ENERGY COMMISSION OF NIGERIA

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PROCEEDINGS
of the
SUMMIT ON ENERGY
AND THE TRANSFORMATION AGENDA IN NIGERIA

HELD AT
REIZ CONTINENTAL HOTEL, ABUJA, NIGERIA,
17th and 18th MARCH, 2015

General Editors: Prof. Eli Jidere Bala, FNSE, FAEng & Engr. Johnson Oluyemi Ojosu, FNSE, FSESN

FOREWORD

This Summit on **Energy and the Transformation Agenda in Nigeria** was organized to discuss Energy issues in relation to the Vision 20:2020 of the Federal Government and the current Transformation Agenda, which is to fast track the main thrust of the Vision. To achieve the Vision, the status of the Energy infrastructure in the country is very significant. No country can industrialize without adequate energy infrastructure. The importance of adequate energy infrastructure cannot be overemphasized but the adequacy starts with proper planning and a good road map for the utilization of available energy resources. Nigeria, no doubt has enormous energy resources to meet the energy requirement of the populace and indeed for industrialization.

The theme for the current Summit; Energy and the Transformation Agenda is apt, given the focus of the Federal Government. The sub-themes; Energy and National Security, Challenges in the Post-Privatization arena of the Nigeria Power Sector, Reforms in the Petroleum Sector, Status of the Nigeria Nuclear Power Programme, Renewable Energy and Energy Efficiency Development in Nigeria, Development in the Coal and Tar sand Energy sub-sector, Financing in the Nigeria Energy sector with Energy and the Gender equation are also very critical considering the energy sector holistically.

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The summit will afford stakeholders in the sector to brainstorm and come out with ways and methods in harnessing the vast energy resources in the country and also enable the Commission in executing its mandate. I urge the speakers and the various discussants for the assigned topics to bare their wealth of knowledge and experience in line with the Transformation Agenda of the current administration and indeed the prevailing realities.

Thank you.

Director General,
Energy Commission of Nigeria (ECN),
Abuja.

PREFACE

The country is in dire need of adequate reliable, sustainable and affordable energy supply to drive the economic and socio-political development strides of government to be within the 20 largest economies in the world by 2020. Sustainable, available and affordable energy is vital in eradicating poverty, improving the human development index and raising living standards of the citizenry.

The Transformation Agenda of the Federal Government seeks to improve tremendously on the production, Transmission and the Distribution of fuels and electricity by utilizing all available energy sources in the country in an environmentally friendly manner. The strategies to be adopted in achieving these include *creating a deregulated and competitive energy sector to attract foreign and local investments; ensuring a viable commercial framework for the electric power sector including a tariff regime that promotes transparency, guarantees security of investments and a reasonable rate of return on investments; ensuring an enhanced transmission capacity and providing redundancies in the transmission system so as to ensure a fully integrated network that minimises transmission losses, while strengthening grid security.* The same applies to the Petroleum sub-sector (upstream and downstream); the Coal Industry for heat and power development; and the Nuclear programme of the country for electric power and other peaceful uses.

The effectiveness or otherwise of these strategies need to be x-rayed in line with present realities. The challenges facing policy implementation in the energy sector, legislative or otherwise which might be an impediment to achieving the Transformation Agenda would be discussed. An assessment of the various policies and plans in the sector for compatibility with the Transformation Agenda is imperative.

The Energy Commission of Nigeria in executing its mandate, amongst others, ***to monitor the performance of the energy sector in the execution of government policies on energy, as well as collate, analyze and publish information relating to the field of energy from all sources***, organizes a 2-day National Energy Summit with the theme ***Energy Sector and the Transformation Agenda in Nigeria.*** It will have the following sub-themes:

- **Energy and National Security**
- **Challenges in the Post-Privatization arena of the Nigerian Power Sector**
- **Reforms in the Petroleum Sector**
- **Status of Nigeria Nuclear Power Programme**
- **Renewable Energy and Energy Efficiency Development in Nigeria**
- **Development in the Coal and Tar Sands energy sub-sector**
- **Financing in the Nigeria Energy Sector**
- **Energy and Gender**

The Summit is expected to fulfil the following specific objectives:

1. Provide a forum for discourse on the Nigerian Energy Sector;
2. Assess the effectiveness of existing energy systems and policies in achieving the energy component of, and contribution to, the Transformation Agenda and vision 20:2020 in order to move the country towards a more Sustainable Energy Future;

3. Generate ideas that will help steer the development of the Nigeria energy sector on the path of sustainability.
4. The Summit will enable the Commission collate feedbacks from stakeholders and experts which will help reshape periodic Master Plan production in fulfilling the mandate of the Commission.

This publication is thus, a further step in ensuring that the gains of the Summit are not lost. Its intended national circulation and publicity is to be a value-addition to stakeholders' contemporary efforts to achieving desired goals of the, Summit through continual enlightenment and sensitization.

It is hoped that this publication will achieve its purpose in strengthening national commitments for energy development and utilization in Nigeria.

Chairman, Local Organising Committee
Director, Energy Planning and Analysis Department,
Energy Commission of Nigeria (ECN),
Abuja.

Local Organising Committee on 2014 National Energy Summit

1.	**Engr. Johnson O. Ojosu**	**-**	Director, EPA – Chairman, LOC.
2.	Engr. E.C.M. Iwollo,	EPA	Member/Interim Secretary
3.	Mr Samaila G. Zaku	EPA	Member
4.	Engr.(Miss) Alaere Matholo	EPA	Member
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6.	Mr. James Agba	EPA	,,
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8.	Mrs. Mariam Bulama	EMTMD	,,
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16.	Mr. Usman B. Sudais	EIS	,,
17.	Mr. Ahijo Hammadiko	NST	,,
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20.	Mr. Tony Lawson	ADMIN	,,
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22.	Mr. Isa Soba Nasiru	RE	,,
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24.	Mrs. I. Mbaeri	EIS	,,
25.	Mr. Ado Abdullahi	EMTMD	,,
26.	Engr. Mrs. Toyin Alozie	Maintenance Unit	,,

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ENERGY COMMISSION OF NIGERIA

Plot 701C CBD, PMB 358, Garki, Abuja,
Email: dg@energy.gov.ng; ecn@hyperia.com

WELCOME ADDRESS BY THE CHAIRMAN, PROFESSOR R I SALAWU, FNSE, FAEng. PRESIDENT NIGERIAN ENGINEERING ACADEMY @ THE OPENING CEREMONY OF A TWO-DAY NATIONAL ENERGY SUMMIT ORGANIZED BY THE ENERGY COMMISSION OF NIGERIA

REIZ CONTINENTAL HOTEL, CENTRAL BUSINESS DISTRICT, ABUJA FCT

17 – 18 MARCH, 2015

Protocol

It is my pleasure to welcome you all to this all important National Energy Summit, organized by the Energy Commission of Nigeria.

May I particularly welcome the Honourable Minister of Science and Technology, Dr. Abdu Bulama, for honouring the invitation to be the Special Guest of Honour and is also the chief host of this August occasion and to declare the Summit open despite his busy and tight schedules. I also wish to welcome the Director General and Chief Executive Officer, Energy Commission of Nigeria, Professor Eli Jidere Bala, who has made it possible to organize this National Energy Summit. All invited guests especially the Chairmen of various committees on Energy and other related establishments in the National Assembly are hereby welcome. I also welcome the chairmen of the various technical sessions, the various speakers, all the participants and the entire organizing body especially the staff of the Commission.

This Summit is very important as it has much to do with the Vision 20:2020 of the Federal Government and the current Transformation Agenda, which is to fast track the main thrust of the Vision. To achieve the Vision, the status of the Energy infrastructure in the country is very significant. No country can industrialize without adequate energy infrastructure.

Energy Commission of Nigeria, the sole organ of Government saddled with the responsibility of Coordinating Policies on Energy in the country in all its ramification has organised Energy Summits in the past which has guided its policy formulation and coordination functions. It has also enabled the Commission in producing the National Energy Policy and the National Energy Master Plan, a follow up to the Policy, awaits legislative backing.

The theme for the current Summit; Energy and the Transformation Agenda is apt, given the focus of the Federal Government. The sub-themes; Energy and National Security, Challenges in the Post-Privatization arena of the Nigeria Power Sector, Reforms in the Petroleum Sector, Status of the Nigeria Nuclear Power Programme, Renewable Energy and Energy Efficiency Development in Nigeria, Development in the Coal and Tar sand Energy sub-sector, Financing in the Nigeria Energy sector with Energy and the Gender equation are also very critical considering the energy sector holistically.

The importance of adequate energy infrastructure cannot be overemphasized but the adequacy starts with proper planning and a good road map for the utilization of available energy resources. Nigeria, no doubt has enormous energy resources to meet the energy requirement of the populace and indeed for industrialization.

The summit will afford stakeholders in the sector to brainstorm and come with ways and methods in harnessing the vast energy resources in the country and also enable the Commission in executing its mandate.

I urge the speakers and the various discussants for the assigned topics to bare their wealth of knowledge and experience in line with the Transformation Agenda of the current administration and indeed the prevailing realities.

Ladies and gentlemen I wish to welcome you once again to the Summit and also wish you fruitful deliberations.

Thank you and God bless

KEYNOTE ADDRESS

Overview of Nigeria Energy Sector

BY

Professor Eli Jidere Bala, FNSE, FNAEng, MIAEE
Director-General
Energy Commission of Nigeria
Abuja

dg@energy.gov.ng

* *Presentation made at the National Energy Summit, 17th- 18th March 2015 at Reiz Continental Hotel, Abuja*

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1. Introduction
2. Where are we and from where?
3. Where Do We Want to Be
4. Prospects, Challenges & Way Forward
5. Conclusion

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1. Introduction

- The objective of this presentation is to provide a bird's eye view of the Nigerian Energy Sector.
- Energy affects social and economic development in any nation.
- Energy drives development in agriculture, transportation, commerce, manufacturing, education, health, in our homes, etc.
- Energy serves as a source of National income e.g. over 70% - 80% of Federally collected revenue in Nigeria is from petroleum
- Energy serves as an instrument for international diplomacy and cooperation e.g. Nigeria is now President of OPEC and GECF; while it is actively involved in WAGP, WAPP, Transahara Gas Pipeline Project, etc.

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1. Introduction Cont'd...

- Unfortunately, energy is also a source of conflict within and between nations
- Sources of energy are generally classified as fossil, renewable and nuclear sources.
- The common final energies, derived from these sources of energy, and needed in driving and transforming our economy are:
  - Electricity
  - Fuels
  - Heat

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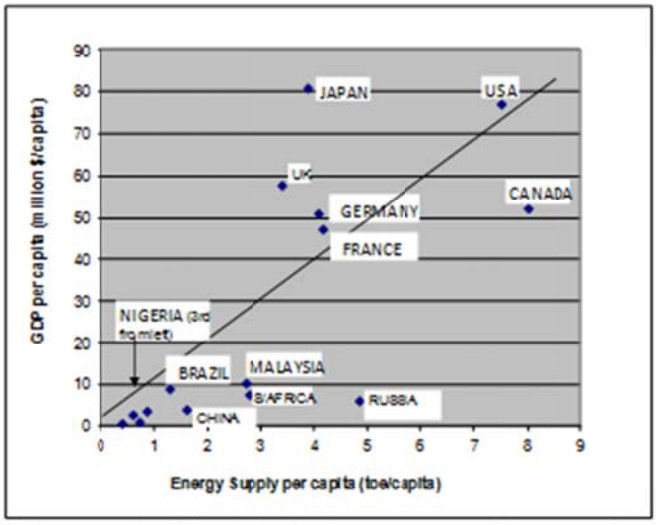
1. Introduction cont'd



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

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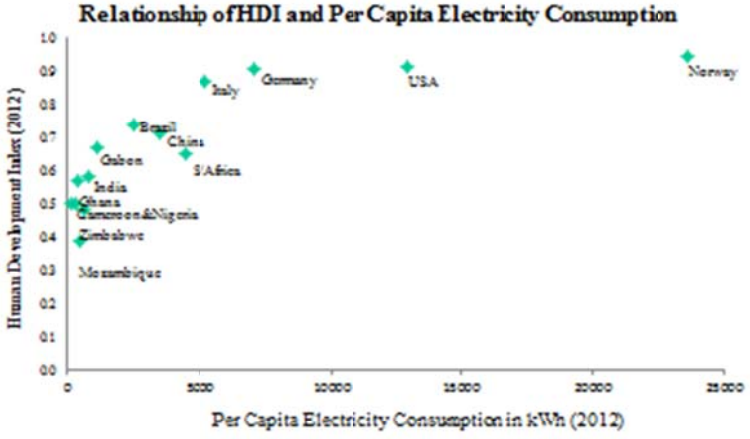
1. Introduction Cont'd...



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

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1. Introduction Cont'd....

Table 1 Fossil Energy Resources and Nuclear Energy Sources

S/N	Resources	Reserves	Production (2013)	Domestic Utilization (2013)
1	Crude Oil	37.2billion barrels	0.800 billion barrels	0.164billion barrels
2	Natural Gas	187 Tscf	2.325 Tscf	82% : Utilized 18% : 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: NNPC/ECN

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1. Introduction Cont'd....

Table 2 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	15MW 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

Source: Renewable Energy Master Plan (REMP)

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1. Introduction Cont'd....

Table3. Nigeria's Energy Supply and The Economy

S/N	ITEMS	200	2004	2005	2006	2007	2008	2009	2010	2011	2012
1.	Electricity generation (billion kWh)	22.0	21.9 3	24.22 (502)^ (10,695)^^	23.8	23.3	21.27 (562)^ (15,602)^^	20.8	25.02	27.7 (619)* (20,407)**	29.6
2.	Energy Consumption per Capita (kgoe/Capita)	151.	125.5 2	122.6 (650)^ (1,780)^^	87.1	81.4	80.8 (670)^ (1,850)^^	83.1	77.8	73.6 (670)* (1880)**	65.7
3.	Electricity Consumption/capita (kWh/Capita)	174.	176.4 6	181.4 (562)^ (2596)^^	167.6	161.2	142.9 (571)^ (2782)^^	135.2	157.1	165 (592)* (2933)**	175.9
4.	GDP/Capita (US$/Capita)	620.	658.0 7	826.3 (2314)^ (8,492)^^	1030.3	1222.5	1286.3 (2540)^ (9550)^^	1,106.8	1440.7	1470.6 (1281)* (7520)**	1513.4
5.	Energy Intensity (kgoe/ US$)	0.24	0.191 4	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	4.6	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)*

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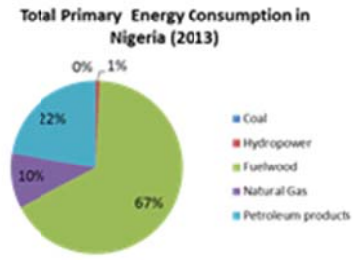
1. Introduction Cont'd...

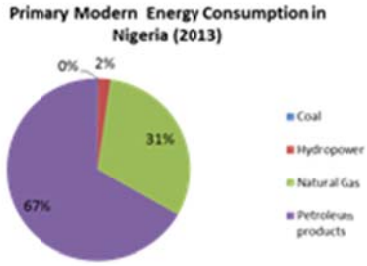
Total Primary Energy Consumption in Nigeria (2013)

Energy Form	Consumption (TOE)	%
Hydropower	555,554.97	0.72%
Fuelwood	54,519,027.42	66.56%
Petroleum Products	18,256,605.52	22.29%
Coal	26,132.45	0.03%
Natural Gas	8,502,790.95	10.38%
Total	81,916,941.54	100.00%

Commercial Primary Energy Consumption in Nigeria (2013)

Energy Form	Consumption (TOE)	%
Hydropower	555,554.97	2.15%
Petroleum Products	18,256,605.52	66.69%
Coal	26,132.45	0.10%
Natural Gas	8,502,790.95	31.06%
Total	27,377,913.92	100.00%





2. Where are we and from where?

- 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.

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2. Where are we and from where? Cont'd...

– In 1956, and in Olaibiri, 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.

– It may be recalled that Nigeria got independence in 1960, the same year Organization of Petroleum Exporting Countries (OPEC) was found in Badhdag, 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.

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2. 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, 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. These enabled the establishment of the first refinery in Nigeria built at Alesa Eleme, Port Harcourt with a name plate capacity of 35,000 bpd, considered then sufficient to meet domestic needs. It was build and operated by Shell. The population of Nigeria was then about 58.7 million. This was later acquired by Government (NNPC). It may be noted that hitherto all Petroleum products consumed in the economy were all imported, and by the international oil companies (IOCs).
- In 1966, the first coup d'etat 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.

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2. Where are we and from where? Cont'd...

- 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%.
- 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). In 1974, Nigeria's participation in the oil companies had reached 55%.

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2. Where are we and from where? Cont'd...

- 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.
- 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.
- 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.

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2. Where are we and from where? Cont'd...

- 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. For instance, the combined average refining capacity utilization for year 2012 was 21%. This has led to massive importation of products to meet domestic needs.
- Also, in 1989 the Nigeria Lignified Natural Gas (NLNG) with Government take was incorporated; and ten (10) years later, NLNG commenced production for exports.

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2. Where are we and from where? Cont'd...

Table 4. 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

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2. 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 involve 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.

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2. 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.
- In 2010, 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.
- In 2012, Lukman's Report of 2008 went through another review before Government submitted it to NASS as the popular Petroleum Industry Bill (PIB). This bill is still under consideration
- Thus a law to back-up reforms in the Petroleum Industry is taken over 15 years to be realised!!!

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2. Where are we and from where? Cont'd...

b) Coal/Lignite, Tar Sands/Bitumen and Uranium

The framework for the exploration and exploitation of these solid energy minerals in Nigeria is provided for in the Minerals and Mining Acts of 2007.

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. 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. Production of coal 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. Between 1988 and 1998, coal production generally continued to decline from an output of 82,490 tonnes to 21,940 tonnes per annum.

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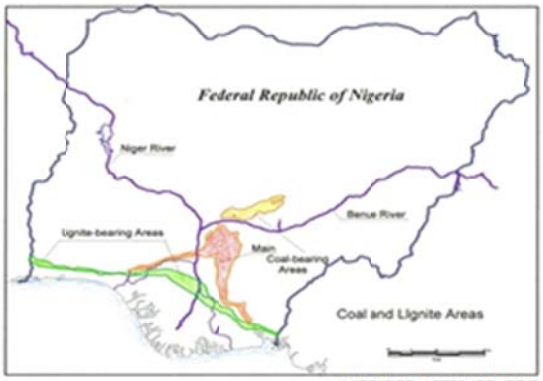
2. Where are we and from where? Cont'd...

- 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 being carried out in Akko LGA of Gombe State, where reserves of up to 20million tonnes is estimated. Production at the site by Ashaka Cement is about 300 tonnes/day and is expected to double to replace 90% of its total heat requirement.



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

Coal & Lignite Deposits of Nigeria

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2. 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.
- In 1976 the Nigerian Atomic Energy Commission (NAEC) Act was made; while in the same year, two Nuclear Energy Research and Training Centres were established in Zaria and Ile-Ife. The two centres commenced operations in 1979.
- In 1995, the Nigeria Nuclear Regulatory Authority (NNRA) was established by law.

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2. Where are we and from where? Cont'd...

- While NNRA commenced operations in 2001, NAEC commenced operations in 2006
- NAEC had since been coordinating the National Nuclear Power Programme.
- In 2007, FGN approved the National Nuclear Power Roadmap to be implemented within 10 to 12 years. The first 1,000MW Nuclear Power Plant by 2020 is under consideration.

c) Renewables, Energy Efficiency & Conservation

- Renewable Energy source, a source that regenerates itself a relatively short time through natural process 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 Electricity generation. About 2000 MW of hydropower has been installed mainly in Niger state. New installations of about 3,300 MW capacity are on the way at Zungeru and Mambilla. Figure 3 shows solar radiation resources distribution in Nigeria.

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2. Where are we and from where? Cont'd...

c) Renewables, Energy Efficiency & Conservation cont'd...

- Solar PV installations have grown from about 240kW installations in 1999 to over 20MW now as solar powered street lights, water bore-holes, mini-grids, traffic lights, etc. Solar PV assembly plants are in Sokoto Energy Research Centres(5MW) for R,D &D, and NASENI (7.5MW) for business. Very few commercial solar thermal systems are available under consideration in the country. However, experimental solar cookers, dryers, water heaters, etc. are in the shelves in our research institutes. They need to be commercialized
- Renewable energy and energy efficient technologies are penetrating the Nigeria market, as renewable energy and energy efficiency & conservation are given due consideration in the National Energy Policy(NEP)

24

2. Where are we and from where? Cont'd...

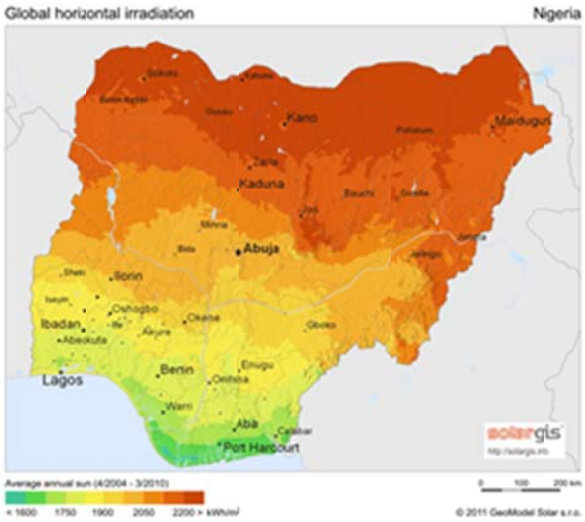

Figure 4. Solar Map GIS

25

2. 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 supplied Administrative centres and industrial areas ;
  - About 50MW was put in place by 1960 mainly distributed generation using diesel fuel.
- 1960 - 1990 (Democratic Parliamentary System (33%) & Military rules (67%))
  - 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

26

2. Where are we and from where? Cont'd...

Table 5. 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

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2. Where are we and from where? Cont'd...

d) Electricity/Power

- 1990 – 1999 (Military)
  - Industry stil managed by NEPA within this period
  - 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 performance
  - By the end of this period available power was below 2000MW
- 1999 – 2007 (Democracy under Presidential System)
  - Private sector driven economic policy was 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 transformed 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.
  - Nigerian Electricity Regulatory Commission (NERC), regulator of the industry was established. Also, the Rural Electrification Agency (REA) was established

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2. Where are we and from where? Cont'd...

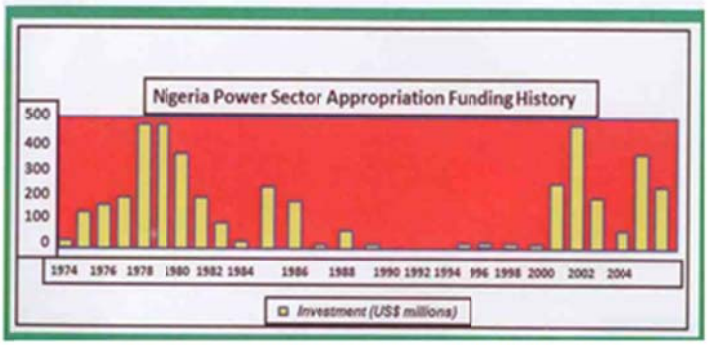

Figure 5. Power Sector Appropriation (1974 – 2007)

Source: FMP, 2014

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2. Where are we and from where? Cont'd...

- In order to fast tract 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

30

2. 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 in 2010
  - The Nigerian Bulk Electricity Company referred to as the bulk trader was established as a transition instrument to go into power purchase agreement

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2. 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
- 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 successfully and transparently 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.
- Grid connected generating capacity was about 11,000MW by end of 2013

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2. Where are we and from where? Cont'd...

Figure 6. Transmission LinesSystem in Nigeria

33

2. Where are we and from where? Cont'd...

Table 6. 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

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2. Where are we and from where? Cont'd...

Table 7. 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	1022.16	1320.00
AFAM (I-V) (GAS)	0.27	95.31	351.00
DELTA (GAS)	0.27	246.23	900.00
SAPELE ST	0.14	98.51	720.00
GEREGU (GAS)	0.66	274.96	414.00
OLORUNSOGO I	0.44	214.39	335.00
OMOTOSHO	0.34	113.02	335.00
SUB TOTAL	0.47	2064.49	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	35.11	180.00
OKHOKU GT	0.26	38.51	150.00
TRANS-AMADI GT	0.31	30.65	100.00
OKPAI GAS	0.92	440.86	480.00
IBOM	0.21	32.06	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

2. Where are we and from where? Cont'd...

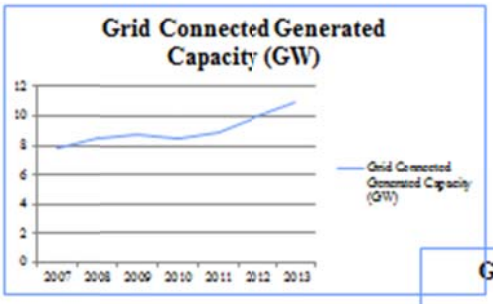
Table 8. Grid Connected Power Plants 2013

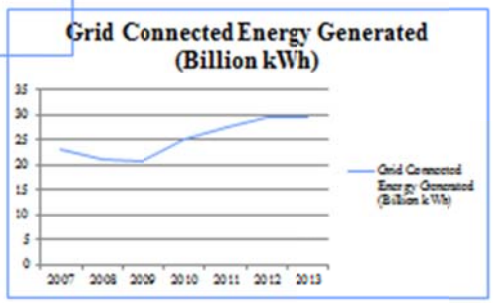
Summary of Generation Capabilities of PHCN Power Stations as Operated in the Year 2013 (January – December)

POWER ITATION	AVAILABILITY FACTOR (MW)	AVERAGE AVAILABILITY (MW)	INSTALLED CAPACITY (LESS DE-COMMISSIONED UNITS) MW
PRIVATISED COMPANIES - HYDRO STATIONS			
KAINJI HYDRO	0.33	170.44	760.00
JEBBA HYDRO	0.46	381.39	578.40
SHIRORO	0.77	442.21	600.00
SUB TOTAL	0.53	1014.04	1938.40
PRIVATISED COMPANIES - THERMAL STATIONS			
EGBIN STEAM	0.74	976.77	1320.00
AFAM (I-V) (GAS)	0.17	58.17	351.00
DELTA (GAS)	0.37	346.78	900.00
SAPELE ST	0.13	94.33	720.00
GEREGU (GAS)	0.55	334.65	414.00
OLORUNSOGO I	0.43	144.54	335.00
OMOTOSHO	0.31	103.90	335.00
SUB TOTAL	0.41	1651.33	4371.00
NIPP - THERMAL STATIONS			
OLORUNSOGO NIPP	0.46	343.94	750.00
ALAOJI NIPP	0.00	0.00	150.00
GEREGU NIPP	0.41	189.74	459.00
IHOVBOR NIPP	0.08	20.11	250.00
OMOTOSHO NIPP	0.37	184.80	500.00
SAPELE NIPP	0.68	254.49	375.00
SUB TOTAL	0.40	993.49	3471.00
IPP - THERMAL STATIONS			
RIVERS IPP	0.51	91.61	180.00
OKHOKU 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	27.17	155.00
AFAM VI (GAS)	0.73	468.14	650.00
A.E.S (GAS)	0.65	194.81	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

2. Where are we and from where? Cont'd...





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2. Where are we and from where? Cont'd...

Table 8. PHCN Successor Distribution Companies and their Core Investors

S/N	DISTRIBUTION COMPANY	STATES COVERED	CORE INVESTOR
1	Port Harcourt Electricity Distribution Company	Bayelsa, Abia, Imo, Rivers	4Power 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	North West Power Ltd.
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, Borno, Adamawa	Integrated Energy Distribution & Marketing Ltd

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2. Where are we and from where? Cont'd...

Table 9. PHCN Successor Generating Companies & Core Investors

S/N	Name	Capacity (MW)	Core Investor
1	Afam Power Plc	987.2	Taleveras Group
2	Egbin Power Plc	1,320	Korea Electric Corporation
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	

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2. Where are we and from where? Cont'd...

Table 10. NIPP Generating Companies & Core Investors

S/No	Name	Location	Capacity (MW)	Core Investor/ Preferred Bidders
1	Alaoji Generating Company Ltd	Aba, Abia State	831.3	??
2	Benin Generating Company Ltd	Benin City, Edo State	507.6	Ema Consortium
3	Calabar Generating Company Ltd	Calabar, Cross River State	634.5	Ema Consortium
4	Egbema Generating Company Ltd	Owerri, Imo State	380.7	Dozzy Integrated Power
5	Gbarani Generating Company Ltd	Yanegoa, Bayelsa State	253.8	??
6	Geregu Generating Company Ltd	Ajaokuta, Kogi State	506.1	Seoul Electric Power Ltd.
7	Ogorode Generating Company Ltd	Sapele, Delta State	507.7	Daniel Power Consortium
8	Olorunsogo Generating Company Ltd	Olorunsogo, Ogun State	754.0	ENL Consortium Ltd.
9	Omoku Generating Company Ltd	Port Harcourt, River State	264.7	??
10	Omotosho Generating Company Ltd	Okiti Pupa, Ondo State	512.82	Omotoso Power Gen Coy.
	Total		5,153.12	

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2. Where are we and from where? Cont'd...

Table 11. 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**		

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2. Where are we and from where? Cont'd...

Table 12. 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**		

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2. Where are we and from where? Cont'd...

e) Current Institutional Framework in the Energy Sector

– Figure 4 shows stakeholders Ministries, Department and Agencies in Nigeria.

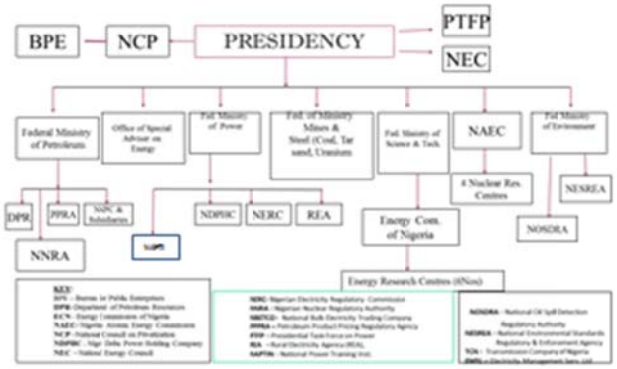

Figure 7. Institutional Framework in the Energy Sector in Nigeria as at 2014.

