

Nigeria's Abundant Gas Reserves and Shortfall in Electricity: A case of Under-Utilization.



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Introduction

It is common knowledge in the international oil and gas industry that gas is gaining significant share in the global energy mix, and the World Bank estimates that the global demand for gas will outstrip oil by the year 2025.¹ Global demand for Liquefied Natural Gas (LNG) is set to rise by 9 % a year during the next decade with Nigeria playing a key role in supplies.²

According to the BP Statistical Review of World Energy 2011,³ Nigeria has an estimated 187 Trillion Cubic Feet (Tcf) of proven natural gas reserves⁴ as of December 2010, making it the ninth largest natural gas reserve holder in the world. The majority of Nigeria's natural gas reserves are located in the Niger Delta region of the country. Many believe that Nigeria is a gas province with drops of oil in it.⁵ Experts estimate the country's gas life expectancy at over 100 years. The Nigerian National Petroleum Corporation (NNPC), the

¹ Opening address to the 143rd Meeting of the OPEC Conference on December 14, 2006 at <http://www.opec.org/opecna/Press%20Releases/2006/pr192006.htm> last assessed October 6, 2011.

² Ibid.

³ www.bp.com/.../bp.../statistical_energy_review_2011/..../statistical_review_of_world_energy_full_report_2011.pdf - Similar last assessed October 10, 2011.

⁴ According to the report, proven reserves are accepted to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions.

⁵ Ugeh, P., Yar'adua: New Gas Policy Underway. At <http://allafrica.com/stories/200711270482.html>.

country's national oil company estimates that its gas reserve could reach about 600trillion CF in 15 years with the commencement of focused gas exploration processes.⁶ However, the sector remains largely undeveloped at the moment due to limited infrastructure. In 2010, the total value of natural gas production⁷ was 30.3 Billion Cubic Metres (Bcu) representing just 1.1% of total world production.⁸

The Gas Advantage

By harnessing its natural gas reserves, Nigeria could single-handedly cater for the energy needs of the West Africa sub-region; yet according to a 2009 data by the International Energy Agency, electrification rates for Nigeria stood at 50%, indicating that approximately 76 million people out of its 150 million population, do not have access to electricity.⁹ Thus, this newsletter examines reforms by the Federal Government of Nigeria towards harnessing the vast gas reserves to address shortage of electricity in the country.

Power Generation

Power generation is one of the oldest and major methods of utilizing gas, yet Nigeria

with its abundant gas reserves is known for regular power outage.¹⁰ The situation is such that the country has a total installed generating capacity of about 5,600MW. However, for the past two decades, the actual generated capacity has hovered between 3,000MW and 4,000MW.¹¹ As such, the level of electricity supplied to the nation is grossly insufficient and is far less than the base load demand and the installed capacity of many countries with far less population than Nigeria.

The amount of electricity required for a developed and industrialized nation is estimated at 1,000 MW per 1 million people.¹² Though, Nigeria is not a developed or industrialized nation, with a population of approximately 150 million, Nigeria should be generating much more electricity than it currently generates in order to derive the optimum benefits derivable from having an efficient power industry.¹³ To resolve Nigeria's power dilemma, the Federal Government adopted the National Electric Power Policy in 2001 with the intention of carrying out a comprehensive power sector reform. Till date, not much has been achieved.

⁶ African Crisis: "Nigeria; ExxonMobil Forecasts Gas Surpassing Coal by 2012". Online newspaper, February 2, 2011 at www.african-crisis.co.za/article.php?ID=90019&

⁷ Excluding flared or recycled gas

⁸ BP Statistical Review of World Energy 2011

⁹ Energy Policy available at www.iea.org, last assessed October 10, 2011.

¹⁰ Yusuf, B: Nigeria- Nyanya-Gwandara Sends SOS on Power Outages on March 31, 2008 at <http://allafrica.com/stories/200803311166.html> last assessed at October 6, 2011.

¹¹ Roadmap document for the Nigerian Electricity Supply Industry.

¹² Ayodele Oni: Domestic gas pricing and Electricity mismatch: A case for Adjustments to attract Private Sector at sdayonline.com/NG/index.php/law/legal-insight/26440 last assessed October 4, 2011.

