KUALA LUMPUR 2012 WORLD GAS CONFERENCE

25th world gas conference

"Gas: Sustaining Future Global Growth"

West Africa Energy Market Integration

The gas success factor

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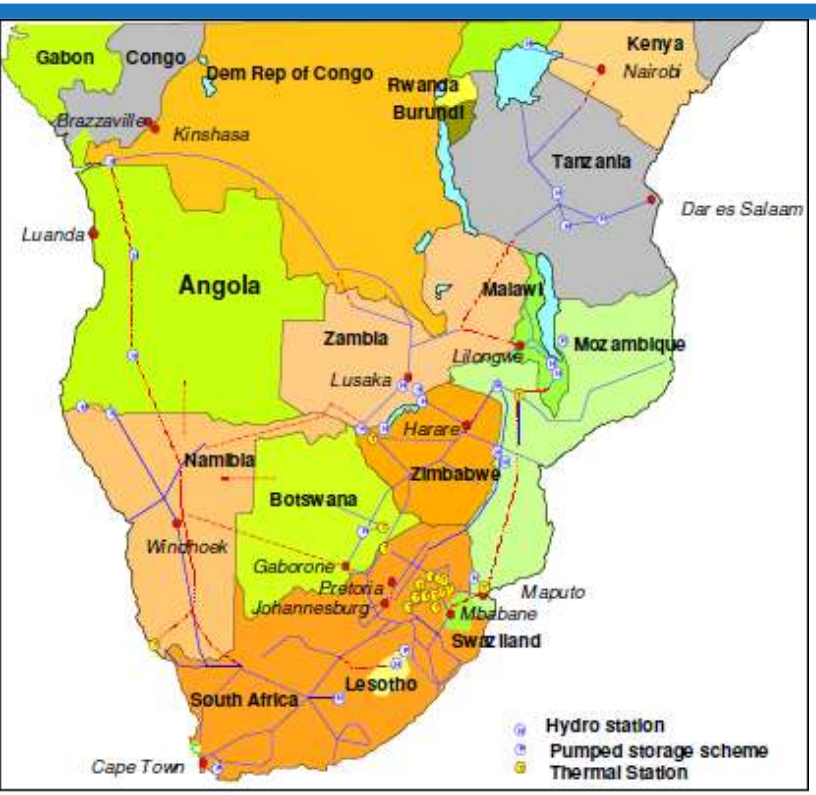
Introduction

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.

