NIGERIAN GAS MASTER PLAN: *STRENGTHENING THE NIGERIA GAS INFRASTRUCTURE BLUEPRINT AS A BASE FOR EXPANDING REGIONAL GAS MARKET*

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Abstract: *The abundance of natural gas reserves in the Western Africa state of Nigeria have over the past few years stimulated a lot of vital projects that placed the country on the global map of major gas players of this century. These projects are poised to expand not only domestic utilization but expand regional frontier in the natural gas market in the West Africa coast.*

This paper presents in details the current Nigeria Gas Master plan put in place by the government of Nigeria, which seeks to address the network of gas infrastructure positioned to establish a vibrant gas economy for not only the country but the whole region. The aim is to refocus the gas resource of country to stimulate the domestic market, its growth, regional development and the export market. The success story of the various gas projects such as the LNG and GTL projects are well narrated in the paper with particular emphases on their roles in actualizing the Nigeria Gas Master Plan.

This paper highlights the current position of the West Africa Gas Pipeline Project, one of the major gas integration projects with the challenges faced so far and finally a brief account of the proposed Trans-Sahara Gas Pipeline Project is also given.

1. INTRODUCTION

From the beginning of oil exploration in Nigeria it was discovered that the oil fields of the Niger Delta were richly endowed with enormous amount of gas reserves that have increased today to a value of about 185TCF.

The country is ranked 7th in terms of proven natural gas reserves in the world, the natural gas reserves/production being estimated as 109 years[1]. Earth scientists believe that there are more gas reserves not found which when discovered may double the current figures.

These resources are evenly distributed between associated and non-associated gas and are greatly characterised as some of the best quality in the world. However, due to low utilization in domestic and industrial usage of natural gas and the limited gas distribution infrastructure, Oil industries producing natural gas in association with their crude oil production have been compelled to flare these gases due to some of the reasons listed below:

1- Limited numbers of appropriate reservoirs conducive for gas re-injection and storage and the economics of the process.

2- Financial commitment of developing major and interconnecting network of gas pipelines.
3- Low technology and industrial base for energy consumption in the country
4- Limited regional market
5- Inadequate fiscal and gas pricing policies to encourage investment.

2. GAS INDUSRTY UPDATE

From an era of gas flaring, Nigeria is speedily moving into a major gas player globally. Projected growth rates from the late 90s show an exponential increase in gas produce from these reserves. Government policies in the gas sector now have instruments that are aimed at increasing the GDP by 10%. These instruments will further pursue the zero flaring policy while developing an integrated infrastructure strategy that will support the domestic, regional and export market. The figure1 below shows the projection of gas utilization in Nigeria.

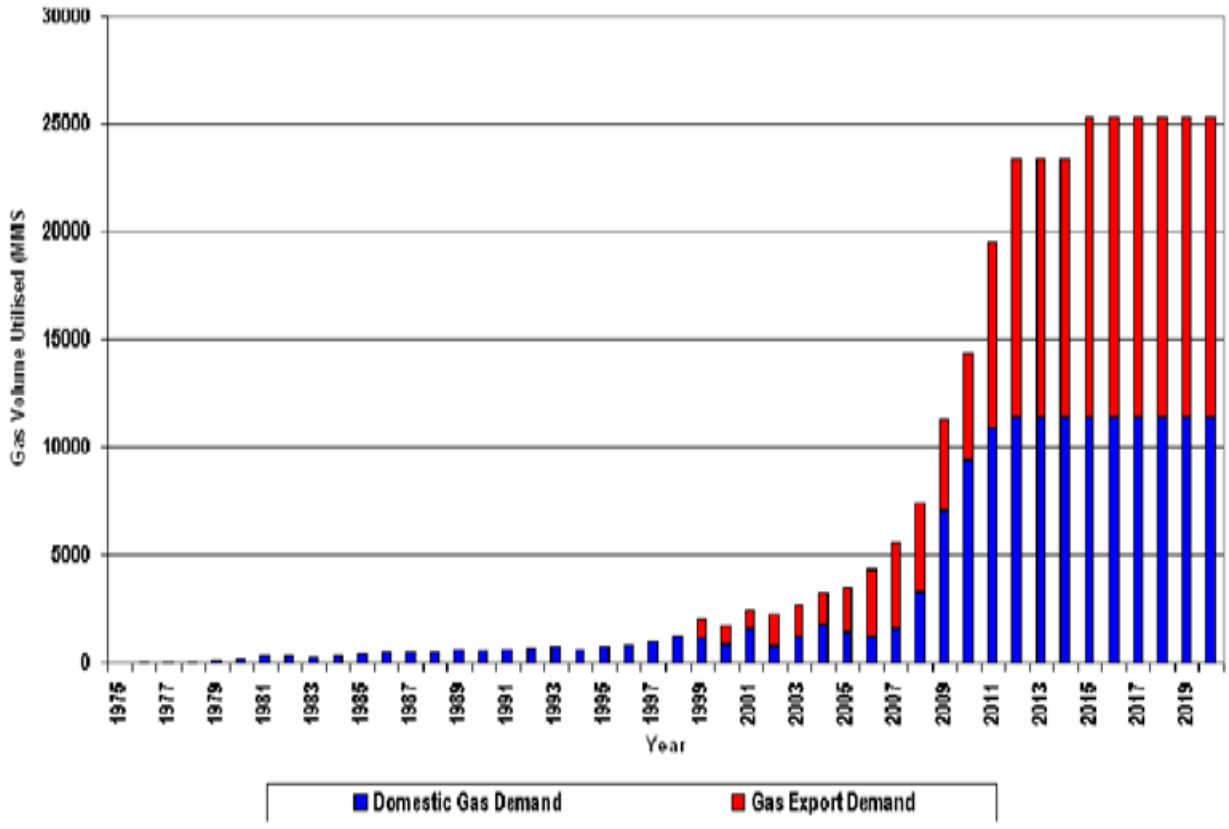

Figure 1. Nigeria's Historical Gas Utilization and Forecast Potential Demand [source: www.ngmproadshow.com]