¹³ Ibid

Attempts to revamp the problem facing the Nigerian electricity supply industry began as early as 1988 with the commercialization of the National Electric Power Authority (NEPA), now known as Power Holding Company of Nigeria (PHCN) and the upward review of tariffs. These efforts, however, hardly made any impact.

In 1999, the Government embarked on infrastructure rehabilitation and expansion programmes which eventually led to the launch of the Nigerian Integrated Power Projects in 2005. A subsequent reform process in 2005 led to the enactment of the Electric Power Sector Reform Act (EPSRA) 2005, which transitioned the then NEPA into PHCN. The key objectives of the EPSRA includes the liberalization of the power sector, the privatization of the key assets of PHCN, the promotion of independent power generation initiatives, and the development of a viable wholesale electricity market over time.

Power generation in Nigeria is mostly derived from either thermal or hydropower.¹⁴ The two principal consumers of natural gas in Nigeria are the power and industrial sectors (including manufacturing, aluminum and steel industries) as there is little or no natural gas supply for household purposes in Nigeria. The largest single domestic consumer of gas is the utility

¹⁴ Ernie, J., Oil & Gas Journal: *Natural Gas Offers Nigeria a Huge Potential Challenge*, (July 2, 2001).

company, PHCN,¹⁵ with 6 thermal power stations using gas as feedstock for power generation. As at 2008, Nigeria had 14 available generating plants, 11 thermal and 3 hydro plants with an installed capacity of 7876mw, out of which only 4361mw formed the available capacity while output was about 3000mw.¹⁶

The effect of this is incessant black outs within the nation, as only about 40% of the Nigerian population have access to electricity.¹⁷

In order to boost power generation through gas, the Nigerian government in 2008 initiated the Nigerian Gas Master Plan (the "Master plan") part of which focused on developing gas to power. Thus both the Electricity Reform Policy and Nigerian Gas Master Plan are targeted at resolving the erratic power supply problems in Nigeria, whilst also prioritising the utilisation of the country's abundant gas reserves.

¹⁵ See Overview of Power Sector at <http://www.bpeng.org/CGI-BIN/companies/Infrastructure%20and%20Network/Power/NEPA%20%20Power%20Holding%20of%20Nigeria.pdf> last assessed September 29, 2011

¹⁶ Amanze-Nwachukwu, C., & Okwuonu, F., *Nigeria Electricity Tariffs to rise next month* on February 21, 2008 at <http://xymbollab.net/stories/200802210325.html> last assessed September 30, 2011

¹⁷ CWC Website at <http://www.cwcniif.com/index.php?page=infrastructure> Last assessed October 10, 2011

The Gas Master Plan

In 2008, the Nigerian government introduced the Gas Master Plan to address the issue of power shortage in Nigeria. The Master plan which is a guide for the commercial exploitation and management of Nigeria's gas sector is aimed at growing the Nigerian economy by pursuing 3 key strategies as follows: a) stimulating the multiplier effect of gas in the domestic economy; b) positioning Nigeria competitively in high value export markets; and c) guaranteeing long term energy security in Nigeria. The Plan comprises guidelines on the Domestic Supply Obligation Regulation, the Gas pricing policy, and the Nigerian Gas Infrastructure blueprint whilst placing emphasis on domestic market as opposed to exports.

The Domestic Gas Supply Obligation

The Domestic Supply Obligation¹⁸ is the first major attempt to refocus gas resource for domestic use in Nigeria. It requires gas producers to set aside a pre-determined amount of gas reserves and production for supply to the domestic market.

Reports indicate that the Domestic Supply Obligation Regulation, referred to as the incomplete bible of Nigeria's petroleum industry, was coined from the Petroleum

Act.¹⁹ Section 34 of the Second Schedule to the Act provides thus:

"If he considers it to be in the public interest, the Minister may impose on a license or lease to which this Schedule applies special terms and conditions not inconsistent with this Act including (without prejudice to the generality of the foregoing) terms and conditions as to;

(a) Participation by the Federal Government in the venture to which the license or lease relates, on terms to be negotiated between the Minister and the applicant for the licence or lease, and

(b) Special provisions applying to any natural gas discovered, which provisions shall include-

(i) the right of the Federal Government to take natural gas produced with crude oil by the licensee or lessee free of cost at the flare or at an agreed cost and without payment of royalty;

(ii) the obligation of the licensee or lessee to obtain the approval of the Federal Government as to the price at which natural gas produced by the licensee or lessee (and not taken by the Federal Government) is sold and

(iii) a requirement for the payment by the licensee or lessee of royalty on natural gas produced and sold."