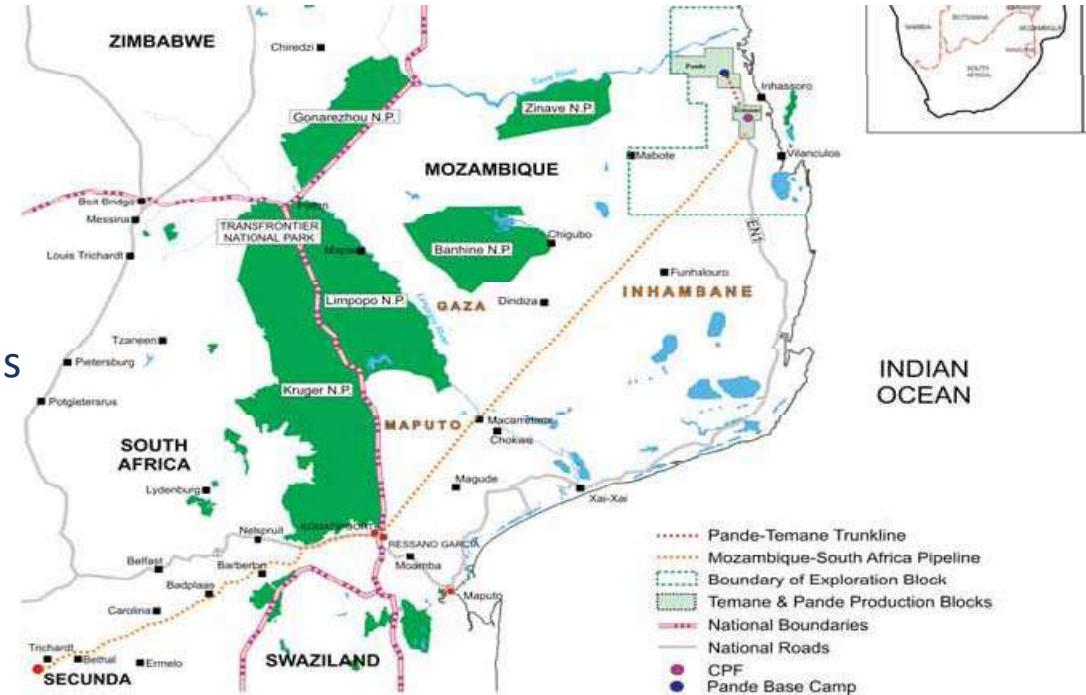
SOUTHERN AFRICAN POWER MARKET PROGRAM



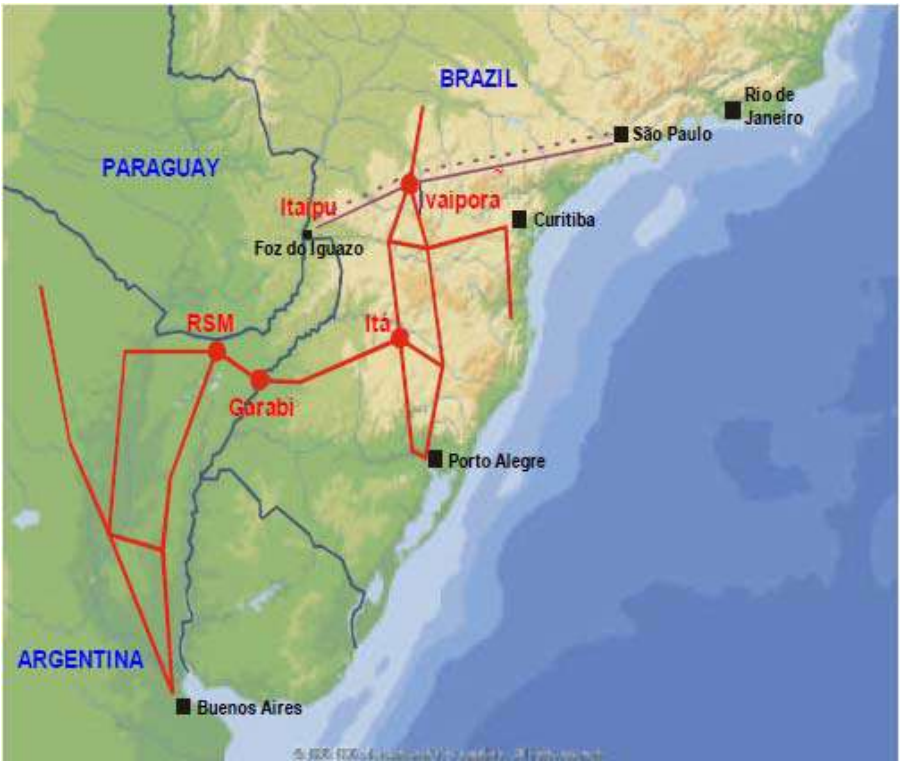
The pool covers 12 countries, an area of 9.09 million square km and a population of about 230 million and about 7.2 million electricity Customers.

Combined total installed capacity of 52,835 MW, of which the available capacity was 45,579 MW to meet their cumulative peak demand of 43,829 MW.

Gas from the Temane and Pande gas fields export via a 26” 865km pipeline to South Africa and Mozambique



BRAZIL-ARGENTINA REGIONAL POWER INTERCONNECTION PROJECT



The energy shortage and vulnerability to drought of Brazil's hydropower-dominated system provided the underlying rationale for the Garabi interconnection to be built.
-Designed for 1000MW import to Brazil

Bolivia- Brazil gas pipeline project carried out towards the end of 1990s was thus designed to help Bolivia diversify its natural gas exports to Brazil.
Pipe network extends to Argentina

SOUTH EASTERN EUROPE ENERGY COMMUNITY PROGRAM

South East European states (Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Romania, Serbia-Montenegro, Turkey and Kosovo) agreed with EU to integrate their electricity markets in terms of EU directives and eventually to integrate their regional market with that of the EU

The Baku-Tbilisi-Erzurum gas pipeline exports natural gas from Azerbaijan's Shah Denis field to Turkey via Georgia for thermal power generation.

Advantages of Regional Market Integration

Balancing of energy demand and endowment mismatch between regional countries.

