

## **INDEPENDENT POWER PLANTS: A VEHICLE FOR SUSTAINABLE ENERGY GENERATION IN NIGERIA**

**Kenechi V. Abanihi<sup>1</sup>, Daniel O. Aigbodion<sup>2</sup>, Alabi S. Olawale<sup>3</sup> and Edet D. Kokoette<sup>4</sup>**

Electrical and Information Engineering, Landmark University  
Electrical / Electronic Engineering Department, University of Benin  
E-mail: Kenechi.abanihi@lmu.edu.ng, Olawale.sulaimon@lmu.edu.ng

**Abstract:** Independent power plants are potential Vehicles for sustainable Energy Generation in Nigeria, and this paper show thus, data was collected from Technical reports produced by National Control Centre Oshogbo showing the Average Availability (MW), Availability factor and installed capacity of the various power stations in Nigeria as at 2011 and it was discovered that due to the ease and speed of development of IPP's it could easily contribute to the growth of the energy sector. This paper also shows the challenges that face the development of IPP's and possible solutions that can be adopted.

**Keyword:** Independent Power Plant, Availability Factor, Energy Generation.

### **Independent Power Plants in Nigeria**

Electricity supply in Nigeria dates back to 1886 when two small generating sets were installed to serve the then Colony of Lagos. By an Act of Parliament in 1951, the Electricity Corporation of Nigeria (ECN) was established, and in 1962, the Niger Dams Authority (NDA) was also established for the development of Hydro Electric Power. However, a merger of the two was made in 1972 to form the National Electric power Authority (NEPA), which as a result of unbundling and the power reform process, was renamed Power holding Company of Nigeria (PHCN) in 2005.

The Nigerian power sector is controlled by state-owned Power Holding Company of Nigeria (PHCN), formerly known as the National Electric Power Authority (NEPA). In March 2005, President Olusegun Obasanjo signed the Power Sector Reform Bill into law, enabling private companies to participate in electricity generation, transmission, and distribution. The government has separated PHCN into eleven distribution firms, six generating companies, and a transmission company, all of which will be privatized. Several problems, including union opposition, have delayed the privatization, which was later rescheduled for 2006. In February 2005, the World Bank agreed to provide PHCN with \$100 million to assist in its privatization efforts [5].

The Nigerian power sector before the advent of the May 29,1999 government was, to say the least, in a deplorable state. Only 15 out of 79 generating units installed were operational in 1999 with a generation capacity of only 1,520MW. While the government clearly understood that massive investment in all the three tiers of the electricity industry was necessary, a holistic approach was essential in tackling the problem. The first few years were therefore utilized in system studies, planning and preliminary engineering designs. The rehabilitation of existing facilities, as a transitional initiative, raised generation capacity to about 3,000MW by the year 2003. This effort was to provide some relief to consumers because new power plants take several years to come on stream. As an example, a hydro power plant usually takes up to 6 years to complete.

The Federal Government has already taken quantum leap in addressing the decay in the nation's power sector by resuscitating through the provision of new host capacity, expansion of INDEPENDENT POWER PRODUCERS (IPP) as well as improved funding to the tune of N170 billion in capital allocations since 1999. World Bank financial assistance for the sector came through multilateral and bilateral grants and credit facilities to the tune of \$100 million IDA credit.

**Table 1:** (NCC 2011)

<b>IPP(To National Grid)</b>	<b>Availability Factor</b>	<b>Average Availability(MW)</b>	<b>Installed Capacity(MW)</b>	<b>Location</b>
Rivers IPP	0.2	35.12	180	Rivers State
Omoku GT	0.26	38.53	150	Omoku
Trans-Amadi GT	0.31	30.65	100	Rivers State
Okpai gas	0.92	440.86	480	Okpia
Ibom	0.21	32.08	155	Ikot Abasi(Akwa Ibom)
Afam vi(gas)	0.93	603.7	650	Rivers State
A.E.S (gas)	0.68	203.99	302	Egbin(Lagos State)

This table shows the average availability, availability factor, installed capacity and the Location Where;

Availability Factor =Average MW Availability / PI

PI = The sum of current site rating of commissioned units installed in the station for the year

Average Availability = Average usable MW capacity of each station putting gas pressure constraints and other external factors into consideration

