# How Private Sector Participation in the Power Sector Engenders Growth in the Economy

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# PRESENTATION OUTLINE

- **Notable Quotes**
- **Current Status (as per Mr. P. Umeh, Commissioner, Finance and Management Services, NERC)**
- **Electric Power Sector Reform Program**
- **Strategic Plan and Priorities**
- **Conclusion**

**JUNE 2, 2011**

## PRESS CONFERENCE ON UN-ENERGY AND GLOBAL SUSTAINABLE ELECTRICITY PARTNERSHIP

A United Nations-backed sustainable electricity partnership made a strong case today for the **transformative role that small-scale, off-grid projects could play in bringing clean, reliable energy and electricity to billions of the world's "energy poor"** people living in remote communities and tied to burning coal or heavy oil.

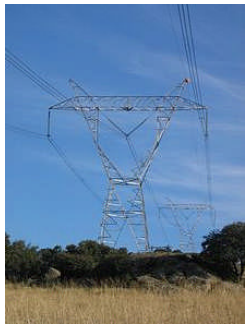
# QUESTION

**Is there any government policy in place to allow Private Participation in the Power Sector?**

# CURRENT STATUS REFORM (Courtesy Mr. P. Umeh)

## Infrastructure & Service delivery

**Generation:** **Inadequate generation** (about 3,500 - 3,800 MW), Obsolete & unreliable power plants (average age: 30yrs), Inadequate gas supply, Poor operational management, etc



**Transmission:** Transmission capacity <4,000MW, Poor voltage profile, **Inadequate coverage,** Overloaded transformers, etc.

**Distribution:** Obsolete protection and Switching devices, Poor metering and collection, **inadequate conductors**, etc.

- **Regulation & Tariff Issues** – subsidies, **power theft**, poor price etc

# CURRENT STATUS -REFORM

## The Nigeria Electric Power Policy (NEPP 2001) and the Electric Power Sector Reform Act (EPSRA 2005) provide for the following:

- Removal of the Monopoly of NEPA in Power Generation, Transmission, Distribution and Trading (Marketing) of Electricity

- Creation of a transition instrument - the Power Holding Company of Nigeria (PHCN) in July 2005
  - PHCN was unbundled in November 2005 into Eleven (11) Distribution Companies, Six (6) Generating Companies, and (1) Transmission Company of Nigeria
  - The successor companies became Independent Corporate entities on July 1, 2006

# CURRENT STATUS –REFORM (continued)

- The Nigerian Electricity Regulatory Commission (NERC) was established on October 31, 2005
- The Rural Electrification Agency (REA) with the mandate to promote rapid growth of access to electricity in rural areas was established on March 2006
- Provision for the establishment of a Power Consumer Assistance Fund
- **Privatization of the PHCN Successor Companies**
- **Private Sector participation in the electricity sector (Generation, Transmission, Distribution, Metering, etc.)**
- Provision of overall sector policies by the Ministry of Power

# CURRENT STATUS –REFORM (continued)

- **Privatization processes of the PHCN Successor Companies are on-going** with over 300 expression of interest by private investors. The Bureau of Public Enterprise (BPE) is leading the effort

- **Local and foreign investors are encouraged to invest** in the power sector considering the improved investment environment due to the establishment of EPSRA (2005), an independent electricity regulator (NERC), and among others

# CURRENT STATUS –REFORM (continued)

- **Short Term Goal**:
  - Raise Generation Capacity-**5,000MW** (by Dec 2011) and **15,000MW** (by Dec 2013) through
  - Rehabilitation of all existing power plants & distribution of network

- **Long Term Goal**:
  - Raise Generation Capacity -**40,000MW (by 2020)**

- **Other initiatives:**
  - **Energy mix** through increased share of renewable alternatives (solar, Wind, small hydro, geothermal, coal generation etc)
  - Private partnership/participation; Joint Ventures, Independent Power Production
  - **Petroleum Industry Bill;** the bill would provide the linkage of the oil and gas industry to Nigerian economy especially in the area of power generation and industry development

