



# Nigeria's Energy Plans and Its Implementation Activities\*

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By

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1. Introduction
2. Energy and Energy Resources in Nigeria
3. Energy as a Driver for National Development
4. National Energy Policy
5. National Energy Master Plan (NEMP)
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7. Challenges
8. Conclusion.



# 1. Introduction



- I am indeed privileged and honoured to be invited by the Board of the Nigerian National Merit Award (NNMA), under the chairmanship of Professor Shekarau Yakubu Aku, FAEng, to present a paper at this 10<sup>th</sup> Forum of Laureates of the Nigerian National Order of Merit (NNOM) with the overall theme of “*Governance Reforms and Human Security in Nigeria*”.
- I gather that the forum is an annual event organized by the Board to enable Laureates have the opportunity to appreciate and contribute to the discourse on silent national issues for the purpose of enhancing good governance.
- With the hindsight of what Nigerian National Order of Merit (NNOM) Laureates are, i.e people who have made valuable contributions to national and global attainments in their fields of human endeavour, this Forum is surely a commendable and invaluable one for advancing national development.



# 1. Introduction .....

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- May I therefore, at this juncture, congratulate the Board of the NNMA for this feat and pray that the objectives of the forum this year will be fully achieved.
- Energy Commission of Nigeria, a government agency established by Law in 1979 and, which I superintend, is charged with the responsibility for the strategic planning and coordination of national policies in the field of energy in all its ramifications; and in doing so, shall, inter alia:
  - serve as a centre for gathering and dissemination of information relating to national policy in the field of energy development;
  - make recommendations for the exploitation of new sources of energy;
  - collate, analyze and publish information relating to the field of energy from all sources;



# 1. Introduction .....

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- monitors the performance of the energy sector in the execution of government policies on energy;
- and liaise with all international organizations on energy matters.
- It is therefore not out of place that I have been invited to make this presentation on “*Nigeria’s Energy Plans and its Implementation Activities*” to support this Forum’s sub-theme of “*Energy as a Driver for National Development*”.
- I believe that the national development referred to, is the one that is sustainable.
- Sustainable development here refers to development as defined by the Brundtland UN Commission Report of 1989, which defines sustainable development as “*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*”.



## 2. Energy and Energy Resources in Nigeria

- Literally, development is viewed as a positive and progressive process that involves work, productivity and value addition.
- Technically, while work is said to be done when a force acts in the direction of the force; energy is the phenomenon or capacity that enables work to be done. Energy exists in various forms.
- It cannot be destroyed or created but can be transformed from one form to another.
- Energy is generally derived from fossil, renewable and radioactive sources.
- These sources are referred to as primary sources of energy.
- Fossil sources of energy, like crude oil, natural gas and coal are hydrocarbon matter formed over hundred of millions of years under the earth's crust in high temperature and pressure.



## 2. Energy and Energy Resources in Nigeria

- Fossil sources of energy are depleting sources, while their consumption tend to upset the natural balance of carbon dioxide, a greenhouse gas, in the atmosphere with concomitant global warming effect. They are non-sustainable sources of energy.
- Renewable energy source, like solar, wind, biomass, hydro, geothermal, ocean waves and tides is a sources which can replenish itself within a relatively short time and through natural process. Such a resource is relatively non-depletable and its consumption has little negative effect on our environment and is therefore a sustainable source of energy.
- Radio-active or nuclear source of energy is energy from the atom, from where energy is emitted from atomic fission or fusion.
- It is a low carbon energy source and therefore also a sustainable energy source.
- Tables 1 and 2 indicate the reserves and utilization levels of these primary energy resources in Nigeria.
- The final energies relevant in driving our economy are fuels, electricity and process heat, which are derivable from these types of primary energy sources.
- Table 3 show information on final energy utilization in the Nigeria economy compared to Africa and World averages.



