

# The Nigerian Electricity Market: Past, Present and the Future

By

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# Outline

- Fundamentals of the Electricity Market
- Evolution of the Nigerian Electricity Industry/Market
- The Electricity Market Defined
- The Nigerian Electricity Market
  - Past, Present and the immediate Future
- TEM: In a Dynamic Equilibrium?
- Challenges to TEM
- Final Statement

# Fundamentals of the Electricity Market (EM101)

- Electricity is the same Product the world over. The Market itself, may vary from country to country only in the structure, stage of its development and in the trading arrangement
- Traditionally, electricity Market consists of Generation, Transmission, Distribution and Retail in an inter-dependent chain
- There are two broad divisions of the electricity market – Wholesale and Retail Market places
- Energy is produced within the Wholesale Market place, and consumed at the retail market place, with transmission and distribution serving as transport channels
- KWh flows from the Wholesale to the Retail Market, through T&D networks, Revenue flows from the Retail to the Retail Market place , in the reverse direction
- The System Operator and Market Operator provide services that ensure technical and commercial stability in the market, respectively

# EM101 (cont'd)

- Full energy generated at the Wholesale Market place do not get to the consumers in the Retail Market due to system losses, but payments for full energy generated get back to the generators through loss adjustments
- Transmission and Distribution sectors of the market get paid handling charges according to efficiency of handling and network stability
- The entire Electricity Market is tied together by contracts, with the buoyancy of Wholesale Trading depending on the efficiency of Retail Trading

# EM101 (Cont'd)

- Electricity market is often defined in terms of scope and size.
- The size of the market is measured in terms of revenues or units sold. Installed capacity is often used as a measure, but it can be misleading
- Electricity Market is said to have developed when the technical and commercial equilibrium are established and guaranteed
- Also, the electricity market is developed when the revenue requirement of the market is met in an on-going bases, without stress on any part of the market
- Investments are encouraged in a developed market because return of capital is guaranteed
- An electricity market is said to have failed when resource allocation is inefficient. Investments are discouraged in a failed or failing market

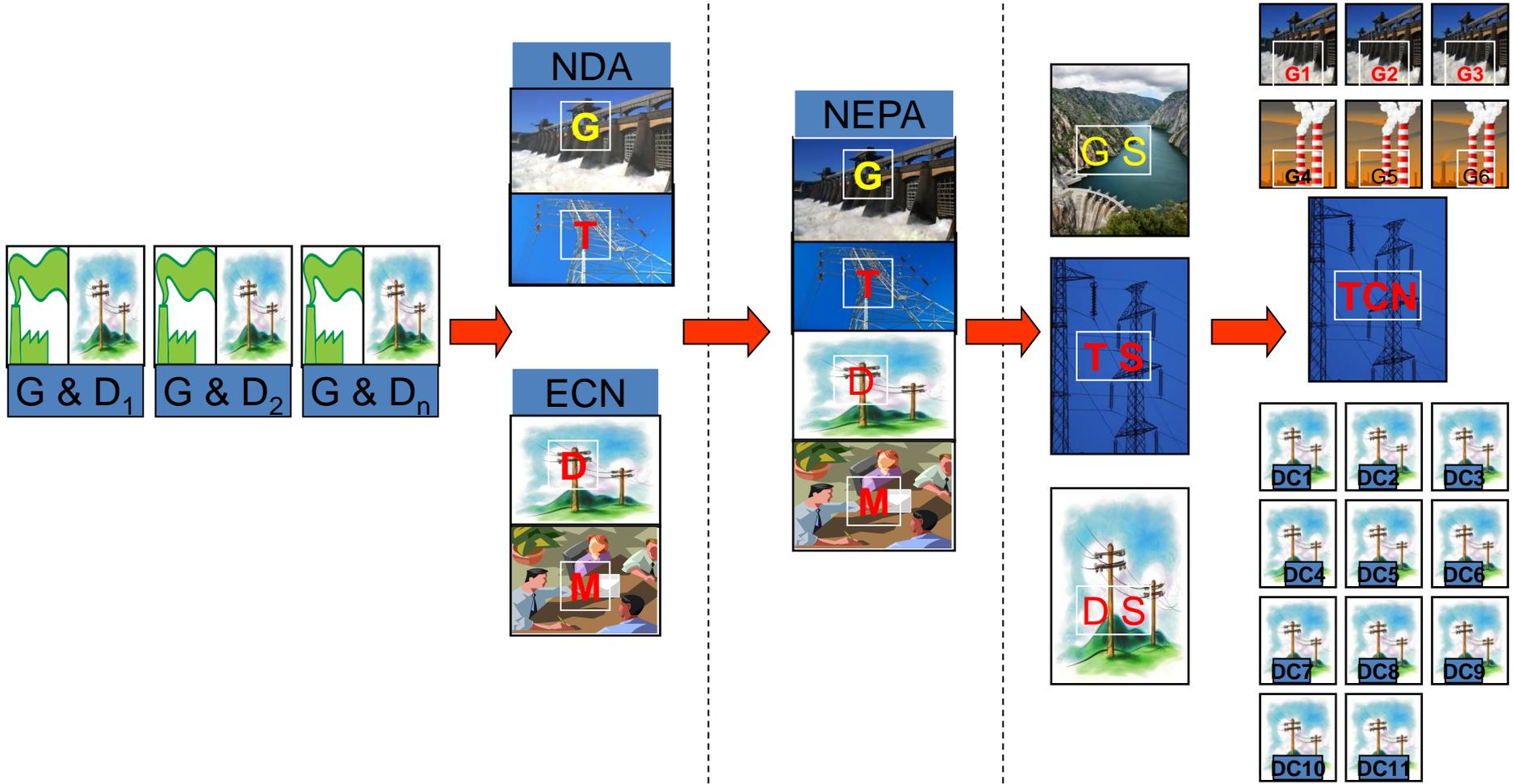
# EVOLUTION OF THE NIGERIAN ELECTRICITY INDUSTRY/MARKET