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2. Where are we and from where? Cont'd...

- 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.
- To this effort, it mid-wifed the production of the National Energy Policy (NEP), which was approved by FEC in 2003.
- The 2003 NEP was revised in 2013 and is available in the Commission's website: www.energy.go.ng

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3. Where Do We Want to Be

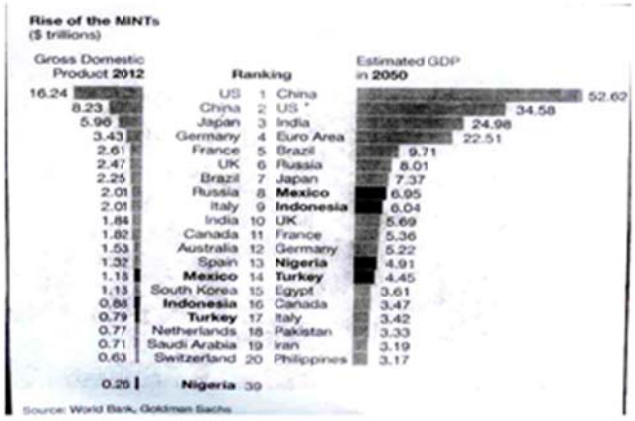

Figure 2. Nigeria's Ranking in the World based on GDP

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3. 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.
- 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 under the following scenarios and assumptions:

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3. Where Do We Want to Be Cont'd...

The assumptions for the study are as follows:

Reference Growth Scenario:

- GDP grows by an average of 7% per annum.
- The main driver of growth is the manufacturing sector
- Manufacturing to account for 15% of GDP by 2020 from 4% in 2010
- Poverty to be reduced by half by 2015 in line with MDG objectives.

High Growth Scenario

- GDP grows by an average of 10% p.a.
- Manufacturing to contribute 22% to GDP by 2030 from 4% in 2010
- Nigeria transits from an agrarian to an industrializing economy

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3. Where Do We Want to Be Cont'd...

– Optimistic Growth Scenario I

- GDP grows by an average of 11.5% p.a.
- Manufacturing to contribute 22% to GDP by 2030 from 4% in 2010
- Nigeria transits from an agrarian to an industrializing economy

– Optimistic Growth Scenario II

- GDP grows by an average of 13% p.a.
- Manufacturing to contribute 22% to GDP by 2030 from 4% in 2010
- Nigeria transits from an agrarian to an industrialized economy

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3. Where Do We Want to Be Cont'd....

Table 13. Projected Electricity access for old and new dwellings

Scenarios / Year (%)	2009	2010	2015	2020	2025	2030
Ref (7%)	52	60	65	75	80	85
High (10%)	52	70	72	86	93	95
Opt I (11.5%)	52	70	72	86	93	95
Opt II (13%)	52	75	80	86	93	95

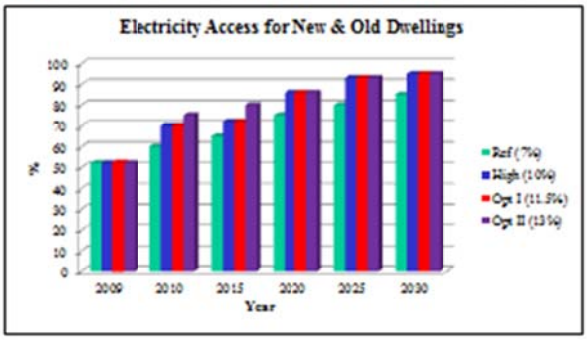

Figure 8. Projected Electricity Access

Source: ECN (2010)

3. Where Do We Want to Be Cont'd....

Final Energy Demand by Sector (Mtoe)

Scenario / Year	2009	2010	2015	2020	2025	2030	Annual growth rate
Reference							
Total	35.02	37.11	61.43	94.29	138.84	190.98	8.27
Industry	1.15	0.47	23.34	46.72	73.80	105.52	24.01
Transport	7.65	9.26	11.63	15.53	21.12	28.51	6.46
Households	24.09	24.68	23.40	27.28	36.46	46.29	3.16
Services	3.13	2.71	3.055	4.76	7.46	10.67	6.01
High Growth Scenario							
Total	35.02	37.56	73.94	124.16	200.95	346.90	11.39
Industry	1.15	1.73	30.46	62.21	115.30	233.12	28.78
Transport	7.65	7.36	11.04	16.49	24.02	34.88	7.49
Households	24.09	27.32	30.44	39.53	52.16	65.15	4.85
Services	3.13	1.15	3.305	5.93	9.49	13.75	7.30
Optimistic I Scenario							
Total	35.02	38.15	73.68	127.40	220.31	413.68	12.33
Industry	1.15	3.05	30.00	66.20	134.79	300.01	30.34
Transport	7.65	8.69	11.07	16.50	24.20	35.50	7.58
Households	24.09	23.24	29.01	38.50	51.10	63.22	4.70
Services	3.13	3.17	3.600	6.20	10.22	14.95	7.73
Optimistic II Scenario							
Total	35.02	40.66	77.15	143.75	278.45	541.42	13.78
Industry	1.15	6.92	34.97	81.66	190.01	420.74	32.45
Transport	7.65	5.56	11.11	16.51	24.71	37.63	7.88
Households	24.09	24.72	26.3735	36.60	49.75	62.97	4.68
Services	3.13	3.46	4.70126	8.98	13.99	20.08	9.25

3. 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
- 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

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3. Where Do We Want to Be Cont'd...

Table 14. 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	6098.9	6098.9	368.1	368.1	686.8	686.8	120.0	120.0	74.2	74.2
2010	6180.0	8890.0	484.0	902.0	791.7	1177.8	180.0	270.0	93.2	132.9
2012*									120	
2014*									260	
2015	14480.0	19510.0	3788.0	7039.0	2301.9	3861.0	1800.0	3380.0	1107.0	1871.2
2016*									600	
2020	28170.4	36687.1	9038.7	22704.6	4178.8	6270.8	4832.1	9277.9	2882.6	6733.6
2025	39789.4	66469.4	16084.9	44286.4	6231.8	11408.4	7806.1	20797.4	4824.0	12862.8
2030	68467.2	88388.2	22084.9	77266.7	8902.4	21348.7	11374.6	46443.4	7029.2	22903.7

Source: Energy Commission of Nigeria (2010)
[32] Punch 29th June 2014, pg 25

3. Where Do We Want to Be Cont'd...

b) Coal/Lignites, 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

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3. Where Do We Want to Be Cont'd...

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

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3. Where Do We Want to Be Cont'd…

(i) Renewable Electricity Supply Projection in MW (7% GDP Growth rate)

S/N	System	Short Term	Medium Term	Long Term
1	Hydro (LHP)	3,000	6,000	6,000
2	Hydro (SHP)	43	533	533
3	Solar PV	1,400	3,000	20,000
4	Solar Thermal	-	45	6,000
5	Biomass	5	16	50
6	Wind	20	22	30
	All Renewable (MW)	4,468	10,026	32,613
	All Energy Resources (MW)	26,000	52,000	160,000
	%RE	17%	19%	20%

(ii) Renewable Electricity Supply Projection in MW (10% GDP Growth rate)

S/N	System	Short Term	Medium Term	Long Term
1	Hydro (LHP)	4,000	8,000	8,000
2	Hydro (SHP)	350	1,332	1,332
3	Solar PV	2,000	4,000	25,000
4	Solar Thermal	-	936	12,000
5	Biomass	5	23	77
6	Wind	28	32	42
	All Renewable (MW)	6,383	14,323	46,451
	All Energy Resources (MW)	32,000	72,000	230,000
	%RE	20%	20%	20%

Source: Energy Commission of Nigeria

3. Where Do We Want to Be Cont'd…

Table 15. 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

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3. Where Do We Want to Be Cont'd…

Targets for Bio-Fuel for Automotive Use in Nigeria, 7% Growth Scenario

Biofuel Type		Time Frame		
		Short	Medium	Long
Bio-ethanol	Demand (billion litres / annum)	1.445	2.817	5.646
	% contribution to motor spirit	10	10	10
Bio-diesel	Demand (billion litres / annum)	0.460	0.835	1.780
	% contribution to diesel fuel	20	20	20

Source: Energy Commission of Nigeria, REMP 2nd Ed 2012

3. Where Do We Want to Be Cont'd….

Table 16. Small Hydro Power Projects for Investment

Name of Dam	State/Location	Capacity (MW)	Estimated Cost (US$)
Oyan	Ogun	10	7,500,000.00
Ikere Gorge	Oyo	6	11,000,000.00
Bakolori	Zamfara	3	4,275,000.00
Challawa	Kano	7.5	3,350,000.00
Tiga	Kano	10	44,562,500.00
Kampe	Kogi	3	8,125,000.00
Owena	Ondo	0.45	1,287,500.00
Doma	Nasarawa	1	4,900,000.00
Zobe	Katsina	0.3	1,531,250.00
Jibia	Katsina	4	91,250,000.00
	Total	45.25	177,781,250.00

Source: FMP 2014

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3. 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:

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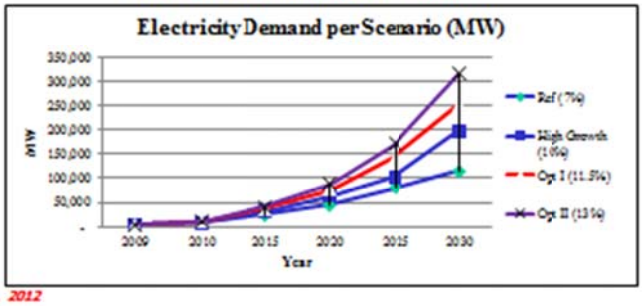
3. Where Do We Want to Be Cont'd....

Table 17. 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	53363	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

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3. Where Do We Want to Be Cont'd....

Table 18. Electricity Supply Projections by Fuel Type : Optimistic II Scenario 7%

Fuel Type	2009	2010	2015	2020	2025	2030
Coal	0	609	1805	6527	7545	10984
Electricity import	0	0	0	0	0	31948
Gas	3803	4572	18679	33711	61891	80560
Hydro	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
Total	5753	7440	26092	52174	86422	161411

Source: ECN (2010)

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3. Where Do We Want to Be Cont'd....

Table 19. Electricity Supply Projections by Fuel Type : Optimistic II Scenario 10%

Fuel Type	2009	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	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	37025
Wind	0	18	28	32	36	42
Biomass	0	0	4	23	50	77
Total	5753	10476	31989	71495	117675	229086

Source: ECN (2010)

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3. Where Do We Want to Be Cont'd....

Table 20. Electricity Supply Projections by Fuel Type : Optimistic II Scenario 11.5%

Fuel Type	2009	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	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
Total	5753	12047	36412	78095	150929	265794

Source: ECN (2010)

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3. Where Do We Want to Be Cont'd....

Table 21. Electricity Supply Projections by Fuel Type: Optimistic II Scenario 13%

Fuel Type	2009	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	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
Total (supply)	5753	21238	47490	88698	171598	315158

Source: ECN (2010)

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3. Where Do We Want to Be Cont'd....

Table 22. 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)

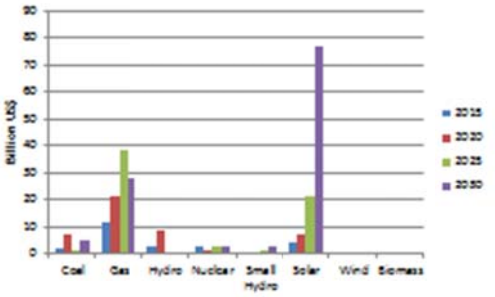

Figure 9. Capital Cost of Additional Generating Capacity by Technology in Billion US Dollars for the Reference Scenario

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3. Where Do We Want to Be Cont'd....

Table 23. 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	0.05	0.08	0.08
Total	51.39	70.19	128.19	196.12

Source: ECN (2010)

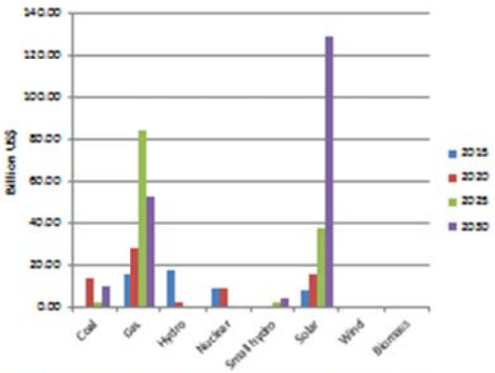

Figure 10. Capital Cost of Additional Generating Capacity by Technology in Billion US Dollars for the Optimistic II Scenario (13%)

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3. Where Do We Want to Be Cont'd....

- In summary where we want to go in the energy sector is encapsulated in the National Energy Master Plan (NEMP), which is the roadmap for the implementation of the National Energy Policy. It incorporate activities with timeline and targets derived from energy demand and supply projections carried out.
- NEMP was produced in 2007 and revised in 2014 after the review of the NEP in 2013.
- The reviewed NEMP is also in the Commission's website
- Both the reviewed NEP and NEMP will be presented to Government for approval and passing into law as an omnibus energy law for Nigeria.

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4. Prospects, Challenges & Way Forward

a. Prospects

- There is a strong political will by Government towards private sector participation in the sector. The EPSR Act of 2005 and the Nigerian Minerals & Mining Act 2007 provide legal framework for the power and solid energy minerals sub-sectors; while the PIB, when passed will do same for petroleum sub-sector
- There are opportunities for investment in diversifying the energy supply mix to include all viable energy sources in Nigeria
- There are investment opportunities in energy efficiency and conservation

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4. Prospects, Challenges & Way Forward

- There are natural and statutory incentives available such as:
  - Big market of about 170 million people in Nigeria and 230 million in surrounding ECOWAS sub-region
  - Trainable resourceful and cost-effective workforce with 60% as youth
  - Relative absence of natural disasters/calamity e.g. earthquake, hurricane, etc.
  - High returns in investments (RoI) of between 35% and 45% generally
  - FGN guarantees backed by World Bank on PPAs
  - Zero import duties on power machinery and equipment
  - Unhindered repatriation of profit
  - Very low VAT regime of 5%
- Feed-in-Tariff available for renewables

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4. Prospects, Challenges & Way Forward Cont'd....

b) Challenges

- Coal and new renewable energy resources are grossly under utilized in the country despite their availability in reasonable quantities.
- Weak regulatory framework in the energy and power sector
- Natural gas supply constraints
- Inadequate sources of both local and international funds
- Inadequate local equipment and machinery manufacturing infrastructure
- Inadequate skilled manpower (Engineers, technicians, craftsman, etc.)
- Non passage of the PIB
- Inadequate synergy between energy related MDAs

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4. Prospects, Challenges & Way Forward Cont'd....

c) Way Forward

- Diversify the Nation's energy supply mix
- To sustain democracy, rule of law and enhanced security
- Passing of the PIB into law
- To enhance capacity building and R & D
- To attract local funds and FDI
- Strengthening of the regulatory agencies (DPR, PPPRA, NNRA and NERC)
- Strengthening of Energy Commission of Nigeria to deliver strategic plans and coordination of National Policies on energy in all its ramifications
- Reviewed National Energy Policy and Masterplan to be passed into law

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5. Conclusion

- Government's political will towards active private sector participation in the energy sector remains ever strong
- The demand for sustainable energy in Nigeria will continue to grow in view of its growing population and the desire for fast industrialization.
- Opportunities for investment into the production, transmission and distribution of electricity, fuels and process heat, from the varied and huge sources of energy in the country are enormous.
- Statutory incentives are available but need to be enhance to attract investments in the energy sector so that the economy can grow to be amongst the 20 largest economies in the world by 2020 and thereabout.
- There is the need to strengthen the energy regulatory agencies and the Energy Commission of Nigeria in order to have successful post deregulated and liberalized energy sector of the economy.
- The reviewed National Energy Policy and its Masterplan should be passed into law.

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GOODWILL MESSAGES

GOODWILL MESSAGE OF THE HONORABLE MINISTER OF ENVIRONMENT AT THE SUMMIT ON ENERGY AND THE TRANSFORMATION AGENDA IN NIGERIA.

GOODWILL MESSAGE BY

MRS LAURENTIA L. MALLAM,

HONORABLE MINISTER OF ENVIRONMENT

AT
THE NATIONAL ENERGY SUMMIT

ORGANISED BY
THE ENERGY COMMISSION OF NIGERIA
17-18 MARCH 2015.

Protocol:

1. Distinguished ladies and gentlemen, it is a great pleasure for me to be with you today to deliver a Goodwill Message at the Annual Summit on Energy. I congratulate the Energy Commission of Nigeria for this initiative and sustaining it this far. I am particularly delighted that apart from this summit as awareness campaign strategy, ECN has over the years exhibited more commitment to monitoring the performance of the energy sector in the execution of government policies on energy.

2. This Summit could not come at a better time, now that the whole world is preparing for the United Nations Climate Conference,the Twenty First Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21) to be held in Paris, France in December 2015, where another legally binding agreement, which will be applicable to

all parties is expected to be adopted. The outcome of the Paris COP21 will provide the necessary stimulus to numerous policies in Governments around the World. This Summit should therefore serve as a forum to synergize on alternative energy in support of transition to Low Carbon future.

3. Energy is critical for development and sustainability but to acquire the proper technology involves technology transfer, which has not been possible, as it seems. Lack of access to appropriate technology for combating climate change persists in Africa and indeed in Nigeria. The key barrier lies on intellectual property rights regime where developed countries claim access to technology is in the hands of the private sector. This makes it expensive and beyond the reach of most developing Countries. To prepare for a smooth transition to the post 2020 regime, this bottleneck must be removed. MDAs should also be encouraged to allocate additional resources in their national budgets and develop plans to address climate change and to create opportunities for private investors in Energy sector.

4. As the country moves towards a sustainable energy future, Federal Ministry of Environment as the National Focal Point for ensuring environmental sustainability is poised to work with relevant MDAs to promote and provide sustainable and climate friendly energy supply that will drive the economic and socio political development strides of government to the 20 largest economies in the world by 2020. The Ministry through its National Climate Change Policy outlines how the energy efficient potentials offer options to mitigate climate change impacts. In line with the Ministry's mandate, the ministry advocates for clean energy alternative sources for environmental sustainability.

5. I am not unaware of the challenges of inadequate Fund to enable robust shift to a desired energy mix for Nigeria. It is for this reason that I urge the Energy sector to explore the opportunities for funds provided by the global "Green Climate Fund" (GCF). The GCF is a new multilateral Fund that was agreed to by Parties at the 2010 United Nations Framework Convention on Climate Change (UNFCCC) Conference held in Cancun, Mexico, and is designated as an operating entity of the Convention's financial mechanism. Its purpose is to promote, within the context of sustainable development, a paradigm shift towards low-emission and climate-resilient development pathways by providing support to developing countries to help limit or reduce their greenhouse gas emissions and to adapt to the unavoidable impacts of climate change.

6. Finally as the world converges in Paris, the problems of transfer of technology, finance and consistent funding including capacity building for sustainability must be the bane of contention for Nigeria to move rapidly in the area of Energy for industrial growth as we move to a new Global Climate Protection Regime.

7. I am confident that this meeting, with the caliber of participants, will provide the much-required platform to generate ideas that will steer the development of Nigeria's energy sector on the path of environmental sustainability.

8. Thank you and I wish you fruitful deliberations.

ADDRESS BY THE SPECIAL GUEST OF HONOUR AND CHIEF HOST, DR. ABDU BULAMA, HONOURABLE MINISTER FOR SCIENCE AND TECHNOLOGY @ THE OPENING CEREMONY OF A TWO-DAY NATIONAL ENERGY SUMMIT ORGANIZED BY THE ENERGY COMMISSION OF NIGERIA

REIZ CONTINENTAL HOTEL, CENTRAL BUSINESS DISTRICT, ABUJA FCT

17 – 18 MARCH, 2015

Protocol

It gives me great pleasure to address you all in this very important NATIONAL ENERGY SUMMIT on "**Energy and the Transformation Agenda in Nigeria".** This is the third in the series of these summits and we hope that this and future summits will address pertinent energy issues or challenges Nigeria faces. As we all know, the relevance of this summit cannot be overemphasized in Nigeria, especially now, when all hands are on deck in the development of the energy sector in the country for sustainable economic growth, as declared by the President, on the Road-Map for affordable , sustainable, reliable and accessible energy and power supply in the country.

As the sub-themes suggest, issues of Energy and National Security, Challenges in the Post-Privatization arena of the Nigeria Power Sector, Reforms in the Petroleum Sector, Status of the Nigeria Nuclear Power Programme, Renewable Energy and Energy Efficiency Development in Nigeria, Development in the Coal and Tar sand Energy sub-sector, Financing in the Nigeria Energy sector with Energy and the Gender equation will be extensively discussed. This I hope will afford participants and stakeholders the opportunity to come up with useful ideas on current issues as they affect the Nigerian energy sector.

The summit is to provide a forum for discourse on the Nigerian Energy Sector. It is also to assess the Effectiveness of Existing Energy Systems and Policies in achieving the component of, and contribution to, the Transformation Agenda and Vision 20:2020 in order to move the country to a more sustainable energy future. The summit hopes to generate ideas that will help in steering the development of the Nigerian energy sector on the path of sustainability.

It is also to serve as a feedback mechanism for Planners in the energy sector, and for Energy Commission of Nigeria as the sole Government organ saddled with the responsibility of

coordinating policies on energy, producing master plans in the energy sector and monitoring policy implementation; and also to advice Governments at all levels on issues relating to energy.

With the calibre of contributors and participants both from the academia, and the private and public sectors, it is my wish that this summit addresses the tethering energy problems Nigeria is facing currently and also to proffer solutions to the possible hindrances to the Transformation Agenda and by implication the Vision 20:2020 mission.

Ladies and gentlemen, let me commend the organizers of this summit as it is timely and apt in the development of the energy sector of the country. All hands should therefore be on deck to achieve the aim of the summit as envisioned by the organizers.

With the above remarks I hereby declare the summit open.

I wish you fruitful deliberations.

Thank you.

PLENARY SESSION ONE:
ELECTRICITY FROM RENEWABLE ENERGY SOURCES IN NIGERIA BY 2030

Chairman: Prof. U.O. Aliyu
Discussants: Prof. B.G. Danshehu, Prof. T. A. Kuku, Prof. I.S. Diso and Engr. A .O. Yusuf
Rapporteurs: Mrs. Ado Abdullahi, Mr. Samaila G. Zaku
Speaker: Federal Ministry of Power

PAPER 1

Plenary Session I:
TOPIC: Electricity from Renewable Energy Sources in Nigeria by 2030

Speaker: Federal Ministry of Power
(Absent)

Summary of Comments and Recommendations from Discussants:

- Nigeria needs a roadmap for the development and deployment of renewable energy especially solar systems for electricity.
- There are needs for provision of local manufacture of associated components like storage battery, inverters, control, protection systems, meters, PV system etc.
- Manpower training and development to be solution providers in renewable energy electricity supply and not just consumers of imported products and technology.
- NERC needs to provide more technical guidelines for the distribution and/or embedded generation being promoted.
- There is a need for solar thermal renewable energy resource which is the Ocean Thermal Energy Converter (OTEC) technology. The OTEC technology is a multi-product technology that will produced electricity and many exportable products such as hydrogen for fuel cell, ammonia for fertilizer, and aviation fuel
- Nigeria needs to look into the economic justification for increasing the share of renewable energy in country's energy.
- Building local capacity for manufacturing: Nigeria should look at components and modules it can invest into, so as to develop local manufacturing capacity for renewable energy technologies. For example, the use of solar energy for charging cell phones.
- Nigeria should focus on improving the quality of the grid to enable it accept electricity from renewable energy before NERC starts to develop an ambitious feed-in tariff. We

need to ascertain the state of readiness of NERC to cope with the challenges of feed-in–tariff especially with the Bi-directional flow of electricity, because this will affect new specifications that will affect the distribution code to ensure safe operation.

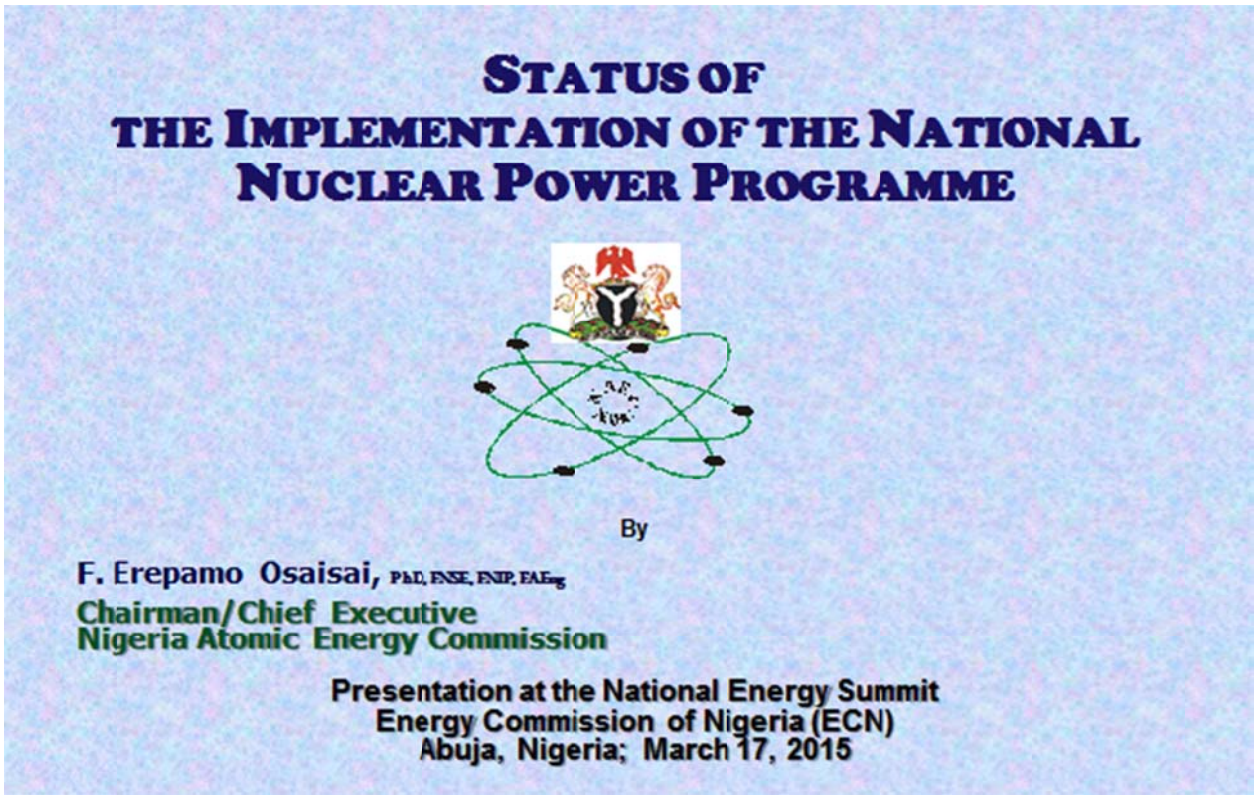
- Nigeria needs to look at having a sustainable strategy for rural electrifications through renewable energy source.
- Nigeria needs to re-examine the reliance of solar for street lighting as a solution because is being vandalized. Therefore a sustainable strategy should be developed before further deployments.
- Government should subsidise the cost of solar products to encourage users.

PLENARY SESSION TWO:
STATUS OF NIGERIAN NUCLEAR POWER PROGRAMME

Chairman: Prof. Bassey Okon Ita-Ewah, CERT, Zaria (former Minister of Science & Technology).
Speaker: Dr. Franklin Erepamo Osaisai, **Nigerian Atomic Energy Commission (NAEC)**
Discussants: (1) Prof. Lawrence James, DG, NNRA (2) Prof. I. Umar, VC, Gombe State University, Gombe.
Rapporteurs: A. Hammadikko and Z. B. Saidu (Mrs.)

PAPER 2

***Plenary Session II*:**
TOPIC: **Status of Nigerian Nuclear Power Programme**
Speaker: Dr. Franklin Erepamo Osaisai, **Nigerian Atomic Energy Commission (NAEC)**



DISCUSSION OUTLINE

i. The National Energy Deficit and the Rationale for Considering Nuclear Power.

ii. The National Nuclear Power Roadmap

iii. Requirements for Building the Critical National Nuclear Power Infrastructure

iv. Ownership, Funding and Financing

v. Medium-Term Funding Requirements, Project Deliverable and Challenges.

vi. Summing Up and Take Away.

I
THE NATIONAL ENERGY DEFICIT AND THE RATIONALE FOR CONSIDERING NUCLEAR POWER

1.1 Energy Security and Natural Resources

- Energy self-sufficiency and long-term energy security are key promoters of sustainable development;
- Achieving long-term energy self-sufficiency is imperative for the attainment of key objectives of national and regional developmental aspirations (NEEDS, NEPAD, MDGs);
- Assurance of long-term energy security requires detailed energy planning studies using appropriate analytical tools for modeling;
- Many nations, particularly African countries, depend on fossil fuels (FF) and hydropower (HP) for their national energy needs. However, FFs are finite and will be depleted over time; also harnessing of HP limited by physical and technical factors.
- Reports on the Estimated Reserves of Fossil Energy Resources in Africa. by the African Energy Commission (AFREC) depicts a dire situation for the continent in no distant future as shown in figures; and
- The Nigerian situation as already aptly captured is not any better!

Oil

African oil situation as of 2010

- **Total Reserves:**
  118 B-bbl (9.5% of World)
- **Annual Production:**

2010	10.9 m-bbl
2009	10.7
2008	10.9
2007	10.8
2006	10.5

Oil

Projected African Oil Situation by 2035

(As of current proven reserves and daily production)

- Only 2 Countries will remain as oil exporters.
- Southern African block willincrease synthesis fuels (coal and gas to liquid).
- Many countries will increase biofuels production.

Natural Gas

African Gas Situation as of 2010

- **Total Reserves:**
  14.58 T- CM (8.0% of World)
- **Annual Production:**

2010	16.09 M-CM
2009	15.44
2008	15.03
2007	15.39
2006	15.50

Natural Gas

Projected African Gas Situation by 2035
(As of current proven reserves and daily production)

- Only 3 countries will remain as producers but only 2 countries will continue to export
- Off-Shore drilliings may add more supplies but expensive

Coal

African Coal Situation as of 2010 (million tonne)

- **Total Reserves:**
  54.7 B-T (6% of World)
- **Annual Production:**

2010	278.9 M-Ton
2009	283.3
2008	278.4
2007	275.6

Coal

Projected African Coal Situation by 2035
(As of current proven reserves and daily production)

- Only southern Africa block will remain coal producers.
- Environmental concerns may discourage wide usages.
- Clean coal technology might develop faster.