THE GAS EXPORT MARKET

Nigeria LNG

The exportation of liquefied natural gas commenced in 1999 with the establishment of the Nigeria Liquefied Natural Gas Company. The company was incorporated as a limited liability company May 17th 1989, jointly owned by the Nigeria National Petroleum Corporation (49%), Shell (25.6%), Total (15%) and Eni (10.4%). Construction at the plant site of Train 1 and 2 (also known as the Base Project) commenced in February 1996. By August 1999, Train 2 was completed, on August 12 of the same year; the plant was ready for start-up and production of LNG commenced on September 15. Train 1 of the Base Project came on stream February 27th, 2000.

In February 1999, Final Investment Decision (FID) was taken for Train 3. The train came into operation in November 2002, NLNG Plus comprising of Train 4 and 5 came on stream November 2005 (for Train 4) and February 2006 (for Train 5). Train 6 (NLNG Six) was started up in the last quarter of 2007.

With the completion of the NLNG Six Project, the Nigeria LNG has an overall capacity of some 22mtpa of LNG, 4mtpa of LPG and condensate from 3.5 bcf/d feedgas intake. Plans for building Train 7 that will lift the total production capacity to just over 30mtpa LNG by 2010 are currently at an advance stage[1].

Brass River LNG

The above success motivated investors and the government to initiate the construction of two more LNG plants. These include the $3.5 billion Brass River LNG plant which is currently waiting for the FID to be signed for full scale construction to begin. The shareholding structure of the company reflects that the Nigerian National Petroleum Corporation holds 49 per cent; Eni, 17 per cent, Conoco Phillips, 17 per cent and Total, 17 per cent respectively[2]. The Front-End Engineering design of the plant was for two trains each nominally sized at 5 million metric tons per year; facilities for liquefied butane and propane extraction, segregation, and treatment; two 185,000 cm LNG storage tanks; two 110,000 cm LPG storage tanks; one 500,000-barrel capacity NGL tank; marine facilities for the products export; and accommodation for plant operators. The facility is targeted to be in operation by 2011 and volumes have been committed. In early 2006, a memorandum of Understanding with BP, BG Cargo and Suez LNG Trading S.A, each for a 20 years period was signed. Brass LNG Limited has also entered into a project management contract with Bechtel Corporation of the United States to manage some aspects of construction work on the Brass LNG project. The contract covers the co-ordination of all plant site activities for construction of the Brass LNG project, as well as other works involved in construction of the plant. These include site preparation, construction camp and construction dock; permanent operator housing and amenities, marine facilities, common facilities and support services, tankages, utilities and off-sites, and others. Bechtel was chosen because of its proven track record, with world-class experience in the implementation of the ConocoPhillips Optimized

Cascade Process, which has also been adopted for the Brass LNG plant.[3]

Olokola LNG

The other LNG plant under evaluation is the Olokola LNG (also known as OK LNG) which is to be situated at the western axis of the Niger Delta. This plant which is to cost over $7 billion is designed with an initial capacity of 11mtpa is funded through a joint venture whereby the Nigerian government holds 49.5 per cent stake, Royal Dutch Shell, 18.5 per cent, Chevron, 18.5 per cent and the British Gas Group 13.5 per cent. OK-LNG will have four trains with a capacity of 22m t/y by 2012/13, with the first two trains (11m t/y) proposed to be on stream in 2011. In the second phase the complex will also produce about 300,000 b/d of LPG and condensate. Ultimately, the complex will have the capacity of 33m t/y of LNG. Gas supply to OK-LNG would initially come from Shell and Chevron operated JVs. About 1,000 MCF/d of gas would be required for each train. Another 500 MCF/d will be needed for internal energy consumption. The BG group, one of the shareholders, has option to participate in the supply of gas to the third and fourth trains.[4]

The Escravos Gas-To-Liquid

The Escravos Gas-To-Liquid project is another project which is currently underway. The project which is jointly owned by Chevron Nigeria Limited(75% share) and the Nigeria National Petroleum Company NNPC (25%) will form an integral part of the owners overall gas utilization strategy that includes domestic gas sales, regional natural sales through the West Africa Gas Pipeline (WAGP) and international sales of GTL products.

The proposed GTL plant will be capable of converting over 300million cubic feet of natural gas a day into premium environmentally friendly fuel, diesel and GTL naphtha products. The Escravos gas to liquids facilities will combine technology from Sasol, a South African-based Fischer-Tropsch technology company, and Chevron, specializing in hydro processing technology. Project cost is estimated at $1.7bn and initial plant capacity designed for 3400 barrels per day and expected to expand to a 120,000bpd capacity within ten years of completion.

This plant is located adjacent to the CNL Escravos Gas Plant - phase 1(EGP-1). This plant process about 150 million cubic feet of gas per day and produce LPG for sales to the international market and pipeline quality gas for domestic use. The EGP-1 project which cost $550 million was completed in 1997. The NNPC/CNL Joint venture is currently expanding the gas plant (EGP-2) and plans to construct an additional plant (EGP-3) to ensure sufficient gas supply for the EGTL and the West Africa Gas Pipeline project.