**Table 1: Fossil Energy Resources and Nuclear Energy Sources in Nigeria**

S/N	Resources	Reserves	Production	Domestic Utilization
1	Crude Oil	37.1 billion barrels	0.774 billion barrels (2015)	0.098 billion barrels @ 4.9% capacity utilization (2015)
2	Natural Gas	182.3 Tscf	2.9 Tscf (2015)	88% : Utilized(2015) 12% : flared (2015)
3	Coal	2.7 billion tonnes	0	Negligible
4	Tar Sands	31 billion barrels of oil equivalent	0	18.25 million barrels (2014)
5	Nuclear	Yet to be quantified	0	30kW experimental nuclear reactor

Source: OPEC (2015)





**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 <sup>2</sup> /day 6.5kWh/m <sup>2</sup> /day	30MW solar PV stand-alone No solar thermal electricity
4	Wind		2-4m/s at 10m height	2x2.5KW electricity generator; 10MW wind farm in Katsina
5	Biomass	Fuel wood	11 million hectares of forest and woodlands	43.4 million tonnes of firewood/yr
		Municipal waste	- 18.3 million tonnes in 2005* & about 30 million tonnes/yr now	-
		Animal waste	- 243 million assorted animals in 2001	-
		Energy Crops and agric waste	- 72 million hectares of Agricultural land	28.2 million hectares of Arable land only 8.5% is cultivated

Source: Renewable Energy Master Plan (REMP)



**Table 3: Final Energy and Nigeria Economy**

S/N	ITEMS	2011	2012	2014	2016
1	Electricity Consumption (billion kWh)	24.5	26.2	25.5	30
		(619)*		(657*)	
		(20,407)**		(21963)**	
2	Total Energy Supply per Capita (Kgoe/cap)	730	790	760	767
		(670)*		(670*)	
		(1880)**		(1890)**	
3	Electricity Consumption (kWh/Capita)	151	155	144	161.3
		(592)*		568*	
		(2933)**		3030**	
4	GDP/Capita (US\$/Capita)	1471	1513	2550	1359
		(1281)*		(1923*)	
		(7520)**		(10,058)**	
5	Energy Intensity (kgoe/US\$)	0.71	0.75	0.3	0.56
		(0.550)*		(0.35*)	
		(0.250)**		(0.19*)	
6	GDP Growth Rate (%)	7.4	6.6	6.3	-1.51

Sources: Transmission Company of Nigeria (TCN) 2011-2015

\*Africa Average - IEA (2013 -2016)

\*\*World Average - IEA (2013 -2016)



### 3. Energy As A Driver for National Development

- It is a well-known fact that from the early times of industrial revolution in the 1780s, energy has since been the major driver of economic and social development in nations.
- Energy services are multi-faceted and affect development in all sectors of the economy; be it agriculture, health, education, manufacturing, transportation, housing, communication, etc; and therefore energy drives national wealth as indexed by the Gross Domestic Product (GDP) and social development as indexed by Human Development Index (HDI), depicted graphically in Figs 1 and 2
- However, control over energy resources has also been known to cause conflicts.



