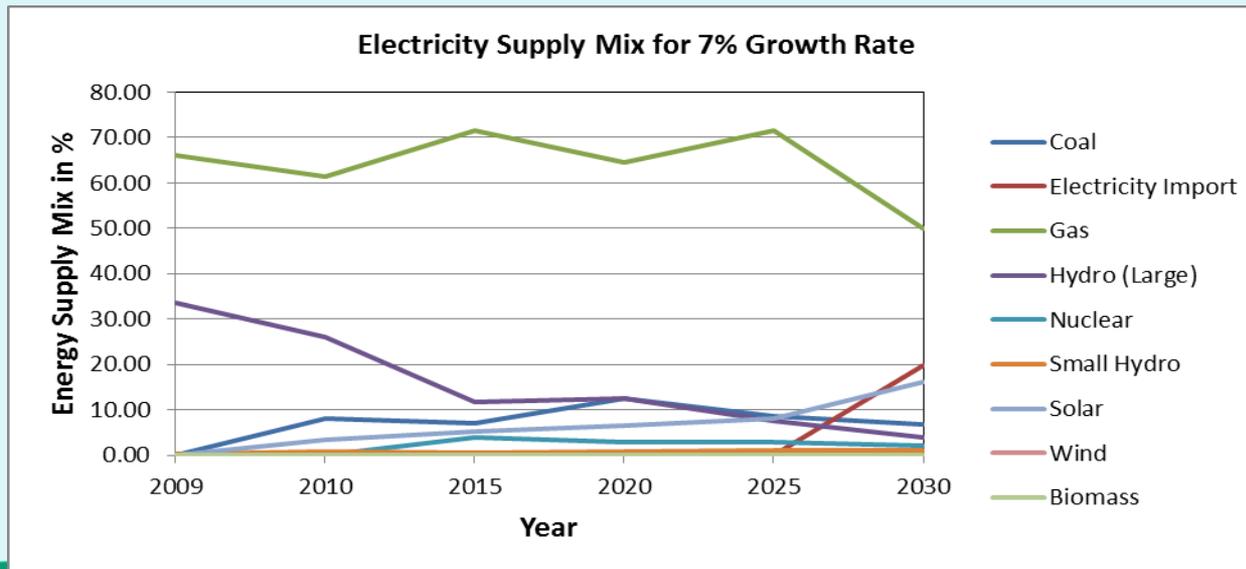


Source: ECN, 2012

4. Energy Supply: : Where Do We Want to Be? ... Cont'd

Table 3a: Electricity Supply Projections by Fuel Type: Optimistic II Scenario 7%

	2009 (Based Yr)	2010	2015	2020	2025	2030
Coal	0	609	1850	6527	7545	10984
Electricity Import	0	0	0	0	0	31948
Gas	3803	4572	18679	33711	61891	80560
Hydro (Large)	1930	1930	3043	6533	6533	6533
Nuclear	0	0	1000	1500	2500	3500
Small Hydro	20	60	172	409	894	1886
Solar	0	260	1369	3455	7000	25917
Wind	0	10	19	22	25	29
Biomass	0	0	3	16	35	54
Supply	5753	7440	26092	52174	86422	161411



4. Energy Supply: : Where Do We Want to Be? ... Cont'd

Table 3b: Electricity Supply Projections by Fuel Type: Optimistic II Scenario 10%

	2009 (Based Yr)	2010	2015	2020	2025	2030
Coal	0	870	2579	9324	10778	15691
Electricity Import	0	0	0	0	0	45640
Gas	3803	6957	21328	44763	82702	115086
Hydro (Large)	1930	2174	4348	9332	9332	9332
Nuclear	0	0	1500	2500	3500	3500
Small Hydro	20	81	246	585	1277	2694
Solar	0	377	1956	4936	10000	370225
Wind	0	18	28	32	36	42
Biomass	0	0	4	23	50	77
Supply	5753	10476	31989	71495	117675	229086