Oso NGL Plant

The NNPC / Mobil JV commissioned the Oso NGL project in Nigeria in 1998. Feed gas for the NGL plant comes from the Oso Condensate field and other associated gas productions. The Oso Condensate field began production in 1992 and produces 110,000 barrels per day. The Oso NGL project is expected to recover 350 million barrels over its life time without any impact on condensate production. The project involves two

principal locations, the offshore site at the Oso field and the onshore site at the Bonny River Terminal.

REGIONAL MARKET DEVELOPMENT

A - West Africa Gas Pipeline:

The regional market is one that the Nigeria Gas Industry is working at with all vigour. In an effort to expand its regional market to countries within the Western African coast, the West Africa Gas Pipeline project was established. The project history dates back to 1982 when the Economic Community of West Africa States proposed the development of a natural gas pipeline through West Africa. In the early 90s, a feasibility report deemed the project to be commercially viable. In September 1995, the government of four African countries signed the Heads of Agreement. The feasibility study was carried out in 1999. On 11th of August 1999, a Memorandum of Understanding was signed by participating countries. In February 2000, an inter-Governmental Agreement was signed. The West Africa gas pipeline will transport natural gas from the Lagos terminal (Nigeria) to three delivery points near Cotonou (Benin), Lome (Togo) and Tema (Ghana) over a distance of 681km. The pipeline construction and operations obtained financial guarantees of the World Bank. The total project cost around US$974 million of which the World Bank guarantee for Ghana was $80 million while the Multilateral Investment Guarantee Agency provided a $75 million political risk guarantee for WAGPCo.

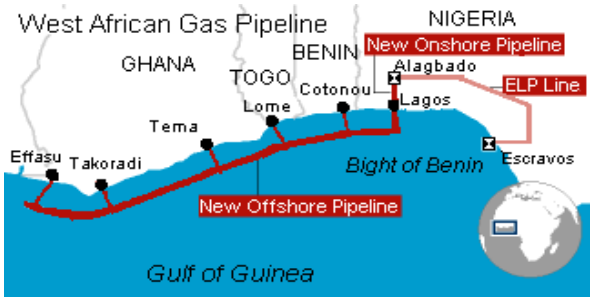

Figure 2. Layout of the West African Gas Pipeline

The West Africa Gas Pipeline Company Limited (WAGPCo) was set up to build, own and operate the pipeline. The company was established by the government of the four countries as a public-private partnership and is owned by Chevron-Texaco West Africa Gas Pipeline Ltd (36.7%), Nigeria National Petroleum Corporation (25%), Royal Dutch Shell (18%), Volta River Authority of Ghana (16.3%), Societe Togolaise de Gaz (2%), and Societe Beninoise de Gaz (2%).[5]

The WAPCo pipeline is seen today by Economists as a catalyst for clean economic growth, a tool for environmental benefit, and a cornerstone for regional integration. It is also unique in being the first natural gas transmission system across the international borders of West Africa. It is an outstanding example of cooperation and partnership between the government of Nigeria, Ghana, Benin and Togo under the auspice of the Economic Community of West Africa State (ECOWAS) to achieve their long term goal of energy security. It serves as a pioneering model of a multi-country private/public sector partnership for regional economic growth. The pipeline shows that through creative cooperation among States in

the ECOWAS Region in providing a predictable and stable business environment, significant private direct investment can be attracted into the sub-region.

Over its life, the pipeline will provide a long term supply of energy to stimulate private investment into the sub region. This investment is expected to create jobs and wealth in the sub-region. Given projected demand for low cost sustainable energy and Nigeria's considerable natural gas reserves, the pipeline extension to other sub-regional markets appear likely in the future. This will bring additional economic benefits that are yet to be estimated.

The construction of the pipeline started in 2005. The pipeline was scheduled to start operations 23rd December 2007, but was delayed after leaks were detected in the supply pipelines in Nigeria. The pipeline was commissioned on the 13th of May, 2008. It has been ready for gas transmissions since the 14th of December 2008[6]. The gas delivery is expected by the end of 2009 after the commissioning of the Takoradi and Tema regulating and metering station in Ghana, compressor station at the Lagos beach in Nigeria and the regulating and metering station in Benin and Togo.

B - Trans-Sahara Gas Pipeline

This project has been described as a veritable vehicle for strengthening the bilateral economic relations between Nigeria, Niger and Algeria. On the 4th of January 2002 the Memorandum of Understanding for the preparation of this project was signed by the Nigeria National Petroleum Corporation and Sonatrach. In June 2005, NNPC and Sonatrach signed a contract with Penspen Limited for a feasibility study of the project which is estimated to cost about $6bn[7.] The pipeline will start from the Southern Nigeria and run through Niger to Hassi R'Mel in Algeria. In Hassi R'Mel the pipeline would be connected with the Algeria export system to supply Europe from the existing transmission hubs at El Kala and Beni Saf on Algeria's Mediterranean coast via Trans-Mediterranean, Maghreb-Europe, Medgraz and Gabi pipelines. The length of would be 4128 kilometers (2565miles). The Nigeria section would be 1,037 kilometers (644miles), 841 kilometers (523miles) of pipelines will be laid down Niger and 2,310 kilometers (1440miles) in Algeria.[8]

France's Total and Russian Gazprom are interested in participating in the project. This is expected to cost about $12 billion for the pipeline and $3 billion for the gathering centres. It is intended to deliver 20 to 30 billion m^3 of natural gas from 2015.