# 3. Energy As A Driver for National Development

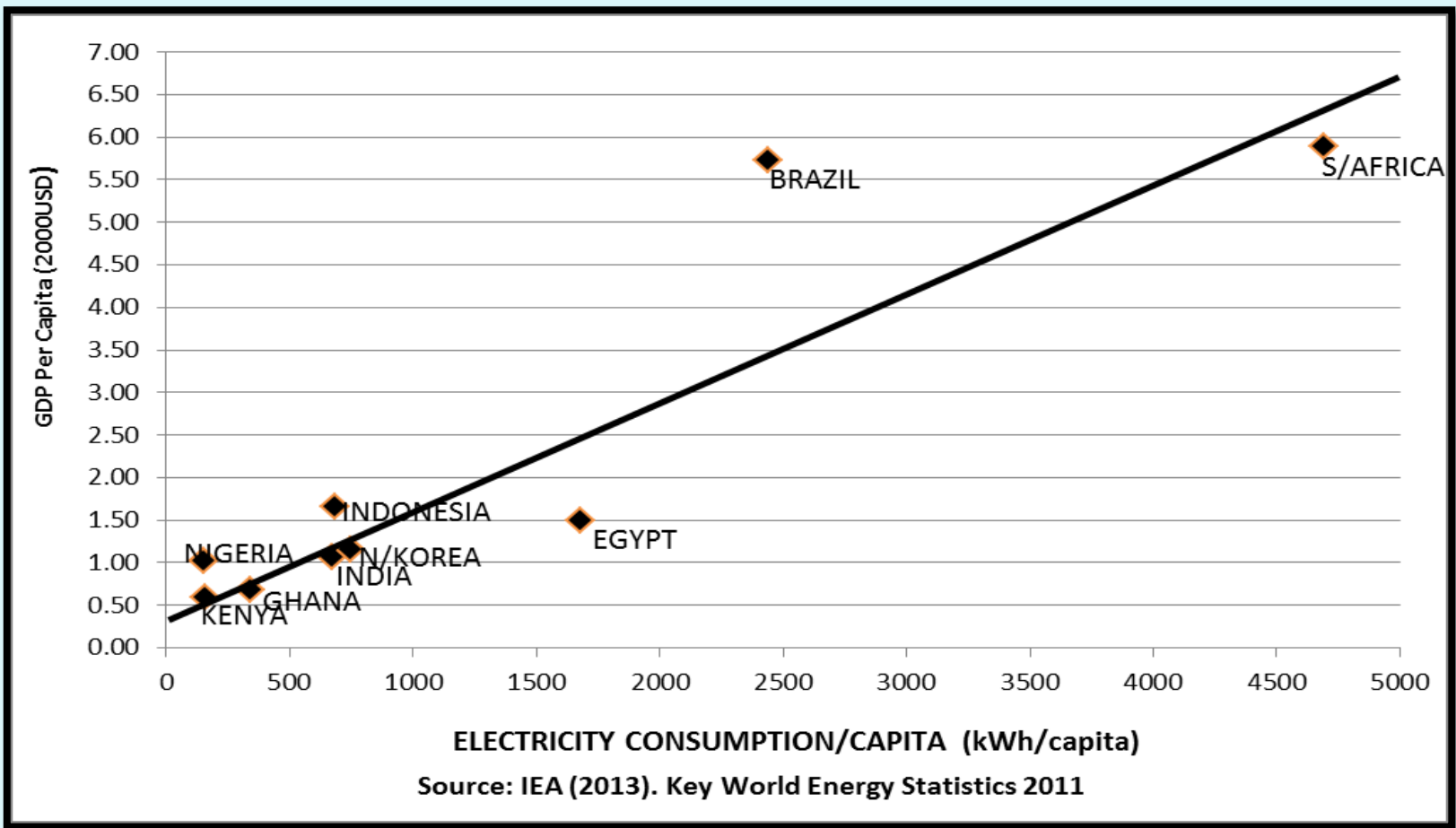


Fig. 1: Electricity Consumption/Capita



# 3. Energy As A Driver for National Development

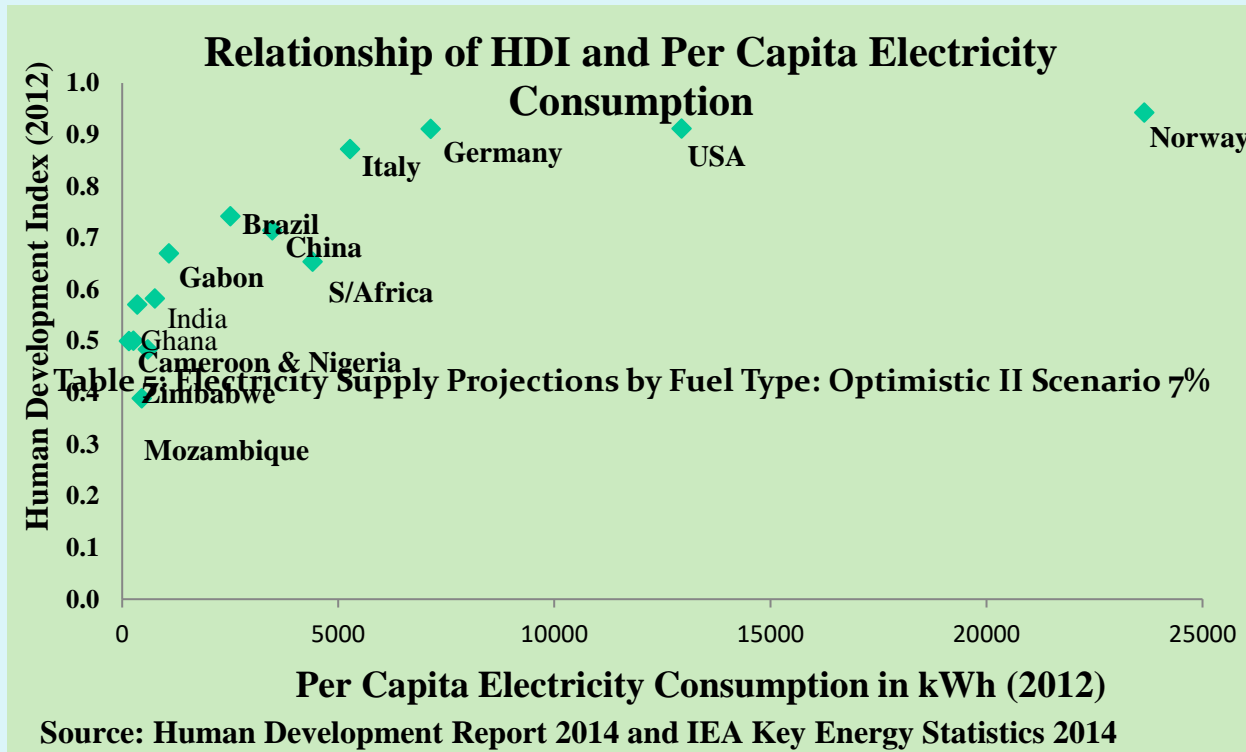


Fig. 2: Electricity Consumption in kWh



### 3. Energy As A Driver for National Development



- The significance and pervasiveness of energy in development was duly acknowledged in 1988, during the inauguration of the first members of Energy Commission of Nigeria, by, the then President, Commander-in-Chief of the Armed Forces, Federal Republic of Nigeria and Chairman of the Commission, where he said that,
- *“the pervasiveness of energy is amply reflected in its technical definition as “that which enables us to do work”; and development can only come about through work”; indeed, hard work.*
- The significance of energy to development became even evident, when the evaluated UN Millennium Development Goal (MDGs) could not meet the expected target.
- It was observed that as important as energy is to development, it was however completely omitted in the MDGs.
- Thus in 2015, the UN made universal access to sustainable energy as agenda seven (7) out of the 17 goals in the Sustainable Development Goals (SDGs) to 2030, to underpin energy in development.



## 4. National Energy Policy



- Energy development is capital intensive.
- In order to attract the needed capital and investments in the sector, policies and plans as well as laws must be put in place to guide and incentivize the flow of investments.
- In general, any plan must be derived from a policy, its objective(s) and strategies.
- Consequently, an energy plan should be based on an energy policy meant to achieve the policy's objective through strategies and its activities.