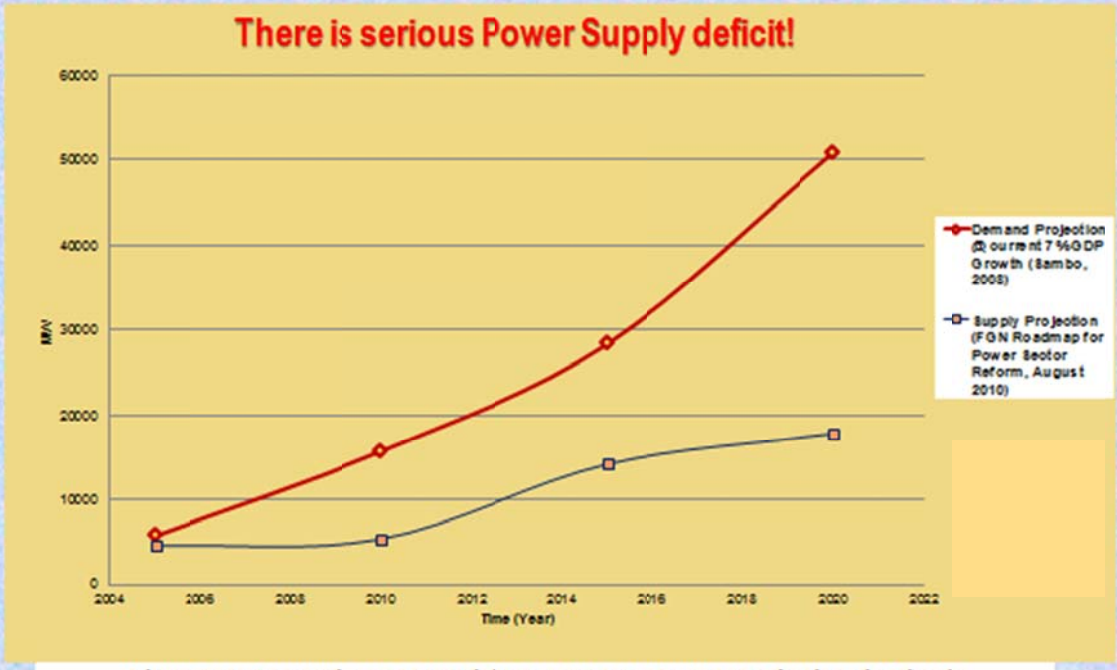


Figure 1. 1: Comparison of Electricity Demand and Supply Projections in Nigeria

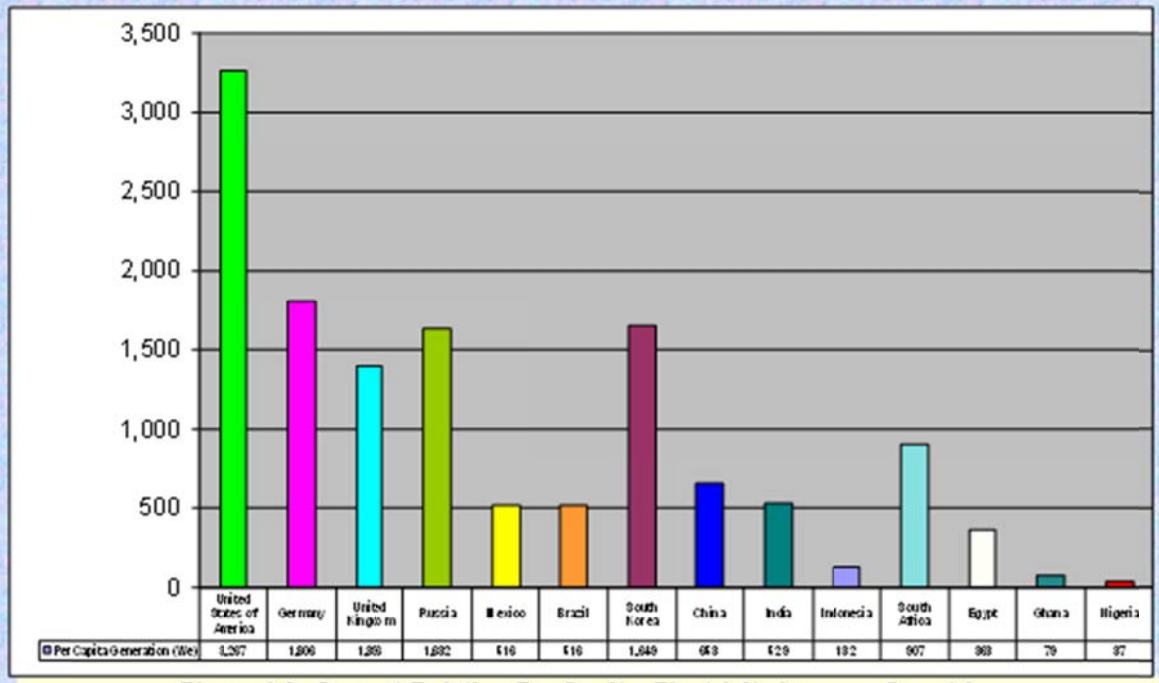


Figure 1.2: Current Relative Per Capita Electricity in some Countries

Table 1.1: Estimated Reserves of some Energy Resources in Nigeria

Resources Type	Estimated Reserves
Crude Oil	36.5 billion barrels
Natural Gas	187.4 trillion SCF
Coal & lignite	Over 4 billion tonnes
Tar Sand	31 billion barrel of oil equivalent
Hydropower (Large)	11,250MW
Hydropower (Small)	3,500MW
Fuelwood	13 million Hectares
Animal Waste	61 million tonnes/yr
Crop residual	83 million tonnes/yr
Solar Radiation	3.5-7.0 kWh/m2 -day
Wind	2-4 m/s (annual average)

Table 1.2 The National Power Generation Situation

	Generation Plant	Location	Installed Capacity (MWe)	Available Capacity (MWe)
Hydropower				
	Kainji	Niger	760	480
	Shiroro	Niger	600	450
	Jebba	Kwara	540	450
Subtotal			**1,900**	**1,380**
Oil-Fired				
	Ijora	Lagos	60	-
Gas-Fired				
	Afam	Rivers	726	60
	Ughelli	Delta	900	300
	Egbin	Lagos	1,320	1,100
	Sapele	Delta	1,020	90
	Geregu	Kogi	414	276
	Omotosho	Ondo	304	96
	Olorunsogo	Ogun	304	96
Subtotal			4,988	1,978
Gas-Fired-NIPP (NDPH) under construction			5,454	-
Mambila/Zungeru HP under construction			1,000	-
Coall-Fired				
	Oji River	**Enugu**	**30**	**-**
TOTAL		**Current**	**6,978**	**3,358**
		Future (5yrs)	**13,432**	
Generation by Source			Hydro (%)	Gas (%)
		Current	27.2	71.5
		Future (5yrs)	21.6	77.7

Excerpts from the Executive Summary of the Draft National Integrated Infrastructure Master Plan:

Resources and Problem

Nigeria has an abundance of most of the energy sources (fossil fuels, hydro, (nuclear (is missing)) solar, tidal, geothermal, and biomass) for power generation, which if properly harnessed can meet the country's energy needs and generate export revenue. Currently, however, Nigeria's per capita electricity generation is among the lowest in the world, limiting economic growth and productivity due to impact on practically all other sectors.

What it takes to Solve

In order to achieve the goals and objectives of the Energy sector, Nigeria needs to increase its investment in energy infrastructure. Estimates using international benchmarks suggest **USD 900 billion** will be required over the next 30 years to achieve the specific sector targets – **USD 550 billion** for power and **USD 350 billion** for oil and gas, which includes maintenance cost.

Rationale for Nuclear

Decision by FGN in 2007 to deploy NPP to generate electricity was informed by desire and commitment to introduce nuclear energy as an important component in the national energy mix; both to increase and diversify the power generation base, as well as deepen other peaceful applications of atomic energy in the country.

Furthermore, consideration of NPP and its successful implementation will also address the important and critical elements of long-term national energy security and sustainable development.

Table 1.3: Features of Nuclear Power

Advantages	Drawbacks	Inherent/Attainable
Low maintenance and Operating cost	High upfront capital costs can be difficult to finance	Need for technical and human resource underpinning
Stable and predictable generating costs	Sensitive to interest rates	High safety standards
Long life time (50-60yrs)	Long lead times (planning, construction, etc)	Security and safeguarding of nuclear materials
Supply security (insurance premium)	Long payback periods	Commitment to an international regime of oversight
Low external costs (so far no credit applied)	Regulatory uncertainties /policy risks	Accession to international treaties and conventions
Least potential for contributing to climate change	Market risks; Predisposed to cost overruns and construction delays	
Higher availability and capacity factors	Long term govt commitment and public support (requires political and policy stability)	

Figure 1.2: Finnish Study (2002) Showing Economic Competitiveness of NPP

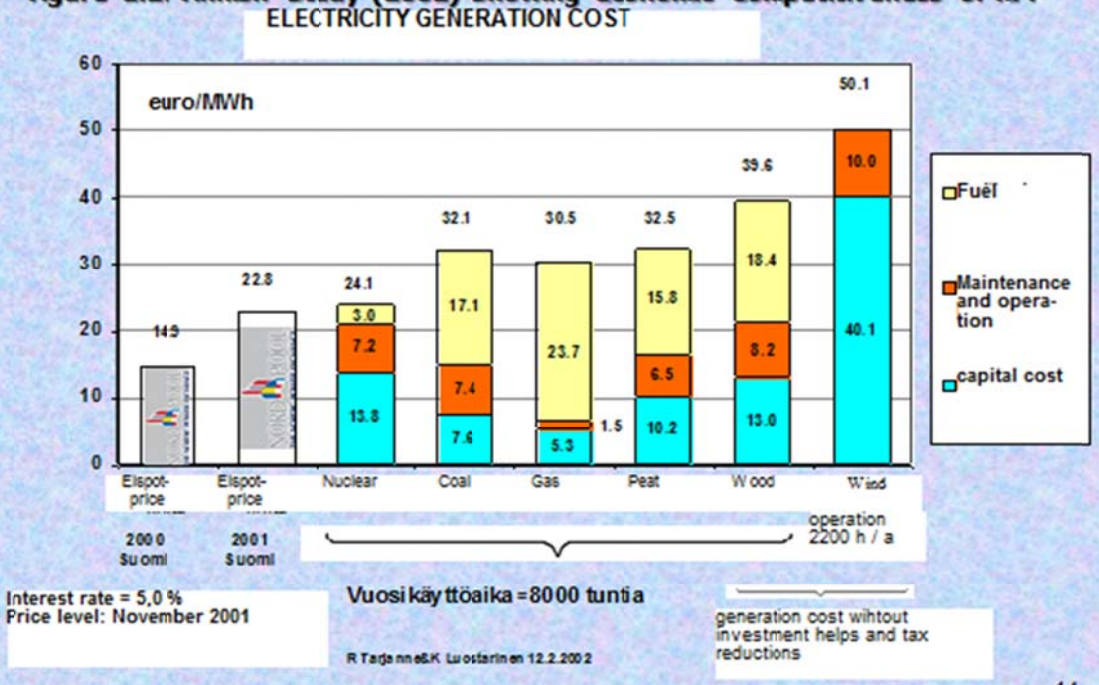


Fig. 1.3a: Comparative Economics of NPP vs Other sources

Actual Costs of Electricity (US cents/kWh)

Technology	region or country	At 10% discount rate	At 5% discount rate
Nuclear	OECD Europe	8.3-13.7	5.0-8.2
	China	4.4-5.5	3.0-3.6
Black coal with CCS	OECD Europe	11.0	8.5
Brown coal with CCS	OECD Europe	9.5-14.3	6.8-9.3
CCGT with CCS	OECD Europe	11.8	9.8
Large hydro-electric	OECD Europe	14.0-45.9	7.4-23.1
	China: 3 Gorges	5.2	2.9
	China: other	2.3-3.3	1.2-1.7
Onshore wind	OECD Europe	12.2-23.0	9.0-14.6
	China	7.2-12.6	5.1-8.9
Offshore wind	OECD Europe	18.7-26.1	13.8-18.8
Solar photovoltaic	OECD Europe	38.8-61.6	28.7-41.0
	China	18.7-28.3	12.3-18.6

Source: OECD/IEA-NEA, 2010, Costs of Generating Electricity.

Fig. 1.3b: Comparative Generating Costs of NPP vs Other sources

OECD electricity generating cost for year 2010 on - 5% discount rate, c/kWh

Country	Nuclear	Coal	Coal with CCS	Gas CCGT	Onshore wind
Belgium	6.1	8.2	-	9.0	9.6
Czech R	7.0	8.5-9.4	8.8-9.3	9.2	14.6
France	5.6	-	-	-	9.0
Germany	5.0	7.0-7.9	6.8-8.5	8.5	10.6
Hungary	8.2	-	-	-	-
Japan	5.0	8.8	-	10.5	-
Korea	2.9-3.3	6.6-6.8	-	9.1	-
Netherlands	6.3	8.2	-	7.8	8.6
Slovakia	6.3	12.0	-	-	-
Switzerland	5.5-7.8	-	-	9.4	16.3
USA	4.9	7.2-7.5	6.8	7.7	4.8
China	3.0-3.6	5.5	-	4.9	5.1-8.9
Russia	4.3	7.5	8.7	7.1	6.3
EPRI (USA)	4.8	7.2	-	7.9	6.2
Eurelectric	6.0	6.3-7.4	7.5	8.6	11.3

Source: OECD/IEA NEA 2010

Table 2.4: Comparison of severe accidents (≥ 5 fatalities) that occurred in Fossil, Hydro and Nuclear Energy Chains in the period 1969-2000

	OECD		NON-OECD	
	Accidents	Fatalities	Accident	Fatalities
Coal	75	2,259	1,044	18,017
Oil	165	3,713	232	16,505
Natural Gas	90	1,043	45	1,000
LPG	59	1,905	46	2,016
Hydro	1	14	10	29,924
Nuclear	0	0	1	31*
Total	**390**	**8,934**	**1,480**	**72,324**

Note: *These are immediate fatalities only (Source: OECD, 2010)
3 Fatalities in Fukushima accident in 2011 not directly linked to radiation emission

II
THE NATIONAL NUCLEAR POWER ROADMAP

2.1 Nigerian NP Programme Overview

- National Nuclear Power Roadmap developed and approved for implementation by the FEC in February 2007;
- Roadmap is a three-phase plan with implementation period of 10-12yrs to generate nuclear electricity with considerable national participation. National Strategy finalized in Dec 2009 – with attainment of IAEA Milestone 1.
  - Manpower training and infrastructure development;
  - Design certification, regulatory and licensing approvals; and
  - Construction and start-up.
- Meticulous implementation envisages commercial operation of first NPP (1,000MWe) in 2022 and gradual increase to four NPPs (4,000MWe) by 2030.
- Currently implementing Milestone 2 activities in NPI development

2.2 National Institutional Framework for NP Programme Implementation

- The Nigeria Atomic Energy Commission (NAEC), created by Act 46 0f 1976 and activated 2006, mandated as national focal institution for atomic energy development in Nigeria;
- Six nuclear energy research centres operate under the supervision of NAEC; involved in manpower training, research and capacity building;
- The Nigerian Nuclear Regulatory Authority (NNRA) is the national nuclear regulator; established by Act 19 of 1995, became operational in 2001, regulates nuclear safety and security in the sector;
- The Energy Commission of Nigeria (ECN) responsible for energy policy and planning;

- National Electricity Regulatory Commission (NERC) – regulates electricity pricing;
- National Environmental Standards and Regulations Enforcement Agency (NESRA) – for environmental protection; and the National Emergency Management Agency (NEMA) – emergency planning and management;
- Harmonization of the input of the many relevant stakeholder institutions is coordinated through the Nuclear Energy Programme Implementation Committee (NEPIC);
- Programme is also implemented with the requisite international endorsement, particularly the support of the IAEA and other partners, ensuring safety and security.

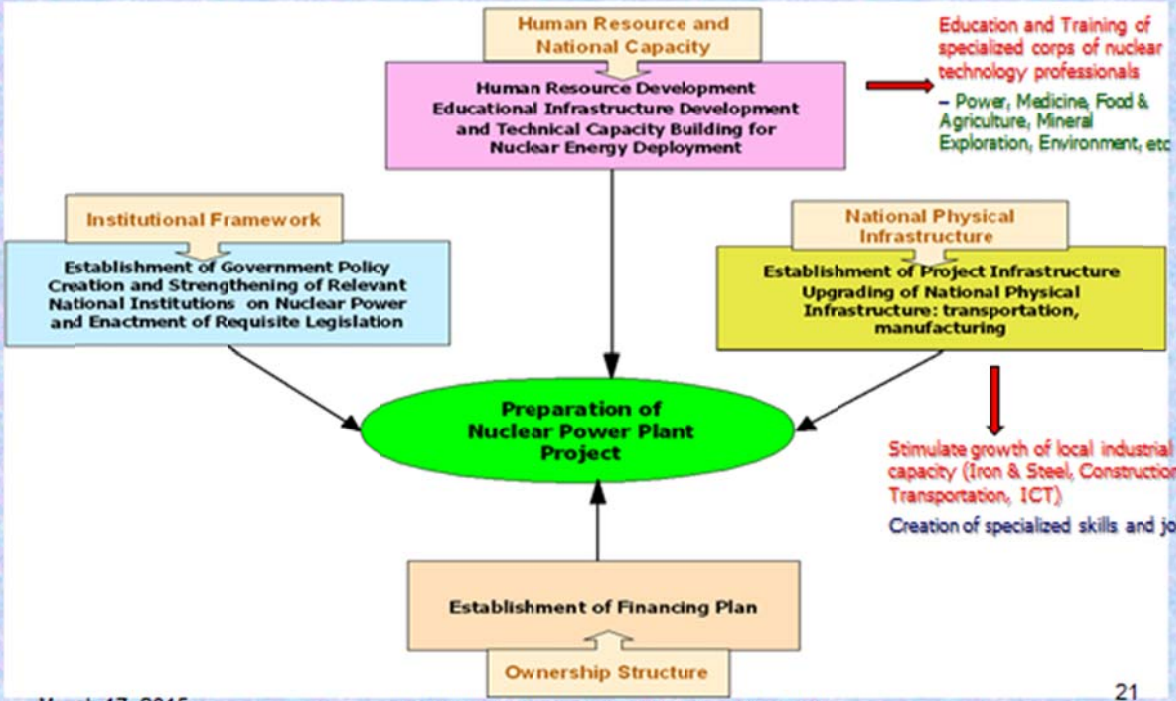
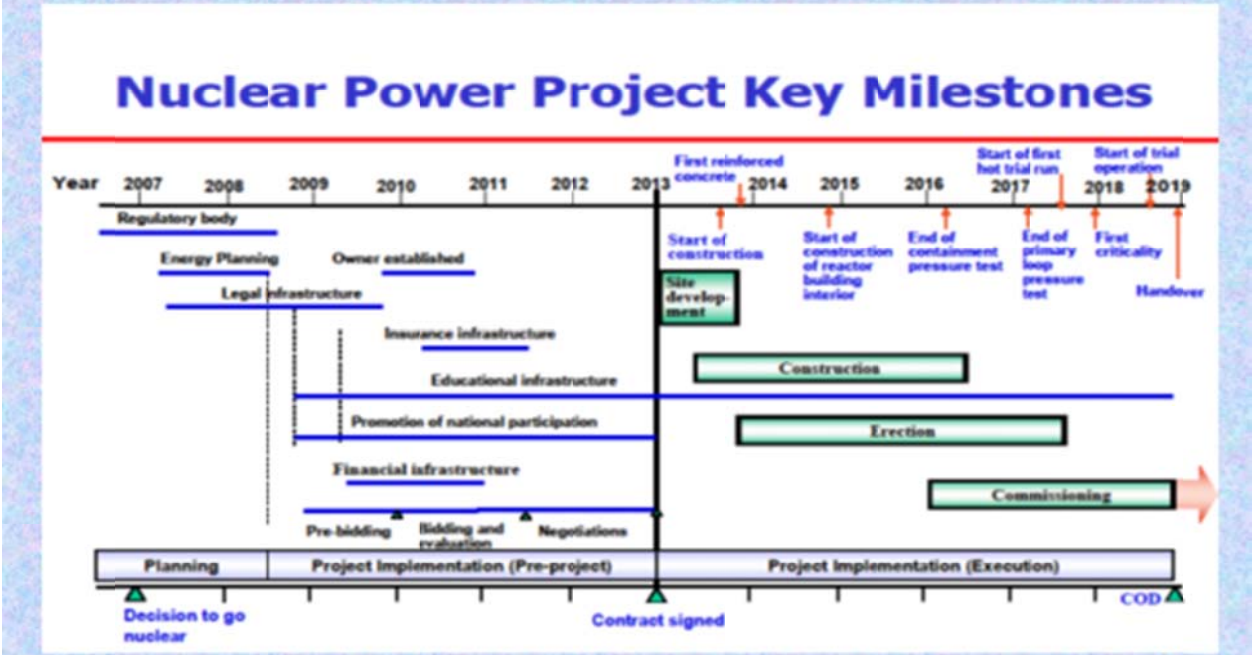


Figure 2.2: NPP Deployment Timeline



2.3 Progress Recorded So Far(1)

Legislation

Some progress made in the *revision of both the NAEC and NNRA Acts by National Assembly* to ensure robust implementation of programme;

Regulations and Policies

- Finalized *Safety and Regulatory Requirements for Licensing of Sites for Nuclear Power Plants*;
- The *National Policy on Radioactive Waste Management* has been finalized by NAEC;
- Developed framework for the establishment of a *National Nuclear Insurance Policy and Scheme* to adequately address the civil liability component of the nuclear power industry in Conformity with the 1963 Vienna Convention on Civil Liability for Nuclear Damage;

Ratify and Domesticate

Activated the processes to positively sensitize Government to *ratify and domesticate all other relevant international statutes, treaties and conventions*.

2.3 Progress Recorded So Far (2)

Build NPI

- Attained IAEA Milestone 1 of 3 since December 2009;
- Emplacement of the critical educational and training infrastructure for the development the national Nuclear Power Infrastructure (NPI): *SER for Phase 2 completed and will host IAEA INIR Mission for Phase 2 in June, 2015;*

Partnerships

- *Strengthening of cooperation* with the IAEA and other development partners;
- Signing of Cooperation Agreements with ROSATOM of the Russian Federation, and their subsequent approval and ratification by the FEC, as well as other ongoing consultations with other potential partners;

HRD

- *Finalization of requisite HRD strategy* in line with the workforce requirements of the national NPP programme and *building of requisite facilities*

NPP Sites

- Concluded *preliminary site selection activities;* detailed evaluation and characterization to be conducted on preferred sites on the approval of government:- Geregu in Ajaokuta LGA of Kogi State and Itu in Itu LGA of Akwa Ibom State;
- Apply for the licensing of the approved site(s) expected by the end of 2015.

III
REQUIREMENTS FOR BUILDING THE CRITICAL NATIONAL NUCLEAR POWER INFRASTRUCTURE

3.1: Building The Requisite National Capacity

- Develop a national strategy to build and strengthen National Preparedness which is critical for the successfully deployment of Nuclear Power Plants.
- National Preparedness in this regard entails:
  - Human Resources Development;
  - Educational Infrastructure Development; and
  - The Requisite National Technical Capacity.
- National Technical Capacity Building is dependent on the first two (HRD and EID), and these elements constitute a component of the national Nuclear Power Infrastructure (NPI); and
- A National Human Resources Development Strategy has been developed to superintend the implementation of all of the above elements.

3.2: Aims and Objectives of the HRD Strategy

- National HRD strategy is designed to meet broadened objectives to:
  - produce indigenous scientists and engineers with fundamental understanding of NT for effective project planning, management and sustainability in NPP implementation;
  - train specialized corps of scientists, engineers, technologists, etc, imbued with fundamental knowledge, discipline and practical expertise, to create a sustainable pool of human capital for safe and secure operation of NPPs;
  - Meet national needs in providing qualified human capital adequately equipped to optimally deploy NT for multifarious applications; and:
  - develop a specialized cadre of scientists and engineers for engagement in applied research, innovations and technology domestication.

3.3 The HRD Implementation Strategy

- A tripartite partnership provides the platform which synergizes the three key elements intrinsic in developing the HRD Implementation Strategy. These are :
  - Responsibility for and Ownership of the HRD programme
    - NAEC as Quasi Owner/Operator Organization (Industry);
  - Funding for the Implementation of the programme
    - Government funds Implementation HRD Strategy; and
  - Platform for the implementation of education and training
    - Educational Institutions (acad, prof & tech)
- The programmatic elements in HRD strategy requires:
  - Curricula design and development;
  - Building of requisite ETI and Research Infrastructure ;

3.4: Physical Training Infrastructure

- Standard training programmes in Nuclear Science and Engineering (Graduate, undergraduate, technologists, technician) must have at a minimum level of physical facilities such as laboratories, workshops and IT facilities, and must be developed in the designated institutions in an integrated fashion:
  - Laboratories and workshops must be equipped with the requisite nuclear instrumentation facilities and training equipment;
  - Coordination and creation of linkages to develop appropriate network for the sharing of physical facilities and personnel between participating institutions in the training programmes;
  - Provision of new key functional physical equipment and relevant research facilities, as well as upgrading of the existing facilities; and
  - The various NPI training and research facilities are being developed and upgraded in the six national nuclear energy research centres.

IV
OWNERSHIP, FUNDING AND FINANCING.

4.1 NPI Dev and National Funding Requirements

- A major characteristic challenge of NP Development in a newcomer country, irrespective of ownership, is long-term national (political) commitment and sustainability of the programme over the gestation period of at least 20 years;
- Overcoming this challenge requires a broad-based acceptance of the programme by the citizenry; should transcend political affiliation which would ensure programme continuity;
- The funding and financing requirements for Nuclear Power Infrastructure (NPI) development over time, and building of nuclear power plants, respectively, are also challenging (see Annexure);
- Funding refers to the initial fiscal responsibility of government in establishing the minimum NPI and is most often provided through national budgetary allocations;
- Government Commitment and the National ability to fund NPI development is a critical determinant of success: key to attract vendor/utility/private sector financing of the nuclear power plants (NPPs .

4.2 Ownership, Funding & Financing Structure

- NAEC empowered by Act as owner operating organization; but will only play a facilitating role. Structure of NPP Owner/Operating Organization (NPP-OOO) will depend on Government's Policy on NP financing model.
- FGN to create the enabling environment for NP programme sustainability; NPP-OOO would be a Special-Purpose-Vehicle (SPV) in the form of a "Joint Stock Company" (JSC) created in accordance with national laws and corporate governance with a Foreign Technical Partner (FTP).
- The JSC FTP, established NPP vendor and/or a NPP utility will hold majority and controlling stake. National entity – minority; Roles to be specified in contractual agreements.
- Globally, BOO and BOOT are becoming attractive for NPP (Russia-Turkey; The Akkuyu NPP project, and most recently, with Bangladesh & Jordan);
- For BOO(T), FTP and/or investor would provide the needed critical capital and technical input to implement the project;
- FGN and Govt. of FTP country to enter into an Inter Governmental Agreement (IGA) to streamline the modalities of the ownership structure and financing of the project;
- A major critical role of FGN in facilitating the success of the BOO(T) arrangement would entail the creation and entering into enforceable advance Power Purchase Agreements (PPAs).

Fig 4.1: Components of Funding and Financing Aspects of the National NP Programme

Time Frame	2014 to 2018	2016 to 2030
Elements and Components of NPP Programme implementation	Funding for NPI Development Funding for Design certifications, Legal & Regulatory Infrastructure Site Evaluation and Licensing, Bidding, Contracting, etc	Financing of Construction of and Commissioning of NPPs -Four (4) units of 1200MW each - (Total 4800 MW) - COD of First NPP - 2022 - COD of Fourth NPP -2030
Financial Inputs for Successful and Sustainable Implementation	N6b to N8b per annum for 5years (0.94 to 1.25% of cost of NPPs)	Estimated contractual Cost of US$5b per NPP unit; totaling US$20b
Who shoulders the Financial Responsibility	Provided by Federal Government of Nigeria	Financed by Vendor/Operator through a BOOT Contractual Model: FGN to enter into an IGA with Government of Country of NPP Vendor Company with possible minority equity participation by FGN; and Execution of an advance PPA

V
MEDIUM-TERM FUNDING REQUIREMENTS, PROJECT DELIVERABLES AND CHALLENGES.

5.1 Minimum Funding Requirements

- Immediate financial requirements are to be channelled towards the funding of the building of the critical Nudear Power Infrastructure (NPI), which includes development of education and training physical facilities, as well as HRD;
- The physical facilities include:
  - Laboratories and workshops which would be equipped with the requisite nuclear instrumentation facilities and training equipment;
  - IT facilities and communication infrastructure; and
  - Integration of facilities through creation of linkages and networking for the sharing of physical facilities and personnel between participating institutions in the training programmes;
- The respective NPI elements to be developed and their cost implications are detailed in the Annexure, and it translates into about ₦6-8bn per annum for the next five years.

5.2 Project Deliverables :Low-Hanging Fruits

- The most important quick outcome of the programme is the qualitative and well-trained national Human Resource Base created for the effective deployment of nuclear technology for national development; Nudear Power (1000MW by 2022 and 4,000MW by 2030)
- In addition to NP development, trained personnel will be useful in other NT applications which include:
  - Human Health (radiotherapy and nuclear medicine),
  - Food and Agriculture (SIT, processing, preservation),
  - radiation protection,
  - environmental management,
  - nuclear security & nuclear safeguards, and
  - in industry and other diversified scientific applications
- Create a sustainable pool of physical, scientific and educational infrastructure in our national institutions for national capacity building and enhanced capacity for technology acquisition and innovation.

5.3 Challenges with Technology Management

- Breaking away from the national malaise of lack of a maintenance culture in effectively managing nuclear technology; deepen the culture of commitment to efficiency!
- Managing and effectively containing the security issues associated with the development and operation of nudear power plants. This will entail:
  - imbedding of security and safety culture which is intrinsic in the training of nuclear professionals;
  - interface with relevant security agencies to strengthen national security commitment to programme from the outset; and
  - investing in requisite nuclear security infrastructure.
- Enthronement of national transparency in programme implementation, as well as commitment to safeguards, so as to earn and continuously enjoy international confidence in the purely civil nature of the national nuclear power programme.