# CURRENT STATUS –REFORM (continued)

## Other areas of investment are in:

- The supply and manufacturing of ancillary materials and spare parts required in the power industry like transformers, gas turbine spare parts, meters, pumps, compressors, heat exchanger, etc.
- Training, research and development programs.
- Metering and improved revenue collection systems.
- Gas facilities (gas gathering, piping, treatment, etc)

# NOTABLE QUOTES
## (from Sweetcrude, A Review of Nigerian Energy Industry

**Abdulahi Sambo, DG, Energy Commision of Nigeria**

- The long neglect of the power sector for the period covering 1979-1999, no new power plants were built and the **old ones were not properly rehabilitated**, bringing the energy sector to a deplorable condition
- Electricity went down from the 5,600mw generation capacity to about 1,750mw in 2001.
- Only **19 out of 79 installed operating units were functional**.

**Rajan Menon, MD of Simba Group of Companies Nigeria**

- Only a sustained recourse to adoption and **use of alternative energy** will ensure future energy security in the country.
- There is **a huge potential and vibrant market opportunity for alternative energy to expand in Nigeria.**
- India, like Nigeria, has had challenge of electricity generation and distribution, and it is through the adoption of alternate energy sources such as solar and others that the country is tackling this problem. **Nigeria cannot afford to be left behind in this technology**

# NOTABLE QUOTES
## (from Sweetcrude, A Review of Nigerian Energy Industry

**Reuben Akinwunmi, CEO, Kainji Hydro-Electric Plant**

- The power plant [is] in a dire strait with **current generation dropping to 210 megawatts** owing to incessant breakdown of the serviceable generating units. He linked the breakdown to lack of statutory overhaul.

**Barth Nnaji, Minister of Power**

- What we will like is to be able, in one go, to repair all these units [refering to Kainji Hydro-Electric Plant] to see the full realisation of the capacity originally installed here, that will really do a lot for power in this country so that the entire **760 megawatts** can become available all at once and we would be able to modernise the plant

- The **5,000 megawatts target of the government by December** was in line.

# NOTABLE QUOTES
## (from Sweetcrude, A Review of Nigerian Energy Industry

**Barth Nnaji, Minister of Power**
[Speaking to CEOs of the nation's generation and distribution companies]

- We have improved and stabilized generation, curtailed losses, etc…. **The onus is now on you to prove that you are qualified and capable to drive the Nation's economic engine**.

- You are no more representing the Government. These are your Companies, **run them as private enterprises**. It is not possible to owe a private enterprise billions of Naira on electricity consumed without being disconnected and asked the Companies to embark on mass revenue drive and spare no debtor who owes the company.

- **So do your absolute best not to fail the nation**. We are aware that gas is being supplied to the plants to a certain measure, and I will request that you alert me if there are challenges along the way.

- **The Nigerian President has made pledges to the Nation on your behalf and stated the Government credibility on your ability not to disappoint the nation**.

# QUESTION

**Is there any government policy in place to allow Private Participation in the Power Sector?**

**YES**

# NOTABLE QUOTES

**Only 2 per cent of Africa's rural people are connected to national power grids.**

**African businesses require affordable, reliable access to electricity.**

From *Africa Renewal, Vol.18 #4 (January 2005), page 6*
**Energy key to Africa's prosperity *Challenges in West Africa's quest for electricity,* By Itai Madamombe**

# POWER GENERATION STATIONS (Courtesy Mr. P. Umeh)

| S/N | Power Plant | Installed Capacity (MW) | Average Actual Generation Capacity (MW) - 2007 |
|---|---|---|---|
| 1 | Egbin | 1320 | 709 |
| 2 | Kainji | 760 | 434 |
| 3 | Shiroro | 600 | 500 |
| 4 | Jebba | 578 | 521 |
| 5 | Sapele | 1020 | 62 |
| 6 | Delta | 900 | 341 |
| 7 | Afam | 971 | 172 |
| 8 | Ajaokuta | 110 | 56 |
| 9 | Agip Okapi | 450 | 391 |
| 10 | AES Egbin | 270 | 212 |
| 11 | Papalanto | 335 | 98 |
| 12 | Omotosho | 335 | 88 |
| 13 | Geregu | 414 | 213 |
| 16 | Omoku | 150 | 66 |

