

Federal Republic of Nigeria

INVESTMENT OPPORTUNITIES IN THE NIGERIAN POWER SECTOR



Outline

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Nigeria on the World Stage

- Population is the *seventh* largest in the World, ~160 million people and still growing at over 6% per annum.
- By United Nations' statistics, Nigeria's population will reach **nearly 230 million** within the **next 20 years**.
- The largest of any country in Africa (accounts for nearly *half* the total population of West Africa and *more than 15%* of the total population of the entire African Continent).
- More than 40% of Nigeria's population is less than 20 years old, functional literacy level is placed at between 30% - 40% over the population and well over 65% on the (18 – 45 years) population segment. Indicating strong, sufficient & modern labour market.
- Nigeria represents over 65% of the effective West Africa market and remains the most competitive destination for the establishment of medium and large manufacturing industries.

Nigeria Background Information



Area: Population: Rural population: GDP GDP growth GNI per capita

923,770 sq. km 162,470,000 (2011) 52% US\$235bn (2011) Ave 7% last 3 yrs US\$2,300 approx.



Nigeria Background Information

Total Energy Consumption 1,259 TWhr per annum Total Electricity Production 19.78TWhr per annum Energy consumption per capita 8.1 MWhr per head **Electricity Consumption** 18.05 TWhr Access to Electricity 51% 10% Access to Electricity – rural Installed Generation Capacity 10,000MW by December 2013 Peak Generation to date 4,500MW

Introduction

Fortunately, Nigeria already has important building blocks to develop a strong, successful power sector

| Natural resources | We have a very broad range and quantity of fuels available for power generation (gas, hydro, coal, wind, solar, etc) | |
|----------------------|--|--|
| | We have a strong base of youth (More than | |
| Local talent | 60% of population are below the age of 30) and reputed technical universities (e.g., FUT. Owerri, FUT, Minna, FUT, Akure, FUT, Yola | |
| | Yabatech, RSUST etc.) | |
| Power Roadmap | We have a strong and well structured roadmap for performance and growth in the power sector. President Goodluck Jonathan has continued to demonstrate clear and strong political-will and direction. | |

Power generation installed capacity



- To achieve Brazil GDP per capita level by 2030 (i.e., \$10,000), we will need 135GW¹ of capacity to supply a projected 230m Nigerians.
- This is a 15 times capacity increase from today based on projections for Dec 2013
- It also means we need to build power plants at 7 GW/year for the next 18 years. Only two countries

 China and US – have done this in the past

1 Capacity estimate based on consumption per capita average of Brazil and South Africa and with capacity utilization of 70%

West Africa Power Pool (WAPP)

- Nigeria is a member of the Executive Board of WAPP & currently serves as Chairman
- Nigeria has a Power Sale obligation of 150 MW with a request for an upward review to 200MW in the short term for CEB (Transmission Company of Benin & Togo)
- Gas supply obligations through the West Africa Gas Pipeline currently supports power production in Ghana with plans to cover other West & Northern African Countries



Source: www.ecowapp.org

Introduction

Structure

 Government owned monopoly with the Federal Ministry of
 Power at the Apex of
 a vertically integrated
 monopoly (NEPA
 later PHCN)

Key Characteristics

- Internalized inefficiencies and leakages ; Annual capital drain from the federal budget.
- Uncoordinated investments in generation, transmission & distribution.
- Poor projects delivery.

Nigeria Power Sector Appropriation Funding History



Results

- Huge widening gaps between demand & supply ; massive industry flight leading to worsening unemployment.
- High suppressed demand throughout Nigeria.
- Large number of manufacturing & industrial operations grounded or relocated to neighboring African Countries.
- Painful loss of economic dominance in the west coast.

Nigeria before Power Sector Reform

Figure 10. Power outages are a major tax on Africa's economies

Economic cost of power outages in select countries



Nigeria Power Reform

The Power Sector Reform has two broad missions :

Service Delivery :

Relying mostly on the completion of the new NIPP projects & the recovery of installed capacities in the up, mid and downstream, grow the availability, supply and reliability of electricity in Nigeria to an acceptable short term level during the divestment period.

Reform:

Move the sector from the position of government ownership/management of the assets to a private-sector driven Nigerian Electricity Supply Industry in line with the EPSR Act 2005.

Nigeria Power Reform

Presidential Roadmap on Power – A short history of the journey

1) Pre - May 2010

- The Electric Power Sector Reform Act enacted (EPSRA 2005).
- NEPA unbundled into Successor companies with PHCN as the holding company
- Nigerian Electricity Regulatory Commission NERC created & later suspended
- A multi-billion dollar National Integrated Power Projects (NIPP) started and later stalled
- Reform stalls until President Goodluck Jonathan assumes office in May 2010.