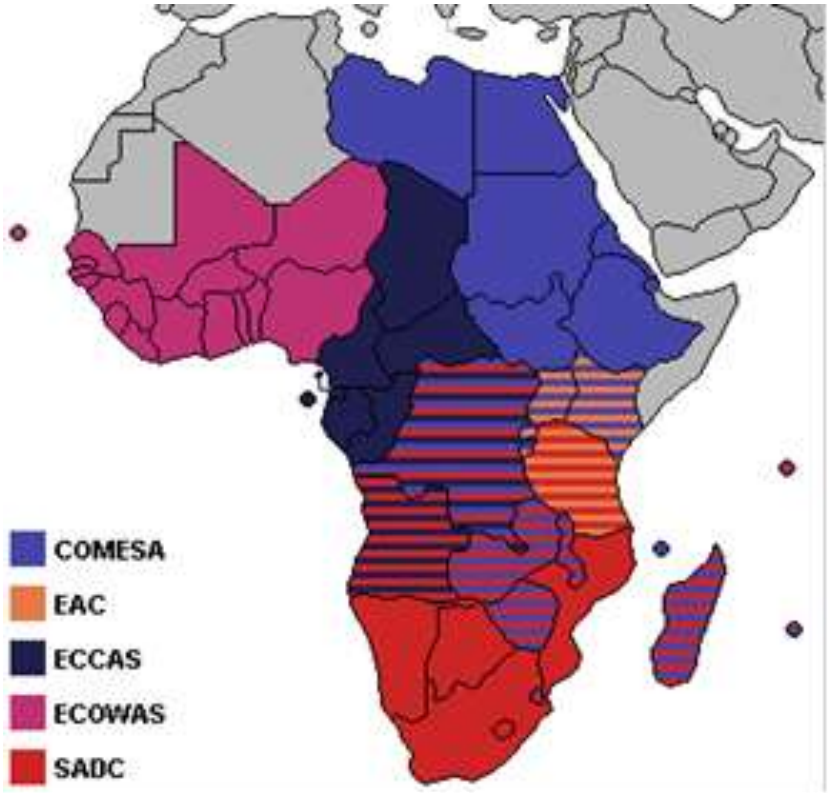
Enhanced energy security.

Energy trade would enable smaller countries with large natural resources (such as hydropower or natural gas) develop their resources exploiting economies of scale.

For resource rich smaller economies, exports of energy could be an engine of growth and development

Help postpone, reduce, or avoid large and lumpy capital investments in new production facilities and thereby overcome temporal cash flow problems.

West Africa Regional Economic Communities



- Largest region in Africa with 15 members.
- Over 262 million people, 40% of Sub-Saharan Africa.
- The Economic Community was founded in 1975.
- Member countries are:
  - Benin
  - Burkina Faso
  - Cape Verde
  - Cote d'Ivoire
  - Gambia
  - Guinea
  - Guinea Bissau
  - Ghana
  - Liberia
  - Mali
  - Niger
  - Nigeria
  - Senegal
  - Sierra Leone
  - Togo

Energy Potential of the Region

- The region is well endowed in natural resources in per capita terms; however these resources are concentrated in very few countries and mostly remain untapped.
- Petroleum and natural gas, are concentrated in costal and offshore regions.
- 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).

Regional Energy Mix

NIGERIA

- Export ~ 2.5million barrels of crude oil
- ~187TCF of Natural Gas
- Generates Hydro-power
- Generates < 4000MW