VI
SUMMING UP AND TAKE AWAY.

6 Summing Up (1)

- Implementing a new NP programme is a daunting task
- Requires a serious national commitment over time, as well as a properly structured national institutional framework to ensure sustainability.
- The challenges, though serious, can be surmounted with meticulous planning.
- **It should be noted:**
  - i. that NAEC is fully on track in the implementation of the first phase of the approved national nuclear power road map in developing the critical NPI, particularly manpower training and capacity development;
  - ii. that, in line with the enabling Act, FEC decisions and subsisting Presidential approval, NAEC is primarily responsible for the Implementation and coordination of National HRD, R&D and capacity building activities;
  - iii. that about two-dozen physical projects for the emplacement of the requisite nuclear power infrastructure for education, training and research are at various stages of completion in the six national nuclear energy research centres;
  - iv. that preliminary site selection activities have been concluded and two suitable sites have emerged for which detailed evaluation and characterization studies would be conducted on the approval of the FGN. The site are located in:

6 Summing Up (2)

- ✓ Geregu/Ajaokuta Local Government Area of Kogi State in the North Central Zone of the country.
- ✓ Itu in Itu Local Government Area of Akwa Ibom State in the South-South Zone.

iv. that the successful completion of these elements of the programme will create the enabling environment for the participation of suitable international nuclear power plant vendors and partners to participate in the national NPP programme;

v. that, expectedly, the funding of these elements (NPI) of the programme shall remain the responsibility of the Federal Government as approved by the FEC in 2007;

vi. that the expected ownership/financing model for the actual construction of the nuclear power plants would entail either a Build, Own, Operate and Transfer (BOOT). These are part of the Commission's discussions with our development partners.

I wish to inform that:

- The National Economic Management Team (NEMT) has approved a sustainable funding structure for the building of the critical National Nuclear Power Infrastructure (NPI) for the next several years, and also approved the BOOT Contractual Model for the financing of the construction of the NPPs; and
- Discussions on finalizing the contractual agreement for the design, construction, operation and decommissioning of Nigeria's first Nuclear Power Plants is ongoing.

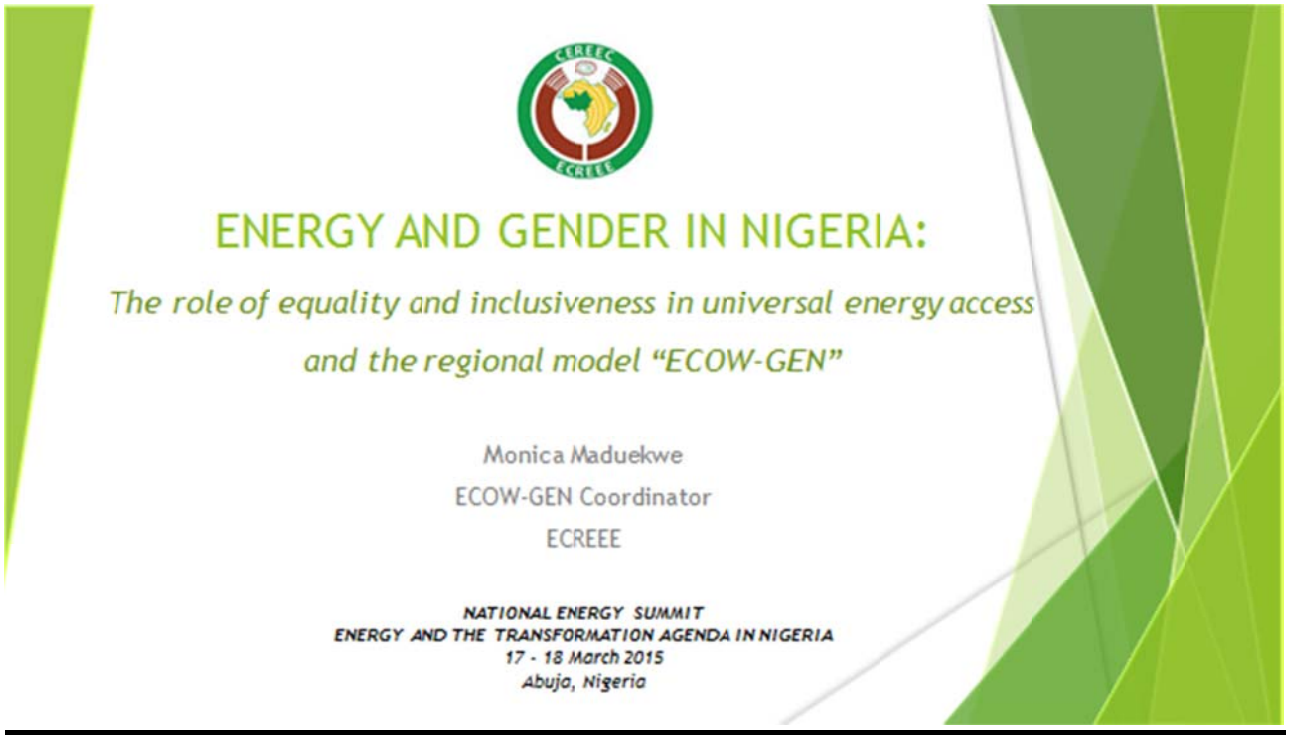
Thank you Excellencies, for your attention.

PLENARY SESSION THREE:
ENERGY AND GENDER IN NIGERIA

***Chairperson*:** Engr. Mrs Joana O. Maduka, FNSE, FAEng; Vice President, Nigerian Academy of Engineering – Represented by Prof. David Segun Aderibigbe
***Rapporteurs*:** Engr Toyin Alozie and Miss Zainab Datti
Speaker: Mrs Monica Maduekwe, Coordinator, ECOWAS-ECREEE Programme on Gender Mainstreaming in Energy Access (ECOW-GEN).
Discussants (1) Dr Mrs Bridget Obi, Children of Farmers Club (2) Dr Mrs Roseline Kela, ECN

PAPER 3

***Plenary Session III*:**
TOPIC – **Energy and Gender in Nigeria**
Speaker: Mrs Monica Maduekwe, Coordinator, ECOWAS-ECREEE Programme on Gender Mainstreaming in Energy Access (ECOW-GEN).



Socioeconomic situation in Nigeria

- With a population of with 174 million people
- GDP (current US$) $521.8 billion- largest economy in Africa
- Income per capita > US $1000 (lower middle income country)
- Over 50% of the population live in rural areas
- Less than 50% of the population have access to electricity
- Only 25% of households have access to non-solid fuels

Source: World Bank data

The energy situation in Nigeria: The challenges

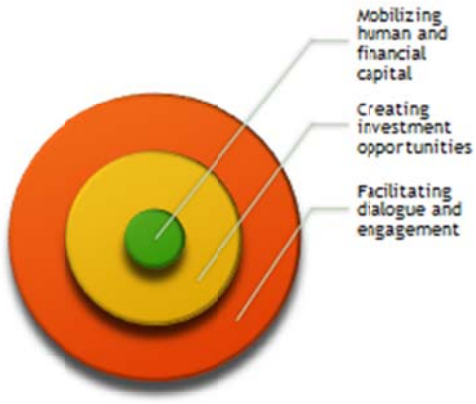
Source: SE4ALL: Rapid Assessment and Gap Analysis

The energy situation in Nigeria: The drivers

- Financial
  - Rural electrification projects are expensive, moreover the purchasing power of rural communities is low
  - Rural consumer's inability and willingness to pay and high cost of extending the grid
  - The capital base of the private sector is not strong enough to finance energy and power infrastructure
- Awareness and Capacity
  - Foreign expertise is depended upon forlarge-scale technology projects
  - The lack of well qualified electrical qualified companies and expert RE technicians
  - Non-acceptance of RE and EE strategies into national electrification strategies
- Technical
  - Local investors and financial institutions lack the technical and financial resources and expertise to develop and promote RE technologies
  - Local financiers and project developers often cannot design and or implement appropriate financing packages for RE technologies
- Policy and regulatory
  - The non-cost reflective tariffs and inadequate revenue collection system
  - Artificial cost of petroleum products

Source: (E4ALL: Rapid Assessment and Gap Analysis

Achieving universal energy access: The conditions



Pathways for Concerted Action towards SE4ALL

SE4ALL Goals

1) Ensure universal access to modern energy services
2) Double the share of renewable energy in the global energy mix
3) Double the global rate of improvement in energy efficiency

Source: SE4ALL:A Global Action Agenda

The rationale for inclusiveness and equality in the solution strategy

- **Mobilizing human and financial capital**
  - Female population in Nigeria is about 49% of the total population and 42% of the labour force (people available for work: employed + unemployed) are women.
    - **However:**
  - Nigeria has one of the lowest population of female entrepreneurs in SSA
  - The entrepreneurial potential of Nigerian women is under-utilized. Less than one in five entrepreneurs is a woman.
  - Women business owners are concentrated in sectors with low revenues and wages, like garments and catering
  - Over half of the fabrication firms in Nigeria do not employ any woman

Source: World Bank (2011) An Assessment of the Investment Climate in 26 States

The rationale for inclusiveness and equality in the solution strategy(2)

- **Creating investment opportunities**
  - Women's businesses are severely hampered by electricity shortages to the same degree as men's businesses.
  - But although female entrepreneurs need credit more than men, but they are less likely to apply for and less likely to obtain a loan.
  - The average woman looking for a job in the Nigerian formal sector is three times more likely to find it in a male-owned than in a female-owned enterprise, simply because women entrepreneurs are so few.
  - Female entrepreneurs create employment at the same rate as male entrepreneurs, especially for female and young workers.
- **Facilitating dialogue and engagement**
  - Due to gender roles, women are mostly responsible for procuring household energy supplies and particularly for cooking. They are the most affected due to the heavy reliant on traditional biomass. Globally 1.3 million annually die from cooking with inferior fuels. Moreover, the time spent on fetching wood deprives women of valuable time for self-advancement.

    However:
  - There are less female technical employees in the energy sectors and in decision-making roles, compared to men.
  - Lack of training and education, and social norms that view modern energy technology businesses as "men's work", limit women's opportunities to engage in sustainable energy entrepreneurship.
  - Women lack information on available funding sources for renewable energy and energy efficient projects or business development

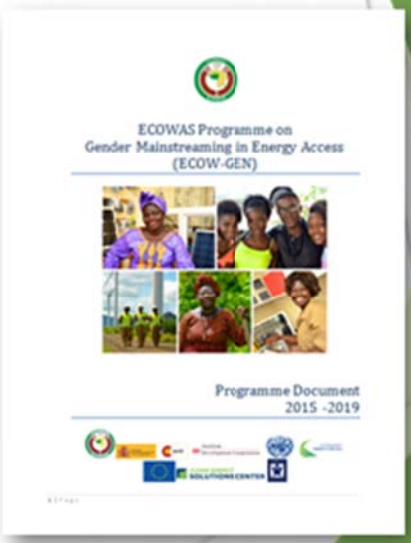
Status of gender mainstreaming in Nigeria's energy access strategy

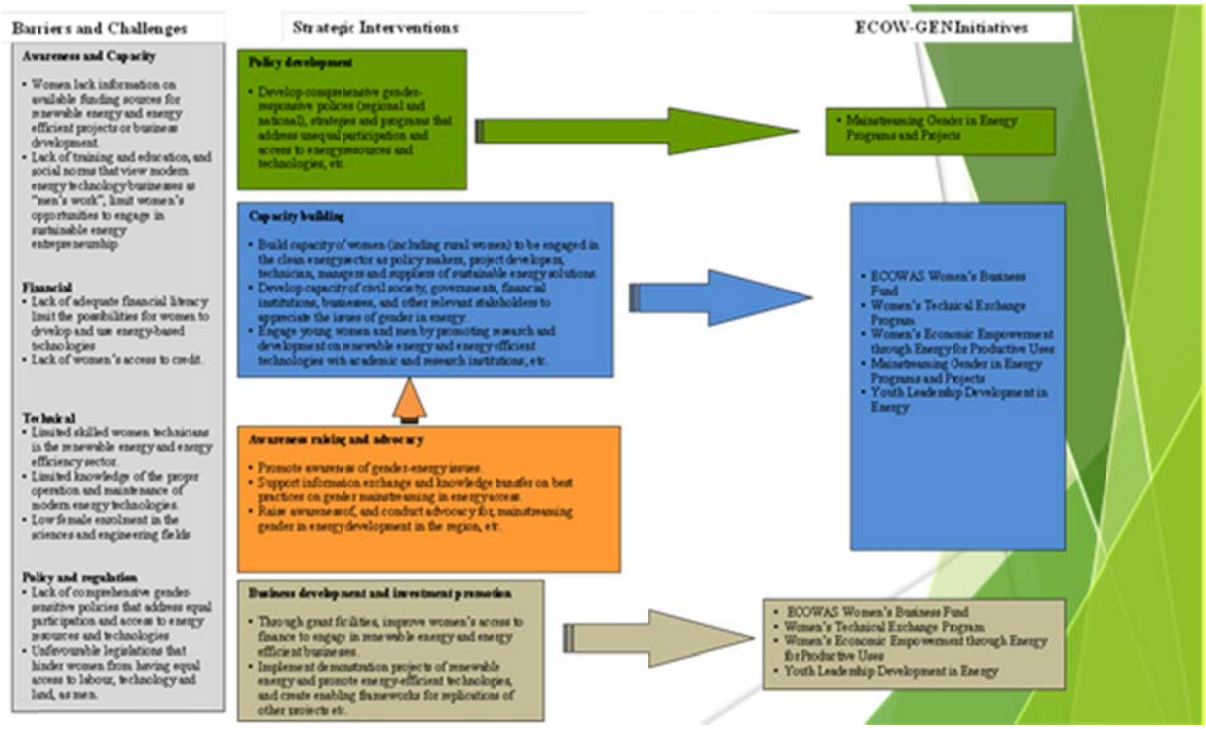
Indicators	Status
Is there a national rural electrification strategy? Does it include a gender dimension?	Yes, the national rural electrification strategy.It includes a gender dimension only to the extent that its objectives includes raising the living standards of the rural population through improved water supply, lighting and security as well as promoting the use of domestic appliances to ease household tasks.
Is there a national biomass strategy or household energy policy? Does it include a gender dimension? Explain	No
Is there a national renewable energy strategy? Does it include a gender dimension? Explain	The National Renewable Energy Master Plan targets remote and inaccessible rural communities with the hope to provide off-grid electrification to reduce among others, the stress associated with smoke from cooking with firewood and from lighting using traditional methods by women.
Has a gender budgeting exercise being conducted for the national energy budget? (Explain)	No
Does your organization have a gender policy and/or strategy (please give examples)? Or focal point	No
Does your organization use gender disaggregated data for planning (please give examples)	No

The energy situation in Nigeria: The opportunities

Background on ECOW-GEN

- *"ECOW-GEN is a flagship programme of ECREEE that works to steer Member States towards the direction of mainstreaming gender in policy formulation, legislative drafting, energy project and programme design and implementation, with the intention to promote equality in energy development through equal access to resources, opportunities and equal contribution to the decision-making processes that shape and influence energy expansion in West Africa".*





What we work towards achieving

Closing the gap that exist in energy production and consumption patterns in West Africa by addressing gender disparities at the supply side and at the end-users, so that the benefits of the ECOWAS region's energy interventions are equally shared among men and women

Leveling the playing field for women and men in the development and expansion of sustainable energy infrastructures in West Africa.

Promoting inclusiveness and equality in energy development in West Africa

How we work towards achieving these goals (ECOW-GEN five high impact initiatives)

- ECOWAS Women's Business Fund
  - A grant facility that supports the establishment or expansion of women-led innovative energy businesses
  - Capacity building component through which women project developers will receive training on designing energy projects and developing bankable project proposals
  - Component on 'Gender in power generation, transmission and distribution' to support gender-specific interventions in large-scale energy infrastructure development projects

How we work towards achieving these goals (ECOW-GEN five high impact initiatives)

- Women's Technical Exchange Program:
  - Facilitate learning and knowledge sharing between women groups and associations involves in energy, within and outside the region
  - Match-up women groups with expertise in various energy technologies and provide financial support for project replications
  - Will be linked to the ECOWAS Women's Business Fund

How we work towards achieving these goals (ECOW-GEN five high impact initiatives)

- Women's Economic Empowerment through Energy for Productive Uses
  - Created with the objective to expand energy access to support rural women in agricultural businesses
  - Will identify and work through indigenous NGOs
  - Outreach and sensitization component targeting the local population
  - Component on fostering functional literacy

How we work towards achieving these goals (ECOW-GEN five high impact initiatives)

- Youth Leadership Development in Energy
  - Support the development of high quality policy-papers on topical energy issues by research teams comprising of young women and men.
  - Research topics will be decided with the MoEs.
  - A grant funding component on R&D in RETs will provide support to young innovators to contribute to upscaling the deployment of appropriate technologies.

How we work towards achieving these goals (ECOW-GEN five high impact initiatives)

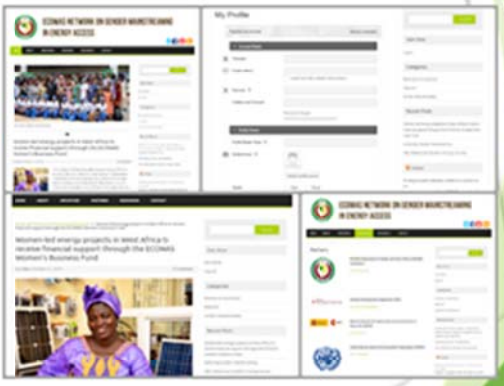
- Mainstreaming Gender in Energy Programs and Projects
  - Develop a regional policy for Gender Mainstreaming in Energy Access; national strategies
  - Mainstream gender in ECREEE's programs and activities
  - Develop gender Analytical tools to be used in program design and implementation, M&E, etc.
  - Conduct training workshops to build capacity for gender mainstreaming at the technical and decision making levels
  - Conduct awareness raising activities
  - Provide technical support to other regional energy centers

How we work towards achieving these goals (ECOW-GEN five high impact initiatives)

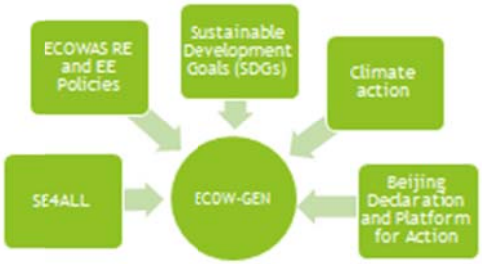
- ECOWAS Network on Gender Mainstreaming in Energy Access

The ECOW-GEN online Network connects gender and energy practitioners all over the world, with the objective to promote, through knowledge sharing, a cohesive, coordinated, and a more effective approach to gender-responsive sustainable energy development in West Africa.

www.ecowgen.ecreee.org



ECOW-GEN's key role in the achievement of Sustainable Development in Nigeria, the region



- ECOW-GEN aligns with the principles and strategic actions of the Beijing Declaration and Platform for Action by developing for and implementing with women programmes that foster their empowerment and advancement.
- ECOW-GEN contributes towards the achievement of the SE4ALL goals in West Africa and the ECOWAS RE and EE policies by ensuring that women make both intellectual and business-wise contributions to ending the energy crises and benefit from energy interventions.
- Through investments, capacity building, advocacy and awareness raising, ECOW-GEN's initiatives addresses climate change and energy poverty issues by closing the energy demand and supply gap through the increased use of renewable energy and energy efficient technologies.

Some notable work so far

- Over 70 energy experts trained on mainstreaming gender in energy policies.
- 250 participants -gender ministers & women groups - trained on developing Gender Action Plans.
- A Framework Action Plan on 'Women's Economic Empowerment through Energy Access in the Mano River Union (MRU) Sub-region developed with, and adopted by, MRU Gender and Energy Ministers.
- Through the Women's Business Fund, implementing demonstration projects in Ghana and Senegal that would lead to 1000 women street vendors having access to improved LPG stoves in Ghana and the installation of 13 clean and improved modern furnaces for fish smoking in a fishing community in the rural areas of Senegal.
- ECOW-GEN is pioneering the development of the first regional gender-sensitive and gender-responsive energy policy. It is envisaged that the policy will be validated and adopted in 2015 with a series of events organized under the framework of the Beijing +20 and SE4ALL.

ECOWAS Gender and Energy Policy

- ECOWAS is developing the first ever gender and energy policy: the ECOWAS Policy for Gender Mainstreaming in Energy Access
- The objective of the policy is to address existing barriers to the equal participation in and benefit sharing of men and women in the expansion of energy access in West Africa and ensure the success of the SE4ALL initiative in the Member States

Standtall: ECOWAS Campaign and writing contest

- "#Standtall", aims to inspire young people to lead the transformation for inclusiveness and equality in the energy sector in West Africa by encouraging them to take part in the discourse on and proffer solutions to topical gender and energy issues in the region.
- Open to young men and women, 16 to 32 years of age, and who are residents of the ECOWAS region, to submit articles.
- Submissions for articles will open on 18 March 2015 and close on 18 April, 2015

Conclusion and Recommendations for Nigeria

- **Inequalities exist:** men and women do not have the same opportunities to contribute to expanding energy access, and benefit from, the energy interventions in the region.
- **The inequality gap in the energy sector is set to widen:** in the last two decades, advancements in information and telecommunication led the technology revolution. The next technology revolution will happen in clean energy technology. ECOWAS, being 2nd only to the EU to have adopted regional clean energy policies is poised to benefit from this revolution. However, if the existing barriers are not addressed now, and women given the support to be engaged in the sector, it would be a missed opportunity for the region and for women.
- The national strategy to increasing energy access, needs to take into consideration:
  - who is benefiting?
  - Are the impacts (benefits and cost) of the interventions being felt by all?
  - Are both genders participating in the process - to ensure that the project/intervention meets an identified need?

Investment decisions need to look more intently into who the beneficiaries are to enhance effectiveness, as well as to measure progress and success.

Conclusion and Recommendations for Nigeria

- **Social Equity is not all there is to benefit from an inclusive energy development pathway:** the justification for this is more than equity, or blind equality. But it makes economic sense (smart economics).
  - Using scarce resources wisely and more efficiently, through gender equality and inclusiveness in energy production and consumption will lead to energy security, economic growth & development and environmental sustainability.

- What to expect for the Nigeria's energy sector, post 2015
  - Regional gender and energy policy to national strategy for gender mainstreaming in energy access
  - The implementation of gender responsive measures and the development of gender specific and sensitive energy programmes to close the gender gaps in energy production and supply
  - The replication of similar measures acrossother sectors of the economy

Thank You for your kind attention

PLENARY SESSION FOUR:
REFORMING THE PETROLEUM INDUSTRY IN NIGERIA

***Chairperson*:** Prof Ibidapo-Obe, President, Nigerian Academy of Sciences
***Rapporteurs*:** Mr Isa Soba Nasiru and Engr Umar U. Adamu
Speaker: Federal Ministry of Petroleum Resources
Discussants : (1) Prof. Nuhu Obaje, IBBU, Lapai, Niger State; (2) Dr. Mohammed Bello Abubakar, Director, National Centre for Petroleum Research and Development (NCPRD), ATBU, Bauchi, (3) Dr. Oladiran Fawibe, Nigerian Energy Services Ltd (4) Prof. Wunmi Iledare, Centre for Petroleum Studies, UNIPORT.

PAPER 4

***Plenary Session IV*:**
Topic: **Reforming the Petroleum Industry in Nigeria**
Speaker: Federal Ministry of Petroleum Resources (Absent)

Summary of Comments and Recommendations from Discussants:

The transformation in the petroleum sector is encapsulated in the Petroleum Industry Bill (PIB). The reform in the Petroleum Industry in Nigeria profoundly involved the exploration and production of oil and gas resources, and its sale in the global market, through the exploration and production activities, Nigeria had acquired a better technology, we are optimistic that soon, Nigeria would have additional smaller refineries to boost our refining capacity. We need the PIB because the petroleum industry requires a huge investment and expertise and that there are risks associated with oil exploration coupled with political risk. The International Oil Companies (IOCs) and Government need to come up with an agreement, and the law governing the industry must be obeyed. Most of the IOCs came around 60s-70s. Therefore we need a global resource institution. The PIB is a controversial issue in the country. The physical and non physical components of the bill are: regulatory institution, upstream and downstream petroleum institution, PTDF, PEF, National Petroleum Asset Management Commission, PTF, National Gas Company and PIB. Currently, what Nigerian takes home is about 40% of earnings, but with appropriate PIB implementation, the revenue will rise to 90%. Moreover, the Nigerian Hydrocarbon Tax emphasized that the number of barrels explored is dependent on the location of the well (onshore, offshore, frontier basin or shallow) exploration. The PIB should have captured the following three points;

- Institutional Empowerment
- Regulations governing upstream and downstream sectors
- National Content Act is the only way out to resolve PIB

CHALLENGES

The following challenges were noted:

- For Inland exploration, there is a burden of evacuating the resources.
- Most of the materials provided are for deep offshore exploration, no provision for inland basins.
- The PIB has to be institutionalized. Currently, most bills are based on personal interest.
- The Petroleum Technical Bill is under The Ministry of Petroleum Resources, this makes exploration weaker.

RECOMMENDATIONS

- There is need for quick human mind and individual attitude for development.
- Comparing Petrobrass and Petronas as in Brazil and Malaysia respectively, a company with such a structure has to be established in Nigeria.
- The institutional set-up is weak. Presently, we don't have any exploration outfit other than NAPIMS.
- A separate Ministry for the implementation of PIB has to be created.

PLENARY SESSION FIVE:
CHALLENGES IN THE POST-PRIVATIZATION ARENA OF THE NIGERIAN POWER SECTOR

***Chairperson*:** Engr. Kashim A. Ali, President, Council for the Regulation of Engineering in Nigeria (COREN)
***Rapporteurs*:** Mr Tony Lawson, and Mr Nosa Osaghae
Speaker: Mr. Benjamin E. Dikki DG, **Bureau for Public Enterprise (BPE);** Represented by Mr. Amechi .C. Aloke.
Discussants: (1) Prof. David Segun Aderibigbe; (2) Engr. James Olotu (MD, NIPP) Represented by Engr. Cyprian Nwachukwu; (3) Mr. Simeon Atakulu, Presidential Task Force on Power

PAPER 5

***Plenary Session V*:**
TOPIC: **Challenges in the Post-Privatization arena of the Nigerian Power Sector**
Speaker: Mr Benjamin E. Dikki DG, **Bureau for Public Enterprise (BPE);** Represented by Mr. Amechi .C. Aloke

THE PRESIDENCY, BUREAU OF PUBLIC ENTERPRISES

CHALLENGES IN THE POST-PRIVATISATION ARENA OF THE NIGERIAN POWER SECTOR

By

Benjamin E. Dikki

Director General, BPE

A TECHNICAL PRESENTATION AT THE 2-DAY NATIONAL ENERGY SUMMIT OF THE NATIONAL ENERGY COMMISSION OF NIGERIA

MARCH 18, 2015

1

Outline

- Why was reform Necessary?
- Objectives of FGN Privatization Programme.
- Design of the New Nigeria Electric Supply Industry (NESI).
- Outcome of The Privatisation Transaction.
- Our Expectation From Private Operators.
- Challenges.
- Conclusion.

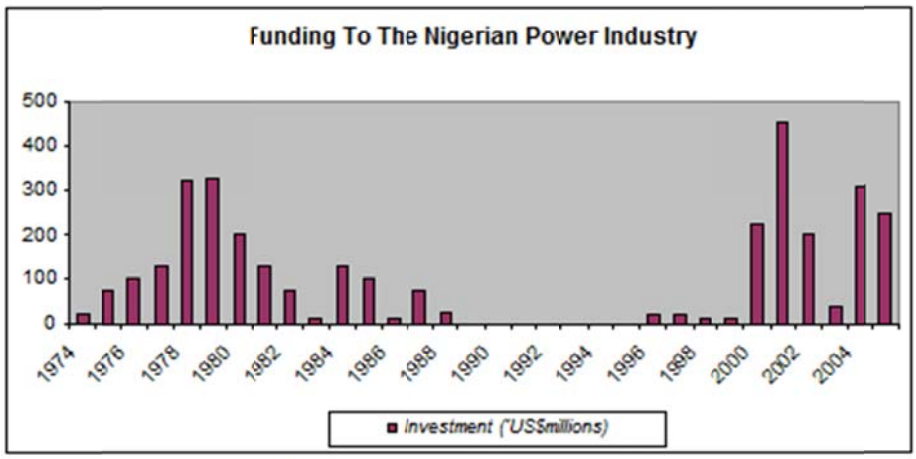
2

Why Reform....

- ✓ At the onset of the democratically elected civilian administration in 1999, the Nigerian electric power sector had reached, perhaps, the lowest point in its 100 year history:
  - Of the 79 generation units in the country, only 19 units were operational. Average daily generation was 1,750 MW.
  - No new electric power infrastructure was built between 1991-1999.
  - The newest plant was completed in 1990 and the last transmission line built in 1987.
  - An estimated 90 million people were without access to grid electricity.
- Accurate and reliable estimates of industry losses were unavailable, but were believed to be in excess of 50%.