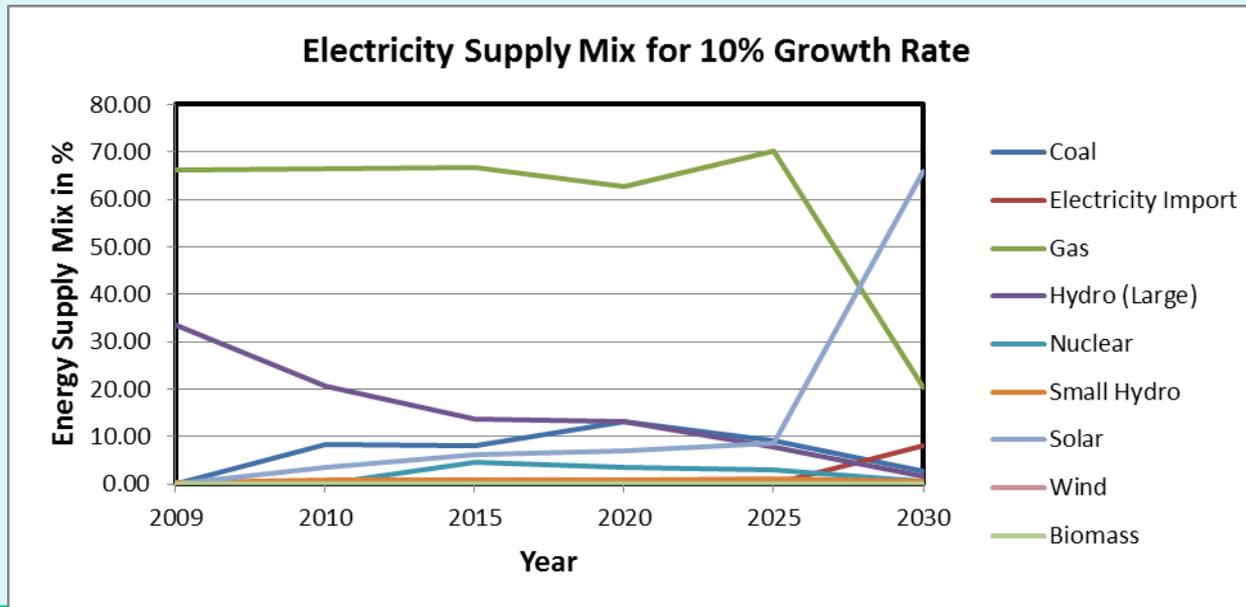
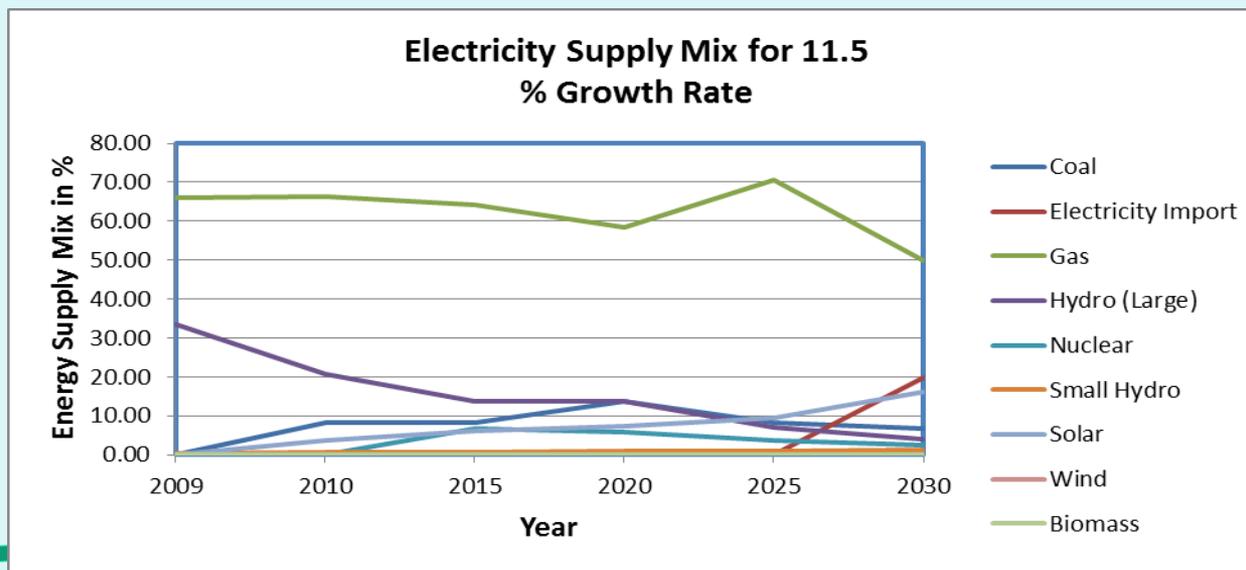


