

# **IMPROVING AND SUSTAINING POWER (ELECTRICITY) SUPPLY FOR SOCIO-ECONOMIC DEVELOPMENT IN NIGERIA**

**BY**

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## **Background Information**

Within the particular conception of socio-economic processes which underscore every economic system, economic development, globally, revolves around the issues of the character, structure, pattern and evolution of desirable inter-personal relations of production, allocation and utilisation of available resources in any country. In order to optimally develop and efficiently manage such available resources, equitably allocate and effectively utilise them and subsequently put economic development firmly on course, modern operational technologies with respect to production, allocation and utilisation are designed and tied strictly to the use of energy in one form or the other. Thus, the quest to rapidly and firmly put the Nigerian economy on the course of economic development is technically, a function of adequate supply and distribution of energy, particularly, electricity.

In this regard, adequate supply and distribution of electricity constitute a central development issue which cannot be over-emphasised. Apart from serving as the pillar of wealth creation in Nigeria, it is also the nucleus of operations and subsequently the 'engine of growth' for all sectors of the economy. In recognition of the consolidating linkage between the energy sector and the other sectors of the economy, electricity development and utilisation therefore have pervasive impacts on a range of socio-economic activities and consequently the living standard of citizens in the country.

The foregoing assertions subsequently explain why one of the most frustrating and disturbing economic development issues in the Nigerian economy and society, particularly since the 1990s, is that of the inadequacy of electricity supply and distribution. The situation of the emerging electricity outages from the supply inadequacy, especially one year before the

inception of the Obasanjo led-civilian administration on May 29, 1999, was that of persistent electric power outages at alarming frequencies in the face of abundant primary electricity resources - coal, natural gas, geothermal, tide, solar, biogas, biomas etc.

Incidentally, some analysts (Iwayemi, 1991; Adegoke, 1991; Ayodele 1992 & 98) have defined this period as a period of serious electricity crisis; a crucial or decisive movement; an undesirable turning point; a time of difficulty and distress; a state of confusion when things no longer happen in the normal or usual manner. In all, the situation of electricity supply inadequacy shows the emergence of a crisis situation in which electricity supply could not catch up with the demand requirements, creating an imbalance as illustrated in a day's experience in Nigeria in Table 1 in the 1990s.

**Table 1: Electricity Supply-Demand Balance Sheet (March 1991)**

	Plants Capacities (mw)		Demand Situation (mw)			
	Installed	Effective	Morning Peak	Evening Peak	Highest Demand	Average Demand
Demand	4,633	1,712	1,500	1,800	1,902	1,855
Excesses		-	212	-	-	-
Shortages		2,921	-	88	190	143
Remarks		Unsatisfactory	Unsatisfactory	Unsatisfactory	Unsatisfactory	Unsatisfactory

**Source:** Adegbulugbe & Seriki **Ed.** Energy Issues in Nigeria, 1991.

Government recognised this supply inadequacy and thus noted the cardinal challenge therefrom. In this regard, the new civilian administration identified for the millennium the need to create a socio-economic environment that does not suffer the inadequacy of the past. Thus, the overriding task at the time of inception of the new administration was a single-minded pursuit of growth and development which would go beyond the annual budgetary revenue and expenditure allocation to the electricity sector. Towards this end, government released the 1999 - 2003 Economic Policy document which sets out very clearly its stretching goals in which 14 specific quantifiable target areas feature.

Much as what the identified target areas indicate what the economy needs, government policy trust for the year 2000 and beyond is to:

“lower the inflation rate, lay a solid foundation for a private sector led economic growth, pay profound attention to education, *energy* and agricultural production and consequently reduce unemployment and poverty” (FGN, 1999).

Against this background, government proposed among several objectives, especially on electricity related matters to:

- i Provide the framework for taking government out of direct involvement in most economic activities which are best suited for private sector undertaking such as energy and power generation;
- i Provide the enabling legal, fiscal and monetary environment for the private sector to become the effective engine of growth and development in the economy; and,
- i Up-grade the performance of major infrastructural (electricity) facilities.