GHANA

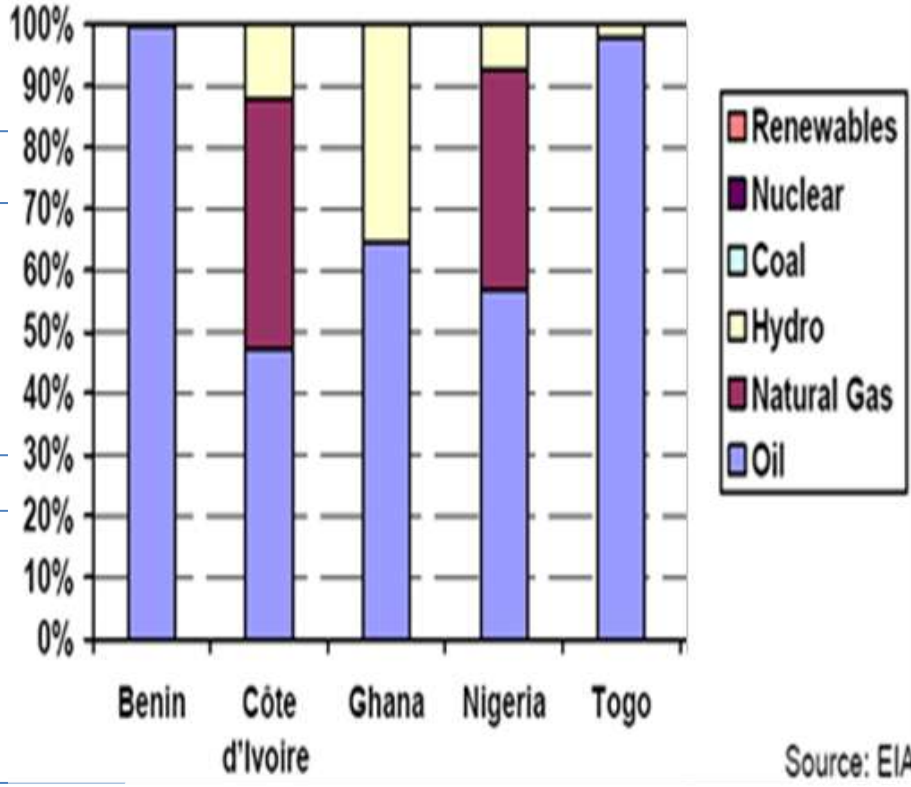
- 5Billion Barrel of oil reserves, 6th in Africa
- 840 BCF of Natural Gas
- Generates over 1GW from Hydroelectricity

COTE D'IVOIRE

- 1TCF of Natural Gas
- 100 Million barrel of crude oil
- Generates ~900 MW

BENIN & TOGO

- Majorly oil consumers



Drivers for Energy Market Integration

It is very saddening that a region that is so much endowed with much energy resources and manpower ranks among the world least energy developed.

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?

ECOWAS adopted a regional energy policy drafting a Master Plan that called for the development of power production plants and the interconnection of electricity grids of the ECOWAS member countries.

In 1999, the West Africa Power Pool (WAPP) was officially inaugurated with the mandate to develop and implement the technical, legal and political frameworks of integrating the operations of the national electrical networks in a unified market

The ECOWAS power sector vision:

Develop interconnection and power exchanges between member states.

Harmonize legislation and standards for power sector operations

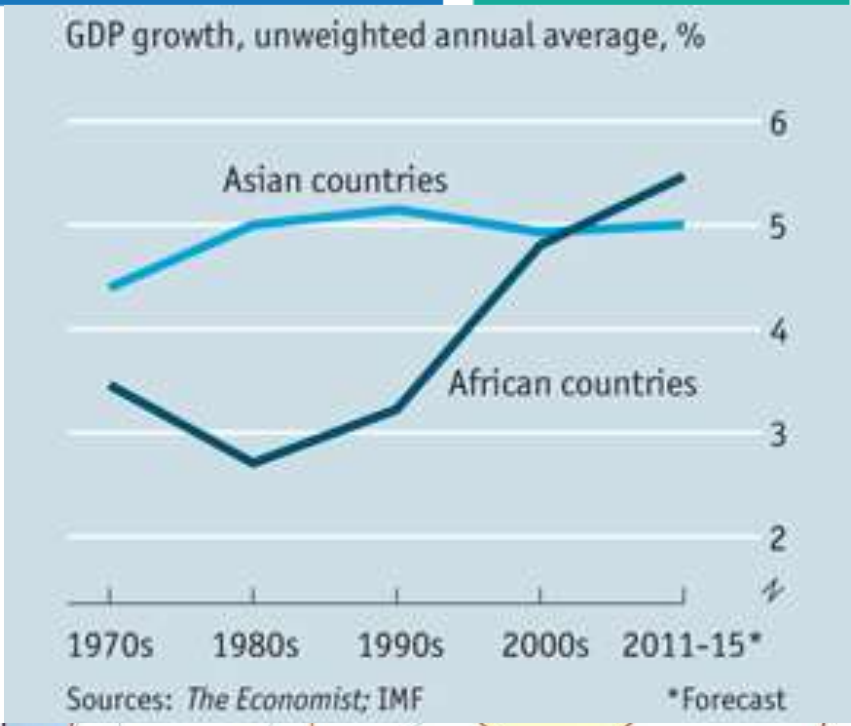
Promote and protect private investment in energy projects.

