Load forecasting in a deregulated Nigerian electricity market*

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Outline

- Introduction
- Current structure of the Nigerian electricity sector
- Framework for electric load forecasting in Nigeria
- Framework for electric load forecasting in some selected countries
- Conclusion

Fig.1: Maps of Nigeria and Africa

1. Introduction

Country Profile

Map of Nigeria

Geography

Longitude: 30 and 14o E of GM
Latitude: 40 and 14o N of Equator
Area: 923,768 sq. km
Season: Rainy and Dry
Temp: between 6° C and 37° C

Demography: as at 2010

- Population: >159.25 million
- Pop. Growth rate: 3.2% p. a.
- 60% Pop: rural

Economy as at 2010:

- Oil revenue based
- GDP led by Agric. Sector (35.6%)
- GDP: Billion N29498.0 ($1962.2billion)
- Per capita GDP of billion N185,759.5 (US$1235.92)
- GDP growth rate is 7.9%
- Inflation rate: 13.7% ,
- Export : N12035.18
- Import: N7079.52
- Electricity access – 55.2%

Top Govt. Policies at the moment:

- Privatization of the power sector
- Deregulation of the downstream oil sector,
- Expansion of oil refining and power generating capacities.
- Oil subsidy removal (partial)

1. Introduction

- The Nigerian electricity sector is undergoing reform into a competitive electricity sector
- Objectives of deregulation:
  - to enhance the effectiveness and efficiency of the electricity supply industry
  - to encourage inflow of the much needed private capital for infrastructure development in the sector.
- To this end, the vertically integrated national power monopoly, the PHCN has been unbundled into 18 independent companies
  - 6 generation stations,
  - 1 transmission company
  - 11 distribution companies.
- Other functions of the unbundled national monopoly have also been transferred to newly created institutions such as, NBETC, NELMCO, NAPTIN, etc.

1. Introduction, contd….

- Load forecasting has always been important for planning and operational decision conducted by utility companies.
- Responsibilities for transmission and distribution systems planning have been assigned to institutions in the evolving electricity market
- Responsibility for generation expansion planning is not yet clear
- Objective of this paper is to explore the institutional framework for long term load forecasting for the privatized electricity sector in Nigeria with the aim of advising the Government on how to proceed with the exercise.