According to government, the foregoing are required to open new and sustainable economic opportunities to all Nigerians for the pursuit of honest and fulfilled life. However, in order to attain these stated objectives, some strategies are designed. Such strategies include among several others:

- i the privatization of NEPA under the guided privatization programme anticipated to begin in 2000 with the establishment of regulatory framework followed by drawing up modalities for effective private sector participation;
- i reduction of tariff in favour of imported raw materials and the rehabilitation and resuscitation of infrastructural facilities to encourage increased capacity utilization; and,
- i increased budgetary allocation, particularly to among others the energy (electricity) sector.

Noting the foregoing, government promised to take urgent steps, among several others, to stamp out the phenomenon of shortages of petroleum products and greatly improve the performance of major infrastructural facilities especially by reducing the frequency of power outages across the nation in order to make development objectives attainable. In recognition of the identification of electricity problems and the notification of the strategies to overcome such problems, the critical issue which remains, relate to what the Obasanjo-led government has done thus far; i.e., what remains to be done and how to do what remains to be done to allow for an

improved and sustained electric power supply for socio-economic development in Nigeria. Against the background of this critical issues, this paper attempts to provoke some thoughts.

## **II. The Current Status of Electricity Supply in Nigeria**

It is important to recognise that the status of electricity supply to any community is a function of several factors. Among such factors are the quantum of energy deposit in such a community, the level of electricity generating technology coupled with the available and effective capacities, electricity demand growth rate, the institutional framework for electricity generation, supply and distribution coupled with the pricing policy, the operational efficiency of the institutional framework etc. Available information without rigorous data analysis show that Nigeria is a primary energy store house accommodating such resources as coal and lignite, natural gas, crude oil, solar, hydro, nuclear, woodfuel, geothermal, tide, biogas and biomass.

In spite of the vastness of these resources in Nigeria, only four sources (coal, crude oil, natural gas and hydro) are currently being utilised in processed forms while two others (woodfuel and solar) are used in their crude forms for heating, cooking and lighting. Table 2 shows available information on the quantum of the deposits of some of these primary energy resources in Nigeria while Table 3 presents some data on the rate of energy consumption in the country. Due to lack of any reliable data, the tables do not include statistical information on the

**Table 2: Nigeria's Primary Energy Deposits**

Resource Type	Reserves & Units of Measurement	Average Energy Content Per Unit (KJ)	Total Resource Energy Content (KJ)	Energy Ratio of Resource Oil (%)	Energy Ratio of Total Resource (%)
Coal	650 (short ton)	$22.7 \times 10^6$	$14.75 \times 10^{15}$	11.2	3.86
Gas	$3.615 \times 10^{12}$ M <sup>3</sup>	$38.55 \times 10^3$	$139.4 \times 10^{15}$	105.9	36.49
Crude Oil	$3.42 \times 10^3$ M <sup>3</sup>	$38.48 \times 10^6$	$131.6 \times 10^{15}$	100.0	34.45
Hydro	$31.5 \times 10^{11}$ kwh – 100 yrs	$3.6 \times 10^3$	$11.34 \times 10^{15}$	8.6	2.97
Solar	$180 \times 10^{11}$ kwh – 100 yrs	$3.6 \times 10^3$	$64.8 \times 10^{15}$	15.2	5.26
Woodfuel	25 yrs available KJ	$2.2 \times 10^{12}$ /day	$20.075 \times 10^{15}$	15.2	5.26

