West African Energy Market Integration:

Natural Gas Success factors and challenges

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Abstract.

With a landmass of about 5.1 million square kilometers and a community of 15 member states, Western Africa is one of the worlds most endowed regions with energy sources. The region holds about 13% of the total proven gas reserves in the world, with Nigeria accounting for almost all that figure with 185tcf.

While natural gas is fast becoming the worlds preferred choice of energy thus seeing an increase in its demand, the region is yet to fully harness the potential she possess in energy generation. West Africa still ranks amongst the regions with the lowest energy generation in the world. Major sources of energy are petroleum, natural gas and hydroelectricity and it is estimated that no more than 20 percent and in some countries as little as 5 percent of the populace have direct access to electricity. The figure falls to about 2 percent in the rural areas. This situation has become a major hindrance to the economic and technological growth of the region.

Thus, energy has become a major driver for regional integration in West Africa, which can assist many of her individual economies in overcoming the mismatch between energy demand and energy resource endowments. Furthermore, this can take advantage of economies of scale and help countries develop and gain access to low-cost energy to sustain future growth. Resource rich smaller economies would then export energy which can become engines of growth and development while larger economies energy imports may help postpone, reduce, or avoid capital investments in new production facilities and thereby overcome temporal cash flow problems.

To integrate the various economies of the region, the governments of the various countries have commenced a number of regional projects. The West African Gas Pipeline (WAGP) is a good example of regional energy market integration. It shows on the one hand achievements of government and regional institutions and the other, the willingness of international companies to invest in the regional market. The West African Power Pool is another regional project with the concept of integrating the national grids of the region member countries.

In this paper, the huge gas potential of the West Africa region will be highlighted and the impact of the gas production from the region on the global economy. The energy situation of the region will also be discussed with the various challenges detailed. The roles of natural gas in the various regional projects being executed will be listed with status update of these projects with particular emphasis on the West Africa Power Pool (WAPP) and the West Africa Gas Pipeline project. Various geopolitical influences will be discussed with major emphasis on polices that impact integration. Finally recommendations will be made on some key success factor that will promote rapid regional development in the face of the mounting challenges.

List of Abbreviations

BOT - Build, Operate and Transfer
APL - Adaptable Program Loan
BCM - billion cubic meters
CAS - Country Assistance Strategy
CCGT - Combined Cycle Gas Turbines
CPS - Country Partnership Strategy
CSP - concentrated solar power
ECOWAS - Economic Community of West African States
EEP - ECOWAS energy protocol
ELPS - Escravos – Lagos Gas pipeline
IBRD - International Bank for Reconstruction and Development
IDA - International Development Association
IFC - International Finance Corporation
IPP - independent power producer
kWh - kilowatt-hour
LNG - Liquefied Natural Gas
MOU - Memorandum of Understanding
MW - megawatt
OMVS - Organisation pour la mise en valeur du fleuve Sénégal (Senegal River Basin Development Authority)
PAD - Project Appraisal Document
PPA - Power Purchase Agreement
PPP - public-private partnership
PRG - Partial Risks Guarantee
STEM - Short term energy market
TCF - Trillion cubic feet
VRA - Volta River Authority
WAGP - West Africa Gas Pipeline
WAPP - West African Power Pool
WBG - World Bank Group
WTO - World Trade Organization

1.0 Introduction

Regional energy markets are fast developing across the globe, each taking advantage of economics of scale and helping countries develop and gain access to low-cost energy. For most of the developing world, regional energy trade is now a logical and rational public and inter-governmental policy choice for regional economic development. This does not only foster bonding between countries but also opens up avenues for cross-border trading in other sectors of their economies and also bears the following advantages:

- Energy trade can help overcome the mismatch between energy demand and energy resource endowments among the countries in the region, especially among neighboring countries.
- Energy security becomes enhanced through prudent reliance on trade to meet part of the demand by diversifying the forms and supply sources, often lowering the average cost of supply.
- Energy trade would enable smaller countries with large natural resources (such as hydropower or natural gas) develop their resources exploiting economies of scale.
- Countries with little fuel or hydro resources or with markets too small to exploit economies of scale can benefit by interconnecting to the grid of neighbors with surplus capacity or resource. It may even be the most cost-effective means of increasing access and reliability.
- For resource rich smaller economies, exports of energy could be an engine of growth and development.
- Even for larger economies energy imports may help postpone, reduce, or avoid large and lumpy capital investments in new production facilities and thereby overcome temporal cash flow problems.
- As the experience of Denmark shows, the ability to trade energy across borders as a member of a large power pool helps expand supply of electricity from such variable renewable energy sources as solar and wind and absorb such intermittent supplies.
- Often energy trade projects lend themselves ideally to the use of public-private partnership arrangements, thereby enhancing private sector participation in the energy sector. [1]

Thus with higher levels of regional co-operation and investment, as well as clearer regulations for energy trade, a sustainable future for energy can be built. The continent of Africa is one that would benefit a lot from this model of trade with about 40% of her population and one-third of her economies trapped in landlocked countries whose trade and development depend almost entirely on events that happen beyond their own borders. Africa is endowed with resources vast enough to meet all its energy needs. Hydroelectricity is by far the single biggest source of electricity in a number of countries. The region possesses some of the largest water courses in the world -- the Nile, Congo, Niger, Volta and Zambezi river systems. The hydro potential of the Democratic Republic of Congo alone is estimated to be sufficient to provide three times as much power as Africa currently consumes. This potential remains largely untapped.[2]

Currently there are multiple regional blocs in Africa, also know as Regional Economic Communities (RECs) developed to harness the full potential of energy resources in the continent. While most of these blocks where built to foster economic growths of their respective regions, others had political and military undertones.