Create an open and competitive regional electricity market.

Use flare-gas in Nigeria to feed power stations in neighbouring countries

Drivers for Regional Energy Demand

- Economic growth with stable political terrains
- Industrial / Infrastructural Expansions
- Urbanizations across capital states
- Population growth

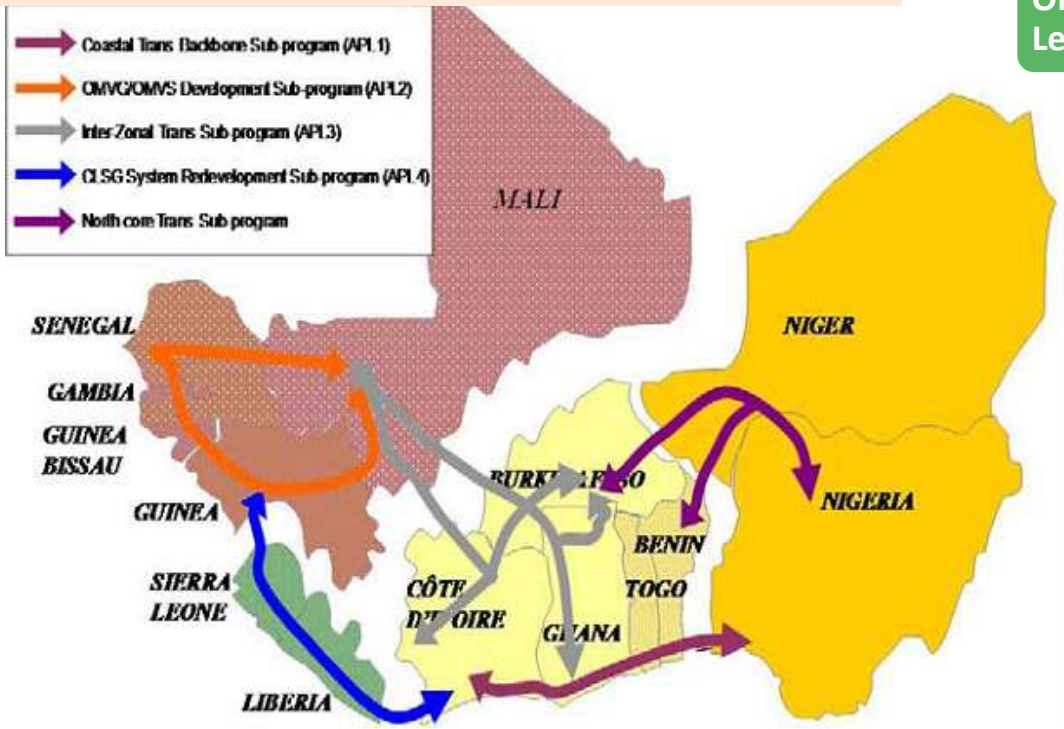


Electricity consumption per capita is below the UN specified minimum energy required for subsistence development of 500 kWh; less than the 1,000 kWh for industrialization take-off; and below the world average of about 2,400 kWh.

Ghana= 247 kWh; Côte d'Ivoire = 176 kWh; Nigeria, Togo and Benin record 104 kWh, 87 kWh and 66 kWh respectively.