1896 - 1951

1951 - 1972

1972 - 2004

2004 - date



Unbundled



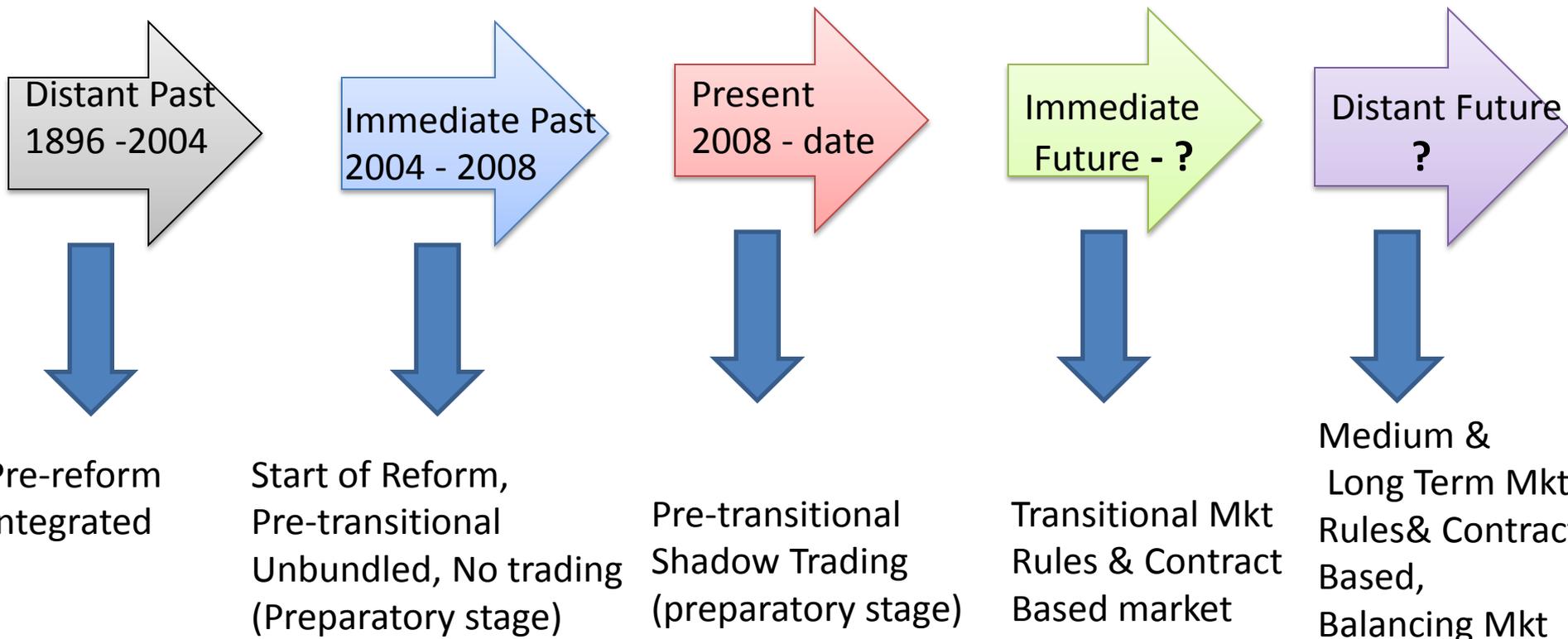
Bundled



Unbundled

# Evolution of the Nigerian Electricity Market

## Where were we & Where are we going?



# The NESI: Originally an unbundled Industry

- Public electricity business in Nigeria began in 1896 with the firing of a 20Mw diesel plant in Ijora, Lagos
- Subsequently and up till 1951, pockets of small diesel power plants were commissioned to supply electricity to isolated cities of Nigeria
- In 1951, the Electricity Corporation of Nigeria (ECN) was formed to co-ordinate and oversee the electricity distribution business all over the country using captive or embedded generators

# Originally an unbundled Industry (cont'd)

- In 1956, the 30Mw coal plant was fired from Oji River in the South Eastern part of the country to add to the number and capacity of generating plants in the country
- The Niger Dams Authority (NDA) was set up in 1961(following increasing demand for electric power), to explore, build and manage dams for hydroelectric generation
- The NDA also to build, operate and maintain the transmission grid in the country.

# Originally an unbundled Industry (cont'd)

- The NDA also had the responsibility to explore, develop and manage other sources of power for the country, including gas, coal, oil, etc. Ownership of all existing generation assets transferred to the NDA
- The industry made up of two separate entities – the NDA responsible for energy generation and transmission and the ECN, responsible for energy distribution and marketing
- Between 1961 and 1972, the NDA developed and built generation capacity of about 3,000 Mw with the associated transmission grid to distribute electric power round the country

# Bundling of the Nigerian Electricity Industry

- In 1972, the NDA and ECN were merged (bundled) to form the vertically integrated monopoly, NEPA, vested with the responsibility of generating, transmitting, distributing and marketing electricity throughout Nigeria

# The Rationale for Bundling of the Nigerian Electricity Industry

- The Fed. Government acknowledged the strategic importance of electric power in economic development and national security, as well as a means for pursuing economic and social distributional objectives
- Electricity cannot be stored, it is consumed as generated. All functions of the industry (technical & commercial) must be constantly and efficiently coordinated to avoid buck passing
- Both generation and transmission are highly capital intensive, any meaningful investment can only be funded (at this stage) by the government

# Rationale for bundling (cont'd)

- Benefits of economies of scale and scope (different functions can be most efficiently performed by the same organization) can only be enjoyed if all functions are under one management
- The need for coordinated investments along the industry chain
- To maximize the benefits of standardization. Standardization is a factor for reduction of construction and operating costs in electricity business
- The network functions are natural monopolies, there is need to guarantee universal access to power supply and consumer welfare

# Rationale for bundling (cont'd)

- Elimination of duplication of managerial capacity and improved coordination of power supply
- Reduction of operating costs and wastes
- Elimination of bickering between NDA and ECN on payments for energy
- Optimal utilization of revenue from sale of electricity to enhance uniform development of the entire power system
- Uniform remuneration of workers from NDA and ECN after job evaluation to enhance morale and productivity