The West African region is one of the largest regions in African with 16 countries. The Economic Community of West African States which was founded by the 1975 Treaty of Lagos seeks to promote the economic integration of the region. The members are Benin, Burkina Faso, Cape

Verde, Côte d'Ivoire, Gambia, Guinea, Guinea Bissau, Ghana, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo. The total population of the 15 countries in 2005 stood at about 262 million representing 40% of the total population of Sub-Saharan Africa. Three of the member countries, Nigeria, Ghana and Côte d'Ivoire account for two-thirds of the population of the sub-region. The population growth rate of the sub-region, estimated at 2.65% per annum, is the highest in the world. With this growth rate, the population of ECOWAS is projected to rise to 320 million by 2015. Currently 43% of the population resides in the urban areas. This is projected to increase to 50% by 2015[3]. Considered as one of the pillars of the African Economic Community, the organization was founded in order to achieve "collective self-sufficiency" for its member states by creating a single large trading bloc through an economic and trading union. Other RECs include the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Economic Community of Central Africa States (ECCAS), the Community of Sahel-Saharan States (CEN-SAD), the Intergovernmental Authority on Development (IGAD), and the Southern African Development Community (SADC).

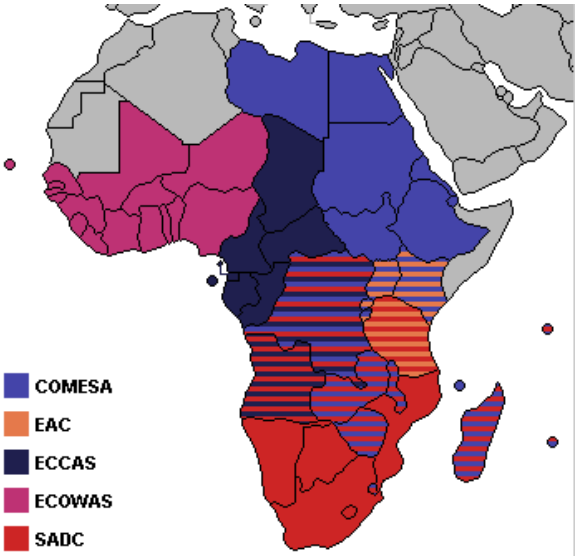

Figure. 1 Active REC pillars of the African Economic Community.

2.0 Energy Potential of the region

One very notable characteristic of the West African region is the uneven distribution of natural resources. The region is well endowered in natural resources in per capita terms; however theses resources are concentrated in very few countries and mostly remain untapped. Commercial energy resources in ECOWAS, primarily petroleum and natural gas, are concentrated in costal and offshore regions. Nigeria for instance has almost all of the region's proven crude oil, natural gas and coal reserves, while the crude oil have been explored ad exploited, her natural gas and coal reserves remain largely untapped. Nigeria thus is West Africa's only significant oil producer, with an average crude oil production rate of 2.06 million barrels per day in 2009 with and estimated oil and condensate reserves of 37.16 billion barrels[4]. This value constitutes 96% of the region's proven crude oil reserves. Smaller reserve deposits are located in the Gulf of Guinea (Offshore Benin, Cote d'Ivoire, and Ghana).

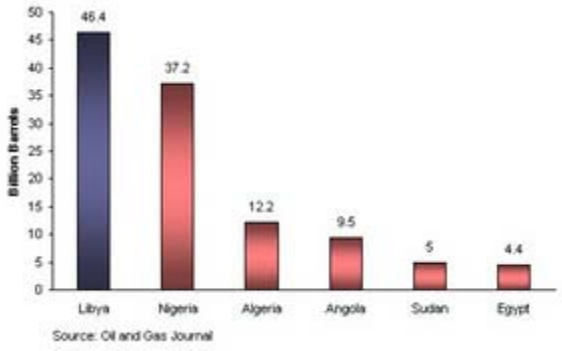

Figure 2. African Proven Oil Reserve Holders, 2011

West Africa contains approximately 32 percent of Africa's total natural gas reserves. Nigeria holds the community's largest proven reserves with 185 trillion cubic feet (Tcf). However, proven reserves are also located in Cote d'Ivoire (1.0 Tcf), Ghana (840 bcf) and Benin (40Bcf).

The vast majority of natural gas found in Nigeria is associated, meaning that it occurs in crude oil reserves as free gas. Because many of the fields lack the infrastructure to produce the associated natural gas, it is flared.

Country	Production, 2003	Consumption, 2003	Reserves, 1/1/2006
Benin	0	0	40
Burkina Faso	0	0	0
Cape Verde	0	0	0
Cote d'Ivoire	50	46	1,000
Gambia	0	0	0
Ghana	0	0	840
Guinea	0	0	0
Guinea-Bissau	0	0	0
Liberia	0	0	0
Mali	0	0	0
Niger	0	0	0
Nigeria	680	262	184,660
Senegal	2	2	0
Sierra Leone	0	0	0
Togo	0	0	0
Regional Total	732	310	186,540

Table 1. Natural Gas overview (billion cubic feet). Source: EIA; Oil and Gas Jornal.)