2) Post - May 2010

- President Jonathan chooses Power as one of his cardinal programmes.
- The stalled NIPP program resumes in earnest.
- President Jonathan inaugurates the Presidential Task Force on Power & the Presidential Action Committee on Power .
- President Jonathan launches the Nigeria Power Sector Reform Road map in August 2010.
- NERC Board reconstituted

The Reform Strategy: Changes in Ownership and Control

Current Configuration

| | Gas Production | Gas Transmission | Power Production | Power Transmission | Power Distribution |
|------------------------|--------------------|---------------------|---------------------|-----------------------|-----------------------|
| Ownership | Mixed | FGN | Largely FGN | FGN | FGN |
| Operational Control | Largely Private | FGN | Largely FGN | FGN | FGN |



| | Gas | Gas | Power | Power | Power |
|-------------|------------|--------------|--------------------|---------------|------------------|
| | Production | Transmission | Production | Transmission | Distribution |
| Ownership | Mixed | Mixed | Largely Private | FGN | Fully Private |
| Operational | Largely | Largely | Fully | Fully Private | Fully |
| Control | Private | Private | Private | | Private |

| Long Term Goals | The Nigerian power market to have reached stability for willing-buyer, willing-seller mode |
|-------------------|---|
| (2015 and beyond) | ✓ To ensure that all aspects and stakeholders of the NESI are working together to deliver quality, reliable and efficient electricity to consumers at |
| _ | reasonable prices |

Power Growth Plan

We need to continue increasing our available capacity



Power Growth Plan

The aspiration of 40 GW by 2020 will move Nigeria to a much more stable socio-economic position



1 Assumes 2.6% population growth per annum; 80% load factor on plants; <u>approx 4.3 GW of new capacity per annum to achieve 40 GW by 2020</u> 2 As of 2009

SOURCE: NERC; McKinsey analysis

The Reform Enablers

The Power sector in Nigeria has already achieved many successes

| Pre-2010: | 2005: Approval of the Electric Power Sector Reform Act and establishment |
|--|--|
| Getting policies | of NERC. NEPA transformed into PHCN marking the start of the unbundling |
| in place | journey. Also marked the start of the NIPP |
| 2010 – 2012: Moving from policies to action | August 2010: Roadmap for Power Sector Reform officially launched by Mr. President 2011: Solid progress implementing power sector reform, e.g., NERC effectively re-established Bulk trader, NELMCO, NAPTIN established and operationalized Privatization process – at handover stage Management Contractor for TCN operationalized. PHCN Wind Down in process World Bank PRG support for PPAs. Signed MOU for equity investment in power generation projects with General Electric, Siemens, Daewoo, Eletrobras etc. Cost reflective tariffs under MYTO II Feed-in tariff for renewables |

Existing Power Stations Connected to Grid



Nigeria..... Transmission Grid



Report Maps 7-24-00

Policy Initiatives for Promoting Renewables



Renewable Energy Policy Guidelines

- RE policy sets out Federal Government's vision, policies and objectives
- Policy Guidelines drawn primarily drawn the Constitution, NEPP, EPSR, RE Master Plan and REA Policy Document
- Vision of Nigeria is to move gradually from a fossil economy by increasing the share of renewables in energy mix
- Development of renewables shall be on equitable and sustainable basis
- Energy transition to less carbon intensive economy powered by natural gas and RE
- Development of domestic Ethanol and Biofuel policy under the purview of the NNPC

Policy Initiatives - Renewables

- The National Electric Power Policy (NEPP) 2001 has set a target of 10% renewable energy mix for all new connection by 2020
- The Ministry of Power has recently developed a draft Renewable Energy Policy that will drive the development of Renewable Energy resources in the country
- The Nigerian Electricity Regulatory Commission (NERC) has published Feed-In-Tariffs for most renewable energy in June 2012 (<u>www.nercng.org</u>) providing investors cost recovery and guaranteed return on investment
- Federal Govt. has established the Nigeria Bulk Electricity Trading Co. Ltd as a credible and creditworthy offtaker of power including renewables. The off-taker is supported by World Bank Partial Risk Guarantee
- The Rural Electrification Agency (REA) has established Rural Electrification Fund (REF) to focus on promotion renewable in rural areas
- NERC has also developed regulation to promote and guide embedded power generation including embedded renewable power generation within existing distribution networks