3

Why Reform.... Cont'd



Source: Presidential Retreat On Power

4

Electricity Consumption per capita (kWh) 2014 Country Ranks, By Rank - marginal increase in rank and quantity for Nigeria

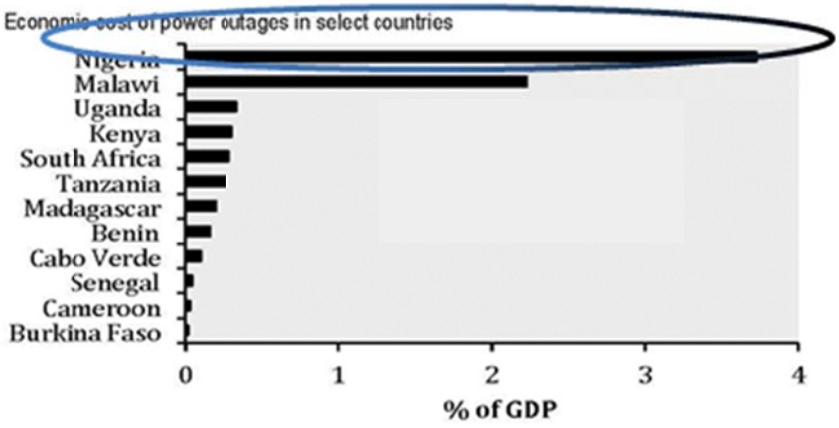
http://www.photius.com/rankings/energy/electricity_consumption_per_capita_2014_0.html
SOURCE: CIA World Factbook 2014

Rank	Country	Value
167	Laos	551.75
168	Cameroon	252.13
169	Angola	247.54
170	Bangladesh	237.65
171	Kiribati	225.19
172	Yemen	217.06
173	Ghana	210.76
174	Vanuatu	195.55
175	Mauritania	189.64
176	Cote d'Ivoire	172.54
177	Cambodia	169.21
178	Senegal	166.91
179	Sudan	162.56
180	Lesotho	158.56
181	Western Sahara	155.54
182	Sao Tome and Principe	149.54
183	Kenya	139.65
184	Congo, Republic of the	130.88
185	Equatorial Guinea	128.14
186	Solomon Islands	127.69
187	Nigeria	116.79
188	Nigeria (2013)	103.81

5

Effect of Power Outages

Figure 10. Power outages are a major tax on Africa's economies



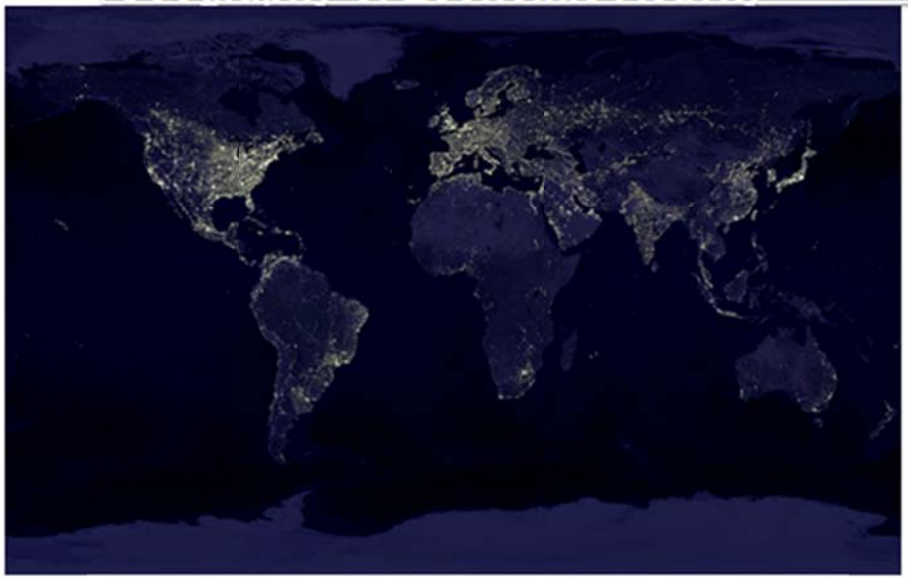
Source: Derived from Eberhard and others (2009).

Why Reform.... Cont'd
Summary of The Condition Of NESI

- High Tech and Non-Tech Losses (Estimated at 45-50%)
- Low Generation, Distribution and Transmission capacity
- Large No. of Employees (over 47,000 in the industry)
- Poor Maintenance Culture
- Frequent Power Outages
- Lack of Commercial Orientation
- Not Commercially viable
- No Audited Financial Statements

Why Reform.... Cont'd

Geography of Economic Activity



9

Objectives OF FGN Power Reform

- ✓ To reduce the cost of doing business in Nigeria so as to attract new investment through the provision of quality and dependable power supply, as necessary to grow the economy via industrial, commercial and socio-domestic activities;
- ✓ To improve the efficiency of the distribution, generation and transmission networks, which were comatose
- ✓ To provide Nigerians with basic and affordable electricity infrastructure, a key to enabling them create employment for themselves
- ✓ To create a robust, commercial, competitive and sustainable electricity market that is private sector driven
- ✓ To inject private sector managerial expertise and capital into the sector
- ✓ To reduce government expenditure in the sector and redirect savings to other social requirements

10

DESIGN OF THE NIGERIAN ELECTRICITY MARKET

NIGERIA ADOPTED THE WHOLESALE COMPETION MODEL AS ITS LONG RUN MARKET DESIGN

THE NIGERIAN ELECTRICITY MARKET IS EXPECTED TO EVOLVE THROUGH THE FOLLOWING STAGES:

- **PRE -TRANSITIONAL STAGE**

  This is characterized by higher demand than supply.

11

DESIGN OF THE NIGERIAN ELECTRICITY MARKET cont'd...

- **TRANSITIONAL STAGE (Where we just moved into)**
  - ✓ Demand will be bigger than the supply.
  - ✓ All trading is made through contracts.
  - ✓ Trading in this stage is "physical" through contracts.
  - ✓ Existing power will be traded through vesting contracts
  - ✓ The conditions and prices of vesting contracts are not freely negotiated.
  - ✓ Transparent and competitive mechanisms for entering in the market (new PPAs).

12



DESIGN OF THE NIGERIAN ELECTRICITY MARKET cont'd

- **MEDIUM TERM STAGE**
  - ✓ There is competition to enter in the market.
  - ✓ There is competition in the market to supply the demand.
  - ✓ Contracts can be negotiated freely and there can be "financial contracts".

13

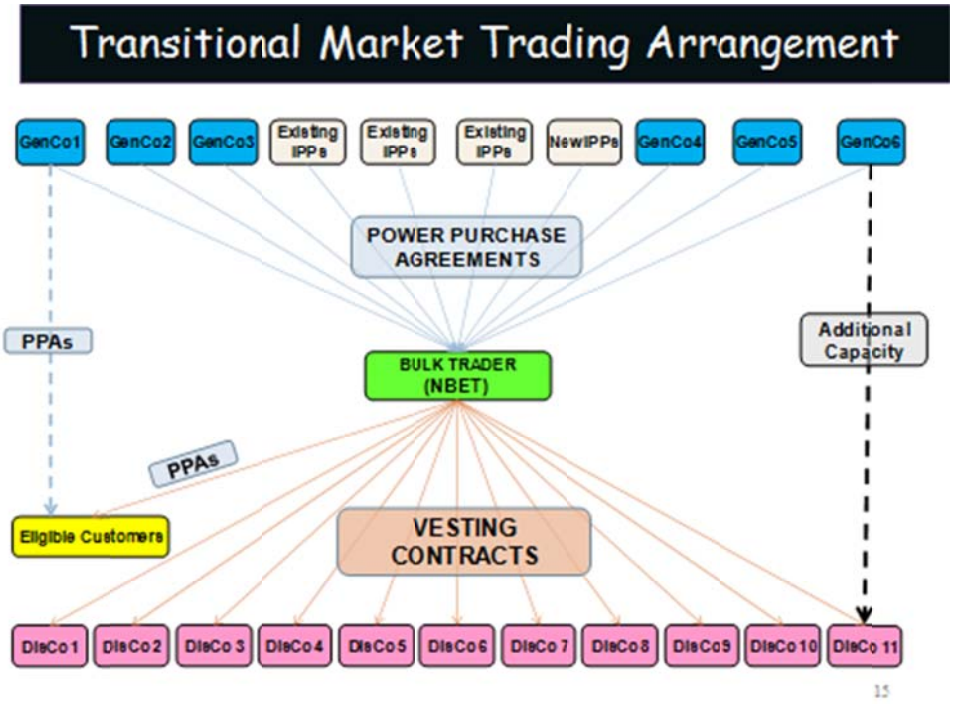


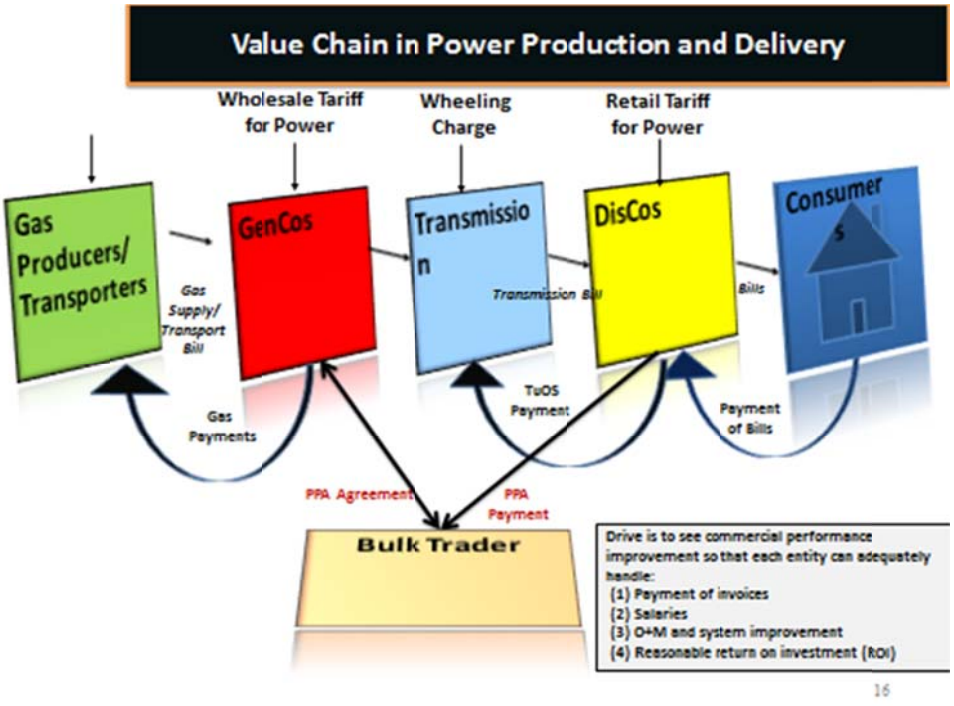
DESIGN OF THE NIGERIAN ELECTRICITY MARKET cont'd...

- ✓ There is a centralised Merit Order Dispatch by the System Operator, where Generators must submit the dispatch nomination (availability, constraints, costs / prices) to be used in the security constrained economic (least cost) dispatch.
- **LONG TERM STAGE**

  Similar to the medium term stage but characterized by more competition and greater freedom by eligible consumers to choose their suppliers

14


Transitional Market Trading Arrangement
GenCo1
GenCo2
GenCo3
Existing IPPs
Existing IPPs
Existing IPPs
New IPPs
GenCo4
GenCo5
GenCo6
POWER PURCHASE AGREEMENTS
PPAs
Additional Capacity
BULK TRADER (NBET)
PPAs
Eligible Customers
VESTING CONTRACTS
DisCo 1
DisCo 2
DisCo 3
DisCo 4
DisCo 5
DisCo 6
DisCo 7
DisCo 8
DisCo 9
DisCo 10
DisCo 11
15


Value Chain in Power Production and Delivery
Wholesale Tariff for Power
Wheeling Charge
Retail Tariff for Power
Gas Producers/ Transporters
GenCos
Transmission
DisCos
Consumers
Gas Supply/ Transport Bill
Transmission Bill
Bills
Gas Payments
TuOS Payment
Payment of Bills
PPA Agreement
PPA Payment
Bulk Trader
Drive is to see commercial performance improvement so that each entity can adequately handle:
(1) Payment of invoices
(2) Salaries
(3) O+M and system improvement
(4) Reasonable return on investment (ROI)
16

Outcome Of Privatisation – Discos and Gencos

The current owners of the successor companies are as follows:

- 4power Consortium – **Port-Harcourt**
- Aura Energy Ltd – Jos
- Integrated Energy Dist. & Mkt. – **Ibadan & Yola**
- Interstate Electrics – **Enugu**
- KANN Consortium Utility – **Abuja**
- KEPCO/NEDC Consortium – **Ikeja**
- SahelianPower SPV Ltd - **Kano**
- VIGEO Holdings, - **Benin**
- West Power and Gas - **Eko**
- Transcorp - **Ughelli**
- Amperion - **Geregu**
- CMEC/EUAFRIC – **Sapele**
- Mainstream Energy Solutions Ltd - **Kainji**
- North-South Power Company Ltd – **Shiroro**

- Kaduna and Afam transactions had to be repeated as the initial bidders failed to meet the required standards.
- Kaduna has since been handed over to Northwest Consortium
- Gas supply issues have delayed the handover of Afam to Taleveras Group.

17

Outcome of Privatisation - Labour

- ✓After a protracted negotiation with the Unions for 14 Months an agreement was reached on December 12, 2012 with the Unions and FGN
- ✓The agreement provides for the payment of severance, pensions and gratuity of all the 47,913 workers of PHCN
- ✓Following a rigorous process of verification, the FGN started paying the workers of PHCN their entitlements
- ✓A final verification exercise was held across the country in the first 2 weeks of February to clear all outstanding cases

18

Outcome of Privatisation: Transmission Company of Nigeria (TCN)

- A successor company of PHCN;
- Incorporated in November 2005 following enactment of EPSR Act 2005;
- Owns and operates the transmission system from 132kV and above;
- Currently functions as an integrated TSP, SO and MO;
- Manitoba Hydro International Ltd of Canada was engaged in July 2013 as Management Contractors for TCN.

19

Outcome: Current Status of MHI Contract

- The management contractor delivered 15 milestone reports on different facets of how TCN is to be transformed;
- Board working with MHINL and Nigerian counterparts to improve upon TCN performance;
- The third year of the base contract will end on July 31, 2015, but NCP has approved a one year extension and the Board has completed negotiations;
- Massive funding needed for network rehabilitation and expansion;
- NCP will determine the next line of action for TCN after the expiry of management contract.

20

OUR EXPECTATION FROM THE PRIVATE SECTOR OPERATORS

- The privatization programme is anchored on the attainment of clearly defined goals and parameters
- In the case of the generation companies, capacity is expected to be ramped up to meet the minimum target capacities specified under the respective business plans.
- For the distribution companies, the performance of the business operations of the new owners will be measured on the basis of their abilities to meet the Aggregate, Technical, Commercial and Collection (ATT&C) loss targets specified in their winning bids.

21

Expectation Cont'd - Generation

- The new owners of the privatized power plants are mandated to increase the capacities of the power plants as follows:

Generating Company	Year Built	Available Capacity (Feb. 2011; MW)	Mandatory Minimum Capacity (MW)	Additional Capacity
Afam Power Plc	1963/01	90	400	310
Geregu Power Plc	2007	276	414	138
Sapele Power Plc	1966	100	400	300
Ughelli (Delta) Power Plc	1978	300	400	100

- From the above table, it can be seen that the new owners of the old PHCN thermal power plants are mandated to increase capacities by a minimum of 848 MW. This will require more than US$800 million over the period of the mandate. In addition some of the new owners will build brand new power plants. For instance KEPCO is to build another 1, 320 MW power plant in Egbin. This will cost more than a billion dollars. In sum the total generation capacity, including that from old and new hydro plants, is expected to hit 16,843MW by the end of 2018.

22

Expectation Cont'd - Discos ATC&C Losses

P Successor Company	Bidder	Opening Loss	5 Year Remaining Loss Level	Disco ATC&C Relative Target (% remaining)= (End Loss)/(Opening Loss)
Abuja	Kann	35.00%	12.78%	36.51%
Benin	Vigeo	40.00%	12.19%	30.48%
Eko	West Power & Gas	35.00%	12.76%	36.46%
Enugu	Interstate	35.00%	6.70%	19.14%
Ibadan	Integrated	35.00%	12.71%	36.31%
Ikeja	NEDC	35.00%	9.99%	28.54%
Jos	Aura	40.00%	18.09%	45.23%
Kano	Sahelian	40.00%	13.02%	32.55%
Port Harcourt	4Power	40.00%	14.90%	37.25%
Yola	Integrated	40.00%	17.34%	43.35%

Note:

- the final column (red) is what purchasers are contractually obligated to meet over 5 years from takeover
- Opening loss levels are estimated and may be adjusted following baseline studies
- 5 Year required remaining loss levels will be adjusted as per the purchaser obligations in the final column

23

Expectation Cont'd - Estimated Investment To Be Made In Discos

Distribution Company	Capex ($) 2013	2014	2015	2016	2017
Abuja	$36,606,000	$36,606,000	$36606,000	$36,606,000	$36,606,000
Benin	$24,314,000	$24,314,000	$24314,000	$24,314,000	$24,314,000
Enugu	$27,230,000	$27,230,000	$27230,000	$27,230,000	$27,230,000
Ibadan	$43,865,000	$43,865,000	$43865,000	$43,865,000	$43,865,000
Jos	$22,755,000	$22,755,000	$22755,000	$22,755,000	$22,755,000
Kaduna	$29,960,000	$29,960,000	$29960,000	$29,960,000	$29,960,000
Kano	$30,379,000	$30,379,000	$30379,000	$30,379,000	$30,379,000
Eko	$45,170,000	$45,170,000	$45170,000	$45,170,000	$45,170,000
Ikeja	$58,737,000	$58,737,000	$58737,000	$58,737,000	$58,737,000
Port Harcourt	$25,514,000	$25,514,000	$25514,000	$25,514,000	$25,514,000
Yola	$13,133,000	$13,133,000	$13133,000	$13,133,000	$13,133,000
Total	$357,663,000	$357,663,000	$357,663,000	$357,663,000	$357,663,000

- 5 Year total Capex for Distribution Companies is almost $1.8 billion and cost reflective tariff reflected next slide

24

Expectation Cont'd : TCN Investment

- Transmission network rehabilitation and expansion would resolve congestions in the network, ease load evacuation and facilitate power exchange within the sub-region (WAPP).
- This would involve investment in 330kV lines, 132kV lines of various lengths with their associated substations according to specified strategic designs and locations to enable the secure wheeling of recovered and new capacities.
- In terms of capital investment, a little over US$2.416 billion (US$2,416,147,872 actually) are needed to increase the transmission capacity to evacuate the forecasted generation capacity of 16,843MW by 2018.

25

CHALLENGES

- **Monitoring Investors' Business Plans**
  - One of the biggest challenges in any privatisation is ensuring that necessary investments are made by the new owner
  - Many countries experience privatisation challenges when private sector partners fail to make investments as required
  - The power sector will require several billion dollars of expenditure over the next five years to achieve the goals of the power reform program
  - BPE has ensured that the Purchasers are contractually required to bring in this investment and BPE and the FGN will be monitoring this requirement closely and continuously

26

CHALLENGES Cont'd

- **Transmission**
  - Transmission is seen by some private sector participants as the "weak link" in the value chain
  - While a reputable management contractor has been put in place, there is still a need to ensure that there are no constraints to the management contractor's achievement of set targets
  - There is also a need to ensure that the transmission sector receives the needed funds, when needed, to make the investments necessary for strengthening the network, wheeling the increased generation capacity and providing all the necessary supporting services.
  - Absence of Board in place for over one year has had a telling effect on the management contract
  - Sanctity of contract has not been respected 100%. This has the capacity to influence development partner funds to TCN

27

CHALLENGES Cont'd

- **Skilled Manpower**

- The need for readily available skilled manpower in the power sector.
- Archaic mentality of the older part of the work force
- New owners need a clear strategy of managing the movement from state-run to a privately managed entity
- There is need for collaboration between the Purchasers and the National Training Power Institute (NAPTIN) to assist in bridging the manpower gaps of the sector.

28

CHALLENGES Cont'd

- **Water management for Hydro stations**
  - Water management for the hydro power stations
  - The water courses through several countries before it enters Nigeria
  - Beside the massive evaporation in the desert, the countries also make various uses of the water including irrigation and hydropower, all of which reduce its volumetric flow rate

29

CHALLENGES Cont'd

- **Gas**
  - The majority of electricity generated in Nigeria is done through gas-fired plants
  - Nigeria is blessed with one of the largest reserves of natural gas in the world
  - There is, however, inadequate supply to the thermal power stations;
  - Adequate investments need to be made to harness some of the gas for current power generation and forecast
  - This requires strong incentives for the private sector to invest as well as direct support from the government

30

CHALLENGES Cont'd

- **Regulatory**
  - Investors tend to be concerned about the lack of an extensive regulatory history
  - There is a need for transparency, consistency and certainty in regulation making
  - Regulation making and tariff adjustments need to be responsive and timely
  - The companies need protection from political and other interference in their administration and operation

31

CHALLENGES Cont'd

- **Consumer Expectation**
  - Changes in electricity supply services will not be immediate
  - Investments in the power sector will take time in order to achieve results
  - Construction of new generation capacity will take two to five years to achieve most of the results envisaged
  - The distribution networks will also take time to rehabilitate and expand
  - Accordingly expectations will need to be managed for the public to understand that perceivable improvements in service provision might take a little longer to attain as the sector is on the path of recovery from decades of underinvestment and corresponding decaying infrastructure

32

CHALLENGES Cont'd

- **Rapidly Changing Market/ Unpredictability (TEM has been declared)**
  - Over the next few years, the market will be moving through a period of rapid transformation
  - Capacity will increase and with large investments being made in the sector it might lead to some degree of initial unpredictability for the regulator, the government, the private sector and the public
  - The market will, however, adjust to working under a new commercial framework, based on bankable contracts that will require adjustments and upgrading of information available, systems and technologies in place
  - All participants will need to exercise flexibility and adaptability in this situation especially with the commencement of TEM since February 1, 2015

33

CHALLENGES Cont'd

Security of assets/infrastructure

- Vandalism of infrastructure/gas pipelines etc. A recent report on television was that Nigeria loses $600 million daily to vandalism of gas pipelines.
- Google map can locate us now in this conference; I reckon, therefore, that this technology can be employed to monitor the pipelines in real time at a cost that is far less than what is lost daily. A beauty of this is that while vandalism is ongoing security officers monitoring the pipelines will have the coordinates of the area of operation, surround it and close on the thieves. Further, vandals' pictures can be blown to reveal their identity so that they won't be mistaken for someone else, and could be used to create a database or track them in the event they escape before they are caught.

34

CHALLENGES Cont'd

- **Stakeholder synergy**
  - Activities of stakeholders could become problems
  - Different stakeholders approaches occurring concurrently over the same project can delay or derail it
  - There is need for stakeholder understanding and respect for established roles and responsibilities in other not work at cross purposes
  - Coordination of policies is imperative to collective success
  - Stakeholders have to be coordinated achieve the synergy necessary for reduced hindrances

35

CHALLENGES Cont'd

- **Public Education/Awareness and Support**
  - The general public as the final consumers of the product should make more effort at objectively obtaining factual understanding of the reform and the privatisation
  - BPE is ever ready to provide education
  - Contacts:
  - Bdikki@bpeng.org
  - Ibcbagana@bpeng.org
  - Aaloke@bpeng.org
  - Janichebe@bpeng.org

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CONCLUSION

- ✓ *The ambition of the FGN is to meet the vision 20: 2020 target of 20,000MW which requires an investment in power generating capacity alone of at least US $3. 5 billion per annum, for the next 10 years.*
- ✓ In addition, large investments will also have to be made in gas supply, power transmission and distribution.
- ✓ A solid foundation has been laid for a sustainable, efficient, secure and reliable power sector that will both satisfy demand and have reserves as obtains elsewhere.
- ✓ The hindering factors have to be identified and tackled decisively so that Nigerians would begin to enjoy better electricity supply.

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Thank You

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PLENARY SESSION SIX:
CHALLENGES IN THE REGULATION OF THE NIGERIAN POWER SECTOR

Chairperson: Prof. T. A. Kuku, Faculty of Engineering, OAU, Ile-Ife.
Speaker: **Nigerian Electricity Regulatory Commission (NERC); Repr. by** Engr. A. O. Yusuf.
Discussants: (1) Dr. Umar Bindir, DG, NOTAP and (2) Prof. U. O. Aliyu, ATBU, Bauchi
Rapporteurs: Mr. Abubakar Yahaya, Mr. U.B. Sudais and Mrs. Mujidat B. Abubakar

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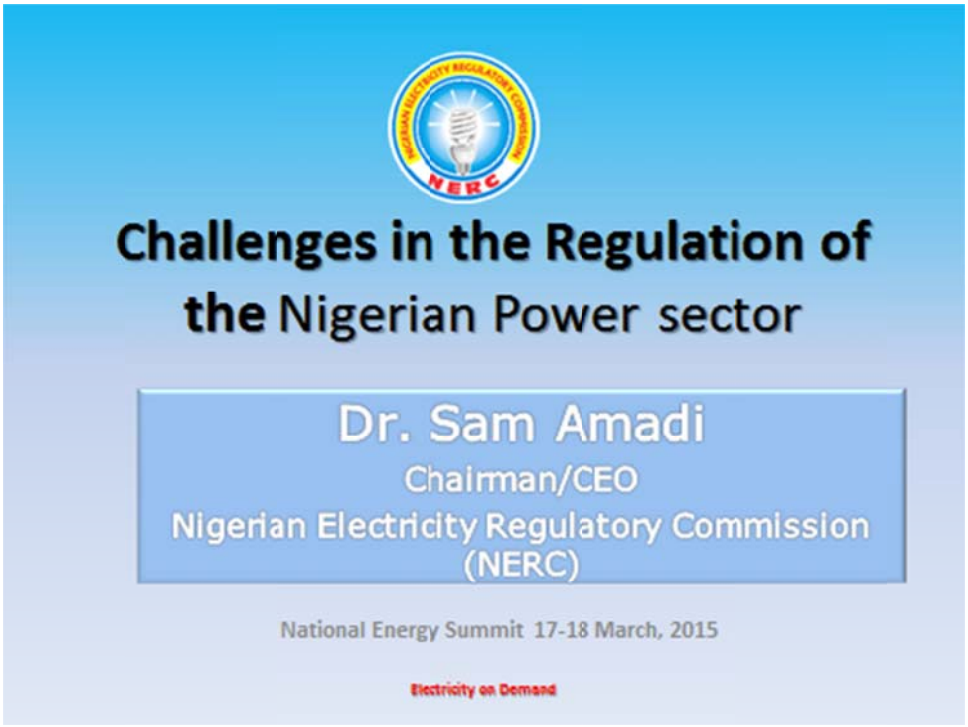
***Plenary Session VI*:**
Topic: **Challenges in the Regulation of the Nigeria Power Sector**
Speaker: **Nigerian Electricity Regulatory Commission (NERC); Repr. by** Engr. A. O. Yusuf.