# POWER GENERATION IN ONTARIO

**Ontario population is approximately 13,000,000**

- **Previously Provincially Owned as ONTARIO HYDRO**

- **1998 was the 92nd and last full year of operations for ONTARIO HYDRO**

- **1999 ONTARIO HYDRO was replaced by five new successor entities,**
  - **Ontario Power Generation Inc.**
  - **Bruce Power**
  - **Hydro One**
  - **Independent Electricity Market Operator (IMO)**
  - **Electrical Safety Authority (ESA)**

- **and Kinectrics Inc. (formerly Ontario Hydro Research Division)**

# POWER GENERATION IN ONTARIO

**Ontario Power Generation Nuclear Fleet**
Generating Capacity: 6,606 MW
Stations: 2

**Ontario Power Generation Hydroelectric Fleet**
Generating Capacity: 6,996 MW
Stations: 65

**Ontario Power Generation Thermal Fleet**
Generating Capacity: 6,327 MW
Stations: 5

**Bruce Power Nuclear Fleet (since 2001)**
Generating Capacity: 6,610 MW
Stations: 2

**Total Generating Capacity: 20,541 MW**

# COMPARISON

**Ontario: 13,000,000**
**20,541 MW**

**Nigeria: 158,000,000**
**<5,000 MW**

# DYNAMICS IN GLOBAL ELECTRICITY INDUSTRY

- **The move toward privatization and deregulation, coupled with new technologies, is spurring several trends in the industry.**

- **This is manifested by:**
  - **a demand for plants that are more efficient and environmentally friendly,**
  - **a desire for energy self-sufficiency by industrial commercial and institutional clients,**
  - **a drive for better management of energy resources,**
  - **and the growth of non-utility power generators such as independent companies and subsidiaries of larger utility holding companies**

# OPERATIONAL PHILOSOPHY

**IF a plant (Public or Private), is**

- **Designed Properly**
- **Built Properly**
- **Operated Properly**
- **Maintained Properly**

**It will provide reliable power supply.**

# PLANT LIFE EXTENSION

- **Expensive to build new plants**
- Many power plants now operate in excess of 20 years beyond design life
- Power plant components are normally designed to have over 200,000 operating hours
- Life assessment of components should be a continual process ideally starting before the unit goes into service.
- Life assessments depend on the accurate documentation of material property data and operating history.
- **Extensive monitoring and refurbishment programs desired periodically (e.g. at about 100,000 hours)**
- Examine critical components causing major failure

# RESEARCH AND DEVELOPMENT

***KINECTRICS (formerly Ontario Hydro Research Division Providing:***

***Expert Condition / Life Assessment & Full Return-to-Service Support***

**Comprehensive Solutions in:**

- ✓ Lifecycle Management of Systems
- ✓ Materials Performance
- ✓ Inspection & Maintenance Systems
- ✓ Concrete / Dam Assessment & Repair
- ✓ Nuclear Parts & Dedication….Obsolescence
- ✓ Reactor Fuel Channel Integrity

# MAINTAINING PLANT PERFORMANCE (Resaerch and Development)

- With an adequately equipped laboratory (basic metallurgy, electron and optical microscopes, fracture testing, creep testing, field metallurgy) utilities are assured of expert services to provide support during condition assessment processes.

- Such process include: evaluation of damage mechanisms, root cause failure investigations, mechanistic evaluations, development of control strategies and on-site support.