3.0 Energy Consumption Mix

Among the selected ECOWAS states, total energy consumption in 2005 varied from 0.034 quadrillion British thermal units (Btu) in Benin to 1.068 quadrillion Btu in Nigeria. Figures for other countries are: Ghana 0.149, Togo 0.036 and Côte d'Ivoire 0.113 quadrillion Btu. Respective figures for Africa and the World are 14.35 and 442.31 quadrillion Btu.

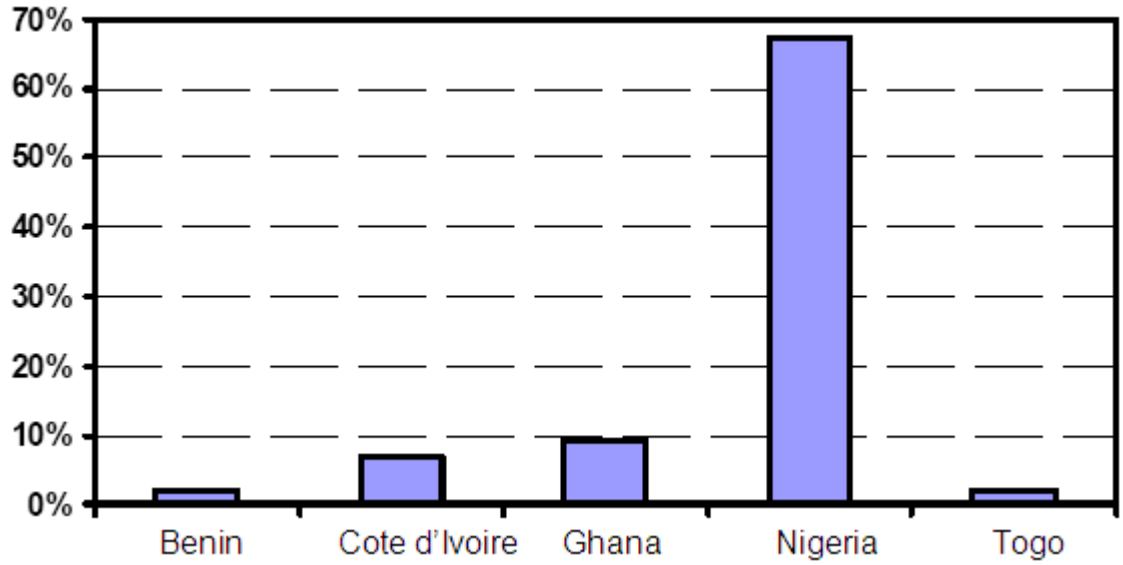

Figure 3: Share of selected countries in ECOWAS energy consumption (source EIA)

Nigeria, as the largest country and the largest economy in the region, has the lion's share of total energy consumption in the ECOWAS region accounting for more than two thirds of total consumption. Other countries' shares are much smaller: Ghana accounts for just over 9%, followed by Côte d'Ivoire with about 7%. Togo and Benin record little over 2% each. In all, the five countries account jointly for 87% of total energy consumption in the ECOWAS region. Diversification of energy sources, in terms of both types of resources and sources of supply for each type, is the most important criterion for enhancing energy security.

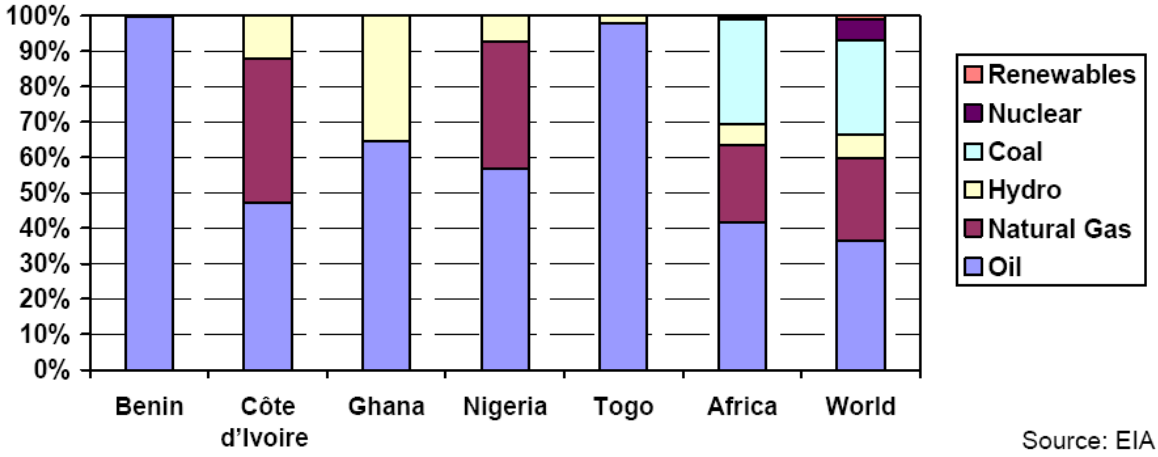

Figure 4: 2005 Commercial Energy Consumption Mix

In Figure 4, the commercial energy consumption mix of the selected countries is depicted. Clearly, there is not much diversification of energy sources. For instance, Benin totally and Togo almost totally depend on oil, which is also important for other countries but somewhat less so. Ghana has basically two sources of energy: oil and hydro. In 2005, the share of oil was 64% but in 2006 and 2007, due to low water levels in Akosombo dam, the share of oil might have increased as Ghana needed more oil to generate electric power to compensate for lost hydroelectricity output. In addition to oil, Nigeria and Côte d'Ivoire also have natural gas production and have been able to diversify more than the others in the region, but still they are basically two-fuel economies. Oil and natural gas account for 57% and 36% in Nigeria, and 47% and 41% in Côte d'Ivoire. The use of coal and commercial renewables is negligible in all countries under consideration; there is no nuclear facility in the region.[3]