The aim of the Domestic Gas Obligation is to make gas available for the strategic

¹⁸ Also termed the "Domestic Reserves Obligation"

¹⁹ Petroleum Act, Cap 350. LFN 1990. Theresa Okenabrie: The Domestic Gas Supply Obligation: Is this the Final Solution to Power Failure in Nigeria? How can the Government make it work?

domestic sector, especially for power generation. The obligation empowers the Honorable Minister of Energy (Gas) to stipulate the requisite amount of gas periodically for a period lasting about 5-7yrs by taking into consideration government's aspirations for the domestic economy ensuring that adequate gas resources are dedicated for rapid industrialization. The operators are expected to comply with the obligations or face a penalty of \$3.5/mcf for gas under-supplied, restricted export or both as the Minister of Energy may decide. The regulation also provides for the establishment of a Department of Gas within the Ministry of Energy that will oversee the execution of this regulation in conjunction with the Department of Petroleum Resources (DPR).

Gas Pricing Policy

The Master Plan also highlights the pricing policy which has key features such as the unequivocal commitment of the Federal Government of Nigeria to making gas available and affordable within the domestic market. The International Oil Companies (IOCs) are to align their gas portfolios such that rich natural gas liquids is to be directed to the domestic market, thus ensuring that Nigeria benefits from the opulence of its gas by making it relatively more affordable for domestic use.

Under this policy, the Nigerian domestic market is grouped into 3 categories namely:

- (i) the strategic domestic sector, which provides power to residential and commercial users;
- (ii) the strategic industrial sector, responsible for gas supplies as feedstock in the creation of new products e.g. fertilizer, methanol, Gas-to-liquid projects; and
- (iii) the commercial sector, which handles supplies to various manufacturing and production companies as industrial fuel.

This categorization forms the basis of the pricing framework which determines the floor price for the different sectors. Also embedded in the pricing policy is the establishment of a Strategic Gas Aggregator to manage the demand and supply of gas in the domestic market and align the reserves obligation accordingly.

Gas Infrastructure Blueprint

The Gas Infrastructure Blueprint presents a plan for investing in gas infrastructure in Nigeria comprising the creation of 3 domestic central processing facilities at the Warri/Forcados area, Akwa Ibom/Calabar area and Obiafu area (north of Port Harcourt).

These central processing facilities will serve as the major gas hubs where wet gas from gas fields will be assembled, treated and processed. Liquefied Petroleum Gas (LPG) and condensates will be extracted at these facilities and the dry gas fed into a network of gas transmission lines. With this arrangement, more LPG will be available for

domestic use and the recurrent problem of liquids ingress into pipelines which has continually impacted on power supply is set to be permanently eradicated.

Also, three franchise areas will be delineated around the central processing facilities, thus only licensed investors within a franchise area will be allowed to develop and operate the facility, thereby preventing proliferation of gas facilities with attendant cost impacts.

The Blueprint further provides for the development of 3 major domestic gas transmission systems in Nigeria, namely: the Western System comprising the existing Escravos Lagos Pipeline System (ELPS) and a new offshore extension to Lagos; the first South-North gas transmission line set to take dry gas from the Akwa Ibom/Calabar facility to Ajaokuta, Abuja, Kano, Katsina and also serve the Eastern states of Anambra, Abia, Ebonyi, Enugu and Imo; and an inter-connector that links the Eastern gas reserves centre with the other two transmission systems. The transmission infrastructure will enable the industrialization of the Eastern and Northern parts of Nigeria, and enable connectivity between the East, West and North, which currently does not exist. In addition, the system is developed as a grid, ensuring redundancy and multiple accesses to gas markets from any gas source.