# The bundled Industry (1972 – 2004) (Gains & Losses)

- Between 1975 and 1990, four additional power plants were built to add 3200Mw capacity to the National grid
- Total generating capacity of the industry by 1990 was about 6,200Mw, while total route length of transmission lines was 10,000Km
- Between 1990 and 1998, there was no significant investment in the industry – plants and equipment could not be adequately maintained, system expansion and reinforcement could not be carried out

# The bundled Industry (cont'd)

- Decay set in, resulting in frequent power cuts, high technical and non-technical losses, high level customer dissatisfaction and low revenue collection
- The Fed. Govt. had responsibilities in the other areas of the economy, could not provide all the investments and management needed to meet the growing demand for electricity

# The Bundled Industry (cont'd)

- The monopoly status of NEPA was amended in 1998 to make way for the entry of the other categories of electricity service providers, including private enterprises, into the electricity market, to save the industry and the economy
- In spite of this amendment, the private sector did not feel sufficiently encouraged to participate actively in the development of the industry
- In 2001 the FGN approved a power policy which proposed a **REFORM** of the power sector, to promote a sustainable electricity industry growth.

# Electricity Market Reform in a Developing Country like Nigeria

- For enduring success in electricity market reform, the following processes are necessary
  - Obliging electricity enterprises to operate according to commercial principles
  - Restructuring the electric power supply chain to enable the introduction of competition -  
**Unbundling**
  - Developing an economic regulation of the power market that is applied transparently by an Agency that operates autonomously

# Electricity Market Reform (cont'd)

- The processes
  - Privatization of the unbundled generation and distribution entities under dispersed ownership. Generally, mostly in developing countries, this is to bring in financial resources, technical and managerial expertise that will rectify the prevailing low standards of electricity supply by the State Owned Utilities
  - Development of competition in generation and supply segments. Competition in the network segments (transmission, distribution and system control) is not feasible because these functions are natural monopolies.
  - Focusing government's role on policy formulation and execution
    - Opening up of the domestic electricity market to foreign investments

# Objectives for unbundling

- To make the industry suitable for competition and private sector participation
  - Separation of the monopolistic activities of the electricity industry from the potentially competitive functions
  - Creation of smaller, ring-fenced business entities that are easier for private sector participation
  - Creation of a number of entities for effective competition in the industry (eg, SO, MO, TSP)
  - Separation of the “wires” function of the distribution from “marketing” function
  - Dis-aggregation of the marketing function into sales and billing operations units

# Sequence of Unbundling in the NESI

- **Functional separation:** Separation of employees involved in different activities with separate managements (Dec. 2004)
- **Accounting separation:** keeping separate accounts for different activities within the industry
- **Operational separation:** Unbundling of investment decision making process. Unbundled entities make own investment decisions
- **Corporate unbundling:** Creating separate legal entities whilst preserving common ownership. Registration of the successor companies with the CAC
- **Divestiture or ownership separation:** Separating different activities into distinct legal entities with different ownerships (Nov. 2013)
- This is not the end of Reform. Reform is a very long journey

# The Electricity Market Defined

- The electricity market is defined in terms of:
  - **Size**
    - The size of the market is measured in terms of revenues or units sold. Installed capacity is often used as a measure, but it can be misleading
  - **Scope**
    - The scope of an electricity market is determined by the transmission network that is available to the wholesalers, retailers and the consumers within the market
  - **Characterization**
    - Electricity market is characterized by its Structure, Architecture and Rules for its operation
  - **Stage of development**
    - In which of the 4 stages is the market
  - **Trading Arrangement**
    - The type of contracts, Agreements and manuals driving the market, as well as the relationships between participants

# Nigerian Electricity Market Defined

- The past, Present and Future of the Nigerian Electricity Market should be looked at from where the market was, where it is and where it should be in the future, in terms of its Size, Scope, Characterization , Stage of development and the applicable Trading Arrangement
- This discussion will focus on the characterization of the Market (Structure, Architecture and the Rules)
- Past will be as defined in the journey (ie 1986 – 2004)
- Present will be a combination of the immediate past and the present (ie 2004 – date)
- Future will be limited to the immediate future (ie Transitional stage of the Market)

# Characterization of the Electricity Market

- **Market structure:**
- Refers to the properties of the market closely tied to technology
- Refers to financing (cost structure) and ownership arrangements
- Has to do with the numbers, sizes, and relationships of the firms in the market (**participants in the Market**)
- Refers to the physical system of the market (generation, transmission, distribution) and the arrangement for service provision – **Market Participants & Service Providers**
- Poor market structure poses the greatest threat to the health of power markets – incentive for reform
- Market structure has a decisive impact on market power and investments
  - The more the participants, the more competition and investment inflow