Table 3c: Electricity Supply Projections by Fuel Type: Optimistic II Scenario 11.5%

	2009 (Based Yr)	2010	2015	2020	2025	2030
Coal	0	1000	2966	10723	12395	18045
Electricity Import	0	0	0	0	0	52486
Gas	3803	8000	23377	45728	106607	132348
Hydro (Large)	1930	2500	5000	10732	10732	10732
Nuclear	0	0	2500	4500	5500	6369
Small Hydro	20	93	283	672	1469	3098
Solar	0	434	2250	5677	14127	42578
Wind	0	20	32	36	42	48
Biomass	0	0	4	27	58	88
Supply	5753	12047	36412	78095	150929	265794

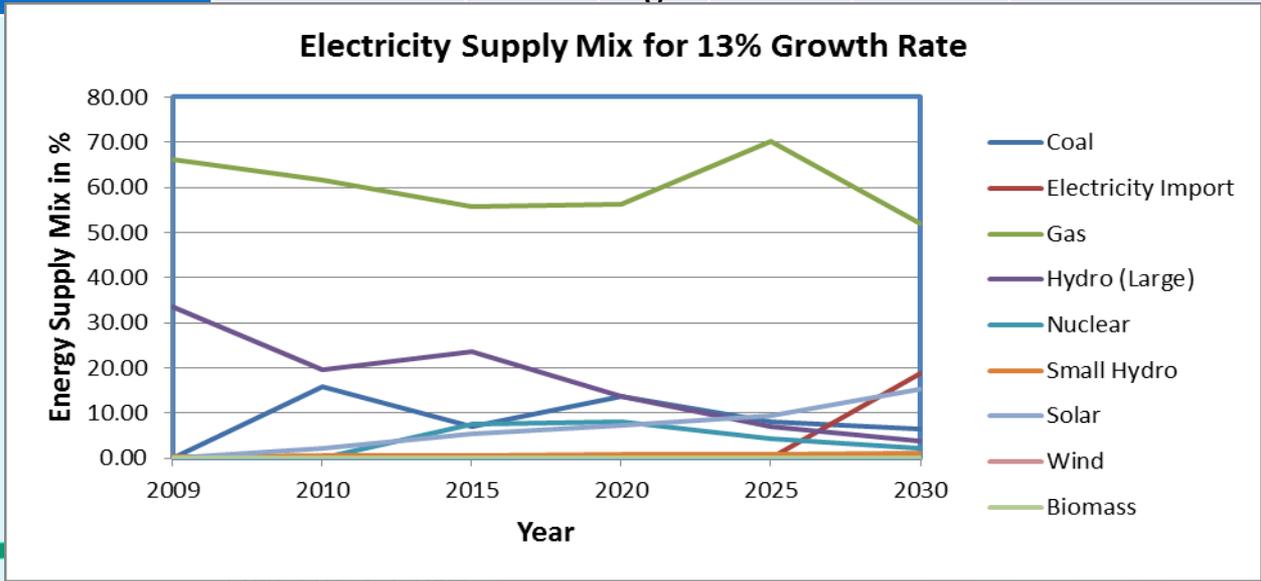


4. Energy Supply: : Where Do We Want to Be? ... Cont'd



Table 3d: Electricity Supply Projections by Fuel Type: Optimistic II Scenario 13%