- **In the restructuring of the power sector, there should be provision for the set-up and operation of a service laboratory to serve the generating stations.**

# MAINTAINING PLANT PERFORMANCE (Inspection)

- **Verify that the various equipment in the unit have adequately operated as designed over the operating period (since installation or last inspection)**
- **Carry out repairs or replacement on known or suspected defective equipment**
- **Provide high level of confidence that the equipment and unit will operate as designed until the next inspection**
- **Acquire data that will enable the plant operator to assess the ageing effects on equipment and systems experiencing long periods of time between routine tests and inspections**

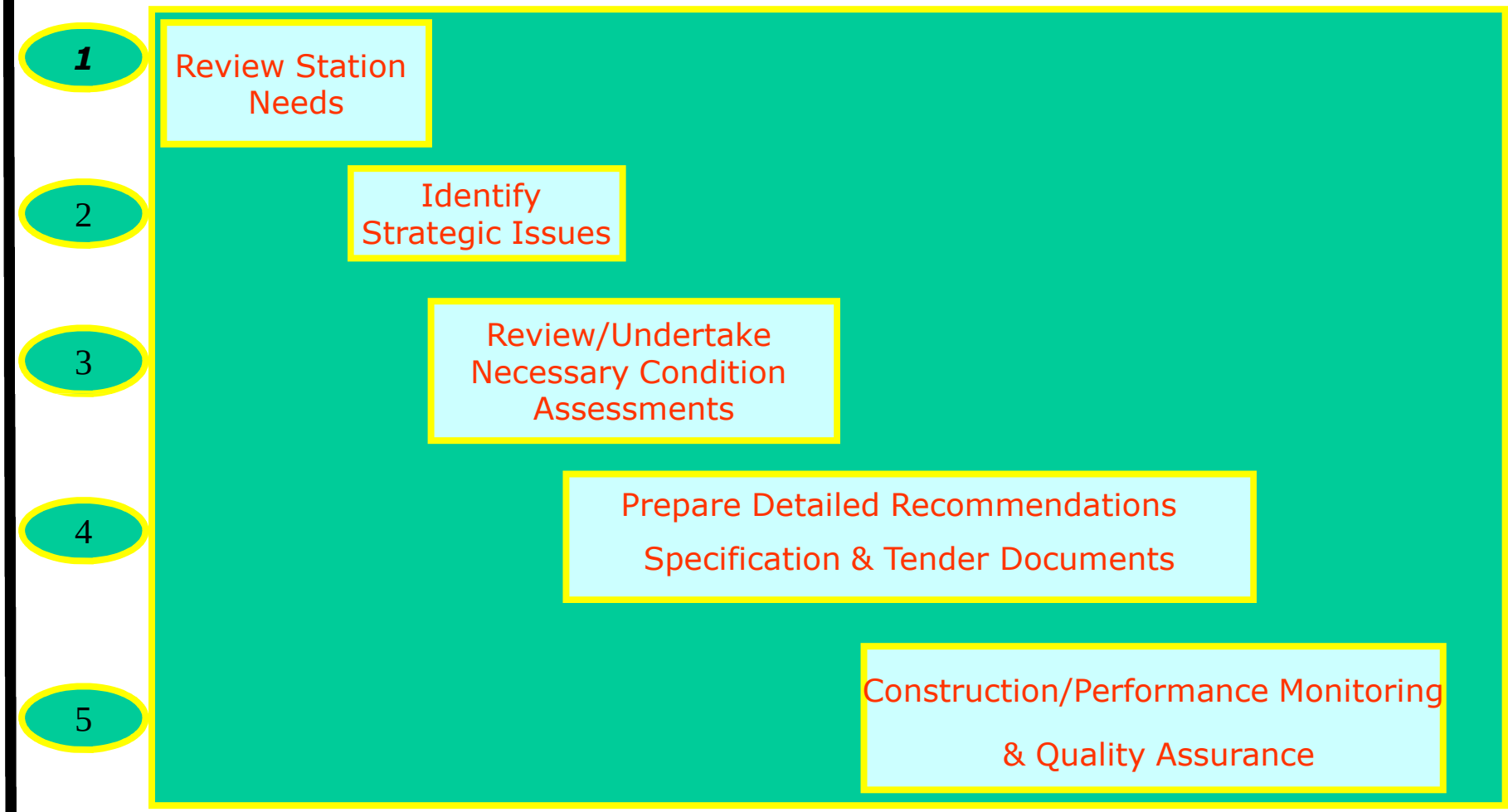
# EXPERIENCE IN LIFE ASSESSMENT (What Works)