The WAPP Infrastructure Program

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



Coastal Transmission Backbone – Cote d'Ivoire, Ghana, Benin/Togo, Nigeria

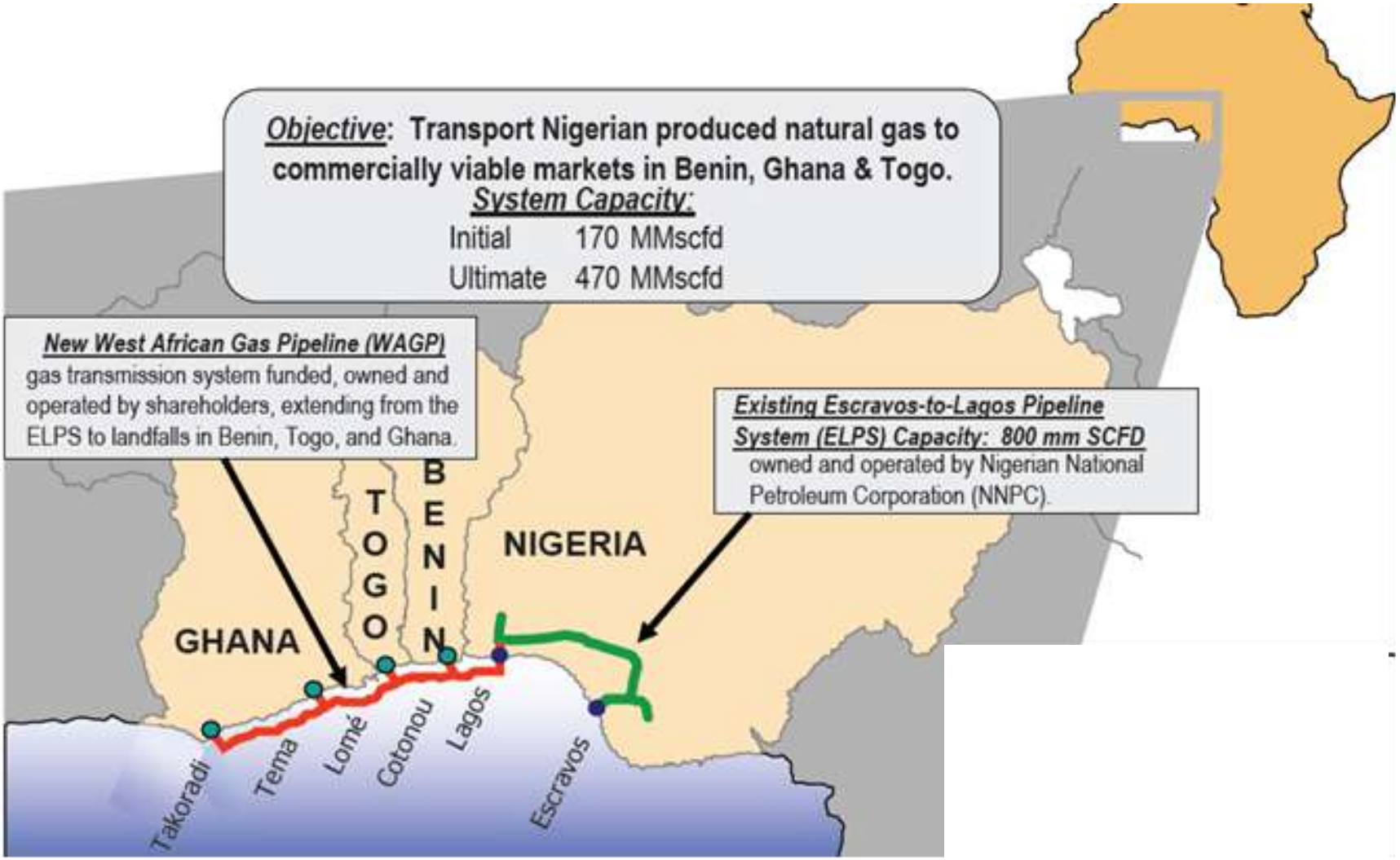
Inter-zonal Transmission Hub – Burkina Faso, Mali via Ghana, OMVS via Mali, Liberia-Sierra Leone-Guinea via Cote d'Ivoire

OMVG/OMVS power System Development covering Gambia, Guinea, Guinea Bissau, Mali and Senegal

Cote d'Ivoire - Liberia-Sierra Leone-Guinea Power Network

North-core Transmission (Nigeria, Niger, Burkina Faso, Benin

Natural Gas Play in the Region's Energy Integration



WAGP Milestones

1982

The ECOWAS proposed the development of a natural gas pipeline throughout West Africa

1995

The governments of four countries signed a Heads of Agreement. The feasibility study was carried out in 1999, that same year, a memorandum of understanding was signed.