2. Current structure of the Nigerian electricity sector

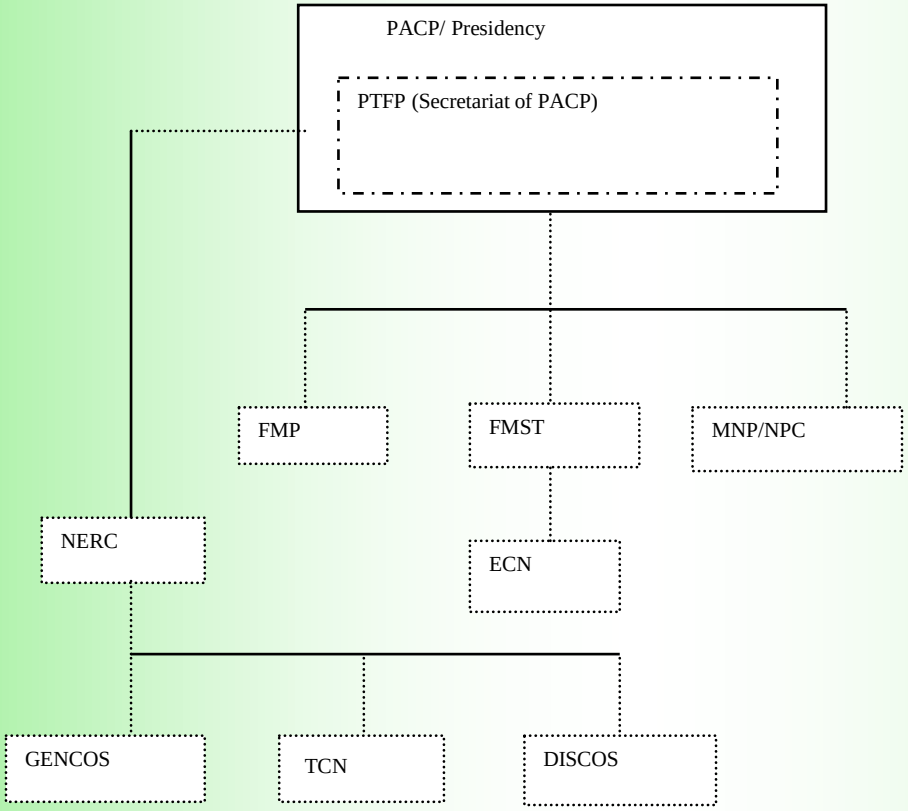

Fig.1: Structure of the Nigerian Electricity Sector

2. Current structure of the Nigerian electricity sector, contd…

- The PACP is currently the apex decision – making organ in Government
- Consists of President, Vice President and ministers, government officials and Heads of agencies with critical roles to play in the power sector
- PACP sets policy and grants expedited approvals for critical decisions
- The PTFP on power serves as the Secretariat of the PACP

2. Current structure of the Nigerian electricity sector, contd…

- PTFP monitors the planning and execution of various short-term projects in generation, transmission, distribution and fuel-to-power that are important to enhancing the capacity of Nigeria's power supply infrastructure.
- Ministry of Power which reports directly to the President

2. Current structure of the Nigerian electricity sector, contd…

- Energy Commission of Nigeria which reports to the President through the Ministry of Science and Technology
- National Planning Commission (also known as the Ministry of National Planning) which reports to the Presidency
- Nigerian Electricity Regulatory Commission which reports directly to the President.
- NERC regulates activities of the generation, transmission and distribution companies

3. Framework for electric load forecasting in Nigeria

- Under state control, electricity demand forecasting, and generation, transmission and distribution planning and facilities expansion were carried out by the Planning Unit of PHCN;
- During the transition to the fully privatized power sector, the PTFP produces the plans for the industry's development as the main driver in collaboration with relevant agencies

3. Framework for electric load forecasting in Nigeria

In the fully privatized electricity sector

- planning for and expansion of transmission infrastructure will be carried out by the transmission company
- each of the eleven distribution companies will carry out planning for and expansion of distribution infrastructure in areas within its jurisdiction

3. Framework for electric load forecasting in Nigeria

- Section 4 of the ECN (Decree) Act 62 of 1979 charges the ECN with the responsibility for the strategic planning and coordination of national policies in the field of energy in all its ramifications;
- Subsection 4d says the Commission shall "prepare, after consultation with such agencies of government whose functions relate to the field of energy development or supply as the Commission considers appropriate, periodic masterplans for the balanced and coordinated development of energy in Nigeria

3. Framework for electric load forecasting in Nigeria

- Part III Section 32 (1a) of the EPSRA 2005 empowers the NERC “to create, promote, and preserve efficient industry and market structures, and to ensure the optimal utilization of resources for the provision of electricity services.
- Section 32 (2a) requires the NERC to promote competition and private sector participation, when and where feasible
- Section 32 (3d) requires the NERC to “license and regulate persons engaged in the generation, transmission, system operation, distribution, and trading of electricity”.

3. Framework for electric load forecasting in Nigeria

- Functions of FMP are administratively prescribed by the President
- The FMP has hitherto administered the award of contracts for the load demand studies conducted for the sector while the PHCN handled the technicalities.
- Section 33 (1) of ESPRA 2005 says “the Minister (of Power) may issue general policy directions to the NERC on matters concerning electricity, including directions on overall:

3. Framework for electric load forecasting in Nigeria

- system planning and coordination which the NERC shall take into consideration in discharging its functions under Section 32 (2), provided such directions are not in conflict with this Act or the Constitution of the Federal Republic of Nigeria".
- the NPC conducts plans for the development of all sectors of the economy from which all sectors of the economy would derive its targets
- ECN load forecasting studies provide inputs to the national plans by the NPC.

4. Framework for electric load forecasting in some selected countries

Country	**Sector structure / ownership**	**Short term**	**Medium term**	**Long term**
Brazil	Government / Private	System Operator	Empressa de pesquisa energetica	Empressa de pesquisa energetica
Ghana	Government / Private	System operator	System Operator	Energy Commission of Ghana
Singapore	Government / Private	System Operator	System Operator	System Operator
South Africa	Government / Private	ESKOM	Ministry of Mines & Energy	Ministry of Mines & Energy

5. Conclusion

- Roles of the institutions in the Nigerian power sector need to be redefined to accommodate long-range forecasting and generation expansion planning for a privatized electricity sector
- A study of institutional frameworks for generation expansion planning in some selected countries indicate that existing institutions in the sector may be able to carry out the exercise without redefining their roles if they develop procedures for exchange of data and information

Thank You