- **Maintaining equipment health/performance perspective rather than just individual chemistry and metallurgy**
- **Knowing actual equipment condition through effective In-Service Inspection**
- **Developing solid and well planned processes and procedures**
- **Maintaining rigid adherence to set rules and procedures, in particular for structural integrity issues**
- **Keeping up with operating experiences**
- **Employing knowledgeable, experienced staff and contractors**
- **Investing in effective R & D program to support decisions**

# EXPERIENCE IN LIFE ASSESSMENT (What Does Not Work)

- Postponing key maintenance actions
- Reactive actions or countermeasures
- Not understanding the consequences of change, in particular the long-term consequences
- Lack of equipment configuration management
- Not monitoring work assignment to contractors
- Not knowing root causes of problems
- Not knowing what to do to mitigate or stop problems
- Ignoring warning signs from critical components
- Lack of equipment condition information
- Short-term focus

# ISSUES AND PRIORITY FOR SUCCESS




***Partnership is key to success using combined expertise & resources from across the country***

# OTHER COUNTRIES (naming a few)

- Electric Power research Institute (EPRI)
- Canadian Electric Association (CEA) and CANDU Owners Group
- Korea Electric Power Research Institute (KEPRI)
- China Electric Power Research Institute (CEPRI)
- ETC.

**These facilities cooperate with universities and industries to develop new technologies for diverse power resources, nuclear energy, transmission voltage upgrade, and stable power supply**

# WHAT ABOUT NIGERIA?

## "Nigeria Electric Power Research Institute" (NEPRI)

**But is this the Solution?**

Not really, but it will help if considered as part of the mix.

# SUMMARY

- Efforts are underway in Nigeria to **elevate the output of the underperforming generating stations**
- Refurbishment inadvertently requires extending design life of old plants and injecting **significant amount of financial resources** (Public and Private)
- Adequate monitoring of the rehabilitation process (conducted by **qualified staff** of the utility) is recommended to ensure that the activities are conducted by **qualified contractors**.
- For new units, plant owners must ensure that proper procedures are followed in **building quality plant** to minimize power interruption as a result of unscheduled outages.

# RESOLUTION?

Overall, in solving Electricity problems, the approach is

**Multifaceted and Multidimensional**

and all must be tackled in parallel

- Portable generators?
- Corruption?
- Vandalism?
- Payment of bills?
- Etc.

# WHAT TYPE OF SYSTEM?

**Wind**

**Biofuel**

**Nuclear**

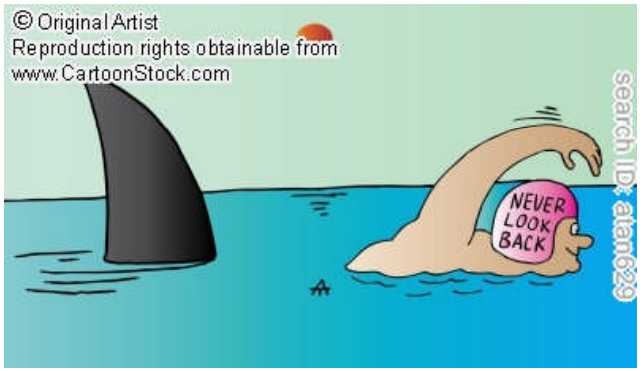
**Solar**

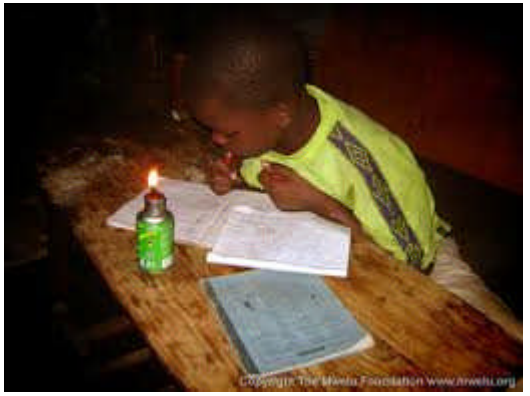
**Water**

**Fossil**

# RECOMMENDATION

**We should "Just Do It"**






Providing power for national growth

# THANK YOU

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