4.0 Drivers for Energy Market Integration

It is very saddening that a region that is so much endowered with so much energy resources and manpower ranks among the world least energy developed. Traditionally, energy planning has been undertaken on a national basis. But the cheapest energy source for a country might well lie just across the border. With cross-border energy networks, countries with surplus power could run their stations at optimum output without risking oversupply. Conversely, countries with limited generation capacity could access affordable power without building costly facilities. Most countries consider national self-sufficiency as a basic for national energy security and reliance on trade as an erosion of such energy security. Thus they become very reluctant in establishing trading links that supplement energy shortages. Such governments are very slow in reaching agreements with neighboring countries and even when they do; sustaining such political commitments is always very difficult.

However, it is widely recognized that substantial expansion in quantity, quality and access to energy infrastructure services, are essential to rapid and sustained economic growth, employment generation, poverty reduction and overall well-being of the region. Thus, the persistent suboptimal levels of energy infrastructure capacity and service provision from both growth and welfare maximization perspectives raises the fundamental question: What ought to be done to establish and sustain a robust energy industry, characterized by acceptable international standards of service reliability, accessibility and availability and that will support sustainable human development and economic growth in the West African region.

The various governments of the member countries of the community in an attempt to answer the question came up with the two major ECOWAS energy initiatives, the West Africa Power Pool (WAPP) and West African Gas Pipeline (WAGP). This became very necessary as the current state of power in the region is very poor. Access to centrally provided commercial electricity service is very limited, although many people use diesel-fueled generators to meet their electricity needs. In Ghana, 50-60 % of the population is said to have access to grid electricity. Benin, Senegal, Côte d'Ivoire have an overall electricity access rate ranging from 20 to 40%. In other ECOWAS countries, the access rates are lower. There are considerable service access gaps among urban zones (40%) and rural areas (average 6-8%). Energy infrastructures within the region are decaying and this has contributed to the poor state of power. The bulk of power plants and transmission facilities were built in the 1950s and 1960s. Little investment and

maintenance has left the infrastructure creaking at the seams. Nigeria, a prime example, operates at one-third of its installed capacity due to aging equipment.[2]

The commitment of the member countries of ECOWAS to resolving this issue was demonstrated in the creation of the department of energy which will be responsible for providing the technical expertise in energy and for the design and implementation of technical projects for the region. The department's functions as enshrined in Article 28, Item 1 & 2 of the Revised ECOWAS Treaty is to ensure coordination and harmonization of Member States policies and programs in the field of energy, and, to this end:

i) Ensure the effective development of the regions energy resources.

ii) Establish appropriate cooperation mechanisms with a view to ensuring a regular supply of hydrocarbons.

iii) Promote the development of new and renewable energy, particularly solar energy, in the framework of the policy of diversification of sources of energy.

iv) Harmonize national energy development plans by ensuring particularly, the interconnection of electricity networks;

v) Articulate a common energy policy, particularly, in the field of research, exploitation, production and distribution.

vi) Establish an adequate mechanism for the collective solution of the energy development problems within the Community, particularly those relating to:

1. Energy Exchanges among Member States.
2. Shortages of skilled technicians, and financial resources for the implementation of energy projects of Member States.

5.0 The West African Power Pool

From the above notes, it is very obvious that the region is characterized by significant imbalance in power supply and demand, abundant but unevenly distributed energy resources as well as weak and dilapidating infrastructures. The West African Pool Power (WAPP) was set up in 1999 by the community under the department of Energy to address the above issues and among other things to:

1. Develop interconnection and power exchanges between member states.
2. Harmonize legislation and standards for the power sector operations
3. Promote and protect private investment in energy projects.
4. Use flare gas in Nigeria to feed power stations in neighboring countries.
5. Create an open and competitive regional electricity market.

The WAPP's strategic objective is based on a dynamic vision to integrate the operations of the national electrical networks in a unified regional market. This unified regional market has to ensure in the medium and long term an optimal and reliable electricity supply at an accessible cost for the population of the different Member States. This will entail an interconnection of national grids across 5600km in most West African countries (Nigeria, Benin, Togo, Ghana, Cote d'Ivoire, Niger, Burkina Faso and Mali). Total investment in the WAPP infrastructure will amount to about US$18 billion between 2004 and 2020. About 90% of this investment is needed for building new generation capacity.

The implementation of the WAPP infrastructure program for 2005-2020 is based on pursuing five distinct mutually reinforcing subprograms the realization of which will converge to facilitate the unified well coordinated WAPP operation. These five subprograms are:
(a) Coastal Transmission Backbone to provide robust interconnection among the power systems of Cote.
d'Ivoire, Ghana, Benin/Togo, Nigeria;
(b) Inter-zonal Transmission Hub (Burkina Faso and Mali via Ghana, *OMVS* via Mali, Liberia-Sierra Leone-Guinea via Cote d'Ivoire) –these interconnections would help to displace expensive diesel based generation by low cost power;
(c) OMVG/OMVS power System Development covering Gambia, Guinea, Guinea Bissau, Mali and Senegal will help securing access to the low cost power from Hydropower Projects to be built on Gambia, Senegal and Konkoure River basins;
(d) North-core Transmission (Nigeria, Niger, Burkina Faso, Benin); and
(e) Cote d'Ivoire - Liberia-Sierra Leone-Guinea Power Network (Cote d' Ivoire, Liberia, Sierra Leone, and Guinea). (see figure 6 below).