# Characterization of the Electricity Market (cont'd)

- **Market Architecture:**

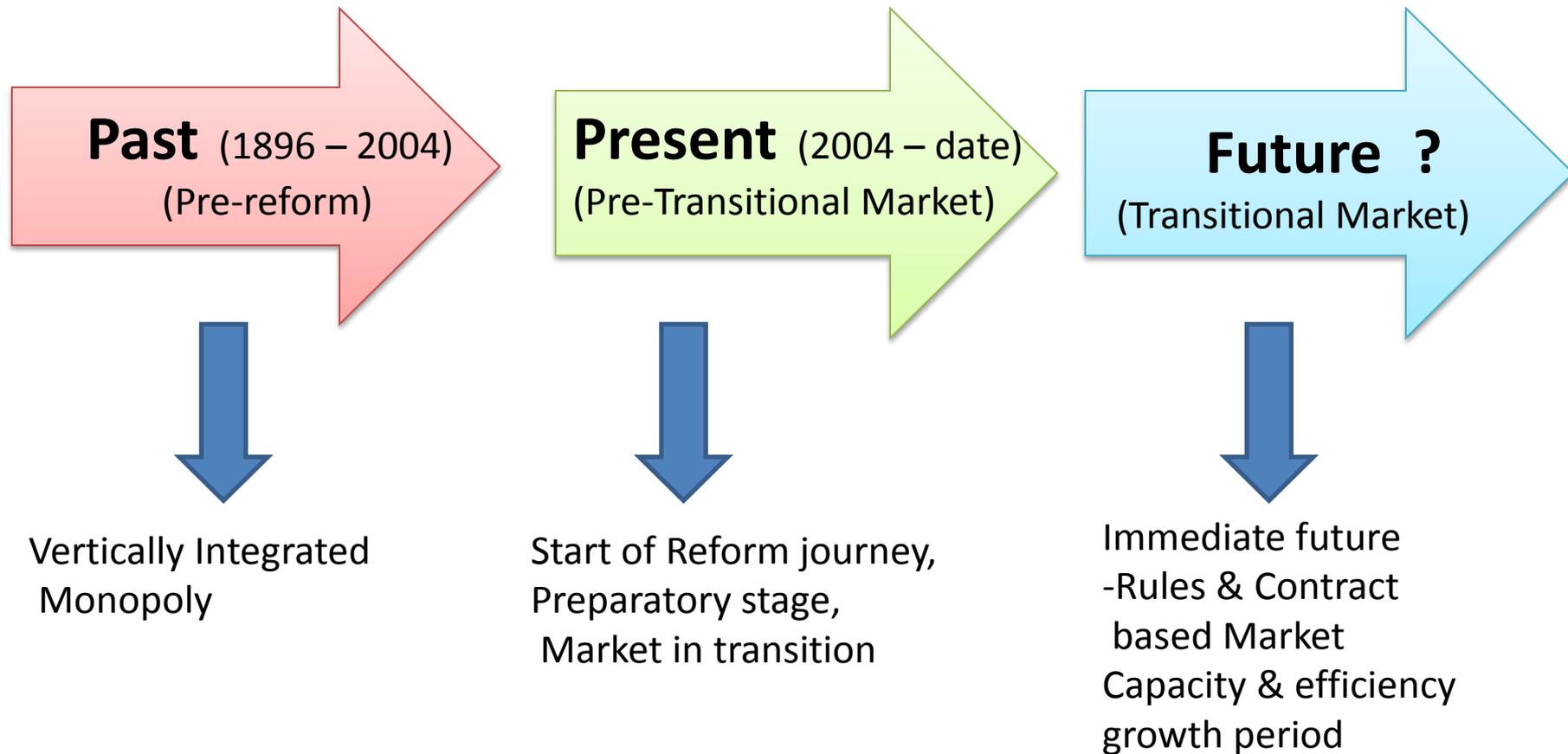
- Comprises the list of component sub-markets together with their types.
- The Sub-markets: Examples are,
  - Forward market (Delivery is at some point in the future)
  - Spot or Balancing market (mkt for immediate delivery)
  - Energy & Capacity Market
  - Ancillary services market
- The market types: Types of contracts driving the Market. The market types for the Nigeria Electricity Market are
  - Bilateral contract market
  - Vesting contract market

- **Market Rules:**

- Define the limits of the rights, the roles and obligations of all the Market Participants and the service providers , and the related interactions, in the Wholesale Electricity Market

# The Emerging Nigerian Electricity Market

## The Reform journey



# The Nigerian Electricity Market (NEM) – In the Past

- **Market Structure**

- Vertically integrated monopoly, industry was engaged in multiple stages of production/delivery, all functions were bundled
- Small market, in terms of installed capacity and units sold
- Full state ownership
- No wholesale market. Energy was merely produced and transported to the final consumers through the transmission and distribution networks
- Technical regulation was provided and enforced by the Ministry of Power, while the Economic regulation ( limited to tariff setting, without any known methodology) was provided by the Utilities Charges Commission (UCC).

# The Nigerian Electricity Market (NEM) – In the Past

- **Market Structure (cont'd)**

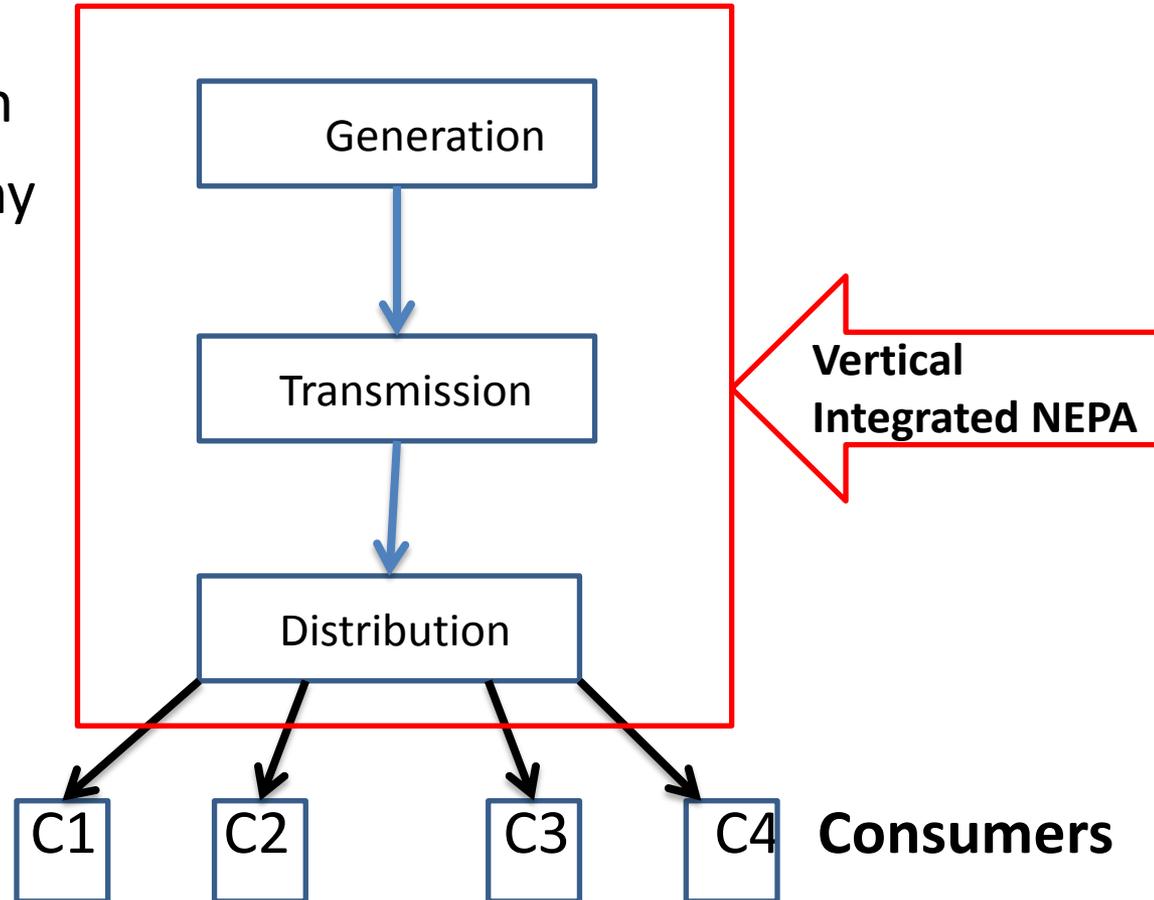
- Generation mix was Hydro, Gas and Coal.
- One IPP (AES) seized the opportunity of the amendment of the monopoly status of NEPA in 1998, and established a 300MW Plant at Egbin, Lagos
- There were no competitive generators, there were no contracts/Agreements. No retail competition. NEPA was allowed by law to have monopoly in both the natural monopoly and in the potentially competitive areas of the industry
- Through the functions of the System Operator, all the power from the generators was pooled and load was allocated to the distribution zones of the industry, from where the final consumers were supplied. There was no MO, no Market Participants and no organized trading
- WAT was about N6.00 per KWh