## 4. National Energy Policy ... Cont'd



- Prior to 2003, Nigeria did not have an official document referred to as a National Energy Policy.
- However, sub-sectoral policies in petroleum, electricity, coal, etc. existed.
- There were also other energy related policies in other sectors whose activities are dependent on those in the energy sector.
- Some of these policies could be conflicting.
- When Energy Commission started operation in 1989, ten (10) years after the Law establishing it was made, it was therefore saddled with the responsibility to come with an integrated and omnibus National Energy Policy.





## 4. National Energy Policy ... Cont'd



- This was reflected again in Mr. President's speech in 1988, when inaugurating the first members of the Commission.
- He said, “ ... *the Commission will realize its objective in the first instance through the formulation of policy, the implementation of which devolve on the ministries of Mines, power and steel; petroleum resources; and Science and Technology. The ministries are the implementing organs of Government and are respectively responsible for matters relating to the exploitation and exploration of solid minerals and generation of power, to fluid minerals of oil and gas, and to overall research in energy.*”
- Consequently, the Commission began the search for, and crafting of, a National Energy Policy through consultations with relevant stakeholders in the Energy Sector.



## 4. National Energy Policy ... Cont'd



By 1993, a draft was produced and presented to Government; and it went through several inter-ministerial reviews and finally was approved by FEC in 2003, ten (10) years after submission of the draft.