The Emergency Power Supply Security Plan envisages the construction of:
(a) 200-400 MW CCGT facility in Benin near the West Africa Gas pipeline terminal;
(b) 400 MW CCGT facility near Takoradi gas terminal in Ghana; and (c) 150-250 MW CCGT facility near Nouakchott using offshore gas in Mauritania. Financing from various bilateral sources is being organized by WAPP.[1]

The WAPP program is being financed by a range of multilateral and bilateral donors. The World Bank has agreed to meet the financing gaps, initially to the extent of $350m from IDA resources in the form of Adaptable Program Loans. The World Bank's mixed APL program closely follows the five subprograms of WAPP and has corresponding tranches (APL 1, 2, 3, 4) each with appropriate phases. So far APL 1-phase 1, APL 1-phase 2, APL 2 and additional financing for APL 2 have been approved. The eligibility criterion for borrowing from the APL facility is the ratification of the EEP. Policy triggers are derived from the core principles of EEP and the

projects need to be part of the revised Master Plan approved by ECOWAS. The preparation time for the APL operation was spread over nearly four years from October 2001 to April 2005.

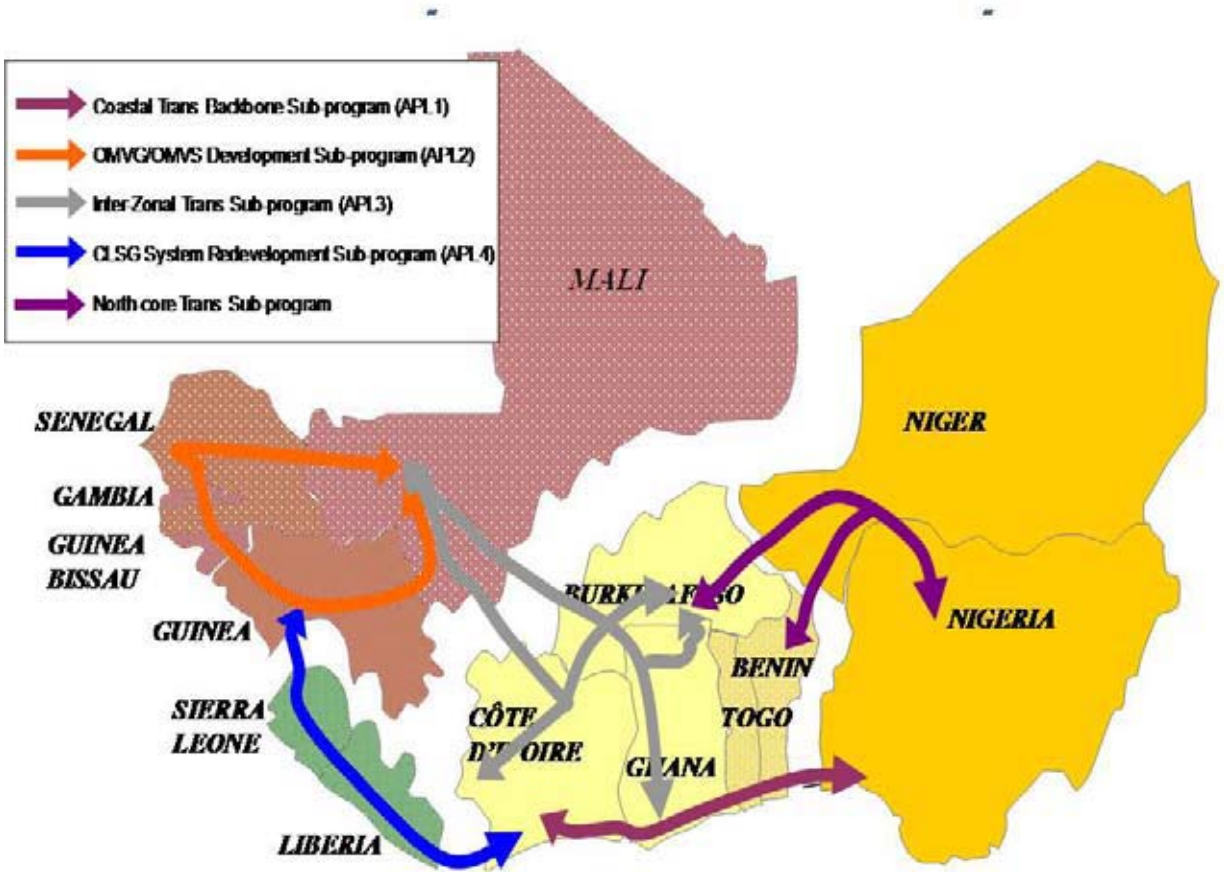

Figure 6: The Five Subprograms under the WAPP program

6.0 Natural Gas Play in the Region's Energy Integration

As a step toward optimal utilization of the region's rich natural gas reserves, the West African gas Pipeline project was initiated. This project is to serve as the backbone of the regional energy system, the WAPP. 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. (see figure 7). 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.