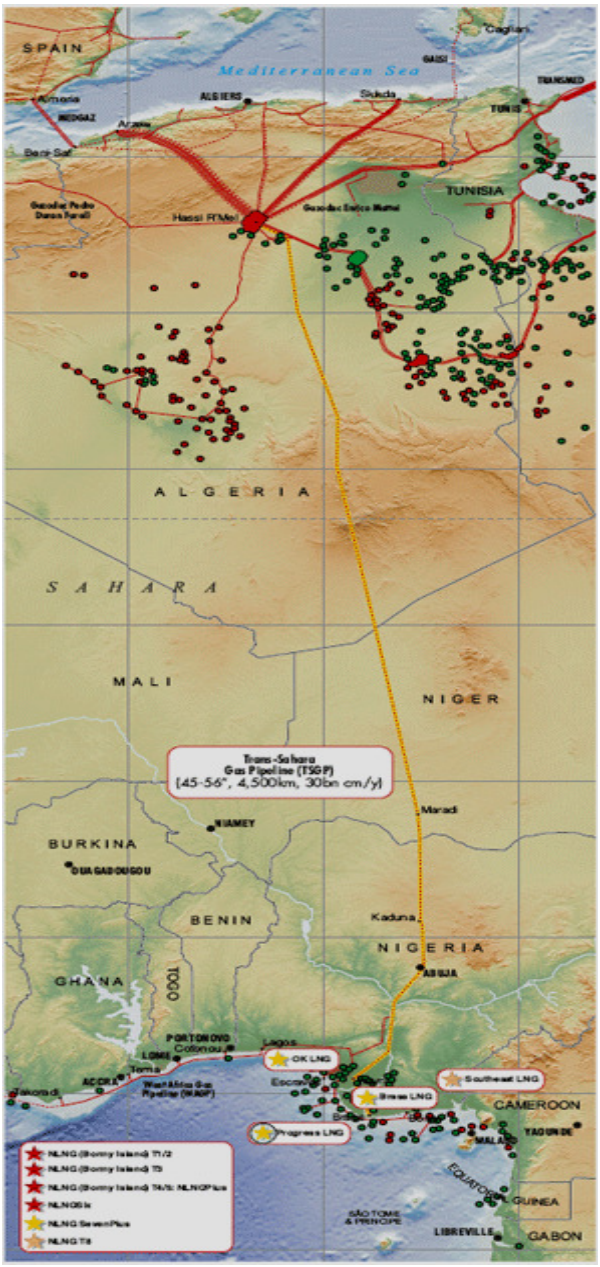

Figure 3. Trans-Sahara Gas Pipeline [source. www.Petroleum-Economist.com]

DOMESTIC GAS MARKET

Nigeria domestic gas utilization opportunities are tremendous; some of the demand centers are power generation, cement industry, fertilizer, iron and steel plants. Others are petrochemical, aluminum smelting and distribution to industrial centres as source of energy supply. Currently the largest single consumer of natural gas in Nigeria is the Power Holding Company of Nigeria which accounts for about 70% of the gas consumed domestically. The company currently operates power generating gas plants at Afam, Ughelli, Sapele and Egbin. The combined daily requirements of these plants at peak are about 1500mmcfpd

Government is encouraging Joint Ventures and multinational oil companies operating in Nigeria to embark on Independent Power Plant [IPP] Projects as part of the power sector reforms. The Reform Act reviewed the generation, transmission and distribution of electricity in the country to improve its performance. The IPPs are expected to contribute about 3000MW to the national grid. This strategy will ensure the realization of the Government intentions to increase the national electricity generation from the current 3000MW now to 10000MW by 2010 to enhance economic activities.[10]

The company in its long term plans intends to establish six additional thermal plants that will use natural gas as fuel. When these plants are built, the gas demand is expected to increase considerably. Electricity consumption growth from 1993 to early 2000 is approximately 0.5% per year whereas growth rate for developing countries such as Nigeria is estimated at 8% per year. An analysis of KWh use of electricity per capita in various countries correlated to Gross Domestic Product (GDP) per capita indicated an average of 425Kwh, per capita electricity consumption is only 136KWh in Nigeria

compared to other neighbouring West African countries such as Ghana and Ivory Coast, which are not endowed with such resources of natural gas reserves, with per-capita electricity consumption of 309KWh and 174KWh respectively.[9] There is therefore considerable room for growth of gas demand for power generation. Using a growth factor of 2.5 as the base estimate would result in increase gas consumption by the power sector of Nigeria from 1999 level of 270mmcfpd to 2400 mmcfpd in 2010 to over 4900 mmcfpd by 2015.

Demand growth in the cement industry is usually limited by local production capability and capacity utilization rates. Non-gas fired cement is not cost competitive because this relies on relatively expensive, often unreliable liquid fuel supplies. Estimating the base case gas demand for the cement industry over the next 5 years, this could increase from 90mmcfpd currently to 350mmcfpd by 2015.

This demand in the cement industry would be met by a combination of plant expansions, new grassroots capacity additions, and conversion of liquid fuelled kilns to the more efficient, gas-fired kilns. The major gas consumer for cement production in Nigeria is the West African Portland Cement Company. Other cement producing companies (Ashaka Cement, Benue Cement, Sokoto Cement and the others) are yet to avail themselves the use of gas as a source of energy to power their equipments and fire their kilns despite the relative cheapness of gas over other sources of energy. This is due to the lack of a Natural Gas Grid, which should have brought gas nearer the plants for ease of accessibility.