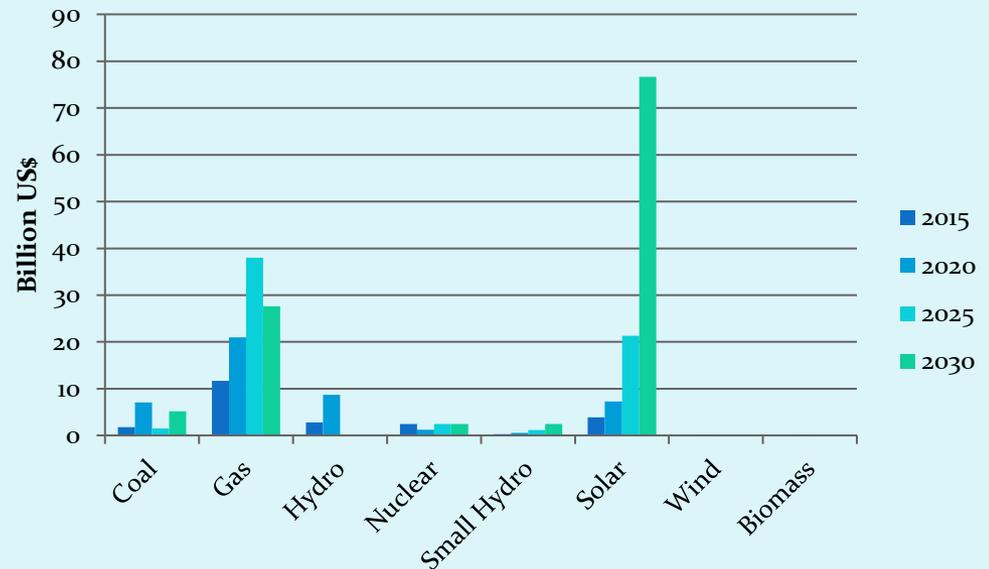
	2009 (Based Yr)	2010	2015	2020	2025	2030
Coal	0	3353	3353	12122	14011	20399
Electricity Import	0	0	0	0	0	59333
Gas	3803	13110	26426	49996	120512	164307
Hydro (Large)	1930	4157	11207	12132	12132	12132
Nuclear	0	0	3600	7200	7200	7200
Small Hydro	20	105	320	760	1660	3502
Solar	0	490	2543	6417	15970	48132
Wind	0	23	36	41	47	54
Biomass	0	0	5	30	65	100
Supply	5753	21238	47490	88698	171598	315158



4. Energy Supply: : Where Do We Want to Be? ... Cont'd

Capital Cost of Additional Generating Capacity by Technology in Billion US Dollars for the Reference Scenario

Resource	2015	2020	2025	2030
Coal	1.79	7.08	1.53	5.16
Gas	11.67	20.98	37.99	27.61
Hydro	2.78	8.73	0	0
Nuclear	2.5	1.25	2.5	2.5
Small Hydro	0.28	0.59	1.21	2.48
Solar	3.88	7.3	21.35	76.67
Wind	0.02	0.01	0.01	0.01
Biomass	0	0.02	0.03	0.03
Total	22.94	45.96	64.62	114.46