- The Policy document can be accessed from the Commission's website: [www.energy.gov.ng](http://www.energy.gov.ng).
- The overall thrust of the National Energy Policy is the optimal utilization of the nation's energy resources for sustainable development through the active participation of the private sector; while the objectives of the policy are as follows:
  - i. To ensure the development of the nation's energy resources, with diversified energy resources option, for the achievement of national energy security and an efficient energy delivery system with an optimal energy resource mix.



## 4. National Energy Policy ... Cont'd



- ii. To guarantee increased contribution of energy productive activities to national income.
- iii. To guarantee adequate, reliable and sustainable supply of energy at appropriate costs and in an environmentally friendly manner, to the various sectors of the economy, for national development.
- iv. To guarantee an efficient and cost effective consumption pattern of energy resources.
  - v. To accelerate the process of acquisition and diffusion of technology and managerial expertise in the energy sector and indigenous participation in energy sector industries, for stability and self-reliance.
- vi. To promote increased investments and development of the energy sector industries with substantial private sector participation.



## 4. National Energy Policy ... Cont'd



- vii. To ensure a comprehensive, integrated and well informed energy sector plans and programmes for effective development.
- viii. To foster international co-operation in energy trade and development in both the African region and the world at large.
- ix. To successfully use the nation's abundant energy resources to promote international co-operation.

The policy document covers the following subjects:

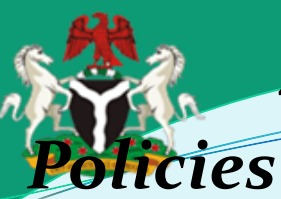
- a) Energy Resources of oil, natural gas, Tar sands, Coal, Nuclear, Hydropower, Fuelwood, Solar, Biomass, Wind, Hydrogen, and other renewables.
- b) Energy utilization as electricity in industry, in agriculture; and in transportation.



## 4. National Energy Policy ... Cont'd



- c) Energy issues such as environment, energy efficiency and conservation; research, development and training; and bilateral, regional and international cooperation.
  - d) Financing and indigenous participation; and
  - e) Planning and policy implementation with short, medium and long term strategies.
- For each of the subject matter, government policy statements, policy objective(s) and strategies on how to achieve the objectives are articulated.
  - For example, natural gas as an energy source has the following policies, objective(s) and strategy statements:



## 4. National Energy Policy ... Cont'd



- Policies*
- i. The nation's gas resources shall be harnessed and optimally integrated into the national economy, energy mix and industrial processes.
  - ii. The nation shall engage intensively in gas exploration and development with a view to increasing the reserve base to the highest level possible.
  - iii. The nation shall put in place necessary infrastructure and incentives to encourage indigenous and foreign companies to invest in the industry.
  - iv. The nation shall put in place necessary infrastructure and incentives to ensure adequate geographical coverage of the gas transmission and distribution network.



## 4. National Energy Policy ... Cont'd



### *Objectives*

- i. To eliminate the flaring of associated gas.
- ii. To expand the utilization of natural gas as industrial and domestic fuel, as well as for power generation.
- iii. To increase the use of natural gas as industrial feedstock for petrochemical, pharmaceutical and fertilizer plants, etc.
- iv. To use gas to diversify the foreign exchange earning base of the nation.
- v. To accelerate the process of technology acquisition and diffusion in the gas industry.
- vi. To encourage indigenous entrepreneurial capability in the gas industry including the of end-use devices.
- vii. To determine the level of gas reserves available to the nation.



## 4. National Energy Policy ... Cont'd



### *Strategies*

- i. Encouraging the oil-producing companies to gather and utilize associated gas in order to eliminate flaring.
- ii. Imposing appropriate and effective penalties to discourage gas flaring.
- iii. Encouraging the establishment of the necessary infrastructure for the effective gathering, transmission and distribution of gas nationwide.
- iv. Providing incentives to encourage industrial and domestic consumers to use gas or to convert to gas.
- v. Providing incentives to encourage the introduction and use of LPG appliances in areas not accessible to natural gas so as to encourage the consumer preference for gas.
- vi. Establishing suitable infrastructure for the export of natural gas.