Energy Resources

| Resource | Potential |
|------------------------|------------------------|
| Large hydropower | 11,500MW |
| Small hydropower | 734MW |
| Solar | 3.5 – 7.0 kW/m/day |
| Sun shine | 4 – 8 hrs/day |
| Wind | 2 – 6 m/s @ 10m height |
| Biomass – animal waste | 61 mill tons per year |

| Resource | Potential |
|------------------|----------------------|
| Crude oil | 36.2 billion barrels |
| Natural gas | 187 trillion scf |
| Coal and lignite | 2.7 billion tons |

Source: SERC - UDUS

Nigeria Solar Radiation

Yearly average of daily sums of global horizontal irradiation (HelioClim-1/PVGIS data, period 1985-2004)



PVGIS (c) European Communities 2002-2006 HelioClim-1 (c) Ecole des Mines de Paris/Armines 2001-2006 http://re.jrc.cec.eu.int/pvgis/pv/ http://www.soda-is.com/

Nigeria Potential Hydropower Sites



Figure 4: River basins with Large and Small scale Hydropower Potentials

Nigeria Onshore Wind Map

Average wind speed: 2 - 6.5 m/sec measured at 10m

Offshore resource mapping in progress

Renewable Energy - Targets

Renewable energy - targets

18% of electricity from renewable by 2025

20% of electricity from renewable by 2030

100MW of small hydropower by 2015 and 760MW by 2025

300MW of Solar PV by 2015 and 4000MW by 2025

40MW of Wind Power by 2020

30MW of biomass – fired capacity by 2020

Infrastructure Expansion & Investment Opportunities

| | Current Assets | On-going projects | New Initiatives |
|---------------------|---|---|--|
| Generation | Legacy Assets (installed) Thermals 5.6GW Hydro 1.3GW Wind (pilot) 10MW | Mambilla Hydro 3.1GW Zungeru Hydro 0.7GW S&MH (pilot) | Sale of NIPP (4775MW) New IPPs in planning stage 2.6GW Coal/Renewables MOUs 30GW (GE, Siemens, Daewoo etc) Rural Electrification |
| Fuel to power | Gas to Power average daily consumption of 650mmscfd | ELPS-C Pipeline SPDC(NPDC) 50mmscfd Oben Gas plant 30mmscfd OB3 Pipeline 120km (48") | SPDC/CNL 100mmscfd SPDC SS 180mmscfd CNL Okan 300mmscfd Bosi/Erha 300mmscfd |
| Transmission | Grid Stability Projects Grid Capability 4.3GWE | Grid Expansion Projects 10.4GWE by Q4 2013 | SuperGrid (Conceptual)40GW by 2020 |
| Support Services | Provision of specialized training for electricity industry technicians and managers. Assembly Plants for intermediary power equipment & accessories including meters Consultancies in Regulatory & Consumer education initiatives Provision of Power Sector specific equipment testing, calibration & logistics services Energy Efficiency Initiatives & products . | | |

Infrastructure Expansion & Investment Opportunities

The 2015-17 power projection is underpinned by several MOU's with the following organizations

| General Electric | Facilitating and promoting private sector investment up to 10,000MW. | |
|--|---|--|
| Siemens AG | Facilitating and promoting private sector investment up to 10,000MW. | |
| Eletrobras | Facilitating and promoting private sector investment up to 10,000MW. | |
| Daewoo E&C | Facilitating the development, financing, procurement, manufacture, commissioning and operations of 10,000MW Promoting power sector investments by sponsoring feasibility studies for approved projects. \$1.5Billion credit facility dedicated to exports of Machinery, Equipment & Engineering Services to develop Power Projects and support growth if the Power Sector | |
| EDF/ETDE | | |
| US Exim | | |
| Multi-Lateral G- to-G Agency Support | Promoting the development of small / medium hydro-power plants as embedded generation for rural communities | |

- Each of these MOUs present opportunities for new ventures by serious Nigerian-led power development consortiums.
- The MOUs are designed to make significant equity contribution in kind or cash, as well as provide credibility for IPPs seeking international financing.

Key Agencies in the Nigerian Power Sector

- Federal Ministry of Power Policy formulation and consistency (<u>www.power.gov.ng</u>)
- Nigeria Electricity Regulatory Commission Issuance of licenses & Regulation (<u>www.nerc.org</u>)
- Nigeria Bulk Electricity Trading Company Plc Power Purchase Agreements (<u>www.nbet.com.ng</u>)
- Bureau of Public Enterprise responsibility of Privatization of Federal Government Assets. (www.bpeng.org)
- Gas Aggregation Company of Nigeria Allocation of gas for domestic use (<u>http://gacn-nigeria.com</u>)
- Transmission Company of Nigeria Management of the National Grid (<u>www.tcnng.org</u>)
- Nigeria Gas Company Gas Infrastructure and Transportation (<u>www.ngc-nnpcgroup.com</u>)
- Rural Electrification Agency Remote & Off grid projects

Why Invest in the Nigerian Power Sector?