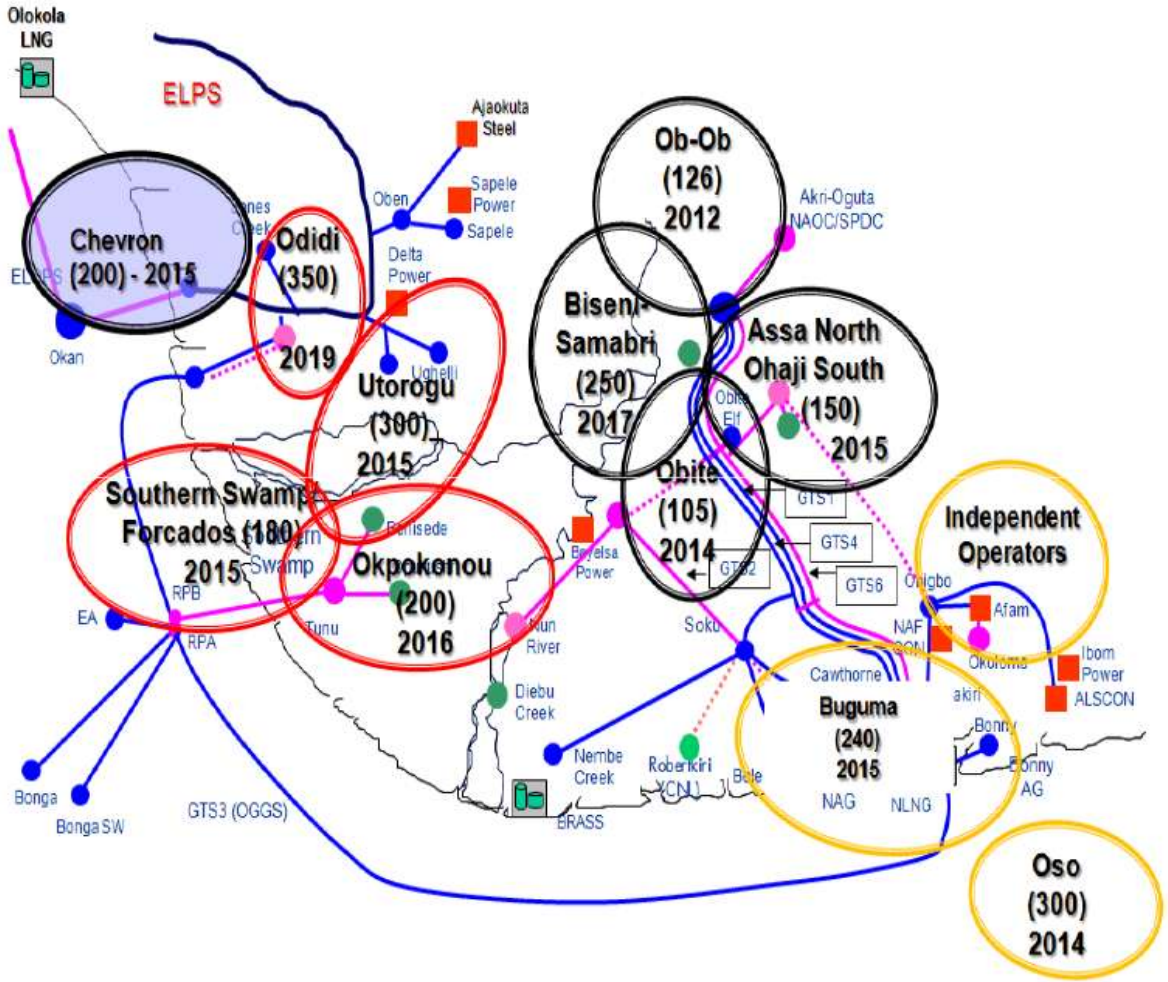
2000-2003

Inter-Government Agreement was signed, the WAGP Implementation agreement was signed 2003

2005 -2009

Construction started and offshore pipeline finished in 2006. 2008, first gas delivery to Ghana. Electricity generation from WAGP gas in April, 2009

Major New Gas Supply Projects



To help boost gas supply to the region the Nigeria Government has developed the Gas Infrastructure Blueprint as part of the Nigeria Gas Master Plan to harness gas fields in the Niger-Delta