## 4. National Energy Policy ... Cont'd



- vii. Expanding and promoting gas related R & D outfits in the country.
- viii. Formulating suitable urban and regional planning needed for the effective distribution of natural gas to, and its utilization by, domestic and industrial consumers.
- ix. Providing necessary incentives to indigenous and foreign entrepreneurs to facilitate their participation in the gas industry.
- x. Ensuring that the price of natural gas is cost-effective, while giving due attention to the effect on local consumption.
- xi. Embarking on deliberate exploration for gas deposits in all parts of the country



## 5. National Energy Master Plan (NEMP)



- In 2007, the Commission produced, in collaboration with stakeholders, a draft NEMP derived from the National Energy policy.
- The Masterplan provides the activities with targets, timelines and implementing agencies derived from the strategy of achieving the objective of the policy of a given subject matter in the policy document.
- The draft Energy Master Plan document is also accessible in the Commission's website: [www.energy.gov.ng](http://www.energy.gov.ng).
- For example, in order to predict energy demand with timelines and corresponding supply mix; IAEA energy modeling tools of MAED and MESSAGE were employed with the support of IAEA Energy Planning Department.



## 5. National Energy Master Plan (NEMP) ... Cont'd



- While MAED is a scenario-based model, MESSAGE is an optimization model.
- Based on our demography, economic structure and performance, desired industrial path, available energy resources in the country, etc.
- The total energy demand from which the electricity demands shown in Table 4 were projected.
- The projections show that for our economy to grow at 7% annually, grid electricity consumption in Nigeria should not be less than 40 GW by 2020 and 115 GW by 2030; while the energy supply mix for that scenario should be as shown in Table 4, with coal, natural gas, hydro, nuclear, solar, wind and biomass as energy resource to be utilized for electricity generation.



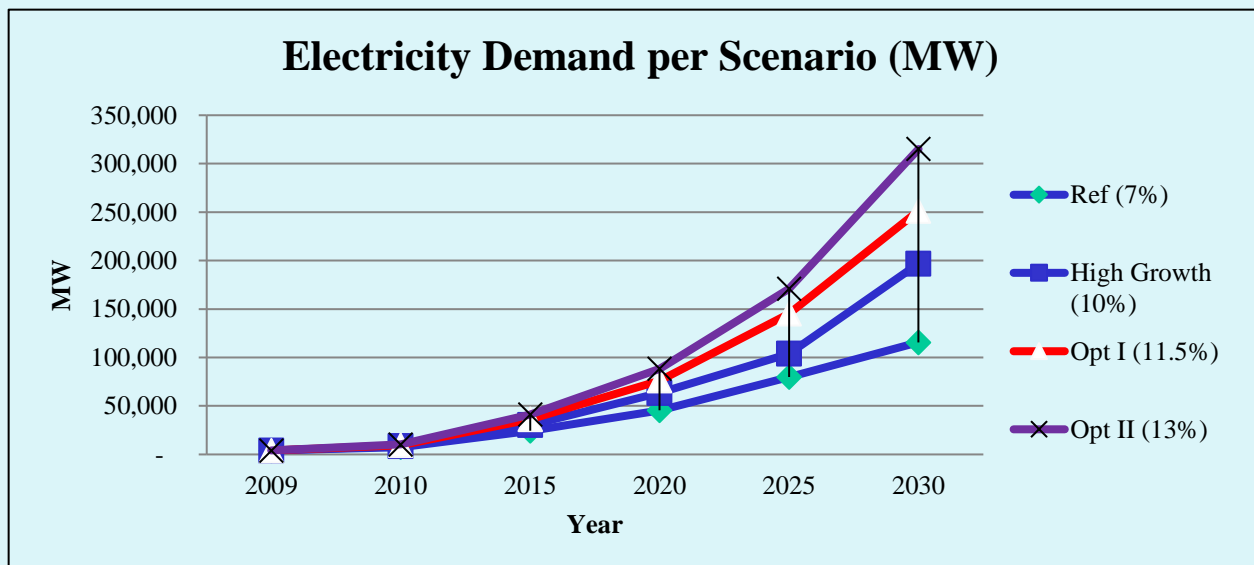
# 5. National Energy Master Plan (NEMP) ... Cont'd



**Table 4: Electricity Demand Projections for Nigeria under various Economic Scenarios**

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

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



Source: ECN, 2012



## 5. National Energy Master Plan (NEMP) .... Cont'd



- Indeed, by 2030, there would be the need for electricity imports from within our sub-region or other sub-regions of Africa.
- The grid electricity generation capacities should be about 52 GW by 2020 and 160 GW by 2030, having considered appropriate transmission and distribution losses and generation efficiencies according to generation technologies.
- The projections was also able to separate the fuels demand from the projected total energy demand under various growth scenarios and is shown in Table 5.
- For example, PMS demand is projected at 77 million litres/day by 2020 and 155 million litres/day by 2030.