Nigeria's fertilizer application rate averaged about 13 kg/hectare, which is much lower than that of many other African countries including Malawi and Ivory Coast, which range from 21 to 22 kg/hectare, respectively. There is considerable opportunity to expand fertilizer production beyond the approximate 800,000 tpy being consumed.

Fertilizer demand is projected to increase by 6 to 7 % per year over the next 20 years. This increase in fertilizer demand will result from increased land cultivation, and the improved fertilizer application rate. Base gas demand in this sector could reach 110 mmcfpd by 2010 and 307 mmcfpd by 2015. Nigeria's per capita use of steel is also low relative to other developing countries. Because of low production capacity utilization due to plant shut downs, demand is met through importation. Current capacity utilization rates are less than 1 % of Nigeria's total production capacity of roughly 2.3 mm tpy.

The situation with the iron and steel industry is dismal. Despite the fact that the gas infrastructure to the plant at Aladja and Ajaokuta has been in-place for a long time, the inactivity of these plants, has reduced the gas consumption to near zero.

However, with improved performance in the industry and the other sectors, it is estimated that base case gas demand may double every 10 years. Restarting the existing steel plants

and revamping them to meet the estimated demand of 2.0 mm tpy by 2020 will result in total gas demand increase of 70 mm cfpd by 2010 and 130 mm cfpd by 2020 for this sector.

Gas is a major feedstock of the petrochemical industry and the gas demand for this industry is put at approximately 60 mm cfpd. The demand results from gas use by the petrochemical plants. The demand therefore increases in direct proportion to production output. The gas demand projection in this sector assumes that all facilities in the sector are operating.

The projection also takes into account the anticipated local demand for finished petroleum products, and assumes that new petrochemical plants would be built in 2015. With the increased capacity, gas demand in the oil petrochemical sector could reach almost 80 mm cfpd by 2010 and 100 mm cfpd by 2020. Nigeria has only one aluminium smelter plant -- the Aluminium Smelter Company of Nigeria (ALSCON) -- with a capacity of 200,000 tpy. ALSCON, which was built in the mid-1990s, operated briefly, and reached a capacity of about 22 % before it became idle in mid-1999. No new aluminium plant capacity additions are foreseen, but if re-activated, gas demand at ALSCON is projected to reach 140 mm cfpd by about 2011. (Figure 4)

Opportunity exist for the development of gas supply to residential consumers and small industrial estates, however we recognise that the cost of infrastructure can be typically high, but the master plan seeks to address and ensure that the strategy in place is such that the back bone infrastructure together with the infrastructure necessary to jump start the market is available. Currently Gaslink and Shell Nigeria Gas already operate in this market.

Domestic and light industry demand to industrial estates is about 6.2 mm cfpd. Consumption in these sectors has the potential to expand significantly and could reach about 100 mm cfpd in 2010 and over 220 mm cfpd by 2020. Nigeria has the potential for a large market for LPG. At present, the domestic market could be a viable outlet for LPG. Nigeria imports about 20,000 t of LPG out of a total estimated market demand of 200,000 tpy. The total current average domestic gas demand in Nigeria estimated at about 600 mm cfpd. Average domestic gas consumption, from a recent study, has the potential to increase to 1,900 mm cfpd by 2010 and ultimately to over 4,800 mm cfpd by 2020.[11]

There is therefore a considerable growth potential for domestic Nigerian LPG to displace other fuels used for cooking, if the local distribution logistics can be resolved.

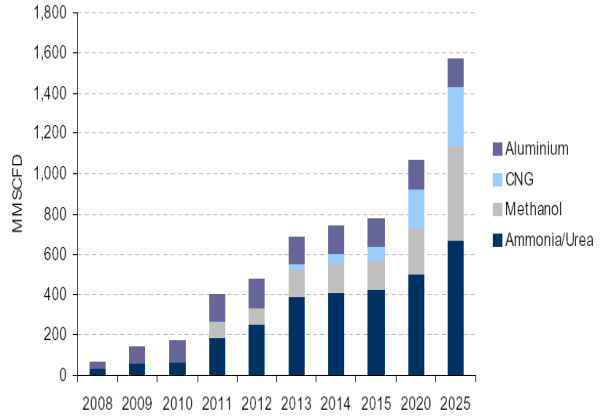

Figure 4. Industrial base Gas Demand.

CNG constitutes a veritable source of fuel in the motor transportation sector which can positively improve the domestic consumption of gas. It has the advantage of being cheaper and environmentally friendlier than gasoline. However, the technology is fairly new and most vehicles in Nigeria are not designed to use CNG.

The Nigerian Gas Company is spearheading a project for the direct use of CNG as an automotive fuel. NAOC has also given indication for the use of CNG in all vehicles within its operational areas. The main problem against the widespread usage of CNG at this time is the non-availability of refuelling infrastructure and the large investment required to put this in-place.

Currently the Escravos to Lagos Pipeline System (ELPS) completed in the nineties is the main transmission pipeline system dedicated to domestic consumption in the country. This pipeline system is the only source to the industrial and utility sectors of the Lagos domestic market and also serves as the service point entry of supply to the West Africa Gas Pipeline.