**Source:** Adegbulugbe & Seriki **Ed.** Energy Issues in Nigeria, 1991.

**Table 3: Energy Consumption in Nigeria (Tons of Coal Equivalent-TCE)**

Energy Type	Weight	1992	1993	1994	1995	1996	1997	1998	1999
Coal ( $10^3 + ce$ )	0.13	71.84	2.83	12.97	16.51	17.01	17.71	9.85	11.25
	% Share	0.2		0.1	0.1	0.1	0.1	0.03	0.04
Hydro ( $10^6 + ce$ )	0.93	7.42	7.25	7.24	3.67	3.08	3.06	2.86	2.88
	% Share	23.7	24.1	29.7	15.0	10.2	11.1	8.9	9.0
Gas ( $10^6 + ce$ )	0.04	7.32	9.76	10.67	10.49	13.61	13.94	15.97	16.99
	% Share	23.3	32.4	43.8	42.9	45.3	50.5	49.9	53.2
Crude Oil ( $10^6 + ce$ )	98.9	16.99	14.33	12.17	10.30	13.32	10.58	13.14	12.06
	% Share	54.2	49.6	49.9	42.1	44.4	38.3	41.1	37.7
Total ( $10^6 + ce$ )	100	31.8	31.35	30.09	24.48	30.02	27.59	31.98	31.94
Index 1985=100		124.3	132.7	104	73.8	96.9	76.3	94.7	86.9

extensively utilised non-commercial energy forms. A critical examination of Tables 2 and 3 shows that Nigeria's primary energy resources are in excess of its domestic electric energy requirements such that it should not experience electricity supply inadequacy. Given this inference, the degree of the technical operations relating to the generation capacity, transmission and distribution, emanating from the abundance of primary resources deserve some investigation.

Table 4 therefore presents some information on Nigeria's electricity plants capacities while Table 5 shows the quantum of electricity output vis-a-vis the levels of supply and distribution. Total installed capacity from thermal (gas and steam) and hydro electricity technologies as at 1999 was 5,860 mw out of which about 5,400 mw (92.0%) constituted available capacity while the effective capacity was 1600 mw (27.3%). The transmission grid consisted of about 5,000 of 330 kv lines and also about 6,000km of 132 kv lines which were heavily overloaded.

Incidentally, electricity supply programme keep on expanding in the country without necessarily allowing the transmission grids to keep pace with the programme requirements. Besides, many of the associated equipment, machines and other facilities for generation, transmission and distribution had operated for several years beyond their normal life-span without adequate and regular maintenance, servicing and rehabilitation. Thus, the National Electric Power Authority (NEPA), Nigeria's national electricity institution, established by decree No. 24 of 1972 with statutory monopoly power to over-see electricity development throughout the expansive country produces electricity under a high proportion of:

- i in-operational generating plants' capacities (27%); and,
- ii overloaded and overstretched transmission lines.

To compound these problems in the Nigerian Electricity Sector is the problem of hydrological inadequacies in hydroelectric plants, particularly within the period of the dry season. The vandalisation of electricity equipment in several points in the country does not seem

**Table 4: Electricity Plants Capacity Utilisation in Nigeria (1999)**

Plants		Installed Capacity		Available Capacity	
Types	Location	mw	% of Total	Mw	% of Installation
Thermal (Gas)	Afam I - II	580	9.9	580	100
	Delta I - II	840	14.3	312	37.1
	Ijora	60	1.0	60	100
	Sapele	280	4.8	-	-
Thermal (Steam)	Egbin	1,320	22.5	-	-
	Sapele	680	11.6	348	51.2
Hydro	Kainji	960	16.4	520	54.2
	Jebba	540	9.2	140	25.9
	Shiroro	600	10.2	-	-
	Total	5860	100	3000	51