## 5. National Energy Master Plan (NEMP) .... Cont'd



Table 5: Electricity Supply Projections by Fuel Type: 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



## 6. Implementation Activities



### (a) Petroleum Sub-sector

The Ministry of Petroleum's Seven (7) Big Wins provide this Government's short to medium term priorities for implementation to grow the oil and gas industry.

These priority areas are as follows:

- Policy and Regulation, i.e. to conclude the Petroleum Industry Bill (PIB)
- Business Environment and Investment Drive, i.e. to improve governance, transparency and renewed dialogue to solving Niger Delta militancy as well as enhance private sector participation in the sector.
- Gas Revolution i.e. to make natural gas a significant contributor to the economy by enhancing gas infrastructure through active private sector participation.



## 6. Implementation Activities ... Cont'd



- Refineries and local production capacity i.e. to make fuels petroleum products supply more secured within our shores through increased refining capacity and capacity utilization of existing refineries.
- Niger Delta and security i.e. to produce synergy between relevant government agencies, oil producing companies and the Niger Delta communities to enhance security in the region for higher oil and gas production in the region.
- Transparency and Efficiency i.e. to reduce and eliminate opaqueness and inefficiencies in the oil and gas industry.
- Stakeholder Management and International Coordination i.e. to get stakeholders better informed of the reforms being carried out to reposition the oil and gas industry for efficiency.





### (b) Solid Minerals Sub-sector:

- The sub-sector is undergoing reforms driven by the Nigeria Minerals and Mining Act 2007 and associated regulations.
- Coal, Tar Sand/Bitumen and nuclear elements are the relevant energy resources in the sub-sector.
- Private sector participation is encouraged and regulated by the Mines Cadastre Office.
- States are now to get 13% of any minerals revenue from their States (Vanguard, 16<sup>th</sup> November 2016).
- Also Ondo State has gotten license to mine bitumen in the State hitherto left unexploited despite huge reserves. (Vanguard, 18<sup>th</sup> July 2018)



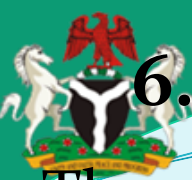
### (c) Electricity Sub-sector

- The electricity sub-sector is driven by the Electric Power Sector Reform Act of 2004, which has liberalized, deregulated and allowed private sector participation in the industry, regulated by NERC.
- Recent activities in the sub-sector are driven by the Ministry of Power's "Incremental Power Policy" and vision 10:20:20 and 30:30:30; i.e. by year 2020, generation capacity should rise from the current 12 GW to 20 GW with 10% renewable energy mix; while by 2030, generation should have reached 30 GW with 30% renewable energy mix.
- However, our national nuclear power programme to generate about 1 GW of electricity from nuclear energy is on course and driven by NAEC.



### (d) Research and Development:

- Challenges in the energy sector will continue to be resolved through research and development, preferably using indigenous capacity.
- For example, in addition to R&D in new energy technologies, Energy commission of Nigeria, in collaboration with International Energy Charter Secretariat in Brussels, are conducting studies on Energy Investment Risk Assessment in Nigeria.