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# NEM: In the Past (Structure)

→  
Energy flow in  
same company

→  
Energy Sales



# NEM: In the Past

- Architecture
  - No sub-markets
  - Market operated without contracts
- Rules:
  - There was no wholesale market, and no wholesale market Rules
  - Rules were policies made by the Ministry of Power
  - There was Grid Code to guide the SO in maintaining technical stability of the network
  - There were technical and commercial regulations from the industry for the distribution network operations, as well as metering specifications

# The Nigerian Electricity Market (NEM) – In the Present

- **Market Structure**

- Fully unbundled industry, with ownership transferred in Distribution and Generation sectors. The TCN is under private management arrangement
- Small market, in terms of installed capacity and units sold
- There is wholesale market of single buyer model, with shadow trading.
- MO is part of the equation, and plays the role of the single buyer, as well as does the settlement administration

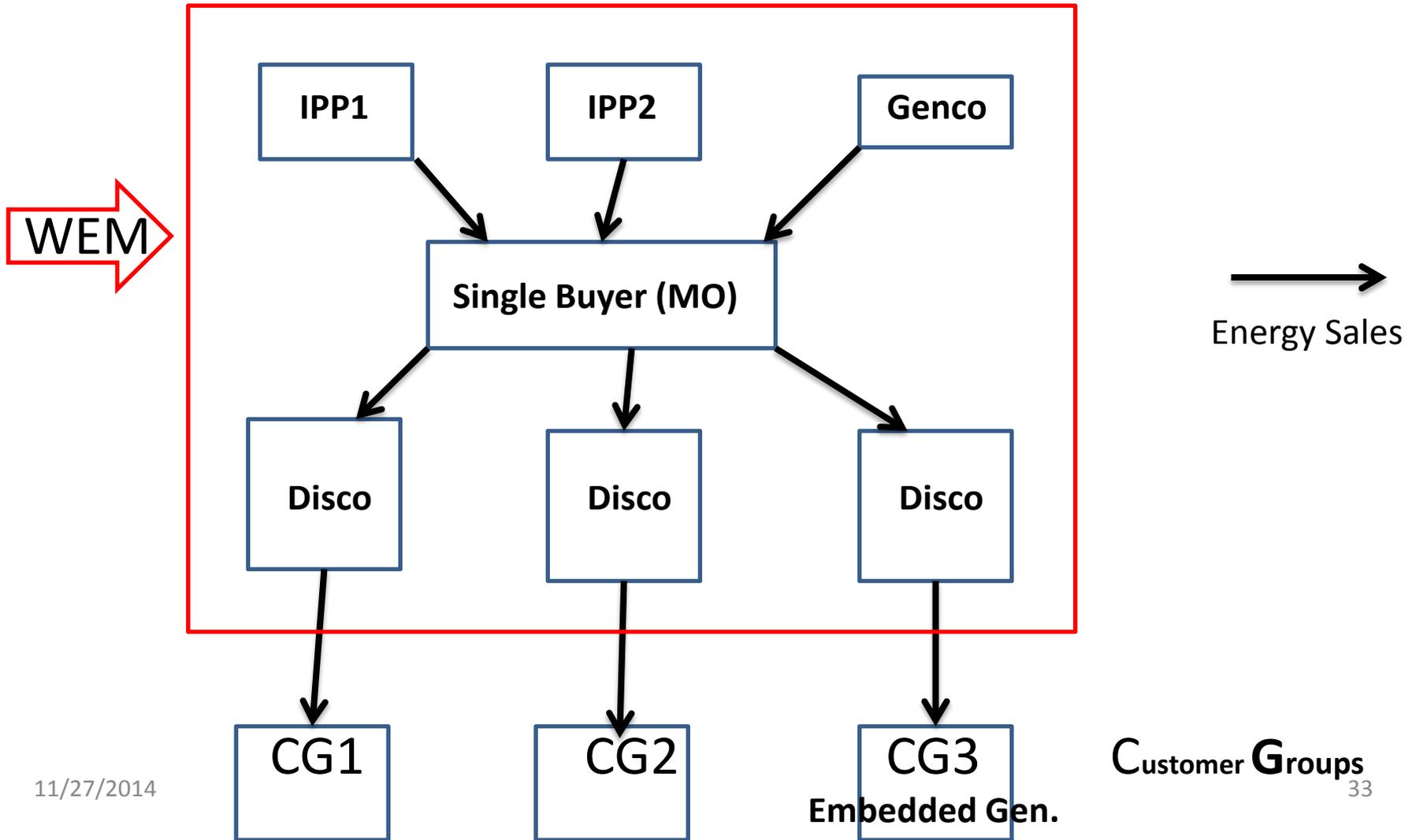
# The Nigerian Electricity Market (NEM) – In the Present