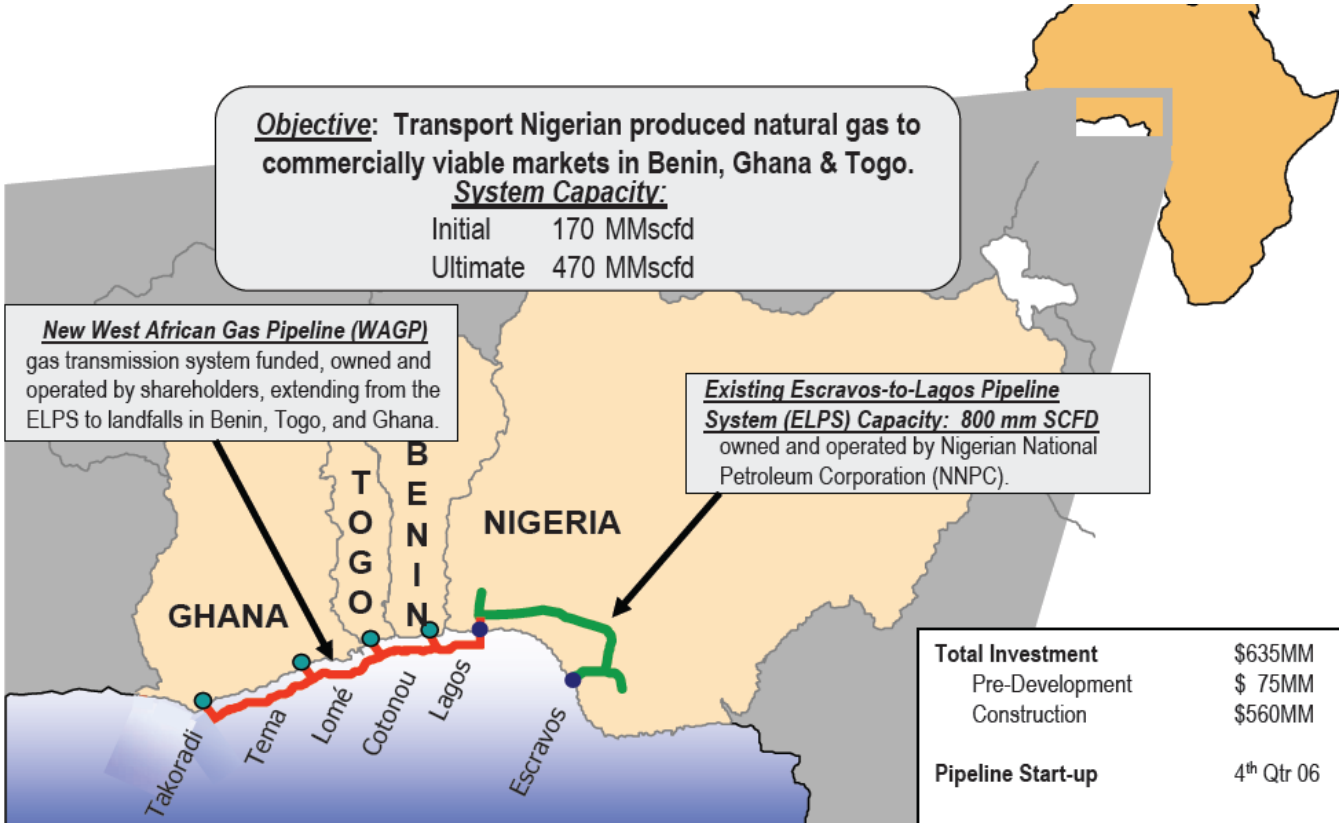

Figure 7. Layout of the West African Gas Pipeline

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%).

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]
Gas delivery started in 2009 after the commissioning of the Takoradi and Tema regulating and metering station in Ghana and the compressor station at the Lagos beach in Nigeria, and by April 2009 Ghana's Volta River Authority started generating electricity with natural gas from WAGP.

The Regulating and Metering facilities in Togo and Benin were commissioned in 2011 and became available to deliver gas to customers in those countries. In total, WAGP system has a capacity to transport 474MMscfd of gas and under the initial agreement is scheduled to transport 132MMscfd of natural gas.

The West Africa Gas Pipeline Project has been faced with a number of challenges. Most of these are at the up-stream end of the pipeline. They include:
1- Security issues around the Niger Delta area. The project generally suffered a number of setbacks due to the violence that was in the Niger Delta prior to its commissioning. Free flow gas to Ghana was interrupted due to insurgents' actions in the region in May 2009 when the ELPS pipeline was vandalized thereby disrupting flow of gas into the WAGP.
The restiveness within the region also affected the total gas production of the country which fell short of meeting the domestic obligation of the various operators of the pipeline there cutting gas flow. The Government of Nigeria has since put measures in place to restore peace to the region and the production of gas to the line has been restored.

The West African Gas Pipeline (WAGP) resumed gas flow from the Nigerian gas producers. On March 25th, the Volta River Authority (VRA) commenced firing one of the Aboadze turbines on gas. The volume of gas flowing is approximately 30 million standard cubic feet per day, which is enough to generate 110 megawatts.

2- Operational Challenges: Most of the operating companies involved with the supply of gas for the project have not been able to meet up with their quota. This is further compounded by the need to meet their domestic obligation first before gas export. This is primarily due to lack of adequate gas gathering facilities to properly harness and channel produced gas to the market.

The Nigeria Gas Master plan has been developed to address the issue of gas gathering infrastructure. 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 (figure 8);
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.
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.