Effect of Domestic Gas Obligation on current commercial contracts

In as much as the IOCs initially embraced the Domestic gas obligation, they have failed to contribute their quota claiming that compliance with the said obligation will affect their long term export contracts. According to the IOCs, they have already committed their reserves into long term Gas Sales and Purchase Agreements with "Take and Pay" clauses and to breach these contracts is to jeopardize their businesses.²⁰ The IOCs are of the opinion that it is the duty of the Federal Government to first address the security challenges and the domestic gas supply infrastructure deficiency rather than compel profit-oriented, private entities to get involved when their returns on investment cannot be guaranteed.²¹

The IOCs further claim that they are not in the business of power production. This seems a paradox given that about a decade ago, before the long term gas contracts were signed, some oil majors, notably Mobil, Agip and Shell, as part of their plans to eliminate gas flares by 2008 and boost the power supply in the country, engaged the Federal Government in discussions on building power plants and using their substantial gas production as feed stock.²² The combined output from their proposals, set to be available within thirty six months if agreed by the Federal Government, was

²⁰ Theresa Okenabrie; Ibid

²¹ Ibid

²², Mobil proposed a 350MW plant in Bonny, Agip a 900MW, two-phased construction in Okpai while Shell was to take over Afam and Sapele Plants in addition to building a fresh one of about 700MW.

over 3,000MW of Greenfield power generation. The oil majors at the time also proposed to generate electricity at 2-3cents per kw/hr, using their own gas as feedstock, as against PHCN's generation cost of over 9cents per kw/hr.²³ They proposed to sell electricity to PHCN at 4cents per kw/hr, which they hoped would increase over time, when the state entity will be compelled to pay market price for gas.²⁴ However, as a condition precedent, they demanded a Government guarantee that electricity transmitted to PHCN would be paid for. It was their contention at the time that PHCN was not even paying the very low price that was charged by NNPC for gas supplied to the entity for power generation and could therefore not be trusted to pay for electricity supplied.

Several options were proposed to offer this guarantee, including an undertaking by NNPC to allow them net-off their power supply bill against their Royalty/PPT obligations.²⁵ The Federal Government however declined to give the guarantee and this stalled further negotiations. On the other hand a single phase of the Agip project was actualized and came on stream within thirty six months. Agip has however not been paid for the power generated.²⁶

²³Theresa. Okenabrie, Ibid

²⁴ Ibid.

²⁵ Other form of guarantee included dedicating some banks as electricity payments collection agents for PHCN. These Banks would in turn guarantee the electricity producers against the PHCN collections with their banks.

²⁶ Theresa. Okenabrie, Ibid.

In practice, where a system is capacity short, the best way to attract investment into power generation sector is to grant investors license to construct project on the basis of a Build Operate and Transfer (BOT) scheme. Under such scheme, investors will build and operate a project and sell the product to earn revenue as return on investment for a set period of time. Thereafter, the ownership of the project is transferred to the host government, and under a service contract the private entity will continue managing the facility.

The risk is thus allocated between the project and the buyer. A government guarantee will be required in the BOT scheme, mostly because of the poor credit rating of the state owned electricity supply company and the fact that there is no market and no other way to mitigate the risk as the only off-taker is the state owned entity.

Funding Options

Among various concepts advanced for the actualization of the government's yearning, the involvement of private sector investors and the concept of Public-Private Partnership (PPP), a concept spreading across the globe for efficient and proper management of public utilities and services have been given priority. The electricity sector in Nigeria had been under the full operation and management of the government. However, inefficiency, depletion in quality, lack of funding and deep dive in management capacity has

made room for the introduction of private sector expertise. To achieve this surmountable quest, the following needs to be put in place by the Federal Government:

- Create an attractive fiscal and regulatory regime that will build investor confidence from private sector investors.
- Remove all obstacles to private sector investments, regulatory and otherwise.
- Introduce and operate of a fair and transparent reformed sector that will transform decades of paralyzing government monopoly into private sector efficiency.
- The introduction and utilization of various electricity technologies that are readily available, with the requisite investment climate, supported by a transparent and efficient management scheme.