Nigeria Liquefied Natural Gas Company commenced the supply of LPG to the Nigeria Domestic market in October 2007 under the Domestic Gas Obligation of 150,000t/yr.[12] The scheme, which has been an outstanding success, has led to a significant reduction in the end-user price of LPG in the domestic market. The company by this supplies over 70% of Nigeria's LPG needs and overall contributes about 7% to the nation's GDP.[1]

The other major downstream pipeline systems are dedicated to single projects leading to sub-optimal pipeline configurations. These pipelines are mainly to export oriented projects and covers areas already served by other single project pipelines. There is no pipeline connection between the gas supply fields of the East and South and the growing market of the West and the North.

With all these projected growth rates resulting from various projects currently being built, developed or proposed, a more robust framework for effective gas transmission and distribution has to be established - a network of infrastructure that will be able to support the growing domestic, regional and export market. Well formulated and clearly defined policies to guide and protect investment have to be in place. The Nigeria Gas Master Plan was then developed to address these imbalances in the gas sector, develop the domestic regional and export market concurrently.

3. NIGERIA GAS MASTER PLAN

The aspiration of the Master Plan is to reposition Nigeria in the shortest possible time as a regional gas supply hub with concurrent presence in the domestic, regional and export market. To accomplish this, it aims to create fully liberalised market within five years which is underpinned by:

a- A robust, scalable and fully connected gas infrastructure that supports the three markets concurrently and cost effective gas from any source can get to any market.

b- Transformation of the domestic market into a vibrant and fully commercial gas market where the gas price stimulates investment in supply and the sustainability of the market compliments the other regional and export LNG markets enabling a balance portfolio.

c- Attracting a more widespread participation by new players so as to stimulate competition and efficiency.[13]

ELEMENTS OF THE GAS MASTER PLAN.

In order to achieve the above said objectives, the Nigeria Gas Master Plan was developed into three critical elements:

1- **Gas Pricing Policy**: this policy is to ensure natural gas is supplied at affordable prices to all domestic sectors, mainly power and other sectors that have a significant multiplier effect on the nation's economy. A stratified pricing mechanism have been adopted for this policy as listed below;

a. The strategic Domestic Sector: this being the sector with the greatest multiplier effect on the economy namely power and also to residential and light commercial users. Thus this sector will be supplied at the lowest commercially sustainable price.
b. The Strategic Industrial Sector: This comprises industries that require gas as their main feedstock, such as fertilizers, methanol, GTL e.t.c. The policy is expected to make prices as competitive as obtainable in other parts of the world.
c. The Commercial Sector: this being the sector that uses gas as industrial fuel e.g. manufacturing industries.

Each of these sectors has a dedicated pricing regime which sets out a transparent structure for the determination of the floor price of gas. The floor price of gas for the strategic domestic sector will be determined on a cost-of-supply basis using pseudo-regulated pricing regimes. This regime establishes the lowest cost of supply that will allow a 15% return for the supplier. The forecasted average domestic price from all three sector will be known as the Aggregate Domestic Price (i.e. the price all gas supplier will be paid). The aim is that buyers will pay for gas at the sector price while suppliers receive an aggregate gas price**.**

The government policy introduces a floor price of US$0.4 /mmbtu at power plants based on a price of US$0.10/mmbtu at 2008 at the wellhead and transmission charge of US$0.30/mmbtu. The price of gas to non-power consumers is expected to cross subsidize the price to the power plants resulting in a pooled price of US$0.50/mmbtu at 2008 to increase to $1.30/mmbtu by 2012 to the gas producers. This arrangement of a pooled price is expected to be managed through the proposed institutional arrangement of a Strategic Aggregator.[14] The Strategic Aggregator will be the first contact point for the gas trade and will issue Gas Purchase Orders after due diligence on buyer. The proposed Gas Aggregator will be empowered to open and manage an escrow account with an escrow agent approved by the Department of Gas and direct purchasers of gas to make payment for gas supply into the account in accordance with the payment agreed by the suppliers, gas purchasers and the Aggregator. The Gas Aggregator shall prepare and provide annual detailed audit report of the escrow account to suppliers of gas and ensure transparency dealings between gas suppliers and purchasers.

Price of gas for the power sector is set to go up as high as US$1.30/mmbtu by 2012 by which time the cross subsidy is expected to be phased out. The Government also introduced a securitization framework to assure investment in gas supply to the power sector. Both of these steps will provide a much needed boost to gas supply.

2- **The Domestic Gas Supply Obligation:** To ensure the success of the Gas Master plan, the Domestic Gas Supply Obligation was formulated as part of the elements. The regulation mandates all gas players in the country to set aside a predetermine amount of the produce gas for the domestic market. Following the Gas Management Model through which the demand and supply of gas in the country will be forecasted, each of these producers will be required to submit a gas production and supply plan consistent with the obligation under the Domestic Gas Supply Obligation Regulation.

The regulation will penalise any defaulter as they will be made to pay compensation to any purchaser for any losses suffered as a result of default to supply gas in compliance with the order of the Gas Aggregator. The policy sets a penalty of $3.5/mcf of obligation that is under supplied and otherwise flared and an environmental surcharge of 0.5c/mcf is levied over this.[9]

3- **The Gas infrastructure blueprint:** A robust gas infrastructure blueprint has been developed to foster the Gas Master Plan. The blueprint aims to reduce the overall infrastructure cost as well as ensure a more flexible supply grid nationwide. The gas grid will provide connectivity between major gas reserves sources and the demand centres, thus providing a roadmap that would guide future investment in the gas sector in a bid to ensure proper utilisation of gas

resources in the key sectors of the economy and the regional market. The process is designed to ensure that synergies are maximised and infrastructure aligned to deliver the aspiration of the Gas Master Plan.