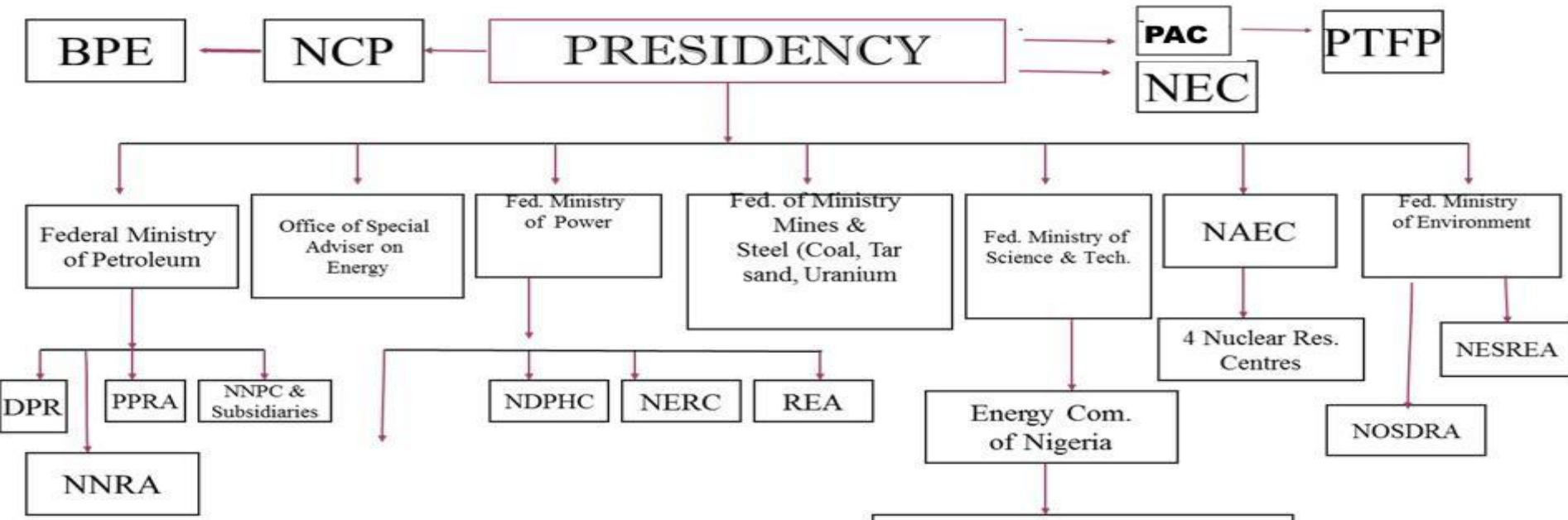
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# Challenges



The major challenges in the energy sector are:

- Insecurity and vandalization of energy infrastructure
- Inadequate investments
- Weak regulatory framework
- Uncoordinated Institutional Framework



**KEY:**  
 BPE – Bureau for Public Enterprises  
 DPR – Department of Petroleum Resources  
 ECN – Energy Commission of Nigeria  
 NAEC – Nigerian Atomic Energy Commission  
 NCP – National Council on Privatization  
 NDPHC – Niger Delta Power Holding Company  
 NEC – National Energy Council

**NERC** – Nigerian Electricity Regulatory Commission  
**NNRA** – Nigerian Nuclear Regulatory Authority  
**NBETCO** – National Bulk Electricity Trading Company  
**PPRA** – Petroleum Product Pricing Regulatory Agency  
**PTFP** – Presidential Task Force on Power  
**REA** – Rural Electricity Agency (REA),  
**NAPTIN** – National Power Training Inst.

**NOSDRA** – National Oil Spill Detection  
 Regulatory Authority  
**NESREA** – National Environmental Standards  
 Regulatory & Enforcement Agency  
**TCN** – Transmission Company of Nigeria  
**EMSL** – Electricity Management Serv. Ltd



- Energy is essential to economic and social development.
- Fortunately, Nigeria is endowed with fossil and renewable energy sources.
- However, the supply of final energies of fuel and electricity derived from these resources have not been adequate, reliable, cost effective and secured in the economy.
- Policies, plans, strategies and activities are however in place to change the situation such that the economy continues to grow in a sustainable manner, inclusively.
- Adequate, secured, cost effective and environmentally sustainable energy supply will create more jobs, grow the economy, empower citizens and improve standard of living.
- It is therefore planned that 4mb/day of crude oil will be refined locally and 30 GW of electricity generated, with 30% from renewables, by 2030.
- Good governance, transparency, rule of law, Research and Development are expected to contribute significantly in stimulating efficiency and better performance of the energy sector for enhanced development in Nigeria.



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**Thank you  
and  
God Bless**