Outlines

- **Introduction**
- **The Role of NERC**
- **Progress made so far**
- **Key challenges**
- **Conclusion**

The Electric Power Sector Reform

- In 2000 Government set up the Electric Power Sector Implementation committee (EPIC)
- Draft Electric Power Policy (NEPP) adopted in 2002
- National Energy Policy Approved in 2003
- The NEPP provided for the
  - Drafting a new electricity law to liberalize the sector
  - Establishment of an independent Regulatory Agency
  - Establishment of the Power Consumer Assistance Fund
  - Establishment of a Rural Electrification Agency
  - Establishment of a Rural Electrification Fund
- March 2005 the Electric Power Sector Reform Act 2005 was enacted creating the Nigerian Electricity Regulatory Commission (NERC)

Objectives of the Reform

General	**•Meet current and prospective demand for electricity** **•Modernize and expand service** **•Support National economic and social development**
Short-Medium Term	•Attract private investment •Develop transparent regulatory framework •Divest government interest in the sector •Promote competition •Develop and enhance indigenous capacity in electric power sector technology
Long Term	•Universal access •Domestic production of electrical equipment •Meet targets for rural electrification •Ensure minimum adverse environmental impact •Ensure subsidies are properly targeted to the poor

4

Industry Structure

- New Institutions emanating from the reform include:
  - NERC – Regulatory Body
  - NBET – Special Purpose Entity
  - REA- Rural Electrification Agency
  - REF – Rural Electrification Fund
    - To rapidly expand access to rural dwellers in a cost effective manner using On/Off grid supplies
    - Subsidies shall be targeted to investment rather than consumption
  - PCAF – Power Consumer Assistance Fund
    - Protect low income and poor consumers through lifeline tariff

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The Role of NERC

- The mission of NERC is ensure adequate, safe, reliable and affordable power supply.
- NERC's objectives include:
  - Promotion of competition and fair market practices
  - Protecting the interests of electricity consumers
  - Ensuring cost recovery and adequate return on investments
  - Ensuring best practices in power and service delivery

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Progress Made So far

Towards achieving the above mission the Commission has:

- Codified foundational regulations
  - Business Rules of the Commission
  - Licensing guidelines and fees
- **ensured Consumer Protection by:**
  - Holding Power consumer assemblies in all the geopolitical zones of the country to enlighten customers on their rights and responsibilities
  - Inauguration of the Power Consumers Forum Office to handle appeals and Complaints not resolved by the Distribution Companies
  - developing the framework for power consumer assistance fund

Progress Made So far

- NERC has produced the following Codes and standards for the industry:
  - Grid Code
  - Distribution Code
  - Metering Code
  - Health & Safety Standards Manual and Code
  - Connection and Disconnection Procedures
  - Customer Complaints Handling Standards and Procedures
  - Customer Service Standards
  - Modified the Grid and Distribution codes to enhance R/E integration.
  - bulk electricity procurement guideline with special consideration for R/E sourced electricity .
  - licensing guidelines with simplified conditions for renewable energy sourced electricity
  - Embedded Generation Regulation.
  - KPIs for monitoring Generation, Transmission and Distribution Companies Performance
  - Regulatory Framework for Renewable Power Generation
  - Established uniform accounting standards for Nigerian Electricity Industry
  - Established Regulation on Independent Electricity Distribution Network (IEDN)

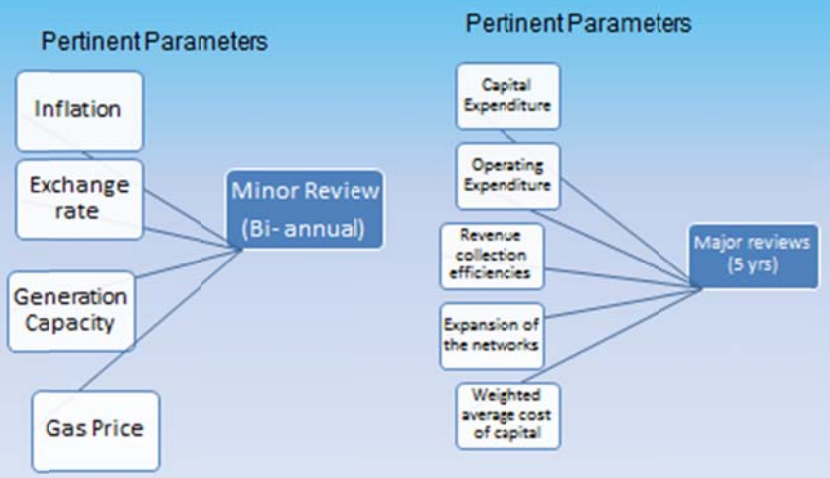
MYTO

The Multi Year Tariff Order (MYTO) is the tariff vehicle:

* Provides a 15-year look ahead for tariff in the sector due to long gestation period required for investors to recoup investment
* Transmission and Distribution tariff are determined using a revenue requirement approach and building blocks principle,

- Generation prices are based on
  - long run marginal cost method (LRMC) as a proxy for market price
  - Contract prices set for each generator by NERC for each form of generation and for each generation site that does not have a PPA.
- It also provides Incentives in terms of Feed-in-tariffs for Renewable Energy Sources of generation.
- MYTO is subject to periodic review as follows:

MYTO Periodic Review



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CHALLENGES

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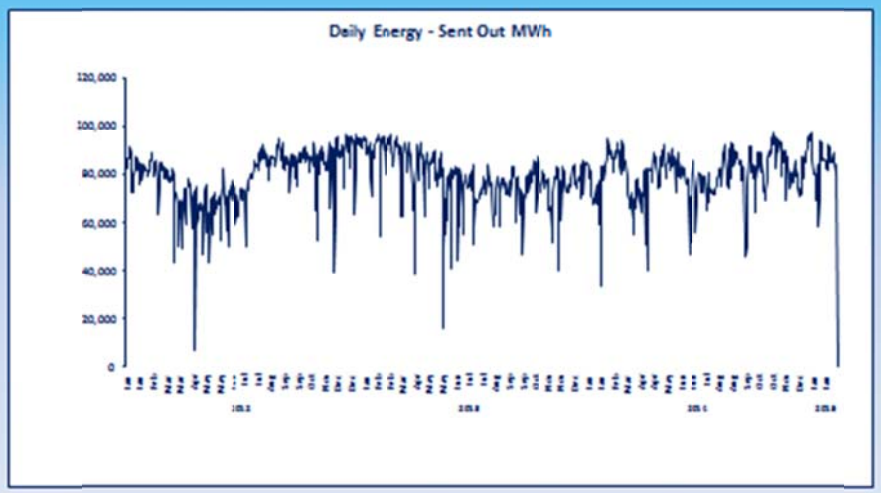
Inadequate Energy in the Market



Average of 79,200MWh - barely enough for 8 million households consuming 10kwh/day (monthly consumption of 300kwh)

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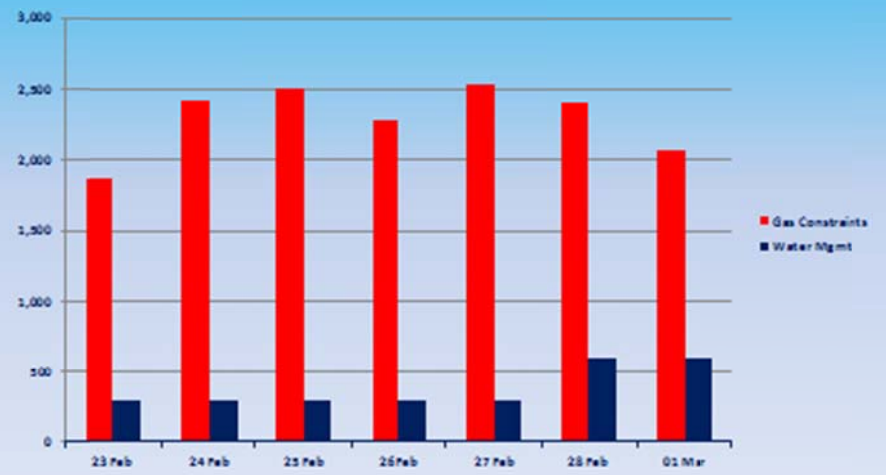
Gas Supply Shortage

- The available gas volumes for the power industry are simply insufficient to meet the current needs of the twenty (20) thermal generating companies, whose daily peak generation as at April 2014 till date has averaged between 5,700MW and 6,000MW;
- During the same period, unutilised thermal generation capacity has averaged over 2600MW daily;

Electricity on Demand

Gas Supply Shortage



Stranded Generation Capacity Due to Gas Constraints

Gas Supply shortage

Event Date: Saturday, March 14th 2015	Weekly Summary based on Average Daily Figures								
	8 Weeks Ago	7 Weeks Ago	6 Weeks Ago	5 Weeks Ago	4 Weeks Ago	3 Weeks Ago	2 Weeks Ago	1 Week Ago	This Week
Energy - Sent Out MWh	83,226	84,493	88,729	85,404	81,047	82,976	77,859	77,466	75,814
Peak Mw	4,155	3,909	4,132	3,936	3,879	3,728	3,513	3,694	3,746
Total Constrained Mw	1,971	2,213	2,128	2,037	2,092	2,408	2,624	2,594	2,656
Total Capability	6,127	6,122	6,260	5,973	5,971	6,136	6,137	6,288	6402
Due to Gas	1,473	1,870	1,646	1,637	1,839	2,139	2,281	1,955	2,056
Due to Water Mgmt	390	304	326	364	253	257	343	639	600
Due to Frequency	-	5	57	36	-	-	-	-	-
Due to Line Limitation	109	33	100	-	-	12	-	-	-

Technical & Commercial Consequences of Gas Supply Shortages

Technical Consequences:

- Only 20% of generation capacity connected to the National grid is from hydroelectric power stations while the remaining 80% is from gas-fired stations;
- Presently, none of the 20 gas fired power stations operate at optimal capacity; 23 turbine units are completely constrained by gas unavailability while 37 units that are on-bar operate below 60% capacity due to either low gas pressure or inadequate gas;
- this situation has led to the insecurity of the system, with attendant low generation level below 50% capacity and redundancy of the plants;
- Gas pricing and Gas pipeline vandalism are the major causes of gas inadequacy. Results to frequent prolonged plants outages;

Technical & Commercial Consequences of Gas Supply Shortages

Commercial Consequences:

- Poor electricity supply to consumers leading to non payment for electricity and poor performance of the electricity market and high collection losses
- Projected market volume is not met meaning that the expected reduction in tariff will not happen quickly
- The commercially unattractive price of gas-to-power, currently $1.50 per MMscf/d also does not incentivise gas producers to supply to power plants;
- Customers ignoring or refusing to accept that Discos are not to blame for the loss of over 260MW daily.

Proposed Solutions to Gas Supply Problem

- A major policy shift is required to enhance gas availability
  - On the short term,
  - removal of the gas-to-power price cap regime, with consequent freedom for Gencos to negotiate new prices for current and future gas supply contracts with gas suppliers through the Gas Aggregation Company of Nigeria Limited
  - The Commission will ensure that such prudently-negotiated gas prices that guarantee steady supplies of gas to all Gencos available to deliver energy to the grid are pass-through and translated into electricity tariffs;
  - This will bring in some of the gas supplies meant for delivery to Nigeria NLNG Limited from Export Quantity;
- JV/IOCs/E&P Companies should be encouraged to develop gas-to-power projects along a dual track – one for gas processing facilities to deliver gas to Gencos and the other their own gas projects whereby they develop IPP projects on terms to be agreed with the Bulk Trader and licensed by NERC; the Exxon Mobil project is a good model for all other JV/IOCs/E&P companies to adopt
- Passage of the PIB is strongly supported as it will ensure the proper regulation and administration of the Petroleum Industry towards effective and efficient production and supply of petroleum resources including natural gas.

Fragile Electricity Transmission System

- The transmission network, a critical link in the electricity value chain, under the government ownership and control is in dire need of attention;
- The network is weak, radial and does not meet the minimum of n-1 reliability criteria
- In the event of significant increase in actual generation, the transmission network would not be capable of supporting such output;

- Presently the national electricity transmission capacity is 4,800MW; beyond this value, the integrity of the network will be threatened;
- There are 118 projects (majorly, 330kV and 132kV transmission lines and associated substations). Their early completion is expected to have positive impact

Proposed Solutions to Transmission Constraints

- The Government is therefore invited to prevail on the TCN board to ensure that the Manitoba Management Contract is fully implemented. This include, sourcing of funds to strengthen and expand the transmission network.
- Funding of Transmission Projects through Government Interventions, Private Sector participation and the use of NIPP power plants sales proceeds;

Cost Reflective Electricity Tariffs

- Privatization of the Successor Companies was premised on some assumptions on ATC&C Losses and Customers Numbers that are not realistic.
- NERC directed the Discos to carry out comprehensive customer enumeration which will vetted by NERC,
- The losses are still high and NERC is monitoring the Disco's compliance with their commitment to reduce losses.
- Following study on losses in the distribution network, NERC has made special review which has led to a recent adjustment tariff;
- Meanwhile the Commission has made it clear that collection losses are within the control of the Discos and they should remove it or bear it fully.

Metering Challenges

- Presently, there is still a very high reliance on the notorious practice of estimated billing for revenue collection, which is estimated to be as high as 50% in some Discos;

- Customers' restiveness has been heightened by the very high estimated bills being charged by the Discos in spite of the present poor state of supply in the grid. Discos have equally displayed poor compliance to the estimated methodology developed by the Commission to assist in ensuring objectivity in estimation of electricity customers' consumption.

Proposed Solutions to Metering Challenges

The Commission has adopted a two pronged approach to addressing the metering challenge:

- **CAPMI (METERING INTERVENTION):** With the aim of facilitating and supporting the Operators on one hand and protecting the Consumer on the other, the Commission introduced a 'Voluntary Scheme' known as Credited Advance Program for Metering Implementation (CAPMI) to assist in dealing with the metering gap.
- Strong Enforcement of the commitment made by the Discos on closing the metering gap as contained in their business plans during the privatisation of the entities. Appropriate financial penalties will be imposed on the Discos once the AT&C losses are adjusted and cost-reflective tariff released.

Conclusion

- **An overview of** the NESI regulatory landscape has been given highlighting the following challenges requiring urgent solutions;
  - Inadequate retail metering causing myriad of problems including poor billing and revenue collection, exorbitant billing through estimation, high level of customer dissatisfaction;
  - Incoherent policy on regulation resulting in duplication of regulatory mandates and causing regulatory uncertainties; and
  - inadequate gas supply and current fragile nature of the transmission network;
- Solution proposed include
  - Parity gas price to divert export bound gas for power generation
  - the facilitation of ongoing projects by Exxon Mobil and the need to encourage other IOCs to invest in gas to power projects;
  - the need to empower the TCN Board and its management contractors (Manitoba Hydro Interrational) to effectively plan, fund and implement transmission projects necessary in the emerging industry.

THANK YOU

Contact us at:
Adamawa Plaza, Plot 1099 First Avenue,
Off Shehu Shagari Way,
Central Business District,
Abuja

Website: www.nercng.org
E-mail: info@nercng.org
Phone: 09-670-0280
09-462-1400

PLENARY SESSION SEVEN:
COAL INDUSTRY REFORMS IN NIGERIA

***Plenary VII*: TOPIC - Coal Industry Reforms in Nigeria**
***Chairperson*:** Engr. Ademola Isaac Olorunfemi, President, Nigerian Society of Engineers Repr. by Engr. John .O. Ayodele
***Rapporteurs*:** Mr Idowu Olokungbemi and Mr Alhassan Musa
Speaker: Federal Ministry of Mines and Steel Development; Repr. By Frank Odoom, Deputy Director, MMSD
Discussants: (1) Prof Oloche, Dean of Engineering, University of Abuja; and (2) DG, Nigerian Geological Survey Agency

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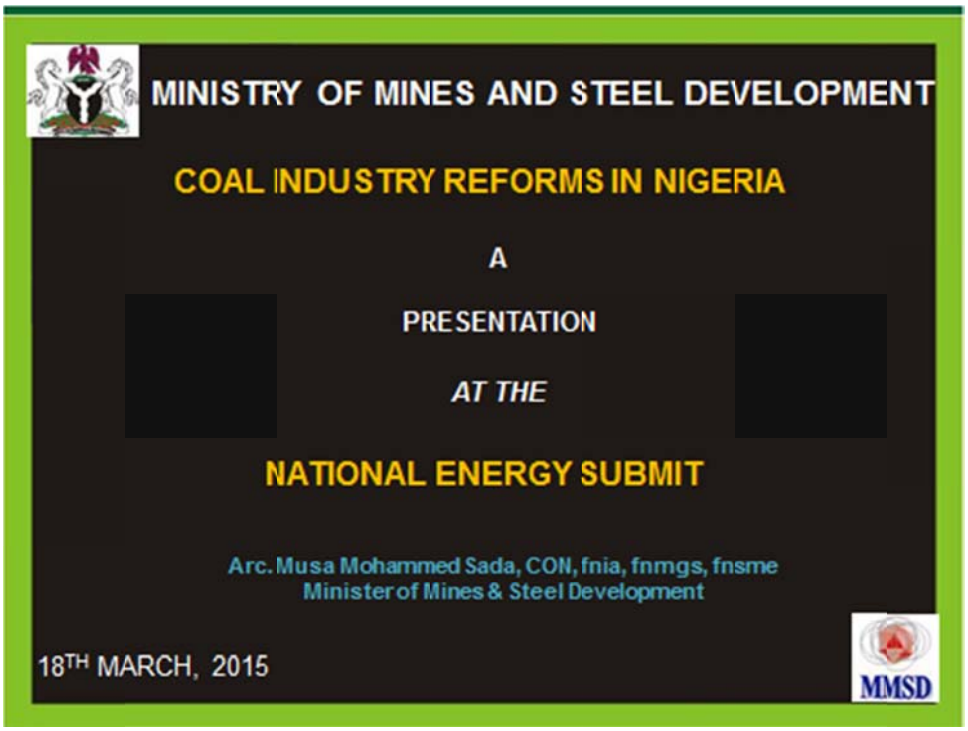
Plenary VII: TOPIC - **Coal Industry Reforms in Nigeria**
Speaker: Federal Ministry of Mines and Steel Development; Repr. By Frank Odoom, Deputy Director, MMSD



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PRESENTATION OUTLINES

- Introduction
- Overview of Nigeria's Coal Mining Industry
- Coal Occurrence
- Coal Reserves
- Coal Type and Quality
- Potential of Nigeria's Coal Resource for Power Generation
- Mining Reform
- Policy and Legal/Regulatory Reforms
- Nigeria's Coal Industry Reform Programmes
- Current Situation – Coal Mineral Title Administration
- Current Situation – Coal Development Operations
- Desired Goal
- Investment Opportunities in Nigerian Coal Industry
- Challenges
- Areas Nigeria Needs Collaboration and Co-operation
- Conclusion

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Introduction

- Before oil discovery, Nigeria had a glorious mining history;
- Produced and exported Tin, Columbite, **Coal,** Tantalite, Gold etc;
- Mining was neglected with the discovery of oil;
- Nigeria is now determined to diversify the economy away from oil;
- Minerals sector holds the key to the success of the diversification strategy;
- Nigeria is committed to developing its mining industry and **Coal development** is at the forefront for power generation

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OVERVIEW OF NIGERIA'S COAL MINING INDUSTRY

- Coal was first discovered in 1909 near Udi, Eastern Nigeria;
- In 1950, the Nigerian Coal Corporation (NCC) was established to explore, develop and mine the coal resources;
- NCC operated two underground mines in Anambra Coal Basin;
- Between 1950 and 1959, coal production increased annually from 583,487 tonnes to a peak of 905,397 tonnes;
- After 1959, production decreased significantly each year including the Civil War period of 1966 to 1970 when no production was reported;

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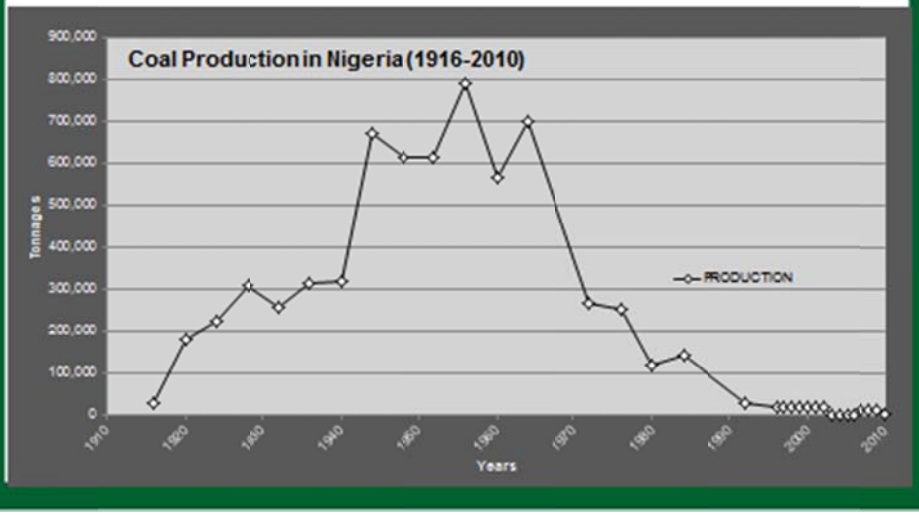
OVERVIEW OF NIGERIA COAL MINING INDUSTRY CONT'D



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OVERVIEW OF NIGERIA'S COAL MINING INDUSTRY CONT'D

- All through, coal was used in locomotive train engines and some small tonnages were exported;
- The discovery of petroleum resources and subsequent dieselization of trains resulted in the drastic reduction of coal utilization and production in the country.
- Following Nigerian coal industry downturn, the Federal Government, in 2005, initiated and implemented a number of economic reform programs in the mineral sector;
- The reforms, which were aimed at increasing mineral production and the sector's contribution to the GDP, were focused on privatization of Government interest in Government owned companies and corporations;

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OVERVIEW OF NIGERIA COAL MINING INDUSTRY CONT'D

- Importantly, the reforms transformed the role of Government in the mining industry from that of owner/operator to administrator/ regulator;
- In line with the reform policy, the coal industry was deregulated and subsequently, NCC was privatized to pave way for the first time for private mining companies to have access to participate in coal resources development in the country.

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COAL OCCURRENCE

- Coal occurs in several locations spread across 15 States of the country;
- The locations have been grouped into fields as follows:

- Okpara coal field, Enugu State
- Onyeama coal field, Enugu State
- Ezimo coal field, Enugu State
- Inyi coal field, Enugu State
- Amansiodo coal field, Enugu State
- Azagba lignite field, Delta State
- Ogboyega coal field, Kogi State
- Lafia-Obi coal field, Nassarawa State
- Ute coal field, Ondo State
- Lamja coal field, Adamawa State
- Gindi Akwati coal field, Plateau State
- Afuze coal field, Edo State
- Okaba coal field, Kogi State
- Owukpa coal field, Benue State
- Afikpo coal field, Ebonyi State
- Gombe coal field, Gombe state
- Janata-Kogi coal field, Kwara State

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COAL RESERVES

- In 2005, the Ministry of Mines and Steel Development commissioned a U.S. based firm, Behre Dolbear to conduct an extensive feasibility study to determine the coal reserves in Nigeria;
- The study confirmed that the coal fields in Enugu, Kogi and Benue States that have significant core-holes information from which reasonable estimates of in-place coal can be made; have a total of 396 million tonnes of demonstrated reserve using Australian Joint Ore Reserve Committee (JORC) Classification Criteria;
- An additional 1,091 million tonnes of inferred and hypothetical coal resources have been delineated in the three States (Enugu, Kogi and Benue).

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RESERVES CONT'D

- The entire currently defined coal resource in areas where detailed geological investigation has been carried out is **1,487 million tonnes**;
- The coal seam thickness averages 2.2 metres;
- The other coal fields remained essentially unexplored;
- Considerable additional work need to be done to fully explore and prove the coal resources in the unexplored coal fields.

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RESERVES CONT'D

Area	Reportable Coal Reserves (Million Tonnes)			Non Reportable Coal Reserves (Million Tonnes)			Total Resources
	Measured	Indicated	Total Demonstrated	Inferred	Hypo-thetical	Total	
Ogboyoga	56	67	123	83	82	165	288
Okaba	45	55	100	191	244	435	535
Orukpa	40	41	81	88	29	117	198
Ezimo	17	26	43	112	151	263	306
Enugu			49	111	-	111	160
Total			**396**	**585**	**506**	**1091**	**1487**

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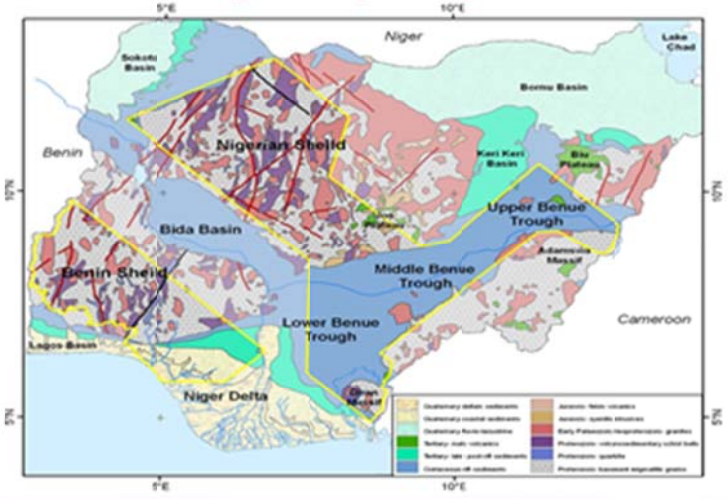
Geological Map of Nigeria



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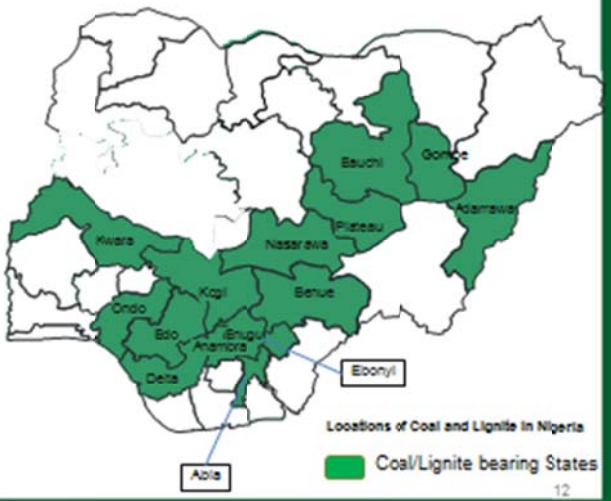
SPREAD OF COAL OCCURRENCES

- Coal exists in 15 States;
- Result of exploration works carried out indicate over 1.4 billion tonnes of coal resource.



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NIGERIA MINERAL ENDOWMENT

- Wide range of minerals spread in the 36 states of the federation and Abuja.
- High prospectivity minerals include Coal, Iron Ore, Bitumen, Limestone, Lead-Zinc, Copper, Tin, Tantalite.
- Industrial minerals, Limestone Baryte (Oil Industry), Kaolin, Other Clays (Ceramic Tiles)

1

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COAL TYPE AND QUALITY

Nigeria coal ranges in type from bituminous to lignite as shown in the table below:

Coal Types found in Nigeria		
SN	Type	%
1	Bituminous	49
2	Sub-Bituminous	39
3	Lignite	12

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COAL TYPE AND QUALITY CONT'D

Analysis of the Coal that occurs in the Anambra Basin where detailed site geological and laboratory investigations had been carried out shows that it has low moisture, ash and sulphur content of between 7.6-13.5%, 6.40-11.2% and 0.40-0.93% respectively and high calorific value ranging between 5.520-6.10 Kcal/Kg.

Quality of Nigerian Coal		
SN	Types	%
1	Sulphur	0.40-0.93
2	Ash	6.40-11.2
3	Moisture	7.60-13.5
4	Heating Value	5.520-6.610Kcal/kg

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POTENTIAL OF NIGERIA COAL RESOURCES FOR POWER GENERATION

- The low moisture, ash and sulfur content, low thermoplastic properties and high calorific value of the Nigerian coal resource makes it an excellent thermal coal for fueling coal-fired power plants for electricity generation;
- The existing coal data demonstrates substantial coal resource to support coal fired electrical power generation in the range of 7,000 – 8,000MW in the Anambra Coal Basin alone;

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POTENTIAL OF NIGERIA COAL RESOURCES FOR POWER GENERATION CONT'D

- It is very possible that when the coal resource in this basin is fully explored and developed, it might ultimately support 10,000 – 15,000MW of electricity generation;
- Economic consideration will require that these power plants be built in phases to match the production buildup of the associated mining operations. For operational efficiency, the power plants will probably consist of several units in the size range of 500-700MW.

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THE MINING REFORM

	2005	2010	2013+
OUT PUT	Base line Studies of the sector	**Established Legal / Regulatory Frameworks & Institutions:** -Mining policy – Private Sector Led -Mining Law and Regulations -Environmental and social liability -Nigeria Mining Cadastre Office -Lapidary for gemstone cutting and polishing -Nigerian Institute of mining and Geosciences **Generated Geosciences data:** -Geophysical Survey of entire country and also Interpretation -Geochemical Survey of 8 out of all 44 cells	
OUT COME			-More investors acquiring mineral titles -Exploration activities by firms -Increase in revenue collection -Better Mineral Title Administration -Community Development Agreements being implemented -Formalization of ASM Operations -Continuous cleaning up of mineral title holding through the application of 'Use it or lose it' principle

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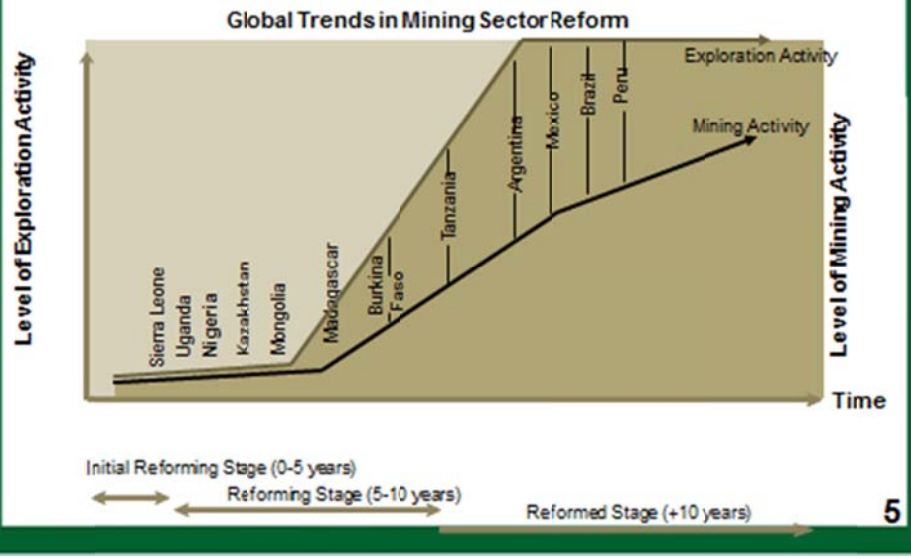

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POLICY AND LEGAL/REGULATORY REFORMS

- The Ministry of Mines and Steel Development is the Federal Government organ responsible for exercising control over the country's solid mineral resources;
- As part of the mining sector reform programmes, the Ministry of Mines and Steel Development has put in place the following Policy and Legal/Regulatory Framework for the development of the country's mineral resources:
  - The Nigerian Minerals and Mining Act – 2007;
  - National Minerals and Metals Policy - 2008;
  - Nigerian Minerals and Mining Regulations – 2011.

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NIGERIA'S COAL INDUSTRY REFORM PROGRAMMES

- Government deregulated the coal industry in 1999 to pave way for private sector participation in coal resource development activities.
- In 2005, Nigerian Coal Corporation (NCC) was privatized and its coal assets bloc and concessioned.
- The Bureau of Public Enterprise (BPE) in conjunction with the Ministry of Mines and Steel Development in 2007, concessioned following NCC coal assets:
  i. Okpara mine, Enugu State
  ii. Onyeama mine, Enugu State
  iii. Owukpa mine, Enugu State

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iv. Okaba mine, Kogi State
v. Ezimo coal block, Enugu State
vi. Inyi coal block, Enugu State
vii. Ogwashi-Azagba coal block, Delta State
viii. Amansiodo coal block, Enugu State
ix. Ogboyega North coal block, Kogi State
x. Ogboyega South coal block, Kogi State

- However, only three (3) out of the 10 blocs were successfully privatized leaving a balance of seven (7) blocs unsold to date.

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Facts about Nigerian Coal Resources

- Privatized coal resource bloc (Okaba and Ogboyoga I & II);
- Coal Resource bloc earmarked for Concessioning (Onyeama, Okpara, Inyi, Amansiodo, etc); and
- Encumbered coal resource bloc - Owukpa
- Unverifiable geosciences data as core drilling for most of the coal resources were carried out in the 50s with no coordinates for verifications
- The sub-bituminous coal resources have low to moderate sulfur and ash values and are non-coking with heat values of above 5,500kcal/kg (air dried basis)
- The bituminous coal resources have high ash and sulfur content and show coking properties
- All the coal resources have been established to be suitable for coal fired thermal plants.