The Gas Infrastructure is divided into two major parts, Gas Gathering / Processing and Gas Transmission.

a- Central Gas Gathering and Processing: This process entails the collection of wet gas from gas fields into a central facility for treatment and processing. Here wet gas will be dehydrated to acceptable standards and any element of undesirable compounds of carbons, sulphur and mercury removed before onward transmission into the grid. At these facilities, processes for the extraction of LPG and condensates will also be available; the recovered products will be supplied to the domestic market. This will solve the problem of liquid ingress into pipeline which has continually impacted power supply permanently. The Central Gas Gathering and processing facilities as designed in the blueprint is proposed to be located at the Warri/Forcados area, the Akwa Ibom/Calabar area and the Obiafu area (North of Port Harcourt). Only licensed investors within the franchise area will be allowed to develop and operate these facilities.

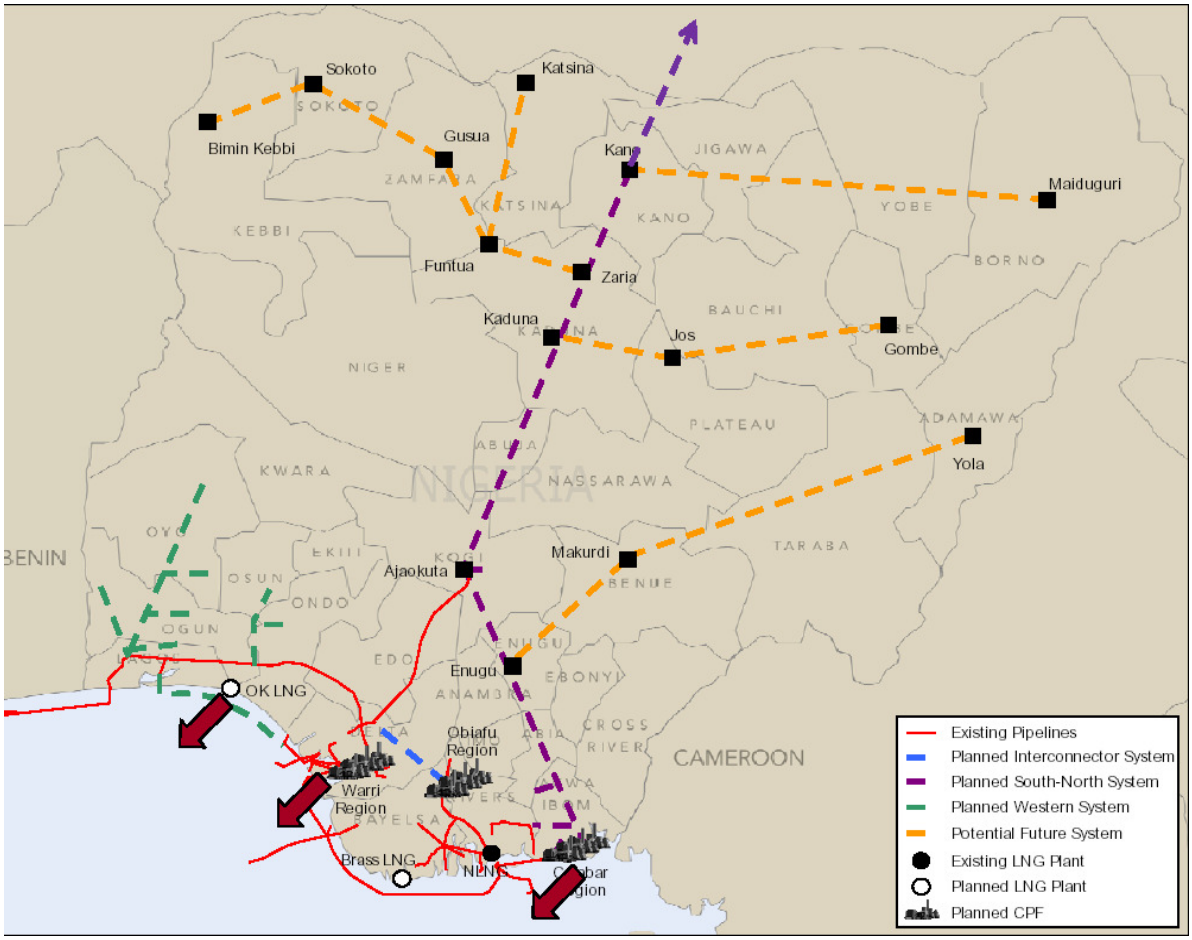

Figure 5. Gas Infrastructure Blueprint layout.

b- Gas Pipeline Transmission System: Grids of pipeline networks have been designed for construction and operation in the Blueprint. These networks of pipeline will transmit gas to areas of demand across the country. Three pipeline systems are incorporated in the blueprint:

i- The Western Transmission System: This network comprises of the existing Escravos Lagos pipeline and a new offshore extension to Lagos. The new offshore extension will be connected to Lagos and ran through the western states to terminate at Jebba. The key market for this network will be the domestic market, feed industrial and residence demands and also the West Africa Gas Pipeline. Expected gas throughput is 3,250MMscf/d.

ii- The South-North Gas Transmission System: This will

take dry gas from Akwa Ibom/Calabar Central Gas Gathering and processing facility to Ajaokuta, Abuja, Kano and Katsina. The line will also serve the Eastern states of Anambra, Abia, Ebonyi, Enugu and Imo. Key market for this system will be domestic and the North Africa regional market, as the Trans – Sahara Pipeline will take its feed from the northern node. Expected throughput at peak is 3800MMscf/d.

iii- The Interconnector System: This network is expected to link the Eastern gas fields with the other transmission systems.