### Analysis of Power Generation in IPP's

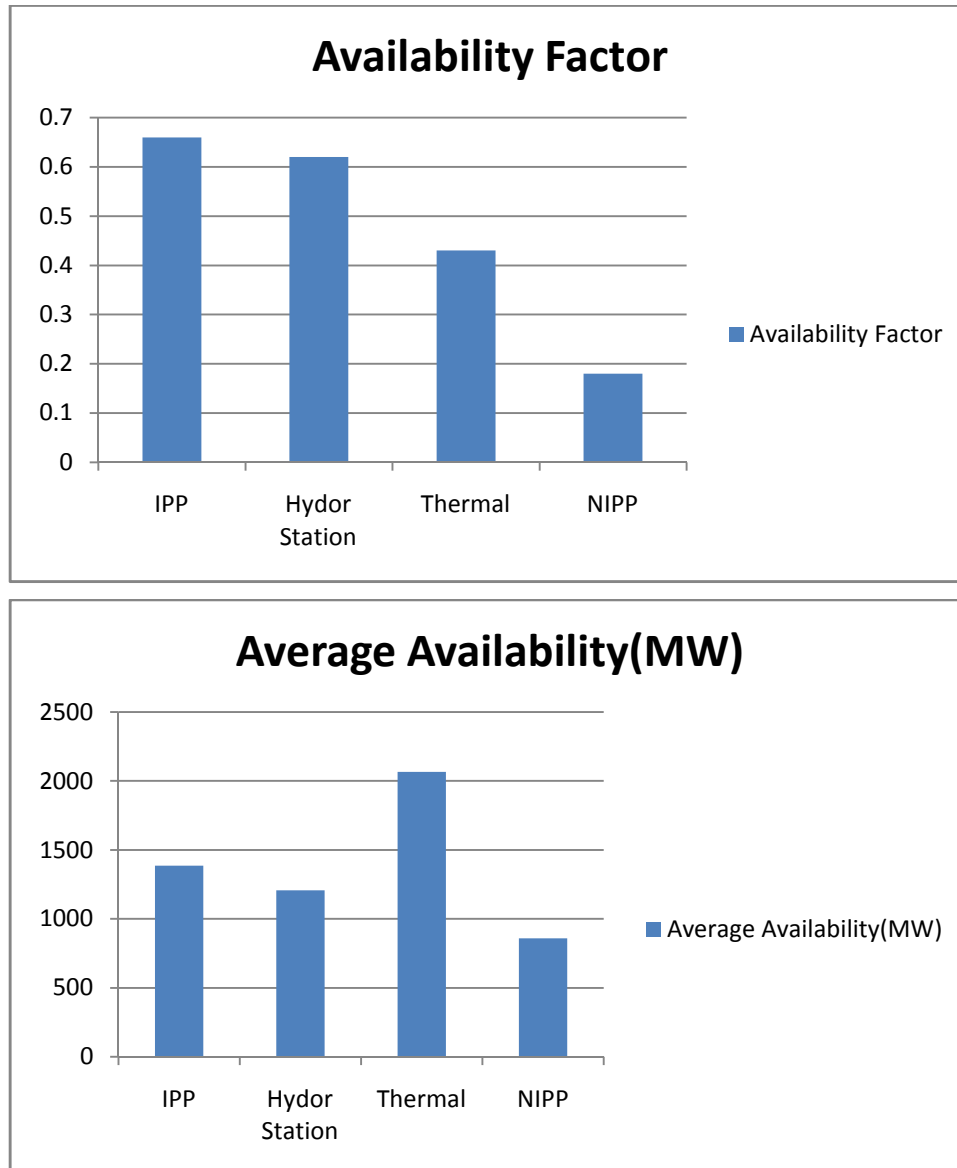
This is a table showing the Installed capacity, Availability factor and Average availability for the various power generation stations in Nigeria.

**Table 2:(NCC 2011)**

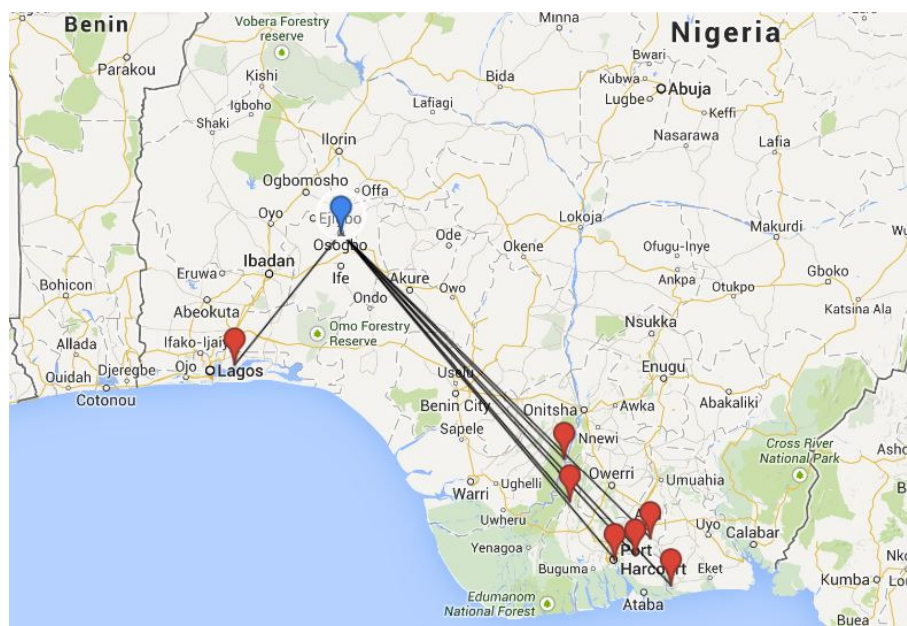
<b>IPP</b>	<b>Average Availability(MW)</b>	<b>Installed Capacity(MW)</b>	<b>Availability Factor</b>
Ajaokuta	0	110	0
Omoku GT	51.2	150	0.34
Trans-Amadi GT	42.38	100	0.42
Okpai gas	404.14	480	0.84
Ibom	104.52	155	0.67
Afam vi(gas)	486.16	650	0.75
A.E.S (gas)	200.86	302	0.67
<b>Subtotal</b>	1289.26	1947	0.66
<b>Privatized Hydro Station</b>			
Kanji Hydro	382.13	760	0.5
jebba Hydro	430.48	578.4	0.74
Shiroro	392.78	600	0.65
<b>Subtotal</b>	1205.39	1938.4	0.62
<b>Privatized Thermal station</b>			
Egbin Steam	939.11	1320	0.71
Afam (I-V) (Gas)	64.84	351	0.18
Delta (Gas)	246.78	900	0.27
Sapele ST	135.41	720	0.19
Geregu(Gas)	254.99	414	0.62
Olorunsogo I	137.03	355	0.41
Omotosho	89.4	355	0.27
<b>Subtotal</b>	1867.55	4375	0.43
<b>NIPP</b>			
Olorunsogo II	108.95	500	0.22
Sapele NIPP	8.17	150	0.05
<b>Subtotal</b>	117.12	650	0.18