**Source:** NEPA Lagos.

**Table 5: Electricity Output and Distribution in Nigeria (10<sup>6</sup> kwh)**

Period	Total Output (Y)	Sales (S)							To Niger		
		Residential		Industrial		Commerce		Kwh	% of Y	kwh	
		kwh	% of S	kwh	% of S	kwh	% of S				
1990	13463	3948	50	2016	26	1906	24	269.3	2	5323.2	39
1991	14167	4023	49	2042	27	2226	27	212.5	1.5	5662.5	39
1992	14834	4340	50	2177	25	2182	25	252.2	1.7	5785.3	39
1993	14504	5217	52	2067	21	2714	27	145.0	1.0	4361	30
1994	15531	5641	55	1888	18	2709	26	139.8	0.9	5153.2	33
1995	13783	4780	52	1888	20	2596	28	124.1	0.9	4394.9	32
1996	16233	4528	50	2061	23	2453	27	162.3	1	7191	44
1997	16128	4522	51	1897	21	2424	27	161.3	1	7274	45
1998	15112	4359	51	1855	22	2308	27	151.1	1	6589	44

**Source:** CBN Annual Report and Statement of Accounts (Several Series).

to help matters. All of these have culminated in:

- i frequent break down of electricity equipment due to system over load;
- ii a large quantum of electricity losses in the transmission system ( a range of 20 - 30%) annually.

The overall consequences of these anomalies are the various devices adopted by NEPA to create an electricity supply-demand artificial balance in the face of supply inadequacies- rationing, shedding and suppressed demand devices. These devices result in one or a combination of the following developments in the Nigerian electricity market;

- i very low voltage especially in the rural areas when available;
- ii power outages at alarming frequencies;
- iii illegal electricity consumption practices among consumers.

Against the background of the enormity of the cost of the frequency of the interruption in public electricity supply which shows up in considerable loss of industrial and domestic output, damages to machinery and equipment and idle labour time, the sustenance of private electricity supply substitution is reinforced in Nigeria. Currently, all major newly established privately or even publicly owned commercial/industrial enterprises under take substantial investment in private supply of electricity relying on privately owned generating plants at high costs which tend to aggravate the high cost of production and subsequently the country's high rate of inflation. The wide spread substitution of private for public provision of electricity explains why the residential electricity consuming class has taken over the leadership of the consumption of electricity from the industrial class in Nigeria contrary to what obtains in most industrialised economies.

Given the foregoing developments in the Nigerian electricity market, especially NEPA's devices to allocate available electricity to consumers, it is evident that the quantum of electricity sales to consumers do not in reality reflect in any form the actual demand for electricity in the country. At best it merely connotes what NEPA could supply. In view of the implications of the on-going electricity supply crisis in the economy, many Nigerians have been pauperized and



made miserable. This has further culminated in the emergence of a more warped economic system than before against the under-privileged. The implications of this undesirable development are the creation of a situation of great stress, tension, suspicion and conflicts in the entire Nigerian system which unofficially encourage some illegitimate activities such as (Ayodele, 1998):

- i illegal electricity connections either to the national grid or the existing residential/industrial electricity outfit;
- i illegal sales of electricity metres to prospective consumers;
- i over/under billing and payment via unscrupulous business collusion;
- i vandalism of equipment, resold in most cases to public/private electricity institutions etc.

In sum, the current status of electricity supply in Nigeria reflects that of an electricity supply crisis in which industrial growth and socio-economic development paces are kept below what is attainable by the economy (FRN. 1975; World Bank, 1991; Ayodele, 1992 & 1999). That is, the existence of an abnormal electricity supply situation in which supply cannot catch up with electricity demand, thereby, creating an electricity supply-cum-demand imbalance in the Nigerian electricity market.

## **Governments 1999/2003 Plan Proposals for Crisis Alleviation: A Critical Appraisal**

Given the foregoing crisis and its implications, government tends to have recognised the need to rehabilitate the electricity sector in order to meet the aspiration of citizens especially as the dividend of democracy. In this regard, it will be necessary to improve the supply of electricity to an acceptable level so as to reduce the high cost of doing business, other economic and domestic operations and subsequently, attract genuine investors to the country. In this regard, government wishes to privatise, deregulate and liberalise electricity supply system and subsequently re-orientate the bureaucracy and create an enabling environment for investments via adequate supply of electricity and other infrastructural facilities (FRN. 1999).