Power Sector Reforms: Egypt

As at 2004, Egypt had installed generating capacity of 17.06 Gigawatts (GW) with set target to add 4.5 GW by 2007 and 8.38 GW by 2012. 84 % of Egypt's electric generating capacity is thermal (natural gas), with the remaining 16 percent hydroelectric.²⁷ All oil-fired plants have been converted to run on natural gas as their primary fuel. Electricity demand has grown over the years necessitating the building of several new

²⁷ Langdon D. Clough: The Encyclopaedia of Earth; Energy Profile of Egypt at www.eoearth.org/article/energy_profile_of_egypt .last assessed October 10, 2011

power plants. Currently Egypt has 7 regional state-owned power production and distribution companies, held by the Egyptian Electricity Authority (EEA).²⁸

In July 2000, the EEA was converted into a holding company, though still owned by the state. Egypt has privately-owned power plants currently under construction financed under Public-Private Partnership (PPP) schemes. In 2001, the first PPP project, a gas-fired steam power plant with two 325-megawatt (MW) generating units, located at Sidi Kerir on the Gulf of Suez costing \$450 million, began commercial operation. Electricity from the plant is priced at 2.54 cents per kilowatt-hour reflecting a competitive market price²⁹. Competitive Price stems from the availability of cheap natural gas with the duration of operational license fixed at 20yrs for investors. Several other PPP projects on electricity generation are coming up progressively in line with population growth such as Electricite de France (EDF) with two gas-fired plants and a part-solar power plant at Kureimat.³⁰

Ghana:

From the year 2000 to 2009, residential demand for electricity rose by 61%. Ghana's target to increase electricity generation is set at 65% to 3,600 MW by 2013.³¹ Power

²⁸ Ibid.

²⁹ Middle East Economic Digest: Egypt Energy: Electric Power at www.egyptenergy.com last assessed October 10, 2011

³⁰ Ibid

³¹ Mbendi Information Services; Electricity Power in Ghana: Overview at www.mbendi.com last assessed October 10, 2011

sector reform is directed at new private sector investments. In 1997, the Public Utilities Regulatory Commission (PURC) was set up in Ghana to set tariffs, policies and promote competition in the sector. The country's Grid Company was created to provide fair and open access to the transmission grid which has provided a clear legal and commercial basis for private sector power generation. Projected growth of Independent Power Producers was about 19% in 2000 to 31% of total power generation capacity in the country by 2013. Transition from total reliance on hydroelectric power to gas-thermal fuel sources was promoted by the government. The country has also invested in the West African Gas Pipeline for the latter to supply power plants in Ghana with cheap natural gas from Nigerian oil fields.³² This has further accelerated the trend towards building gas-fired thermal plants and by 2013, thermal power plants will, for the first time, supersede hydroelectric power and account for 66% of total installed power generation capacity in Ghana.³³

Recommendations

- More than just prioritizing the development of gas via reforms, the Federal Government of Nigeria should create an enabling environment in the sub-sector for

private sector investment confidence.

- Establishment of an independent regulator in the gas sub-sector to introduce and implement a market driven regulatory framework geared towards promoting full liberalization of the sub-sector.
- Gradual removal of subsidies to integrate economic and market driven prices for electricity to balance the interests of electricity producers/suppliers and consumers.
- The independent regulator should be transparent and flexible to avoid any form of regulatory capture.
- Establish Third-Party-Access (TPA) regulatory framework to allow access to the national grid by other parties without undue influence and costs.
- Fully liberalize all sectors of the electricity industry: generation, transmission, distribution, supply and metering with infinite possibilities for investors.
- Provide the required Federal Government guarantees and bonds to support and promote investors confidence on ROI.
- The Federal Government should set a barometer to measure success in the electricity sector under the following headings;
 - Price of electricity
 - Density and spread
 - Efficiency
 - Quality of service

³² Mbendi Information Services; Electricity Power in Ghana: Overview at www.mbendi.com last assessed October 10, 2011

³³ Ibid.

- Growth of the sector
 - Policy transformation and flexibility amongst others.
- Appropriate infrastructure for gas development such as a gas bank for the storage of excess products among others.

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**Power & Energy Group
Aina Blankson LP
5/7 Ademola Street
South-West Ikoyi
Lagos**

Tel: +234 1 8980882-3

Fax: +234 1 2710566

www.ainablankson.com

For further information please contact any of the contributors:



Chinonyelum Uwazie
c.uwazie@ainablankson.com



Kingsley Sawyerr
k.sawyerr@ainablankson.com



Olabanji Adewusi
o.adenusi@ainablankson.com



Tolulope Olaiya
t.olaiya@ainablankson.com

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