- Capitalize on growth opportunities in the Nigerian electricity market where demand far outstrips current supply and the potential for strong economic growth is high.
- Establish a strong presence in West Africa, using Nigeria as a platform for acquiring further assets in the region.
- Benefit from a Multi Year Tariff Order (MYTO), designed to be a cost-reflective tariff that accounts for the operating cost and capital recovery, incentivizing efficient operations, based on best new entrant capabilities and technology. MYTO brings certainty to the Tariffs.

Conclusion

- The Power Sector Reform has recorded major achievements and milestones due to the unflinching support of President Goodluck E. Jonathan.
- The milestones achieved so far are beginning to impact on service delivery and market structure.
- Nigeria is poised to meet its demands and contribute more to the West Africa power pool.
- Huge investment opportunities exist in the Nigeria Electricity Supply Industry.
- Local and international investors are encourage to take advantage of the ongoing power sector reform.
- The Federal Government will continue to ensure a conducive environment and level playing field for all investors.



Thank You

www.power.gov.ng



Investment Opportunities – Hydro Power

Large Hydro Power Development

- 3,050MW Mambilla Hydro Power Plant Project
- 360MW Gurara II Hydro Power Plant Project
- Potential Sites Medium Size
 - 38MW Dadinkowa Hydro Power Plant Project
 - 40MW Itisi Hydro power Plant Project

Small & Medium Hydro Power Projects - Nationwide

| DAM | STATE | CAPACITY (MW) | ESTIMATED |
|-------------|----------|---------------|----------------|
| | | | COST |
| | | | (usS) |
| Oyan | Ogun | 10 | 7,500,000.00 |
| Ikere Gorge | Оуо | 6 | 11,000,000.00 |
| Bakolori | Zamfara | 3 | 4,275,000.00 |
| Challawa | Kano | 7.5 | 33,500,000.00 |
| Tiga | Kano | 10 | 44,562,500.00 |
| Kampe | Kogi | 3 | 8,125,000.00 |
| Owena | Ondo | 0.45 | 1,287,500.00 |
| Doma | Nasarawa | 1 | 4,900,000.00 |
| Zobe | Katsina | 0.30 | 1,531,250.00 |
| Jibia | Katsina | 4 | 91,250,000.00 |
| TOTAL | | 83.25 | 207,930,750.00 |

Investment Opportunities – NIPP

- Niger Delta Power Holding Company (NDPHC) is planning to divest its holdings in the generation assets in the National Integrated Power Projects (NIPP).
- **39 Gas Turbine Generators** in 10 Plants with a total capacity of 4,775MW located in:

| 0 | Calabar | (5) | 561MW, |
|---|------------|-----|--------|
| 0 | Egbema | (3) | 338MW |
| 0 | Ihovbor | (4) | 451MW |
| 0 | Gbarain | (2) | 225MW |
| 0 | Sapele | (4) | 451MW |
| 0 | Omoku | (2) | 225MW |
| 0 | Alaoji | (6) | 961MW |
| 0 | Oloronsogo | (6) | 676MW |
| 0 | Omotosho | (4) | 451MW |
| 0 | Geregu | (3) | 434MW |

o Total equivalent cost in excess of USD3.8 billion

Investment Opportunities

Transmission

- Our Transmission network needs an injection of about \$5b within the next 5 years
- Plan for a 765KV Super Grid
- Funding options include:
 - International Development Banks
 - Multilateral Funding Sources
 - Public Private Partnership.
 - Local Capital Market

Remote, Off-Grid and Renewable Energy

- Pre-feasibility & Feasibility Studies for Remote and off-grid locations.
- Load profiles & forecasts for Remote and off-grid locations.
- Development of commercial framework for implementation of remote and offgrid power.
- Funding and Technical support for pilot project implementation.
- Staff training.

Investment Opportunities - Renewables

- Power generation using renewable sources of energy
 - Solar,
 - Wind,
 - Biomass and
 - Small Hydropower)
- Manufacture of solar panels and small hydropower equipment
- Capacity building in the field of renewable energy technologies
- Supply of renewable energy equipment and accessories
- EPC contracting in renewable energy projects
- 10MW Wind Farm ready for commissioning and concessioning
- Over 300 small and medium Hydropower projects were identified, while feasibility studies has been carried out on 12 of the dams awaiting interested investors to takeover and develop the hydropower potentials

Contact Information for Investment in Nigeria

One Stop Investment Center Nigerian Investment Promotion Commission

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