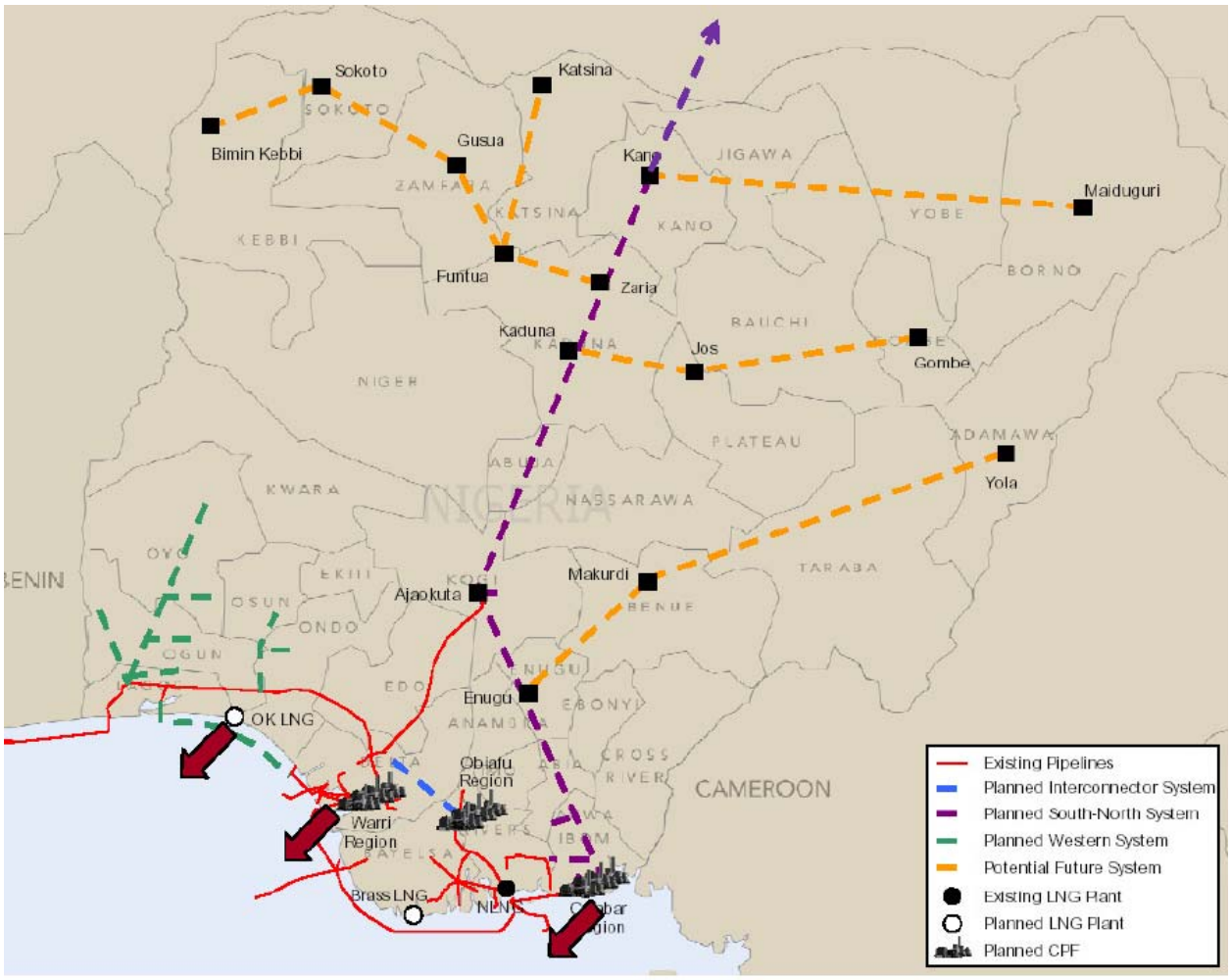

Figure 8: Gas Infrastructure Blueprint Layout

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. 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.

3- Geopolitics: During the construction phase, the project was constantly shaped by the energy policies of the member countries. There were some amount of lack of commitment to the project due to political instabilities and internal energy issues in some states. Thus it became critical to harmonise a comprehensive fiscal, regulatory, legal and investment regime across all four states to mitigate the influence of policy changes within the four countries. This was to create an enabling environment for the sustainability of the project despite political scenarios in participating countries.

The WAGP Authority was thus established by the WAGP treaty to represent the states, carry out facilitation between project stakeholders and enforce regulation, access code etc. The authority was also saddled with the responsibility of conflict resolution. The WAGP treaty is a joint commitment to implement the International Project Agreement which entails the commercial and regulatory terms of the WAGP business, pipeline access code principles, tariff methodology principles and an investment regime that enables WAPCo to operate as a single business entity across the four countries. A unified legal and fiscal regime which includes income tax harmonization, custom duty and vat exemptions on investment, agreement on revenue sharing by all four countries is fully imbedded into the framework of the authority.

7.0 The Future of the West Africa Energy Market

With the success story of the West Africa Gas Pipeline project a lot is being proposed for the future of the region's energy integration. There are talks to take the project further down to the shores of Gambia. A deeper look at the WAPP, the growth potentials are very obvious and a lot of private investors will tap into this in the nearest future. The demand for energy is on the increase as more economies in the region continue to grow and develop, Ghana is a typical example. All of this demand will start to drive more expansion projects in the gas industry.

There are possibilities on the long term for the provision of LNG in the energy mix of the region. The only limitation now is the non-existence of infrastructures for LNG regasification. With the existing liquefaction plant in Nigeria, supply of LNG to the market is thus within reach to the region.