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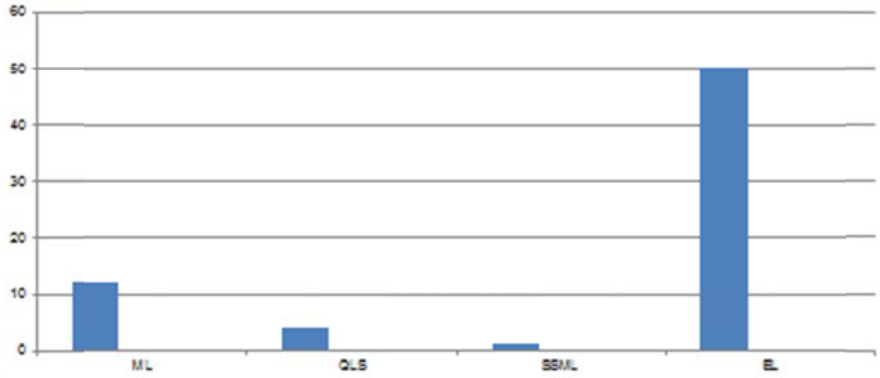
CURRENT SITUATION – COAL MINERAL TITLE ADMINISTRATION

A total of 67 extant coal mineral titles are held by operators following the revocation of non-performing ones in line with the NMMA 2007



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CURRENT SITUATION – COAL DEVELOPMENT OPERATIONS

- Two functional coal mines:
  i. Maiganga coal mine located in Gombe State- owned and operated by Ashaka Cem Plc
  ii. Zuma 828 Okobo coal mine located in Kogi State- owned and operated by Eta- Zuma Group
- Several companies are engaged in coal exploration activities major amongst which are::
  i. Eta-Zuma group of companies
  ii. Prohtrip Resources Ltd
  iii. First Capital Infrastructure Development Ltd
  iv. Dessert Rock Exploration Nigeria Limited
  v. Aira Integrated Resources Limited
  vi. Phipat Exploration Limited
  vii. Oil Data Integrated Consulting Company Ltd

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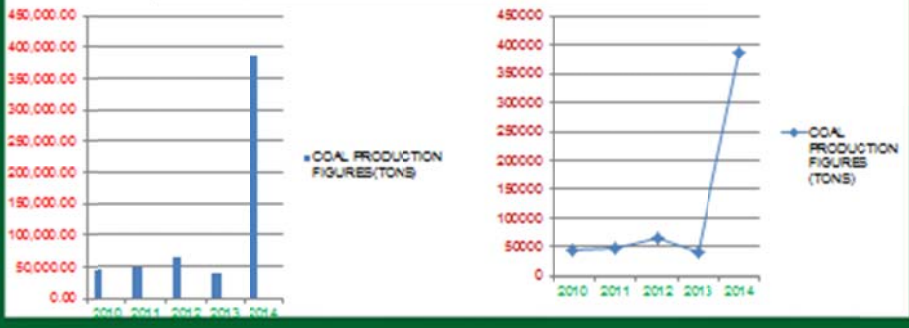
COAL PRODUCTION FIGURES FOR 2010-2014

S/NO	YEAR	PRODUCTION FIGURES(TONS)
1	2010	45,713.14
2	2011	48,523.53
3	2012	64,348.56
4	2013	40,359.39
5	2014	385,897.13



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DESIRED GOAL

To have a coal industry:

- Producing large tonnages of coal using world best environmentally friendly techniques to facilitate the production of 30% of Nigeria's power requirement by coal-fired power plants, cement manufacture, steel production, briquette production, other domestic uses and for export.
- Generating revenues for Government ;
- Providing jobs;
- Being driven by the private sector; and
- Providing the economic diversification platform for the country's economy.
- Capacity utilization;
- Import substitution;
- Foreign exchange savings.

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INVESTMENT OPPORTUNITIES IN NIGERIA COAL INDUSTRY

- Detailed exploration of the coal fields where the reserve has only been inferred to determine the mineable coal reserve in such areas;
- Partnering with existing coal mine owners with a view to mining the coal resource for power generation;
- Development of appropriate technology for mining of the coal; and
- Establishment of coal fired-power plants using clean coal technology for the generation of electricity.

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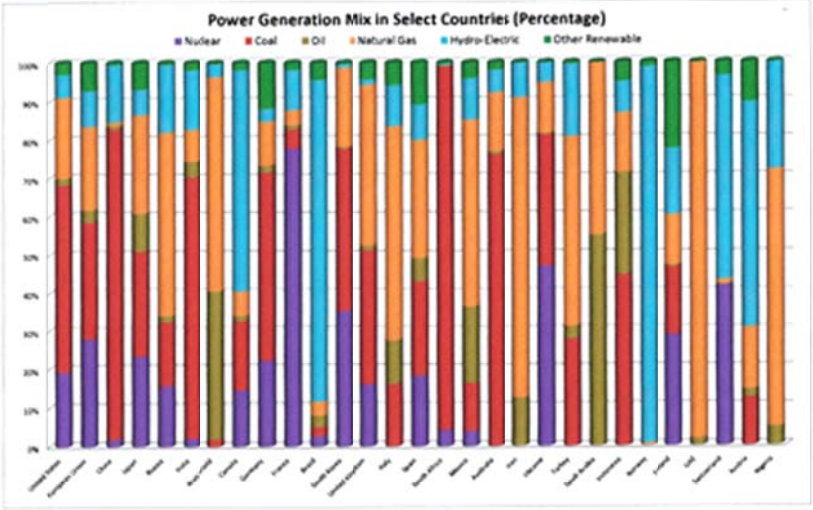

Source: Assembled from data published on the The World Bank website

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Challenges

- Coal is known to be a highly environmental pollutant;
- Coal-fired plants require large quantity of water for cooling during operation, so the need to situate plants close to large flowing rivers;
- High cost of clean coal technology, equipments and skilled manpower;
- Investors would require credible off-takers for power generation

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AREAS NIGERIA NEEDS COLLABORATION AND CO-OPERATION

- Development of appropriate coal mining policy and regulatory framework that would facilitate application of modern coal mining technologies;
- Training of mines inspectors on coal mines health, safety and environmental sustainability; and
- Exchange of knowledge and technology transfer in the field of exploration, production, preparation, and utilization of coal and clean coal technologies.

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Conclusion

- Nigeria has coal deposits in large commercial quantity and quality;
- Thrust of the Government policy ensures private sector as main engine for growth of the sector;
- Nigeria has put in place Policy and Legal/Regulatory framework which provides attractive incentives for investors in minerals sector;
- Government now plays the role of regulator-administrator in creating conducive environment for growing the minerals sector, while the private sector plays the role of owner/ operator;
- The prevailing poor energy access in the country is seen as enabling environment for coal development for power generation and other applications;
- Nigeria needs collaboration and cooperation with developed coal mining jurisdictions to develop the coal industry.

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THANK YOU FOR YOUR
ATTENTION

PLENARY SESSION EIGHT:
ENERGY FINANCING IN NIGERIA

***Plenary VIII*: TOPIC – Energy Financing in Nigeria**
***Chairperson*: Mr Mustapha Alhaji, UNIDO**
***Rapporteurs*:** Mr Nafi'u Tijjani and Miss Alaere Matholo.
***Speaker*: Managing Director, African Development Bank (AfDB).**
***Discussants*:** (1) Elder Boma Binebo, Director, Development Finance, CBN; (2) Managing Director, Bank of Industry, Repr. by Mr. Joseph Babatunde, BOI; (2) Yesufu Alonge, Nigerian Bulk Electricity Trading Company, NBET.

PAPER 8

***Plenary VIII*: TOPIC – Energy Financing in Nigeria**
***Speaker*: Managing Director, African Development Bank (AfDB) -** (Abscent).

Summary of Comments and Recommendations from Discussants

CBN, BOI are working hard to see that there is no financial problem in the power sector and the CBN intervention in the power sector is handled by BOI. In this respect, energy financing cannot be compromised, Nigeria is generating less than 5,000MW with about 170 million population while South Africa with population of about 50 million are generating 40,000MW leaving Nigeria behind. If we are looking at our population growth, then energy financing is necessary in Nigeria. The integrated master plan indicates that, N125billion is needed for financing energy in Nigeria. Since 2005 when the Electricity Sector Act Reform come into existence we have not seen serious financing in the energy sector. Gas Pricing has also been liberalized, although the NNPC, CBN and PHCN met and agreed that, gas price cap be removed.

- CBN is ensuring low-cost long-term energy financing. Although, the CBN knows the location of the coal resources in the country but do not know the specific areas of coal deposits.
- Energy financing by CBN is based on integrated master plan and is concerned with hydro and thermal energy production.
- CBN catalyzed proper gas pricing for PHCN and NNPC. PHCN purchased gas from gas producing companies but do not pay always. Therefore, the debt is always settled by CBN since most of these companies are foreign gas generating companies. Presently, CBN has committed N213billion to the energy sector.
- CBN always identify the gas, Gencos and PHCN are owing, and subsequently pay off the gas debts. CBN also strengthen the Bank of Industries so that it finances captive power supply.

- Power is very important especially in the manufacturing sector of this country and the financing energy is very cost effective, it's very high risk area of investment considering its long gestation period, due to change in governments and policies .
- We must be looking at multi power approach, i.e. we should consider renewable energy in the financing system.
- Most of the power captive projects are completed and they are needed in the cement and sugar industries. The energy loss is due to lack of energy financing. The BOI collaborate with UNDP to enhanced power supply from renewable energy sources.

- Nigerian needs to develop, thus financing energy is imperative. Looking at the privatization of PHCN, creating right institution is the one of the basic necessity. Privatization brings about confidence in the power sector.
- The investors have the money, but are not very sure on how to recover their money. Government must assure investors on how to recover their money in the event of any eventuality. Assurance is important in energy financing and the proposal has to be adequately explained, since there are a number of projects on ground waiting for financing. For example, Egbin Power Plc has six power plants, only four plants are working, one is completely down and government is adamant to take it for refurbishment.

Thank You

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REPORT OF THE SUMMIT ON ENERGY AND THE TRANSFORMATION AGENDA IN NIGERIA

REPORT OF THE NATIONAL ENERGY SUMMIT HELD AT ABUJA FCT; ON 17TH - 18TH MARCH, 2015.

THEME: ENERGY AND THE TRANSFORMATION AGENDA IN NIGERIA

Introduction

Energy Commission of Nigeria (ECN) organized a 2-day National Energy Summit with the Theme: **Energy and the Transformation Agenda in Nigeria** was held at Reiz Continental Hotel Central Business District Abuja, FCT, from 17th – 18th March, 2015. Participants were drawn from the Federal Ministries, Departments and Agencies (MDAs), Academic Institutions, Financial Institutions, Civil Society Organizations, Development Partners, Non- Governmental Organizations (NGOs), Private Sector and The Media. More than 200 participants attended the Summit.

The Opening Ceremony of the Summit was chaired by the President Nigerian Academy Engineering, Engr. Professor R. I. Salawu. The Keynote Address titled "**Overview of the Nigerian Energy Sector"** was delivered by Engr. Prof. E. J. Bala, Director General/CEO, Energy Commission of Nigeria. The Special Guest of Honour was the Honourable Minister of Science and Technology, Dr. Abdu Bulama, who was ably represented by the Director of Chemical Technology and Energy Research of the Ministry, Engr. Abbas Gummi, who also declared the Summit open. Goodwill messages were delivered by the Minister of Foreign Affairs, Ambassador Aminu Aliyu Wali, who was ably represented by Ambassador Bukun-Olu Onemola; Minister of Water Resources, Mrs Sarah Ochepe, ably represented by Engr Nicholas Madu, Director of Dams and Hydropower in the Ministry; Minister of Environment, Mrs Lawrencia Laraba-Mallam, ably represented Dr. Peter Yerima Tarfa, a Director in the Ministry; Minister for Mines and Steel Development, Arch Mohammed Musa Sada, ably represented by Mr. Frank Odoom; Country Director, UNIDO, Dr Patrick Kurawa, ably represented by Alhaji Mustapha; and representative of JICA. Engr. J. O. Ojosu, Director, Energy Planning and Analysis, ECN, gave the Vote of Thanks.

The following sub-themes were comprehensively discussed during the technical sessions, with notable speakers from the Energy Sector;

- Electricity from Renewable Energy Sources in Nigeria by 2030
- Status of Nigerian Nuclear Power Programme
- Energy and Gender in Nigeria
- Reforming the Petroleum Industry in Nigeria
- Challenges in the Post-Privatization arena of the Nigeria Power Sector
- Challenges in the Regulation of the Nigeria Power Sector
- Coal Industry Reforms in Nigeria
- Energy Financing in Nigeria

Objectives of the Summit were:

- To Provide a forum for discourse on the Nigerian Energy Sector;
- To Assess the effectiveness of existing energy systems and policies in achieving the component of, and contribution to, the Transformation Agenda and Vision 20:2020 in order to move the country towards a more Sustainable Energy future ;
- To generate ideas that will help steer the development of the Nigeria energy sector on the path of sustainability;
- To address both current and anticipated challenges of the energy sector affecting or likely to slow down the pace of achieving the Transformation Agenda.

PLENARY SESSION I

Topic: Electricity from Renewable Energy sources in Nigeria by 2030
Chairman: Prof. U. O. Aliyu, ATBU, Bauchi
Discussants: Prof. B.G. Danshehu, UDFU, Sokoto; Prof. T. A. Kuku, OAU, Ile-Ife; Prof. I.S. Diso, Bayero University, Kano and Engr. A .O. Yusuf, Nigeria Electricity Regulatory Commission (NERC).
Speaker: Absent
Rapporteurs: Mrs. Ado Abdullahi, Mr. Samaila G. Zaku, ECN

Chairman: - The Chairman remarked briefly that most renewable energy resources are derivatives of solar energy.

Prof B. G. Danshehu: - He discussed the fundamental parameters of solar energy which are; Thermal system, Biomass, Wind and PV, and concluded that Nigeria have no option than to embrace renewable as an alternative source of electricity generation.

Prof T. A. Kuku: - He discussed the application of solar energy in area like drying farm products, heating of water, street lightening. He advised that there should be a standard price for solar products and training of right people to be able to manage the solar industry.

Prof I. S. Diso: He discussed the late penetration of renewable energy into the market in the country. He advised that something should be done about the cost which is too expensive for now. He also suggested that we create awareness of the solar energy to the public and encourage the building of solar storage facilities.

Engr A. O. Yusuf: He talked about formulating a rural renewable energy policy which will encourage more participation. He advised that water heating in the house should be done by solar instead of using grid. The UN projected 50% penetration of renewable energy by 2030.

Comments and recommendations:

- ❖ Nigeria needs a roadmap for the development and deployment of renewable energy especially solar systems for electricity.

- ❖ There are needs for provision of local manufacture of associated components like storage battery, inverters, control, protection systems, meters, PV system etc.
- ❖ Manpower training and development to be solution providers in renewable energy electricity supply and not just consumers of imported products and technology.
- ❖ NERC needs to provide more technical guidelines for the distribution and/or embedded generation being promoted.
- ❖ There is a need for solar thermal renewable energy resource which is the Ocean Thermal Energy Converter (OTEC) technology. The OTEC technology is a multi-product technology that will produced electricity and many exportable products such as hydrogen for fuel cell, ammonia for fertilizer, and aviation fuel
- ❖ Nigeria needs to look into the economic justification for increasing the share of renewable energy in country's energy.
- ❖ Building local capacity for manufacturing: Nigeria should look at components and modules it can invest into, so as to develop local manufacturing capacity for renewable energy technologies. For example, the use of solar energy for charging cell phones.
- ❖ Nigeria should focus on improving the quality of the grid to enable it accept electricity from renewable energy before NERC starts to develop an ambitious feed-in tariff. We need to ascertain the state of readiness of NERC to cope with the challenges of feed-in–tariff especially with the Bi-directional flow of electricity, because this will affect new specifications that will affect the distribution code to ensure safe operation.
- ❖ Nigeria needs to look at having a sustainable strategy for rural electrifications through renewable energy source.
- ❖ Nigeria needs to re-examine the reliance of solar for street lighting as a solution because is being vandalized. Therefore a sustainable strategy should be developed before further deployments.
- ❖ Government should subsidise the cost of solar products to encourage users.

PLENARY SESSION II

Topic: Status of Nigerian Nuclear Power
Chairman: Prof. Bassey Okon Itah-Ewah, former Minister of Science & Technology
Speaker: Dr. Franklin Erepamo Osaisai, Chairman, Nigeria Atomic Energy Commission (NAEC)
Discussants: Prof. Lawrence James Dim, (DG, NNRA), Prof. B. B. M. Dewu, (Director, CERT, Zaria) and Prof. I.M. Umar, (Gombe State University)
Rapporteurs: A. Hammadikko and Z.B. Saidu (Mrs.), ECN

Summary of Presentation

The lead paper presentation was presented by the Chairman/CEO of NAEC Dr F. Erepamo Osaisai. He said that the reasons why Nigeria should go nuclear includes the following

- The National Energy Policy (NEP) by gives the mandate to go nuclear and the energy use projections by ECN support the use of nuclear energy.

- That Nigeria oil and gas will dry up by 2035 and our source of fossil fuel for energy will finish. So there is the need to look for other sources of clean energy which is Nuclear energy.
- The proposed Nuclear Power Plant will add 1000MW to the National grid;
- It will take over 15 years to successfully implement a NPP;
- The NPP was approved by Government in 2007 with NAEC being the promoter, NNRA the regulator and ECN the policy maker with other stakeholders like NESREA, NEMA, NERC etc fully involved in the NPP;
- in line with the enabling Act, FEC decisions and subsisting Presidential approval, NAEC is primarily responsible for the Implementation and coordination of National HRD, R&D and capacity building activities

Progress made so far by NAEC

i. NAEC is fully on track in the implementation of the first phase of the approved national nuclear power road map in developing the critical NPI, particularly manpower training and capacity development;

ii. About two-dozen physical projects for the emplacement of the requisite nuclear power infrastructure for education, training and research are at various stages of completion in the six national nuclear energy research centres;

iii. Preliminary site selection activities have been concluded and two suitable sites have emerged for which detailed evaluation and characterization studies would be conducted on the approval of the FGN. The site are located in:

- ✓ Geregu/Ajaokuta Local Government Area of Kogi State in the North Central Zone of the country.
- ✓ Itu in Itu Local Government Area of Akwa Ibom State in the South-South Zone.

v. The successful completion of these elements of the programme will create the enabling environment for the participation of suitable international nuclear power plant vendors and partners to participate in the national NPP programme;

vi. Expectedly, the funding of these elements (NPI) of the programme shall remain the responsibility of the Federal Government as approved by the FEC in 2007;

vii. The expected ownership/financing model for the actual construction of the nuclear power plants would entail either a Build, Own, Operate and Transfer (BOOT). These are part of the Commission's discussions with our development partners.

He concluded that the National Economic Management Team (NEMT) has approved a sustainable funding structure for the building of the critical National Nuclear Power Infrastructure (NPI) for the next several years, and also approved the BOOT Contractual Model for the financing of the construction of the NPPs. Already discussions on finalizing the contractual agreement for the design, construction, operation and decommissioning of Nigeria's first Nuclear Power Plants is ongoing.

Director General NNRA

He commended Nigerian's initiative to go Nuclear through NAEC and NNRA and other stakeholders. He said that nuclear power will substantially improve our energy needs. He pointed out that the NPP is capital intensive and takes a long time to implement. He agreed that the risk of accident is minimal in NPP as compared to other energy sources. He said that NNRA is pursuing its mandate of regulating ionization radiation in Nigeria.

Prof. I. M. Umar

He said that due to economic and population growth projections made by ECN, there is need for Nigeria to go nuclear to meet the country's energy demand. He added that Nuclear knowledge is very important and is needed urgently, and enjoined that all stakeholders should be involved and resources must be judiciously utilized in the process of implementing the NPP.

Prof. B. B. M. Dewu, Director, CERT Zaria

Nigeria Research Reactor NIRR-1 was commissioned in 2004 and has been upgraded. Between five to ten PG students are graduated annually from CERT Zaria where the NIRR-1 is situated and it absolves over 30 students annually too for Industrial Training. The research reactor has been a success story with no case of accident or mismanagement. He advised that every hand should be on deck to make the NPP a success too so that the international community can be convinced of Nigeria being able to carry out a NPP.

Comments and Questions

Dr. Francis Ibitoye, Commissioner, Research and Infrastructure Development, NAEC.

The Nigeria Atomic Energy Commission in addition to application of nuclear technology for power generation, is making efforts to procure a nuclear research reactor for multipurpose application in nuclear medicine, agriculture, industrial etc. Currently, nuclear medicine clinics in Nigeria import radioisotopes for diagnostic and therapeutic purpose from abroad, with attendant high costs. A research reactor with multipurpose application can be used to produce these radioscopic materials and also used in developing the needed manpower for the nuclear power programme.

Prof. Usman O. Aliyu

I should state that I am a strong believer that Nigeria will ultimately acquire Nuclear Power Plant to meet her energy needs. However, I have the following technical questions for the chairman and discussants.

i. For a Nuclear Power Plant (NPP) to be admitted into an existing integrated power system, the reliability must be high unfortunately, the reliability of the Nigerian power system is too low to admit Nuclear power plant that is expected to operate in base region and is it too optimistic to have roadmap that expects the first Nuclear power plant to be commissioned by year 2022? I am aware that it typically takes 7years to construct and commission a NPP.

ii. What type of technology are we expecting? There are many types like the Pressurized water reactor, boiling water, reactors e.t.c

iii. What are your views on modular power reactors (typically 100MWe) that some governors (Katsina state) and former governor (Imo state) have expressed interest in?

Responses

In his response to the questions the speakers identified, the following challenges in the implementation of the NPP, especially challenges with technology management:

i. Nuclear technology is capital intensive and is not easily given.

ii. Acceptability of the nuclear technology.

iii. Capital requirement is high.

iv. Breaking away from the national malaise of lack of a maintenance culture in effectively managing nuclear technology.

v. Managing and effectively containing the security issues associated with the development and operation of nuclear power plants. This will entail:

- Imbibing of security and safety culture which is intrinsic in the training of nuclear professionals;
- Interface with relevant security agencies to strengthen national security commitment to programme from the outset; and
- Investing in requisite nuclear security infrastructure.

vi. Enthronement of national transparency in programme implementation, as well as commitment to safeguards, so as to earn and continuously enjoy international confidence in the purely civil nature of the national nuclear power programme.

Recommendations

Implementing a new Nuclear power programme is a daunting task; it requires a serious national commitment over time, as well as a proper structured national institutional framework to ensure sustainability. The challenges, though serious, can be surmounted with meticulous planning:

- Strategy plan to be implemented
- There is need to deepen the culture of commitment to efficiency
- Execution of NP programme requires high level international diplomacy and Support from international organizations for nuclear technology transfer.
- There is need to have a good project managers to have a successful nuclear project.
- Government Support-Full government support is necessary in ensuring that appropriate structure for handling such a programme are in place and working is highly necessary and essential.
- Make Effective use of all past experiences.
- Mobilizing and taking along all stake holders and resources: There is need to build the necessary confidence in all partners in the NP programme, especially the regulatory/central organizations in such matters.

- There is a need to established Administrative structures: Administrative structures may sometimes be cumbersome but they are necessary, such structures provide means of checking and ensuring the performance of the organization as regards its mandate, optimal performance of personnel.
- There is need to partner with technology owners.

PLENARY SESSION III

Topic: Energy and Gender in Nigeria
Chairman: Engr. Mrs J. Olu Maduka Represented by Prof. Segun Aderibigbe
Speaker: Mrs. Monica Maduekwe, Coordinator, ECOWAS - ECREEE Programmme on Gender Mainstreaming in Energy Access (ECOW-GEN)
Discussants: Dr. Mrs. Bridget Obi, Children of the Farmers Club; Dr. Mrs. Roseline Kela, ECN.
Rapporteurs: Engr. Zainab A. Datti, Engr. Toyin Alozie, ECN

Chairperson:

The session commenced with an introduction by the Chairperson, into the importance of gender mainstreaming in energy policy and activities. He mentioned that gender assignment has historically been a social and cultural heritage which we now are challenged to disintegrate and make it all encompassing to ensure the energy needs/knowledge/technicalities embrace all sexes.

Speaker's Presentation

Mrs. Monica Maduekwe, ECOW-GEN Coordinator, ECREEE, spoke on "The role of equality and inclusiveness in universal energy access and the regional model: "ECOW-GEN". She applauded the ECN on the revised National Energy Policy that included mainstreaming gender in energy policy and summarized the socioeconomic situation in Nigeria, where 50% of a population of 174 million people live in rural areas; less than those 50% have access to electricity; and only 25% of households have access to non-solid fuels. Findings showed that the different types of fuels are accessible to rural and urban households: Rural households predominantly consume fuel wood and kerosene, while urban households mostly utilize LPG, gasoline and electricity, with 76% of all households using traditional biomass for cooking.

Challenges & Barriers

- Challenges and barriers faced in improving energy access are Financial, Awareness, Capacity, Technical, Policy and Regulatory
- Financially, rural electrification projects are expensive and these rural communities have low purchasing power. These communities tend to be unwilling and at times unable to pay the cost of grid inclusion, while consequently the private sector that would have been ideal to undertake the expansion isn't financial strong enough to finance energy and power infrastructure.
- Renewable energy practices, RE technologies and large scale projects are still largely dependent on foreign expertise, investors and financial institutions to develop and promote tem

- With the artificial costs of petroleum products and inadequate tax collection and non-cost reflective tariffs system, policy and regulation of RE is difficult.

Conditions to achieving universal energy access

- These barriers to universal barriers to energy access has led to the global efforts named SE4ALL (Sustainable Energy for All), whose goals are to ensure universal access to modern energy services, double the share of renewable energy in the global energy mix and double the global rate of improvement in energy efficiency.
- The solution strategies towards the SE4All goals include***: mobilizing human and financial capital, creating investment opportunities and facilitating dialogue and engagement.***
- The rational for inclusiveness and gender equality into these strategies is because Nigeria still has a relative low population of women into the labour force and one of the lowest female entrepreneurs in sub Saharan Africa, where their potentials are under-utilized or concentrated in sectors with low revenues and wages with negligible employment of women in fabrication firms
- Women have little to access credit and even the small percentages that apply are least likely to be provided a loan, although their business could provide further employment opportunities.
- Technical employees in the energy sector and decision making roles lack an equal playing field, with modern energy technology dubbed as “men’s work”, there are fewer women trained and educated in said disciplines and positions.

Status of gender mainstreaming in Nigeria’s energy access strategy

- Presently, the national rural electrification strategy includes a gender dimension but only to the extent of its objectives which include raising living standards through improved water supply, lighting and security as well as promotion of domestic appliances utilization
- The National Renewable Energy Masterplan has specifically targeted gender dimension in remote and inaccessible rural communities with the hope for off-grid electrification.

Opportunities

- Women could be empowered, as entrepreneurs, to make both intellectual and business-wise contributions to the business of expanding energy access (in both urban and rural households)
- Developing women’s human capital would enable Nigeria mobilize and utilize the full potential of its abundant human resources to improve electricity access and support the transition to clean energy technology development, in the most efficient and effective way.
- Barriers to girls pursuing careers in the technical fields of the energy sector could be addressed to allow more women participating the design, development and implementation of energy projects.
- The energy sector is a lucrative sector. Ensuring that women have opportunities to benefit from this sector could contribute towards poverty reduction in the country.

ECOW-GEN

- ECOW-GEN is a brain child of ECREEE that seeks to steer member states towards gender mainstreaming in policy formulation, legislative drafting, energy project/programme design and implementation, with the intent to promote equality in energy development through equal access to resources, opportunities and equal contribution to the decision making processes that shape and influence energy expansion in West Africa.
- ECOW-GEN seeks to achieve their through various high impact initiatives such as creating women's business fund that supports the establishment and expansion of women-led innovative energy business, a women's technical exchange programme to facilitate learning and knowledge through women sharing group and break social and cultural norms in terms of women in technical roles
- ECOW-GEN also seeks economic empowerment of women through energy for productive uses such as agricultural business and fostering functional literacy. This will also include development of youth leadership in energy to encourage and support young innovators in research and development of appropriate technologies

Some notable achievements include:

- 70 energy experts have trained on mainstreaming gender in energy policies and 250 participants comprising of energy ministers and women groups have also been trained in developing action plans
- The Framework Action Plan on 'Women's Economic Empowerment through Energy Access in the Mano River Union (MRU) Sub-region developed with, and adopted by, MRU Gender and Energy Ministers.
- Implementing demonstration projects in Ghana and Senegal that would lead 1000 women street vendors access to improved LPG stoves and installation of 13 clean and improved furnaces for fish smoking in rural areas of Ghana and Senegal, respectively though the Women's business fund.
- ECOW-GEN is pioneering the development of the first regional ***gender-sensitive and gender-responsive energy policy***. It is envisaged that the policy will be validated and adopted in 2015 with a series of events organized under the framework of the Beijing +20 and SE4ALL.
- The Objective of this ECOWAS gender and energy policy is to address existing barriers to the equal participation and benefit sharing between the sexes in the expansion of energy access in west Africa and ensure success of the SE4All initiative in the member states

Conclusion/ Recommendations

- Inequalities exist in terms of opportunities and contribution to expanding energy access as well as benefitting from the energy interventions in the region. With advancements in information and technology through the technology revolution of the last two decades, clean energy technology is expected to be the next technology revolutions and the ECOWAS is set to benefit with the adopted clean energy policies, but the existing barriers have to be addressed for this to

be a success. To stay on track in increasing energy access, questions on beneficiaries, impacts of interventions and gender participation in the process should be taken into consideration at every step.

- The justification for gender mainstreaming is more than about equity or equality but it is just smart economics: more people trained (Human resource), better energy security, economic growth and development and environmental sustainability.
- Post 2015, Nigeria is expected to include regional gender and energy policy to national strategy for mainstreaming in energy access. These gender responsive measures and specific sensitive energy programmes will close gaps in energy access through implementation, which, when successful will sweep into other sectors of the economy,

Discussants

Dr. Mrs. Bridget Obi

- She applauded ECN's campaigns and awareness exercises towards energy access for all. About 75% of Nigerian populations still use firewood for cooking which is causing deforestation at an alarming rate. Yet in the rural setting where forest is steadily decreasing, firewood costs N200.

- Kerosene which is the other alternative fuel for most rural areas is however expensive. Unlike its other petroleum counterpart, vehicle fuel, it is still sold expensive and due to its domestic utilization women are majority of the procurers. WHO has stated that 95,000 deaths occur from smoke related sickness; 3rd from Malaria and HIV/AIDS, yet, there is sadly little or no awareness campaign of dangers of smoke inhalation. Health wise, these lamps that use kerosene also give off fumes that are dangerous and fatal. She stressed the importance of energy efficient woodstove that already exists but is taking a long time to reach majority of the women out there. This would require the efforts and support of the government

- She cited the example of Sierra Leonean society, where a school was established that trained women on RE technology by assembling solar panels. This energized rural electrification and the women established themselves as solar women engineers. This project was further made successful through the support of their government. But a similar programme failed in Liberia.

Dr. Mrs. Roseline Kela

- Gender is also important not only because men and women use, benefit from and access energy differently, but because sometimes the opportunity of one of the sexes may impact the opportunity of the other. When gender issues are in the mainstream, they are central to what the organization is trying to do. Gender mainstreaming stands for "good governance". While gender mainstreaming is generally voiced by most development organizations as an objective of their establishments, yet there is little consensus concerning how to achieve it.

- She summarized the various challenges facing the country in achieving gender mainstreaming in energy policy and programmers: social and cultural restrictions for females, lack of

information on gender and energy, small proportion of women in relevant professions and positions of authority, low institutional capacity and inadequate gender specific data.