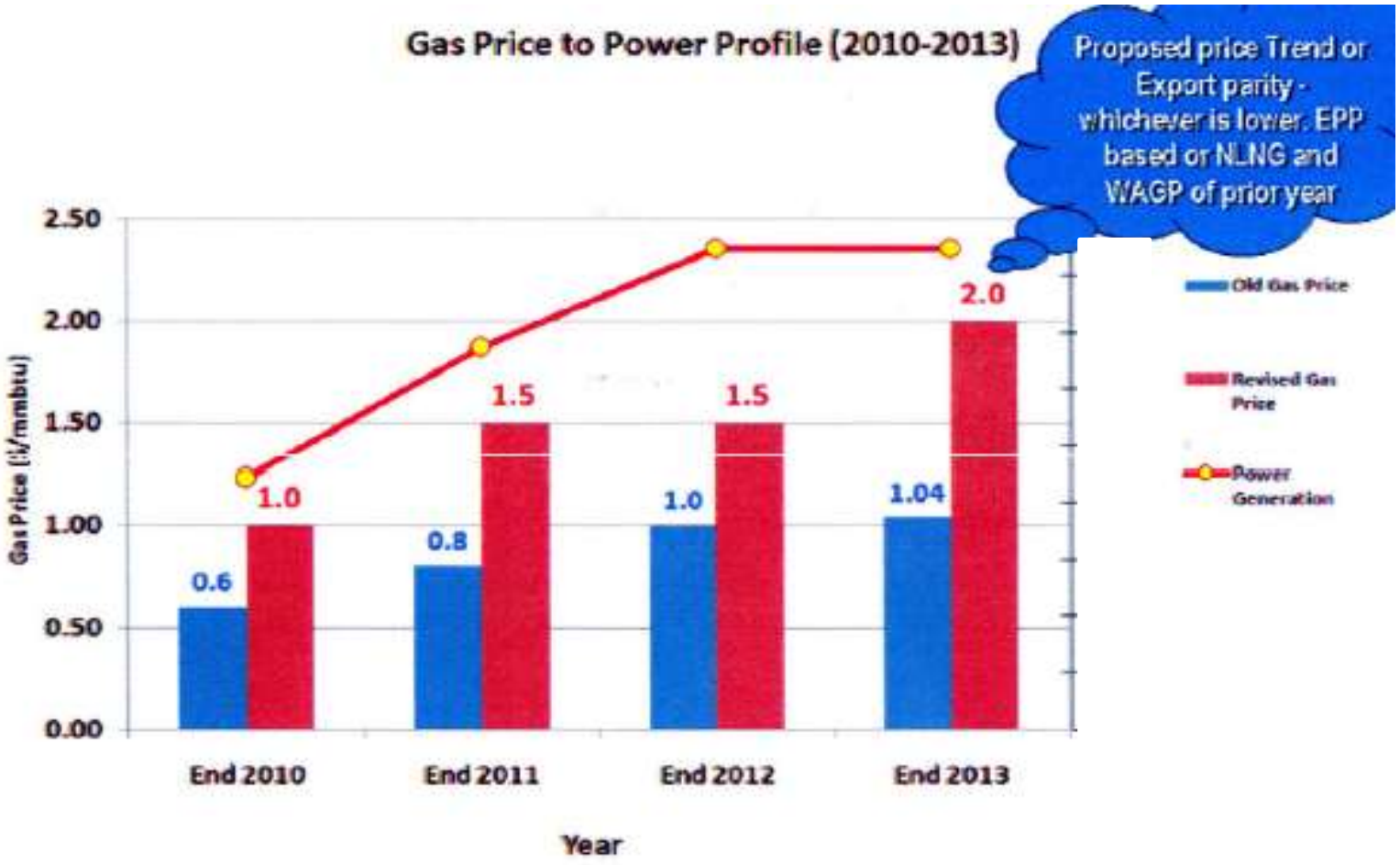
Challenges of the WAGP

- **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. 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.**

- **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. Thus the line is operated under 60mmscf/d as of today**

- **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**

- **There is the issue of streamline the Gas Pricing Regime vis a vis the National Gas Supply and Pricing Policy – Is WAGP seen as domestic or export gas?**



To assure sustainability of gas supply, a revised transitional pricing structure is in place for gas to Power. Aspiration as market develops is 'willing buyer willing seller' prices.

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.**

- **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.**

Conclusion

- ECOWAS Energy Integration strategy and processes are inline to take full advantage of regional cooperation within her member countries.
- 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.

THANK YOU