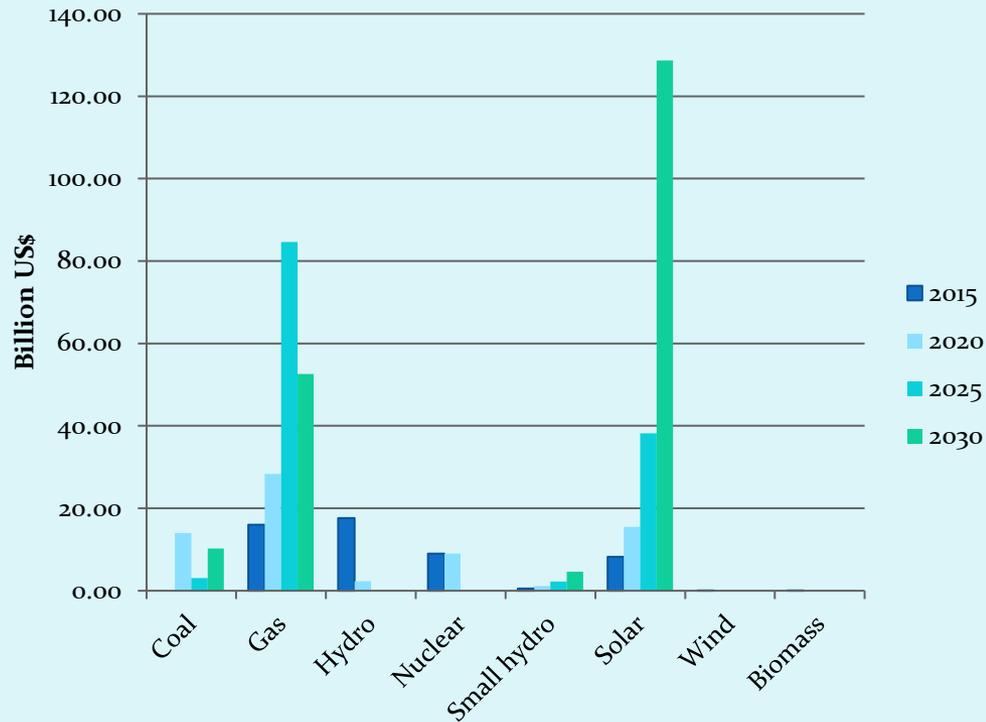
Source: ECN (2010)

Capital Cost of Additional Generating Capacity by Technology in Billion US Dollars for the Reference Scenario

4. Energy Supply: : Where Do We Want to Be? ... Cont'd

Capital Cost of Additional Generating Capacity by Technology in Billion US Dollars for the Optimistic II Scenario (13%)

	2015	2020	2025	2030
Coal	0.00	14.03	3.02	10.22
Gas	15.98	28.28	84.62	52.55
Hydro	17.63	2.31	0.00	0.00
Nuclear	9.00	9.00	0.00	0.00
Small hydro	0.54	1.10	2.25	4.61
Solar	8.21	15.50	38.21	128.65
Wind	0.03	0.01	0.01	0.01
Biomass	0.01	0.06	0.08	0.08
Total	51.39	70.29	128.19	196.12