- **Market Structure (cont'd)**

- Generation mix is Hydro and Gas. More IPPs came in to replace some of the disappearing capacities in the system. With the privatization of the State owned generators, the number of IPPs is now 15
- A Regulatory Agency is on ground to provide both technical and economic regulation
- There are no competitive generators, there are no retail competition. Each Disco still has a complete monopoly over all its final consumers ,
- Through the functions of the System Operator, all the power from the generators are pooled and load allocated to the Discos, with an agreed formula, from where the final consumers are supplied.
- There are Market Participants registered by the MO and trading is organized
- The WAT is about N22.00 per KWh

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# NEM: In the Present



# NEM: In the Present

- Architecture
  - The sub-markets consists of
    - Energy & Capacity Market
    - Ancillary Services Market
  - Market operated without contracts, though they are in place
- Rules:
  - The Wholesale Market Rules for the TEM is being implemented on testing bases, along with the Market Procedure. An Interim Rule is developed to operate the Market
  - The Grid Code is in operation, along with the Operating Procedure
  - The Metering Code is in place and being operated
  - The Distribution Code is in place, and is being operated

# The Nigerian Electricity Market (NEM) – In the Future

- **Market Structure**

- Fully unbundled industry, with ownership transferred in Distribution and Generation sectors. Transmission Services provision under private management arrangement
- Growing market, in terms of installed capacity and units sold
- There is a developed wholesale market of single buyer model.
- The Bulk Trader is introduced as the single buyer in the Market, who signs long term contracts with the IPPs
- The System Operator and the Market Operator ring-fenced into an ISO, with own License

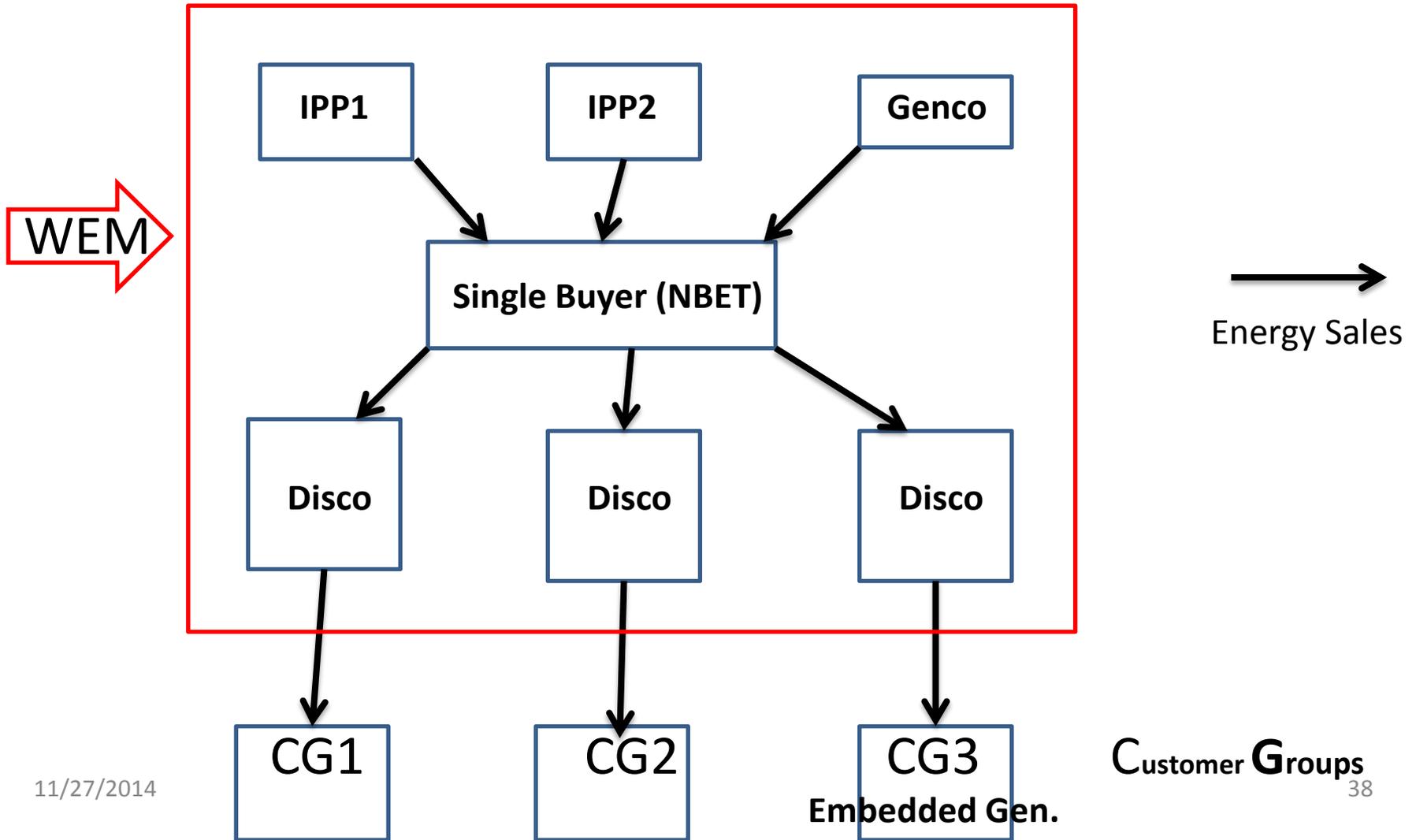
# The Nigerian Electricity Market (NEM) – In the Future