**Table 3:** (NCC 2012)

<b>IPP</b>	<b>Availability Factor</b>	<b>Average Availability(MW)</b>	<b>Installed Capacity</b>
Rivers IPP	0.2	35.12	180
Omoku GT	0.26	38.53	150
Trans-Amadi GT	0.31	30.65	100
Okpai gas	0.92	440.86	480
Ibom	0.21	32.08	155
Afam vi(gas)	0.93	603.7	650
A.E.S (gas)	0.68	203.99	302
<b>Subtotal</b>	0.69	1384.93	2017
<b>HYDRO</b>			
Kanji Hydro	0.39	295.38	760
jebba Hydro	0.72	414.42	578.4
Shiroro	0.83	497.46	600
<b>Subtotal</b>	0.62	1207.26	1938.4
<b>THERMAL</b>			
Egbin Steam	0.77	1022.56	1320
Afam (I-V) (Gas)	0.27	95.32	351
Delta (Gas)	0.27	246.23	900
Sapele ST	0.14	98.52	720
Geregu(Gas)	0.66	274.96	414
Olorunsogo I	0.64	214.39	335
Omosho	0.34	113.02	335
<b>Subtotal</b>	0.47	2064.99	4375
<b>NIPP</b>			
Olorunsogo II	0.66	496.2	750
Omosho NIPP	0.29	144.73	500
Sapele NIPP	0.58	218.26	375
<b>Subtotal</b>	0.53	859.2	1625



It can be seen from this Table and Chart that the Availability Factor of the IPP is more than other generating stations, due to the fact that they are compact and easier to run and maintain also they are wide spread across various places across the states. Also the IPP's are next to thermal stations in terms of Average Availability (MW) in terms of supply to the national grid.



Transmission Station

Independent Power Plant

## Challenges of IPP

### Illegal Electricity Connections

The connection of consumers illegally to the grid is rampantly increasing in the nation and if not intensively dealt with would affect any progress design for the power sector in the future. Even some government officials who should be an example to citizens practice these illegal acts. These illegal connections are not accounted for and no funds are generated from these connections and in the end there is a negative effect on the power sector and citizens.

### Over/Under Billing

Most payment are not made through the proper channel. There are illegal deals made to cut down people's payment while they get a percentage of what is issued out as payment. Sometimes, the meters are not read correctly which leads to over/under billing of consumers.

### Poor Metering

Lots of revenue has been lost due to this problem. Many at times, people are not billed according to the amount of power they use either because they do not have a meter or are illegally connected to the grid. Also, the fact that most electric officials could be threatened so that such homes or areas are not visited by PHCN officials.

## Conclusion

With this statistical analysis, we can conclude that IPP's are efficient vehicles for sustainable energy generation in Nigeria, It would be imperative for the federal government to invest more in the development and construction of IPP's at various locations across the Nation. Lagos

state under the Fashola administration has convinced the people that steady power is possible as it has demonstrated with its four Independent Power Projects at Ikorodu, Akute, Lagos Island and recently, Secretariat, Alausa, Ikeja. It is currently pursuing similar projects at Lekki, Ikeja GRA and Ikorodu as well as Matori and Imota Industrial Schemes. Equally, government is currently working on a plan to put in place a power plant in Somolu, a popular hub for commercial and industrial printing. This is also a clarion call for states to take a cue and begin work on development of IPP's at strategic locations to combat strategic power needs [1].

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