The system is developed as a grid, ensuring redundancy and multiple accesses to gas markets from any gas source. This increases the resilience of the gas market to pipeline disruptions. The foregoing provides the basis for the establishment of a robust and liquid Nigeria gas market and also reveals a lot of gas transmission investment opportunities for investors (Figure 6). With these, gas availability can be assured and the deliverability as well as commerciality also assures. It is anticipated that over the next 4-5 years, a great part of the infrastructure will be delivered. [15]

4. Conclusion.

The evolving gas market in Nigeria has been giving the right foundation to thrive on with the establishment of the gas master plan. The plan was developed out of a well thought out process of gas infrastructural development model that supported rapid growth of the domestic market, expansion of the regional market and consolidation of the export strategies.

The elements of the Gas Master plan are designed to aid the aspiration of the government in building a vibrant economy; the Natural Gas Pricing Policy is going to tackle the age long problem of a price model, domestic supply of natural gas will handled by the Domestic gas Supply obligation that ensures that there is supply of natural gas for power generation, industrial usage, residential consumption and gas based industries. Infrastructures to support these projects and plans are well thought of in the Infrastructure Blueprint. All these present lots of investment opportunities in the nearest future to all investors in the gas world. The multiplier effect of these gas infrastructural developments to the Nigeria economy will be enormous.

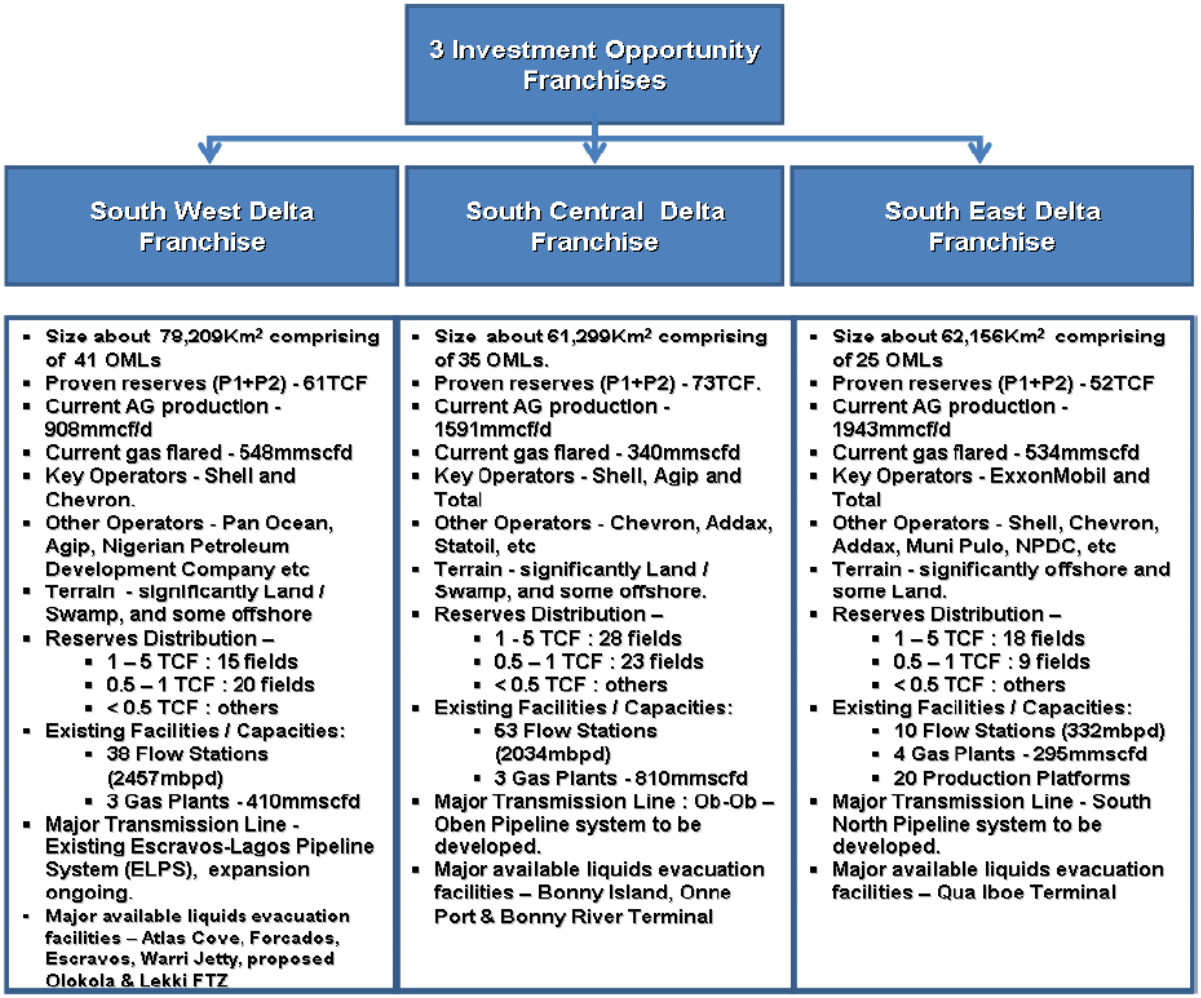

Figure 6. Gas Transmission Investment Opportunities [source: www.ngmproadshow.com]

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