The Nigeria LNG company is one of the region's huge gas success stories. The company's performance in the supply LNG and LPG to the world energy market has been excellent. The exportation of liquefied natural gas commenced in 1999. 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 total production capacity to over 30 MTPA LNG are currently at an advanced stage[7].

8.0 Conclusion

The advantages of regionalism are significant and not in dispute. The prospect for the success of regional integration in West Africa are enhanced by the focus and relevance of the ECOWAS integration process and by the strategies that been adopted. With the abundance of energy resources available in the region, energy market integration has becomes one of the major drivers for regional integration.

Obviously, the region's energy demands are not being met by the current market. And this is very evident in the state of power supply within the region. While infrastructural development is paramount to resolving this issue, the service chain of sourcing and delivery energy resources to the end users also will contribute largely to the successes of developed infrastructures.

The West African Power Pool was then established to meet the region's energy deficiency exploring the huge natural gas reserves of the region. This will be complementing other sources of energy such as hydro-electricity. The West African Gas Pipeline as the vehicle for gas transmission from Nigeria to Benin, Togo and Ghana has been fully commissioned and operational, a pointer to a viable regional integration. The project is faced with a number of challenges which are being currently handled from different dimensions.

The projects are beginning to yield results; gas is being delivered across national boundaries to demand zones and being utilised for power generation thus opening up new investment possibilities (figure 9).

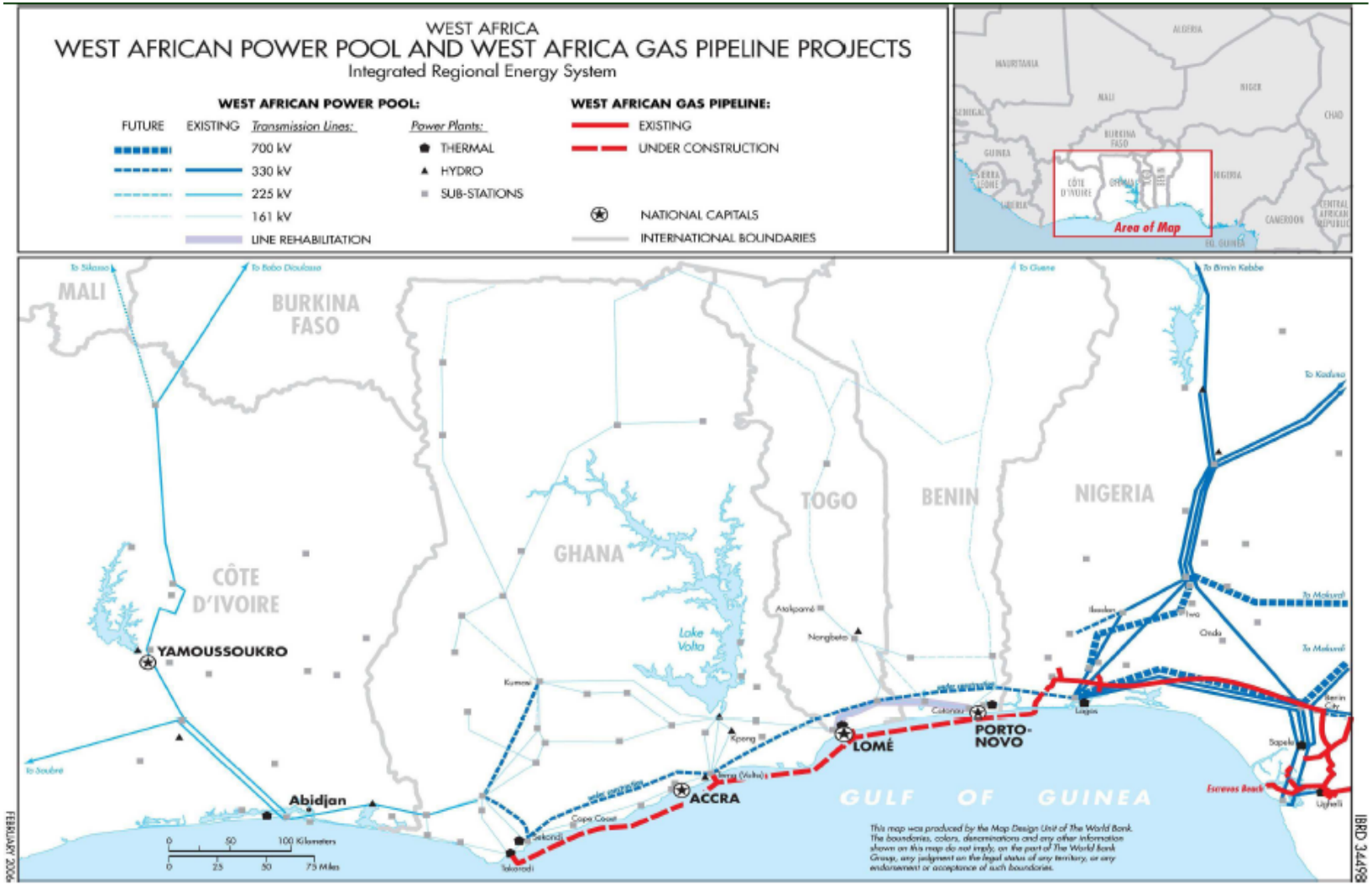

Figure 9. Integrated Regional Projects; WAPP & WAGP

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