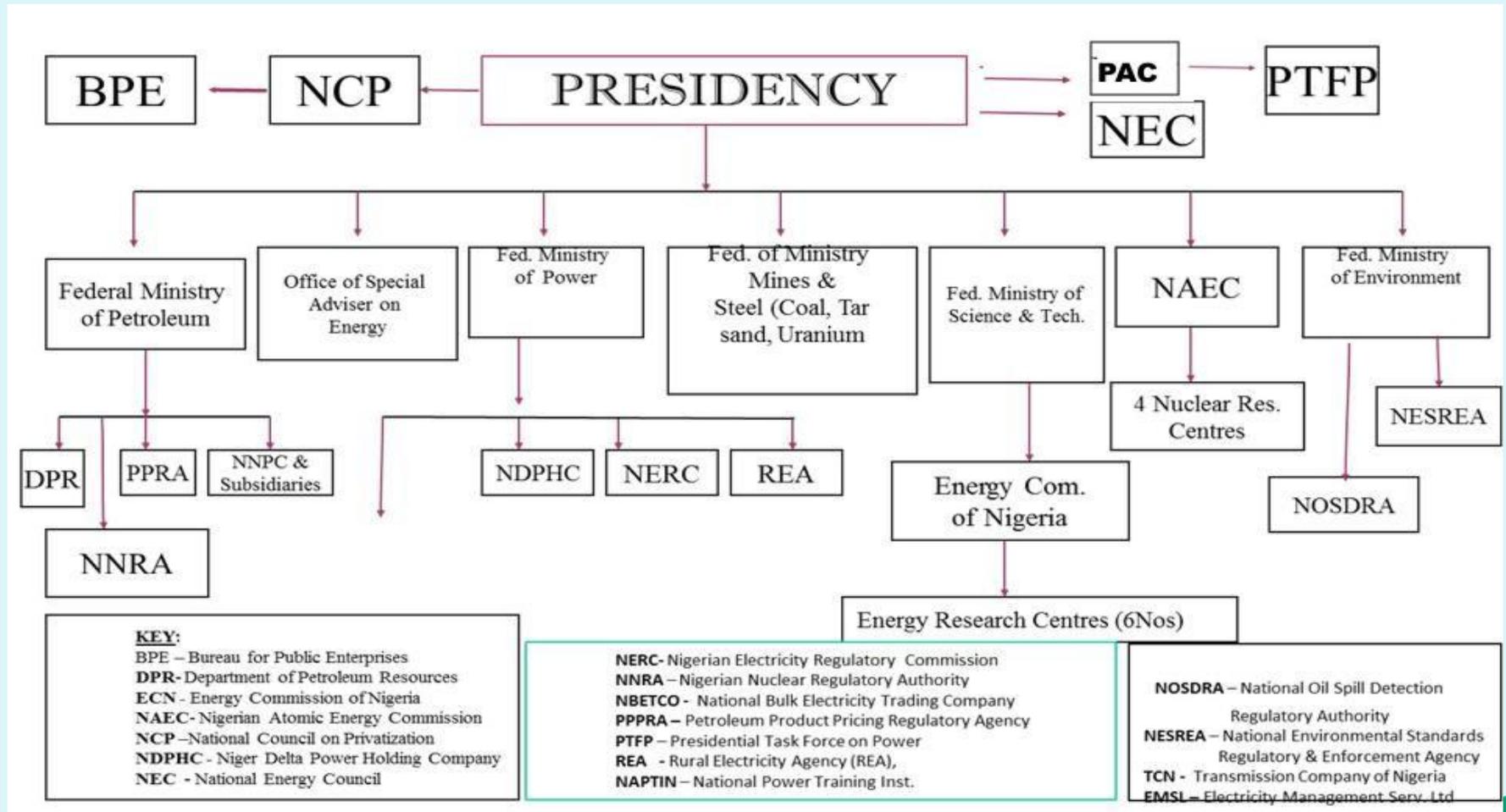


Capital Cost of Additional Generating Capacity by Technology in Billion US Dollars for the Optimistic II Scenario (13%)

Source: ECN (2010)

5. Institutional Framework in the Energy and Power Sector

- The following are Stakeholders Ministries, Department and Agencies the in Nigerian energy sector.