Towards this end, it is the aspiration of the Obasanjo-led-administration to allow Nigerians to have access to reliable and regular supply of electricity without outages. In this regard, NEPA, the national electricity body in the country, would be completely restructured for reformation and privatisation within two years of the inception of the civilian government. Specific quantitative targets became established for meeting these laudable and desirable aspirations. Such targets include (FGN. 1999):

- i access to electricity supply from 30% to 50% rising consistently from 2000 to 2003;
- i effective generation capacity from 1,600mw to 4,000mw by 2001; and,
- i upgrading distribution transformers via the provision of relief transformers or the installation of higher capacity transformers.

In the case of rural electrification programme, the then on-going 300 rural electrification projects was planned to be completed by June, 2000, with completion of additional another 200 projects by June, 2001. Under this plan, it was anticipated that at least 40 Local Government Area (LGA) headquarters out of the then 122 unelectrified ones would be considered for completion. Besides, an achievement of 50% completion level for projects whose contracts were awarded in 2000 was assumed. Against the background of this anticipation the following strategies and measures were adopted:

- i the rehabilitation and maintenance of existing electricity supply stations to raise the level of effective capacity;
- i the construction of new power stations;
- i the encouragement of independent power producers to supplement public power supply;
- i sourcing for funds from diverse sources for electricity development including raising electricity tariffs.

i proposing to deregulate power generation, transmission and distribution.

As at January, 2001, sizeable funds had been provided for the reactivation of electricity facilities. It is therefore plausible to assume that with these funds, the aging electricity facilities had been replaced while many transformers had been provided to reinforce the strength of the few which were previously available. Further, the previously over loaded transmission grid had also received a considerable policy attention and action. Perhaps, due to public pressures and outcry, some unscrupulous staff of NEPA linked with incessant sabotage and large scale equipment vandalism were identified and were subsequently relieved of their duties. Additionally, NEPA seems to be more conscious about the need to improve its distribution network, characterised in the past by illegal connections, poor billing and revenue collection, high pace of meter tampering, inadequate distribution stations and transformers to reduce the pace of the high non-technical losses estimated in 1999 to be about 1.0 billion monthly.

In empirical terms, NEPA within the year 2000 had reactivated and/or replaced some of its plants, made provision for the supply of many transformers and got engaged in effective turn around maintenance (TAM). With government frequent pronouncements on privatization, NEPA's monopoly power is seriously threatened under the on-going privatization proposal in which some state governments and private firms (local and foreign) had signified interests in electricity business in Nigeria. The consequences of these developments in the Nigerian electricity market currently include:

i raising effective capacity from 1,600 mw in 1998 to 2,400 mw in 2000.

Certainly this could be a desirable improvement, nonetheless, it is below the established target of 4000 mw to accomplish a supply target of 50% access to electricity supply by June, 2000.

i installed capacity had reached 5,876 mw in 2000 from 5,400 mw in 1998 while total electricity generation and distribution had equally risen to 16,088 kwh and 8,576 kwh against 15,110 kwh and 8,521. Kwh in 1998 respectively (Table 6 ).

However, this exhibits an unabated transmission losses of about 46.7% of electricity generation in year 2000.