- She cited some strategies that needed to be expanded upon to promote gender and energy advocacy, which included: identification of stakeholders and determine knowledge gaps, influences and interests; providing evidence based messages; engaging in awareness creation and training activities[building coalitions; developing linkages among related development concerns. She further reiterated that the national energy policy and renewable energy masterplan by the ECN took care of gender mainstreaming in the energy energy.

Questions / Comments

Mr. A.O. Aliyu, Deputy Director, Energy Information Systems, ECN

- He mentioned the efforts made by the Energy Commission to be more gender aware since 1996 through practices like the Biogas Digester in Lagos that was used by women to provide cooking gas. The Commission went ahead and collaborated with ENERGIA network and Friends of the Environment (FOTE) to assist and advice in mainstreaming gender balance into the energy mix. He recommended that sensitization needs to include Local Governments in the rural areas, with Local Government counselors and chairmen being targeted into understanding the importance of gender balance.

Prof. B. G. Danshehu, Director, Sokoto Energy Research Centre, Usmanu Danfodiyo University.

- Even though women are involved in energy production and management, it should be noted that in many parts of this country, especially in the Northern part of Nigeria, it is the men that are involved in every production, it is the men that gather wood, cow dung etc. for women to utilize at home. Limitations in terms of affordability, availability and accessibility are great factors not given consideration in the design of most gender programmes. There is also limited understanding within urban cities which is mostly not in line with actual socio-economic labour of the rural people

Barr. A. Y. Elamah, Deputy Director, Energy Commission of Nigeria

- The result of the campaign is such that women are now dominant in petrol station as attendant. It used to be an ‘all-male affairs’. Vehicles used by women are always said to be better used, especially when considering “Tokunbo Cars”. A situation that presupposes that women are better drivers and better at taking care of their cars, and yet women are not considered for employment as drivers. The use of the word “GENDER” is such that the men feel sidelined when it is supposed to be leveraged for equality. If this is so, why not create and give specific loans to men to start businesses in areas where there are fewer men.

RESPONSES

Mrs. Monica Maduekwe

- Gender is both men and women; however women are mentioned often because of the disparity of opportunities. In schools more males graduate with engineering, science, etc degrees, so more of them are placed in positions of authority in sectors relating to these degrees, even where women technocrats might be more insightful.

- Women should be empowered economically, so they can climb up the professional ladder. This will push sustainability of family finance. There is need to provide more than just woodstoves but also how to apply its use economically.

- The creation of the ECOWAS Women's Business Fund (WBF) to stimulate the development of women-led business initiatives in the energy sector. ECREEE will work with Member States to identify and support, through the fund, innovative energy projects implemented by women groups and associations. This is all about creating an even playing field.

Mrs. Bridget Obi

- Women are the focus about gender mainstreaming because men tend to leave home, rural area, to make a living in the cities. They leave the women behind where she then becomes the breadwinner and thus the focus on gender inclusion.

PLENARY SESSION IV

Topic: Reforming the Petroleum Industry in Nigeria
Chairperson: Prof. Oyewusi Ibidapo-Obe, President, Academy of Science, Represented by Prof. Nuhu Obaje
Speaker: Absent
Discussants: Prof. Nuhu Obaje, IBBU, Lapai, Niger State; Dr. M. B. Abubakar, Director, National Centre for Petroleum Research and Development (NCPRD) Bauchi and Dr. Oladiran Fawibe, Nigeria Energy Services Ltd
Rapporteurs: Mr. Nasiru Soba and Engr. Umar Adamu Umar, ECN

OPENING REMARKS

The Chairman, Prof. Nuhu Obaje stated that petroleum resources is the number one energy sources in Nigeria; it has dominated almost all the energy sources and it virtually dominated the global economy. He highlighted the fact that the transformation in the petroleum sector is encapsulated in the Petroleum Industry Bill (PIB). He stated that the reform in the Petroleum Industry in Nigeria profoundly involved the exploration and production of oil and gas resources, and its sale in the global market. He emphasized that through the exploration and production activities, Nigeria had acquired a better technology and expressed optimism that soon, we would have additional smaller refineries to boost our refining capacity.

Dr. M. B. Abubakar

He started by explaining why we need the PIB. He stated that the petroleum industry requires a huge investment and expertise and that there are risks associated with oil exploration coupled with political risk. The International Oil Companies (IOCs) and Government need to come up with an agreement, and the law governing the industry must be obeyed. He mentioned that most of the IOCs came around 60s-70s. Therefore we need a global resource institution. He said that the PIB is a controversial issue in the country. He then listed the physical and non physical components of the bill such as; regulatory institution, upstream and downstream petroleum institution, PTDF, PEF, National Petroleum Asset Management Commission, PTF, National Gas Company and PIB. In conclusion, he mentioned that currently, what Nigerian takes home is about 40% of earnings, but with appropriate PIB implementation, the revenue will rise to 90%. Moreover, the Nigerian Hydrocarbon Tax emphasized that the number of barrels explored is dependent on the location of the well (onshore, offshore, frontier basin or shallow) exploration.

Dr. Oladiran Fawibe

Dr. Fawibe from the Nigerian Energy Services Ltd., stated that National Assembly is responsible for harmonizing the PIB. He said that Oil and Gas sector still operates with an act made in 1969 During the Nigerian Civil War under the military regime of General Gowon. He further stated that the PIB has no owner, and there is need to have someone who can go to places such as National Assembly and talk. He equally explained that the PIB should have captured the following three points;

- Institutional Empowerment
- Regulations governing upstream and downstream sectors
- National Content Act is the only way out to resolve the Petroleum Industry Bill (PIB)

CHALLENGES

The following challenges were noted:

- For Inland exploration, there is a burden of evacuating the resources.
- Most of the materials provided are for deep offshore exploration, no provision for inland basins.
- The PIB has to be institutionalized. Currently, most bills are based on personal interest.
- The Petroleum Industry Bill is under The Ministry of Petroleum Resources, this makes exploration weaker.

RECOMMENDATIONS

- There is need for quick human mind and individual attitude for development.
- Comparing Petrobrass and Petronas as in Brazil and Malaysia respectively, a company with such a structure has to be established in Nigeria.
- The institutional set-up is weak. Presently, we don’t have any exploration outfit other than NAPIMS.

- A separate Ministry for the implementation of PIB has to be created.

PLENARY SESSION V

Topic: Challenges in the Post-privatization Arena of the Nigeria Power Sector
Chairman: Engr. Kashim. A. Ali, President, COREN
Speaker: Benjamin E. Dikki DG, BPE Represented by Mr. Amechi .C. Aloke
Discussants: Prof. David Segun Aderibigbe; Engr. James Olotu- (MD, NIPP) Represented by Engr. Cyprian Nwachukwu; Mr. Simeon Atakulu, Presidential Task Force on Power
Rapporteurs: Engr. George Nosa Osaghae, Mr . Tony Lawson and Mrs Mary Mbazigwe, ECN

Chairperson Opening Remark

- The Chairman, remarks that the purpose of privatizing the power sector is to ensure an improved and sustainable power supply. He charged the discussants to proffer solutions to some of the challenges that we may encounter in the power sector.

Speakers' Presentation:

The Speaker in his presentation said that there was zero funding/investment in the sector between 1988 and 1999; hence, Nigeria energy sector was one of the least viable in the world and yet had too many workers, about 47,713 workers.

The Challenges facing the power sector include

- Monitoring investor's business plans.
- Transmission inadequacy(it needs to be expanded)
- Paucity of skilled manpower
- Water management for hydro-stations
- Gas inadequacy (gas supply to power stations is inadequate)
- Regulation
- High Consumer expectation (unlike telecommunications where consumers were used to no availability of service)
- Security of assets/infrastructure.

Discussants:

- **Mr Simeon Atakulu** - stated that he power sector was faced with a lot of problems prior to the reform era, the issues of vandalism, ineffective management and lack of investment marred the sector efficiency, and this underscored the need to privatize the sector for optimal performance. He however maintained that even after the privatization of the sector, vandalization of power equipment and gas pipeline supplying the power station has continued.

- **Engr. Cyprian Nwachukwu** from (NIPP) in his contribution posited that the post privatization arena has been characterized by non- remittance of bills by electricity

consumers and their refusal to key into the prepaid metering system. He went further to say that some users usually bypass the prepaid meters thereby stalling the performance of the sector.

- **Prof. David Adesegun Aderibigbe** revealed that the idea of Bureau of Pubic Enterprise (BPE) establishment was conceived by the NSE then but when it was constituted the society was sidelined by Chief Obasanjo's regime. He further put in perspectives the issues raised in the presentation as it affects monitoring investors as true but attributed it to non-inclusion of the stakeholders in the process of constituting performance indicator monitory body. He commended both the former presidents, Chief Obasanjo and Jonathan, for their investment in the power sector as it requires a long gestation period to pay off. He also highlighted over-reliance on prepaid meters whose specification is doubtful as a problem faced in the post privatization arena today. He admonished the sector regulator to allow the technical people to have a say in the sector so that it can be moved forward. The non- passage of PIB was also identified by him as a major challenge for investment in the gas to power sector.

Questions and Answers/Contribution Session

The Chairman, Engr. Kashim A Ali asked the following questions:

- What is the place of ECN in the power sector reform as it has over the year be involved in power sector projection study and analysis.
- From consumers' expectation angle, have we moved from where we were to a better situation as regard the power supply?

Engr. John O. Ayodele FNSE; in his contribution said that the labeling of Archaic for all staff of PHCN/NEPA as "Archaic" was incorrect as there are still effectively trained and competent staff of PHCN. They are one of the best in the world.

Prof. U. O. Aliyu in his contribution observed the following:

- Shortage of generation option which needs to be improved.
- Disco have not put in place the elementary things such as replacement of broken and obsolete equipment.
- Non-technical losses can only be reduced if we display modern technology.
- Embedded generation will be necessary to reduce the energy gaps, but will require modern protection schemes.

Mr. A.O Aliyu DD EIS ECN

- There should be synergy among energy related government agencies in implementing the National Energy Strategic plans.

Dr. Bridget Obi in her contribution spoke on the challenges of energy efficient appliances. She said that losses on the use of inefficient bulbs and antiquated home appliances continue and the losses need to be arrested. Hence the need to develop gender awareness programs so that women

can conserve energy using efficient bulbs and other efficient home appliances. This will go a long way in reducing the loss level.

Dr Umar Bindir DG NOTAP, FMST in his comments said that we need to state clearly what is going to be done differently in the post privatization era. We need to identify the technologies needed to face the challenges, since the sector is a high technology consuming sector. Why is this? As Einstein said something like if you use the same methods to solve problems that created them in the first place, you will not succeed. Now with the same people in and out of Government running the sector in Nigeria, how can we succeed? The high capital flight out of Nigeria based on this sector should have been one of the issues to be addressed – post-privatization. This was not addressed in the paper.

Discussants:

Engr. Cyprian Nwanchukwu (NIPP)

- The regulatory body should be strengthened to do their jobs effectively especially in the review of tariff system if need be.

Mr Simeon Atakulu

- Former president Obasanjo gave out N2.5billion to boost the sector with about #1.5billion to be invested in the gas sector but it was not well utilized.
- There is no strict compliance to regulations. The NERC regulatory function should be well monitored.
- All hands should be on desk to ensure effective service delivery by the sector by paying bills and report saboteurs to the appropriate authorities.

Prof. David. A Aderibigbe

- We should allow the players in the sector both in Gencos and Discos to operate as the less competent ones with time will be naturally eliminated given room for more capable ones.

Responses:

- BPE was created in 1988, during the regime of IBB, not by the former President Obasanjo as alleged and it is constituted by competent and knowledgeable members of the society as against the belief of Prof. David. Aderibigbe.
- The problem that has affected the sector is not the staff but lack of maintenance culture by the past government as the sector was not given attention for fifteen years prior to Third Republic which kick stated the privatization of the sector.
- The players should be supported by all to enable them deliver the expected result.
- We should ensure that the models which worked elsewhere are domesticated in Nigeria taken into cognizance our peculiar factors.

PLENARY SESSION VI

TOPIC: Challenges in the Regulations of the Nigerian Power Sector

Chairperson: Prof. T. A. Kuku, OAU, Ile Ife.

Speaker: Engr. A. O. Yusuf, NERC

Discussants: Dr. Umar Bindir, DG, NOTAP and Prof. U. O. Aliyu, ATBU, Bauchi

Rapporteurs: Mr. Abubakar Yahaya, Mr. U.B. Sudais and Mrs. Mujidat B. Abubakar, ECN

Speaker's Presentation

- Role of NERC
- Progress made so far
- Key challenges
- Conclusion

Introduction:

In 2000 Government set up Electric power sector implementation committees and the result was the Draft Electric Power Policy. The objectives of the reform was to meet current and prospective demand for electricity; modernizing and expand service; support economic and social development and attract private investors.

NERC mission is to ensure adequate, safe, reliable power supply by regulating the tariff structures and monitoring licensed operators in the electric power sector. Other issues include the progress made by NERC, gas shortages, consequences of poor electric supply and solutions, transmission issues and metering.

Contribution from Engr. John .O. Ayodele

He said that good regulation is what the Energy Supply Industry (ESI) need and if not done properly, it spells doom for the industry. Recently tariff was adjusted for zero tolerance on collection thereby pushing 100% collection as a factor. Bearing in mind that the companies inherited a very poor collection mechanism and system, how do you expect them to make the right revenue to justify their cash flow which were made based on different tariff and collection efficiency. Most of these companies are already cash strapped and hope that NERC will review their stand to ensure that companies do not bleed to death.

Comments and Questions

Chief Mrs. A.N Okuribido

(a) Conflict Resolution of arbitration policy by NERC to proffer solution to conflict that may ensue between GENCO and DISCOS.

(b) Reduction and Relaxation of documentation for licenses form NERC for electricity generated from renewable sources.

(c) what is the way forward for the energy sector after this energy summit, are pressure committee formed to follow up decisions or communiqué drafted during this summit?

Dr Umar Bindir, DG NOTAP.

He commended the paper. He said that for adequate power supply we have to generates, transmit and distribute. Marketing and branding, and also sustainability is equally important. He opines that marketing and branding including sustainability should be seriously looked into. He wants Nigerians to design, operate and maintain electrical components. Nigeria is not involved in core electricity research facilities at present. However, gas supply is not our problem in Nigeria but knowledge and research. Hence, regulations need energy experts in the technical and managerial levels. Nigerians have to acquire technology transfer procedures so that we have to produce wires, meters etc for the electricity sector and stop comparing privatization in the electricity and power sectors. We should not be consumption and import country only but seek to produce internally.

PROF. U. O. ALIYU:

He said we have weak infrastructure in Nigeria. Inadequate generation is one problem - generation planning involves knowing the demand projections for up to twenty years (which ECN is providing), this is the very key for the sector to develop. He further said that the Nigerian problem is not regulation but enforcement. The technology is not available in NERC to do post mortem on power failure and without that, we cannot avoid any future reoccurrence. ICT is today integral in power systems as it is worldwide. Contingency helps shore up electrical system failure. Liability matrix is another problem - measuring power supply to consumers should be done by the regulators but unfortunately this job has been left to the DISCOS who are the distributors.

Challenges

1. Regulation is at the heart of the power sector. Wrong and bad regulation spells doom for the sector. A 50% reduction in tariffs spells doom for the cash flow of the companies. Therefore government should not pass the buck to the new companies. NERC should do their homework properly.
2. If a company wishes to generate 50 to 100 megawatts, what special incentives are available for electricity generation from renewable?
3. What form of arbitration exists for issues between GENCOs and DISCOs?

Responses

Engr Yusuf:

- You can visit NERC website for all the explanation on tariff regulation.
- We agree that collection losses should not be passed to consumers
- The commission (NERC) serves as arbitrators between consumers and DISCOs and between GENCOs and DISCOs
- Renewable plants have some hurdles to pass before they can supply to the grid.

PLENARY SESSION VII

TOPIC: Coal Industry Reform in Nigeria

Chairperson: Engr. Ademola Isaac Olorunfemi, President, Nigerian Society of Engineers, Represented by Engr. John .O. Ayodele

Speaker: Frank Odoom, Deputy Director, Federal Ministry of Mines and Steel

Discussants: Prof Oloche, Dean of Engineering, University of Abuja; and DG, Nigerian Geological Survey Agency

Rapporteurs: Mr. Idowu Olokungbemi and Mr Alhassan Musa, ECN

Speaker Presentation

The speaker highlighted the following issues:

- Coal was first discovered in 1909 near Udi, Enugu State and coal production started in 1916. Oil discovery led to reduction in the exploitation of coal in Nigeria. The coal industry received a reformation in 2005. Coal resource as at today is about 1487million tonnes in Nigeria. Today, coal exists in 15 states in Nigeria.

Some of the challenges in the Coal industry are:

- Environmental pollution from coal. High cost of clean coal technology and paucity of investors in the coal industry

He concluded that Nigeria has a large coal deposit and that there is need to put in place a policy and legal framework for coal exploitation.

Discussions

Prof. Oloche commented that coal was a viable source of energy in the past as it was used to drive electricity in form of coal fired plant and transportation(trains), but was later abandoned on discovery of oil despite his large deposit. The R & D of coal in universities should be strengthened and the result should be put to action so that the sector can be revived.

DG, Nigerian Geological Survey Agency, in his own comment, said the various moribund coal mines across Nigeria should be exploited as it is capable of generating the required megawatts needed for electricity generation in Nigeria

Question and Answers

Question: Prof. Aliyu, ATBU Bauchi asked if the licence issued for coal can be used for other mining.

Answer: Mr Frank Odoom pointed out that he is not aimed with the conversion factor at present. Responding to the issue of licensing, he maintained that mining license is usually specific; he said coal mining license can't be used for other mining however; provision can be made for such on request.

Question: The Chairman, Engr. John O Ayodele, asked if coal mining can be done where human beings live.

Answer: Mr Frank Odoom enlightened the entire congress that coal mining is not advisable where human beings live, it should be done from other positions.
Question: The Director General, Energy Commission of Nigeria, Prof E.J Bala asked about the position of Tar Sand and Bitumen. Are there investors?
Answer: Mr Frank Odoom gave a brief update on Tar Sand and Bitumen, and said it's in the process of being advertised as it has been broken down into blocs from Lagos to Enugu to ease the process.

PLENARY VIII
TOPIC: Energy Financing in Nigeria
CHAIRMAN: Mr. Mustapha Alhaji, UNIDO
DISCUSSANTS: (1) Elder Boma Binebo, Director, Development Finance, CBN; (2) Mr. Joseph Babatunde, Bank of Industry; (2) Yesufu Alonge, Nigerian Bulk Electricity Trading Company.
RAPPORTEURS: Mr. Nafi'u Tijjani and Ms. Alaere Matholo, ECN.

Mr. Mustapha Alhaji, Chairman:
He commended the Energy Commission of Nigeria for organizing the 2015 National Energy Summit. He said that all planning need finance. CBN, BOI are working hard to see that there is no financial problem in the power sector and the CBN intervention in the power sector is handled by BOI. In this respect, energy financing cannot be compromised, Nigeria is generating less than 5,000MW with about 170 million population while South Africa with population of about 50 million are generating 40,000MW leaving Nigeria behind. If we are looking at our population growth, then energy financing is necessary in Nigeria. The integrated master plan indicates that, N125billion is needed for financing energy in Nigeria. Since 2005 when the Electricity Sector Act Reform come into existence we have not seen serious financing in the energy sector. Gas Pricing has also been liberalized, although the NNPC, CBN and PHCN met and agreed that, gas price cap be removed.

Elder Boma Benabo
- CBN is ensuring low-cost long-term energy financing. Although, the CBN knows the location of the coal resources in the country but do not know the specific areas of coal deposits.
- Energy financing by CBN is based on integrated master plan and is concerned with hydro and thermal energy production.
- CBN catalyzed proper gas pricing for PHCN and NNPC. PHCN purchased gas from gas producing companies but do not pay always. Therefore, the debt is always settled by CBN since most of these companies are foreign gas generating companies. Presently, CBN has committed N213billion to the energy sector.
- CBN always identify the gas Gencos and PHCN are owing and subsequently pay off the gas debts. CBN also strengthen the Bank of Industries so that it finances captive power supply.

Discussions

Mr. Babatunde Joseph, Representative of MD BOI

- He stated that, power is very important especially in the manufacturing sector of this country and the financing energy is very cost effective, it's very high risk area of investment considering its long gestation period, due to change in governments and policies .
- We must be looking at multi power approach, i.e. we should consider renewable energy in the financing system.
- Most of the power captive projects are completed and they are needed in the cement and sugar industries. The energy loss is due to lack of energy financing. The BOI collaborate with UNDP to enhanced power supply from renewable energy sources.

Mr. Yesufu Alonge, Representative of MD NBET

- He stated that as a nation we need to develop, thus financing energy is imperative. Looking at the privatization of PHCN, creating right institution is the one of the basic necessity. Privatization brings about confidence in the power sector.
- The investors have the money, but are not very sure on how to recover their money. Government must assure investors on how to recover their money in the event of any eventuality. Assurance is important in energy financing and the proposal has to be adequately explained, since there are a number of projects on ground waiting for financing. For example, Egbin Power Plc has six power plants, only four plants are working, one is completely down and government is adamant to take it for refurbishment.

Comment / Observation

Government should back out of energy financing since private investors are just adequate on delivery, so that exploitation through government purchase will reduced and funds will be redirected to better use.

Questions

Barrister A. Y. Elamah: (1) We always talk of pension fund when we are faced with financial problem, knowing the volatility of the pension funds, and based on our past experience, there are many institutions that can finance the power sector, such as African Development Bank, IMF and other banks.

(2) National Grid is so wide, why don't we allow each state to legislate on matter of power to allow them to wholly attend to their needs?

Answers:

Mr. Yesufu Alonge responded by saying that the power sector has been liberated, that is why Lagos State can generate power for the use of its citizen.

Question:

(3) Mr. Chima Muoneke**,** Federation for the Sensitization on Electricity, Power Conservation and Safety: If a DISCO signs a bilateral agreement with an IPP that has to go through the 330/132 KVA lines within which the NBET operates, will NBET get involved?

Answers:

The NBET acts as intermediary between Gencos and Disco. NBET does not really trade but rather transfer the power generated by Gencos to Discos which attract some administrative charges. The NBET according to the law setting it up will seize to exist in a period of 7 years after the Discos are satisfied strong enough to engage the Gencos directly.

Question:

(4) Mr Chima Muoneke: The CBN intervention fund of N213 Billion was for gas debt and revenue shortfall, how can NBET get fund to finance its PPA in case of default?

Answer:

The CBN achieves this by ensuring that the power purchase agreement is put in place before giving out money. It always ensure that security is met so as not to lose out in case of defaulters.

Question:

(5) Prof. Usman O. Aliyu, ATBU, BAUCHI: What is the average cost of a solar project?

Answer: N40 Million was projected to erect a stand-alone solar power plant for twenty houses.

The summit ended with a communiqué read by DG/CEO of Energy Commission of Nigeria.

COMMUNIQUE OF THE SUMMIT ON ENERGY AND THE TRANSFORMATION AGENDA IN NIGERIA

ENERGY COMMISSION OF NIGERIA
NATIONAL ENERGY SUMMIT
THEME: ENERGY AND THE TRANSFORMATION AGENDA IN NIGERIA
REIZ CONTINENTAL HOTEL, CENTRAL BUSINESS DISTRICT, ABUJA FCT.
17th AND 18th MARCH, 2015

COMMUNIQUE

Preamble:

Energy Commission of Nigeria (ECN) organized a 2-day National Energy Summit with the Theme: **Energy and the Transformation Agenda in Nigeria** was held at Reiz Continental Hotel, Central Business District, Abuja FCT, 17th – 18th March 2015. Participants were drawn from the Ministries, Departments and Agencies (MDAs); Academic Institutions; Financial Institutions; Civil Society Organizations; Development Partners; Non- Governmental Organizations (NGOs); Private Sector and The Media. More than 200 participants attended the Summit.

The Opening Ceremony of the Summit was chaired by the President, Nigerian Academy of Engineering, Engr. Professor R. I. Salawu. The Keynote Address titled "**Overview of the Nigerian Energy Sector"** was delivered by Engr. Prof. E. J. Bala, Director General/CEO, Energy Commission of Nigeria. The Special Guest of Honour was the Honourable Minister of Science and Technology Dr. Abdu Bulama, who was ably represented by the Director of Chemical Technology and Energy Research, of the Ministry, Engr Abbas Gumi, who also declared the Summit open. Goodwill messages were delivered by the Minister of Foreign Affiars Ambassador Aminu Aliyu Wale, who was ably represented by Ambassador Bukun-Olu Onemola; Minister of Water Resources, Mrs. Sarah Ochekpe, ably represented by Engr. Nicholas Madu, Director of Dams and Hydropower in the Ministry; Minister of Environment Mrs. Lawrencia Laraba-Mallam, ably represented by Dr. Peter Yerima Tarfa, a Director in the Ministry; Minister for Mines and Steel Development, Arch Mohammed Musa Sada, ably represented by Mr. Frank Odoom, Country Director, UNIDO, Dr Patrick Kurawa ably represented by Alhaji Mustapha; and representative of JICA. Engr. J. O. Ojosu, Director, Energy Planning and Analysis, ECN, gave the Vote of Thanks.

The following sub-themes were comprehensively discussed during the technical sessions by notable speakers in the Energy Sector;

- Electricity from Renewable Energy Sources in Nigeria by 2030
- Status of Nigerian Nuclear Power Programme
- Energy and Gender in Nigeria
- Reforming the Petroleum Industry in Nigeria
- Challenges in the Post-Privatization arena of the Nigeria Power Sector
- Challenges in the Regulation of the Nigeria Power Sector
- Coal Industry Reforms in Nigeria

- ❖ Energy Financing in Nigeria

Observations:

The Summit observed that:

- Adequate, affordable, accessible and reliable energy is key to achieving the Transformation Agenda and Vision 20:2020
- Diversification of energy supply mix is essential in driving the Transformation Agenda, for example, Coal, Nuclear, Renewables, Oil and Natural Gas.
- There is need to revitalize the coal industry for energy supply and power generation.
- Renewable energy source is abundant in all parts of the country and it can be tapped to alleviate the shortage of energy supply and power generation in most rural areas.
- There is need to develop and domesticate renewable energy technologies in the country.
- There is need to conserve the available energy supply and power generation through energy efficiency and conservation practices
- There has to be enhanced exploration and exploitation of petroleum resources for the benefit of Nigeria
- There is need for a progressive fiscal framework that encourages further investment in the petroleum industry, while optimizing the revenue accruing to government.
- Gas pricing and pipeline vandalism are major issues in the country for power generation
- Inequalities exist in terms of opportunities and contribution to expanding energy access as well as benefitting from the energy interventions in the country
- The justification for gender mainstreaming is more than just equity or equality but is about smart economics: more people will be trained (Human resource), better energy security, economic growth & development and environmental sustainability due to better information
- The National Nuclear Power Programme is on course.
- Nuclear power is imperative in meeting energy demand.
- Nuclear power can be utilized not only for electricity generation but also for medicine, agriculture and other **peaceful** uses
- Data for proper planning and technical input in the power sector is a basic issue for the GENCOS, DISCOS and even the TRANSCO
- Data is also necessary for good policy formulation and implementation
- There is weak regulation for the power sector
- Inadequate generation is a major issue due to gas supply problems
- Another constraint in power supply is the Transmission capacity restriction of 4800MW
- No core Power Research Institute in the country
- Lack of adequate manpower in the power sector
- No conscious effort for technology transfer by government

- To achieve Vision 20:2020 and the Transformation Agenda, Energy financing cannot be compromised
- Financing is enormous for even the reference scenario of 7%
- Energy financing is always very risky
- There has to be assurance from government
- Are the energy projects bankable considering the high risk involved
- There is no adequate utilization of domestic funds and the pension funds for the energy sector
- There is need for Foreign Direct Investment (FDI)
- Legacy debts were a major issue for the Power Generation companies

Recommendations:

The summit therefore made the following recommendations:

- A conducive business environment for Petroleum Industry Operations is imperative
- There should be enhanced exploration and exploitations of petroleum resources for the benefit of Nigeria
- Domestic Gas supplies be optimized particularly for power generation and industrial development
- Established 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
- Deregulate and liberalize the downstream petroleum sector
- Well articulation and passage of the PIB can aid adequate power supply
- Efficient and effective regulatory agencies be put in place for O/G
- The Petroleum industry should be more Open and Transparent in its operations
- A resuscitated coal industry through active private sector participation and with high local content is a way forward
- Adequate funding of the coal industry to meet the energy and power requirement of the country in a cost effective and sustainable manner is paramount
- The tar sands/bitumen reserves be explored and exploited through active private sector participation and high local content in an environmentally friendly manner for domestic and international markets
- Nuclear energy be utilized for peaceful purposes
- Requisite manpower for the peaceful use of nuclear power is essential as technology transfer is not easy
- There must be adequate storage and disposal facility of nuclear waste in a safe and sustainable manner
- To have renewable energy mainstreamed into the nation’s commercial energy mix through active participation of private sector and high local content

- To have renewable energy resources 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
- That power contributes to a double digit growth of the economy such that Nigeria becomes within the 20 largest economy in the world by 2020 or thereabout, can only be through active private sector participation with high local content and in an environmentally friendly manner
- Policy shift is needed to bring about adequate gas supply for power generation
- There should be synergy between Agencies
- Financing energy projects starts with the appropriate policy and regulation
- Appropriate pricing is also an investment incentive
- Availability of Low Cost Long Term Energy finance is a necessity
- Solution imbedded in the National Integrated Infrastructure Master Plan
- Expedite the payment of Legacy debts to enhance investment in new technologies by the power companies
- Specific financing for captive or embedded generation is necessary
- There is need for the institutionalization of the National Energy Policy and the National Energy Master Plan through an act of the National Assembly to ensure policy consistency in the energy sector.

Conclusion

Participants at the Summit dealt with the objectives of the Summit succinctly. The Observations and Recommendations are as outlined above. ECN, the organizer of the Summit, wishes to commend the contributions of all stakeholders and look forward to the next Summit. Accordingly, ECN was enjoined to ensure the implementation of the recommendations at the Summit.

Director General/ CEO
Energy Commission of Nigeria

ENERGY COMMISSION OF NIGERIA

Plot 701C CBD, PMB 358, Garki, Abuja,
Email: dg@energy.gov.ng; ecn@hyperia.com