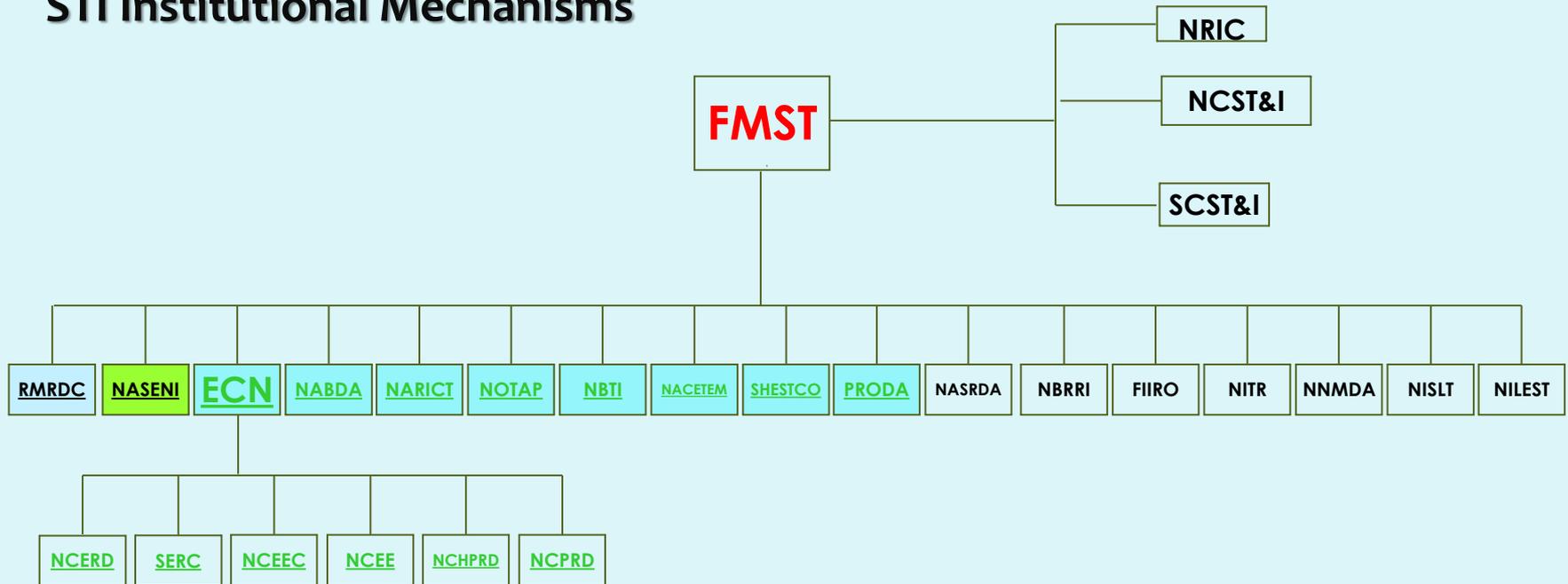
5. Institutional Framework in the Energy and Power Sector



..... Cont'd

- The following are research institutes and allied organizations with respect to Science, Technology and Innovation.

STI Institutional Mechanisms



Key:

- | | |
|---|---|
| • RMRDC - Raw Material Research & Development Council | • NRIC - National Research & Innovation Council |
| • NASENI - National Agency for Science & Engineering Infrastructure | • NCST&I - National Council on Science, Technology & Innovation |
| • ECN - Energy Commission of Nigeria | • SCST&I - State Council on Science, Technology & Innovation |
| • NABDA - National Biotechnology Development Agency | • NASRDA - National Space Research Development Agency |
| • NARICT - National Research Institute for Chemical Technology | • NBRRRI - Nigerian Building & Road Research Institute |
| • NOTAP - National Office for Technology Acquisition & Promotion | • FIIRO - Federal Institute of Industrial Research |
| • NBTI - National Board for Technology Incubation | • NITR - Nigeria Institute for Trypanosomiasis |
| • NACETEM - National Centre for Technology Management | • NNMDA - Nigeria National Medicine Development Agency |
| • SHESTCO - Sheda Science & Technology Complex | • NISLT - Nigerian Institute of Science Laboratory Technology |
| • PRODA - Project Development Institute | • NILEST - National Institute for Leather Science & Technology |