**Table 6: ELECTRICITY GENERATION & CONSUMPTION**

Year	installed Capacity (mw)	Total Generation (Million Kwh)	Total Consumption (Million Kwh)	Power Losses in Transmission	
				Million Kwh	% of total
1990	4,548.0	13,462.9	7,870.5	5,592.4	41.5
1991	4,548.0	14,166.6	8,292.0	5,874.6	41.5
1992	4,580.0	14,833.8	8,699.0	6,134.8	41.4
1993	4,586.6	14,504.6	9,998.3	4,506.3	31.1
1994	4,548.6	15,531.0	9,593.9	5,937.1	38.2
1995	4548.6	15,856.6	9,435.9	6,420.7	40.5
1996	4,548.6	16,242.8	9,051.8	7,191.0	44.3
1997	4,548.6	16,116.6	8,843.2	7,273.7	45.1
1998	5,400.0	15,110.0	8,521.2	6,588.8	43.6
1999	5,876.0	16,088.7	8,576.3	7,512.4	46.7

- Sources: 1. CBN. Statistical Bulletin Vol. 9, No. 2. 1998  
2. CBN. Annual Report & Statement of Accounts, 1999

### Conclusion and Some Policy Propositions

Admittedly, the shocks from the electricity crisis in Nigeria have created some wedges in the national wheel of effective management of industrial and the other socio-economic development programmes in Nigeria. Against the background of this admission, NEPA's institutional reforms via the economic deregulation policy seems wise and desirable. However, for effectiveness and desirable results, the functions of electricity development from the short term to the medium term could be re-arranged under two broad categories within the reform processes viz:

- i Generation and Transmission with initial centralisation proposal format: and,
- i Distribution and sales proposed for decentralisation under the economic deregulation policy.

On the long run the foregoing short to medium terms re-arrangement should focus on total deregulation of electricity development under the following guided privatisation arrangements:

- (i) Admittedly, Nigeria's national electricity body (NEPA) has been slated for privatization to break the public monopoly in the supply and distribution of electricity in the country. Under this programme, some states and firms have already indicated their interest in this programme as earlier noted. However the privatization programme of NEPA under 'guided privatization

programme' takes the form of 40:40: 20 per cent equity share holding structure for government, foreigners and indigenes respectively.

Under this arrangement, government needs to prevent the transfer of public monopoly to private monopoly. In this regard, the application of the theoretical contestable market model under which some firms based on the market structure and size would be allowed to operate and compete in output, quality and tariffs could be practicalised. In order to empirically adopt this theoretical proposition, electricity development activities should not only be deregulated they should also be liberalised. This would allow new firms (local and foreign) to go into electricity business and compete with the central body in whatever form it is privatised in the long run.

(ii) It is important to note that more than two years into the guided privatisation programme in Nigeria, it has not gone beyond the establishment of the National Council of Privatisation.

Thus, the execution of the programme with respect to electricity development is too slow for any effective impact. Government should therefore, pronounce the deregulation and liberalisation of electricity production and subsequently approve the applications of would - be producers in Nigeria.

(iii) It is important to indicate that within the process of the guided privatisation programme NEPA/Government must continue with the refurbishing, rehabilitation and expansion of existing plants for electricity development in the country. Thus, the National Council on Privatisation should take note of this need and its plan to private the electricity plants should be speeded up subject to ensuring that the core investors should bring in adequate machinery and equipment to produce at costs similar to those of the industrialised countries or counterparts on identical development level that are efficient. Additionally, all states and local firms that are desirous of going into the electricity business should be actively encouraged by government. However, such states could be advised that the ownership structure should be similar to that of the privatised federal government NEPA.

Government is however advised to consider its 40% equity shareholding in NEPA as transitory. The ultimate intention should be to also look for a Nigerian core investor that would hold at least 30% of government shares while the remaining 10% can be sold to interested

Nigerian small holders. It is believed that except a Nigerian core investor is involved in electricity development there could be the risk of excessive domination by foreigners who could eventually swindle the Nigerian government and the numerous small share holders. Nigeria's experiences with the indigenisation programme of the 1970s should be a guide in this regard.

- (iv) While NEPA has commenced raising the number of transformers in the country, the exercise should continue. This must be extended to injections and distribution stations nation-wide. Additionally, NEPA must be equipped to embark on aggressive revenue generation drive to significantly reduce overdue receivables to reinforce revenue resources to fund expansion crises.

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