- **Market Structure (cont'd)**
  - MO is the Market Settlement Agent. He also administers payments for all the Market Services
  - Generation mix is Hydro and Gas. The NIPP plants are undergoing ownership transfer. When sales are completed, the number of the IPPs in the Market will be 25
  - There are plans for more Hydros and more Gas plants. So the generation ratio will continue to change
  - A Regulatory Agency (NERC) is on ground to provide both technical and empirical economic regulation. In order to reduce regulatory costs and allow industry more discretion in investment and operational matters, NERC developed the MYTO which set prices 15yrs ahead with provision for 5-yrly reviews
  - There will be competition for the generators, but it will only be competition to build plants and operate them. There will be no retail competition. Each Disco still has a complete monopoly over all its final consumers ,

# NEM: In the Future (cont'd)

- The Market Structure (cont'd)
  - Through the functions of the System Operator, all the power from the generators are pooled and load allocated to the Discos, with Vesting Contracts.
  - There are Market Participants registered by the MO and trading is organized
  - The other sources of power (eg Coal, the Renewables, etc, will be developed to change the generation mix for the better
  - Electricity Tariffs will be adjusted to their cost reflective levels
  - Investment inflow to keep up with demand growth and efficiency improvement (ie improvement in financial performance), is expected

# NEM: In the Future (Structure)



# NEM: In the Future (cont'd)

- Architecture
  - The sub-markets consists of
    - Energy & Capacity Market
    - Ancillary Services Market
  - Market operated with contracts.
    - Bilateral contract Market
    - Vesting Contract Market
- Rules:
  - The Wholesale Market Rules for the TEM is operationalized, along with the Market Procedure
  - The Grid Code is in operation, along with the Operating Procedure
  - The Metering Code is in place and being operated
  - The Distribution Code is in place, and is being operated

# NEM: In the Future (cont'd)

- **The Rules:** The Market Rules and the Grid Code for the TEM are developed such that
- The Market Rules:
  - Provide the framework for an efficient, competitive, transparent and reliable wholesale electricity market
  - Set the responsibilities of the participants, the SO, MO, TSP in relation to trading, dispatch and contract nomination, pricing of imbalances, ancillary services, metering, settlements and payments
  - Establish a market governance mechanism and a market monitoring system
  - Provide a framework for the resolution of disputes between participants or between the participant and the service providers
  - Provide an efficient and transparent process for amending the Rules and the Grid Code

# NEM: In the Future (cont'd)

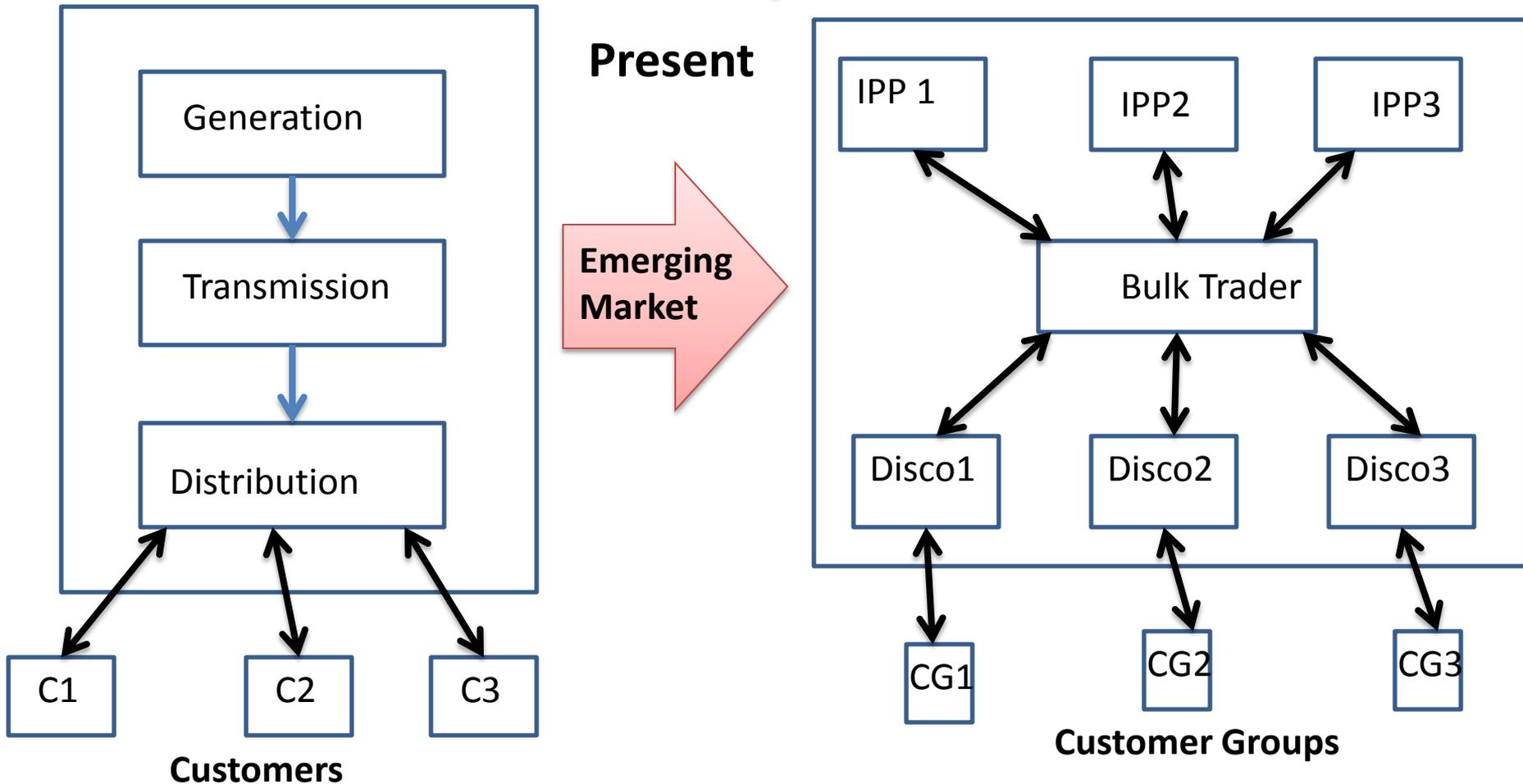
- While the Grid Code
  - Specifies the criteria and conditions for connections to the transmission network
  - Establishes the procedures for monitoring, testing and investigating the performance of generation and load plant
  - Provides guidelines and addresses the requirements for the SO to perform long-term system expansion planning.
  - Specifies the required actions for the power system to be operated in a way to maintain adequate system security and safe energy transport
- The absence of Rules to operate the electricity market, was one of the main causes of reluctance of the private sector from taking advantage of the amendment of the NEPA Act of 1972, which gave total monopoly of supply to NEPA

# The NESI from the Past to the Immediate Future

Past

2004 -> ?