STI Areas of Focus for Poverty Reduction



5. Institutional Framework in the Energy and Power Sector



- **STI Policy on Energy:**

- Developing of R&D, demonstration and deployment capabilities in thermal (coal, oil and gas), nuclear, solar, wind, biofuels, hydro and other renewable energies.
- Developing requisite infrastructure and human capabilities for acquisition and deployment in nuclear power technology.
- Promoting the use of safe, clean, efficient and sustainable energy technologies for national development.
- Encouraging the development of energy conversion technologies for sustainable power generation.
- Facilitating the adaptation of appropriate energy technologies for rural development.
- Encouraging the development and deployment of locally produced power equipment for sustainable power industry.
- Supporting national vision to acquire technologies for sustainable power industry.

6. Challenges and Way Forward



(a) Challenges:-

- I am aware that some of the research institutions for Science, Technology and Innovation are yet to have legal frameworks. This will hamper effective pursuit of their activities for poverty reduction.
- Inadequate funding from annual appropriation for Science, technology and innovation. For example, between 2000 and 2015, an average appropriation for FMST and its parastatals have been less than 1% of the Federal budget. This was for less than the 20% recommended by UNESCO. Framework of Action on Education made in Dakar in 2000. It is also far below the 1% of GDP recommended by AU in its STI strategy for Africa 2024.

6. Challenges and Way Forward ... contd



Challenges (cont'd):-

- Mopping of annual appropriation for R&D projects at the end of every fiscal year does not allow for flexibility, efficiency and effectiveness required in execution of R&D projects.
- The present mode of implementing personnel costs through the IPPIS, though transparent and eliminates financial leakages, however, does not encourage/facilitate movement of expertise from abroad and within as is required worldwide in R&D institutions for results.
- Federal research institutes are by law of the Education Trust Fund (ETF) excluded from accessing ETF grant facilities; because Research Institutes are not listed as tertiary institutions and beneficiaries of ETF facilities



Challenges (cont'd):-

- Disparity between personnel emolument of Research Officers in Research Institutes and that of University lecturers is a challenge to innovation for poverty reduction.
- Inadequate interface between industry and Research Institutions
- Lack of a Ministry of Energy to holistically coordinate all energy development activities of policy, planning, implementation and R&D is a hindrance to adequate supply of energy required to drive jobs, grow the economy and to reduce poverty



(b) Way Forward

- There should be speedy and appropriate liaison with the National Assembly to ensure that all STI agencies have legal frameworks establishing them so as to provide the required legal backing to their poverty reduction research activities.
- It is imperative to increase annual appropriation to STI institutes towards the 20% of public expenditure or 1% GDP recommendations by UNESCO and AU. To this effect the National Research and Innovation Fund (NRIF) should be operationalized.
- The ETF law should be amended to allow Research Institutes access ETF facilities like any other tertiary institution to boost research and innovation.

6. Challenges and Way Forward ... contd



Way Forward (cont'd):-

- There should be parity in the emolument of Research Officers in the research institutes and that of University lecturers to allow for expertise retention and attraction into the Research Institutes.
- There should be an annual forum where Research Institutes and Industry come together to share areas of common interest.
- There may be the need for the Federal Government to have a re-think and to establish a Ministry of Energy to oversee all energy related Agencies and to coordinate holistically development of the entire energy sector to deliver adequate, reliable, cost effective and sustainable energy supply for growing the economy, job creation and poverty reduction.

7. Conclusion



- Science, Technology and Innovation (STI) is essential for secured national economic growth and satisfaction of human needs and aspirations in a sustainable manner. In particular, energy and power services facilitate job creation, human health, comfort and poverty reduction.
- However, the supply of energy and power in the economy has not been secured, equitable and environmentally sustainable as is required.
- The necessary energy STI institutional frameworks and mechanisms to drive the required change into 2030 and beyond need effective coordination, adequate funding and better interface with the industry.
- The manner in which public STI institutions are presently managed need to be ingeniously flexible, while maintaining accountability and transparency, for better output.

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**Thank you
and
God Bless**