Immediate Future

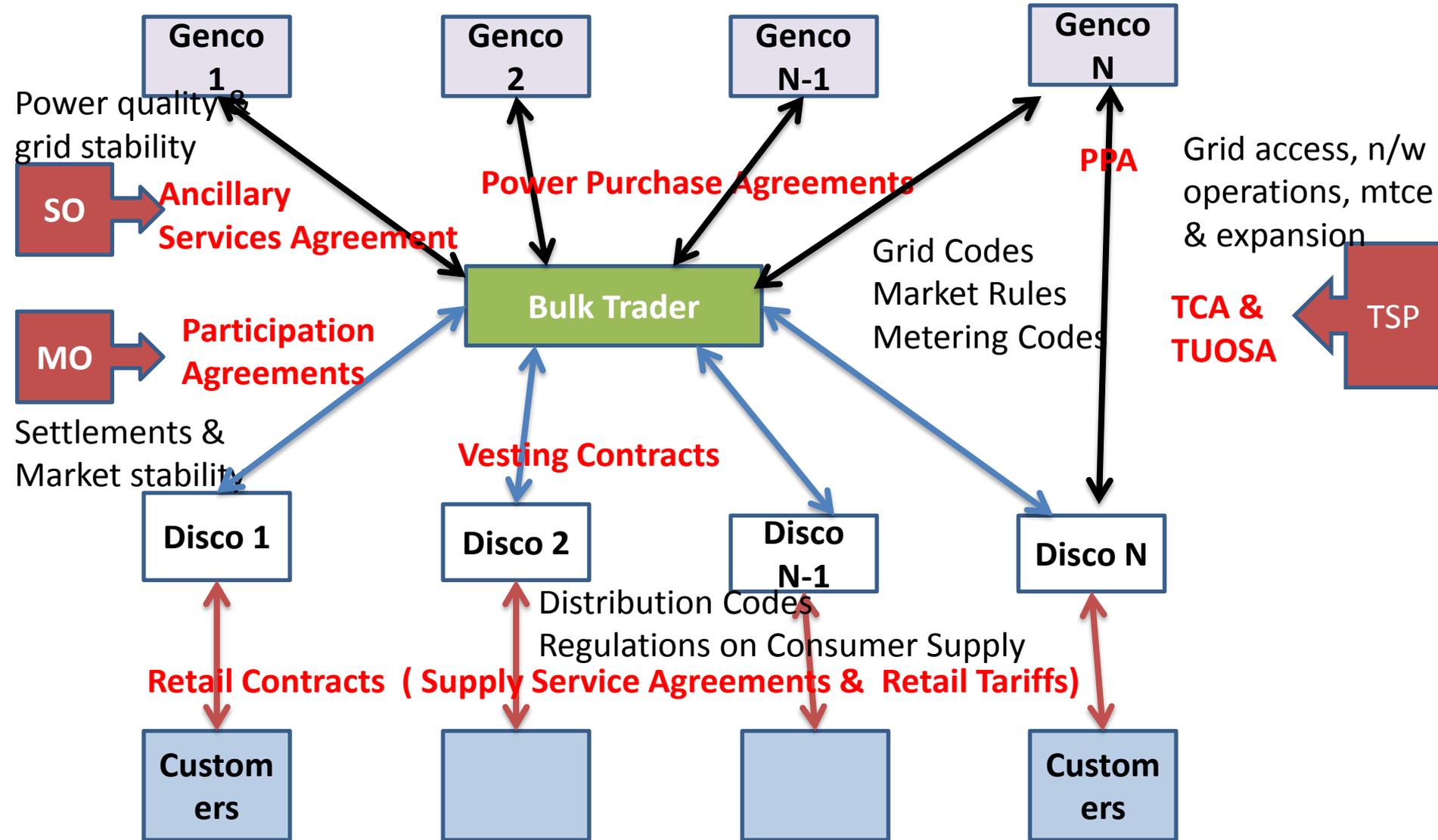


# TEM: In a Dynamic Equilibrium?

- Electricity is a restless commodity and the electricity market is in a constant state of flux
- Through the interplay of Rules, Codes and Agreements, the Nigerian Electricity Market, during TEM, is designed to be in a state of Dynamic Equilibrium
- The efficiency with which these Rules, Codes and Agreements are operated and administered, and the efficiency and transparency of market participation, will determine the state of the Nigerian Electricity Market, going forward

# TEM:- Electricity Market in a Dynamic Equilibrium

Electricity Market Driven by Agreements, Codes and Rules



# Challenges to NEM: In the Immediate Future

- Inadequate generation is not a threat to the initiation of TEM. One of the expectations of TEM is that investments will flow in to increase the generation capacity, as well as to strengthen the transmission and distribution networks
- If investments do not come into generation, transmission and distribution, as projected, operation of TEM is threatened
- The major challenge to the actualization and operation of TEM is the threat of Market Failure, due to the fact that a critical step in the reform process was omitted, ie obliging the successor companies to operate according to commercial principles, before ownership unbundling
- Tariff uncertainties are also due to this omission. Adequate T&CDD have not been carried out to determine the true costs and real losses that must be passed on to the consumers

# Final Statement

**Electricity Market Reform is  
a Process or a set of  
Processes, Certainly not an  
Event**

# The End

# Thank you