ELECTRICITY MARKET IN PRIVATIZED POWER INDUSTRY

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ELECTRICITY MARKET

- In economic terms, electricity (both power and energy) is a commodity capable of being bought; sold and traded within the electricity market.

- Power is the metered net electrical output of a generator at any given time measured in Megawatts (MW).

- Energy is electricity that flows through a metered point for a given time and is measured in Megawatt Hours (MWH).

- In addition, there are power related commodities, energy related commodities, transmission congestion and electricity derivatives which are also actively traded.

- An electricity market is a system of effecting purchases of those commodities through bids to buy and offers to sell. Bids and offers use supply and demand principles to set the price.

- Energy market operates much like a stock exchange, with market participants establishing price for electricity by matching supply and demand.

POWER MARKET

Market types are either trade or time based

Trade based market is of three categories:

1) Energy market,
2) Ancillary services market and
3) Transmission services markets.

Time based market are two types:

1) The forward or (day ahead/hour ahead) market and
2) The real-time market

Suffice it to say that markets are not independent but interrelated.

ENERGY MARKET

- This is where a competitive trading of electricity occurs; the energy market is a centralized mechanism that facilitates wholesale transactions (bids and offers) in electricity between buyers and sellers, typically cleared by SO and settled by the MO (under the ISO). It consists of:

- The day-ahead market is a forward market in which hourly Locational Marginal Prices (LMPs) are calculated for the next operating day based on generation offers, demand bids, and scheduled bilateral transactions.

- The real-time market is a spot market in which current LMPs are calculated at five-minute intervals based on actual grid operating conditions.

ANCILLARY SERVICES MARKET

- Ancillary Services (AS) act as an insurance policy against the unforeseen loss of a major power plant or transmission line. In addition, they help balance the flow of electricity minute-to-minute.

- In the restructured industry, AS services are mandated to be unbundled from energy market. Ancillary services are procured through the market competitively and are cleared sequentially or simultaneously.

AS continued……..

Ancillary Services include among others the following:

- Regulation,
- Spinning reserve,
- Non-Spinning reserve,
- Replacement reserve,
- Energy Imbalance
- Voltage support, &
- Black start capability among others.

“Energy imbalance service matches any discrepancies between actual and scheduled transactions in order to maintain load and generation balances over every single hour. It is often referred to as ‘load following’ service”.

TRANSMISSION MARKET

- In a restructured power system, the transmission network is where competition takes place among suppliers in meeting the demands of large users and distribution companies.

- The commodity traded in the transmission market is a transmission right to:

  - transfer power,
  - inject power into the network, or
  - extract power from the network

- The above led to the concept of Financial Transmission Rights (FTRs) which assist market participants in hedging their price risk when delivering energy on grid.

- FTRs are essentially financial instruments that entitle the holder to a stream of revenues (or charges) based on the hourly congestion price differences across a transmission path in the day ahead energy market.

- The holder of a transmission right can either physically exercise the right by transferring power or be compensated financially for transferring the right for using the transmission network to others.

- The importance of the transmission right is mostly observed when congestion occurs in the transmission market. In holding certain transmission rights, participants can hedge congestion charges through congestion credits.

- The transmission right auction would represent a centralized auction in which market participants submit their bids for purchase and sale of transmission right.

- The auction is conducted by the ISO or an auctioneer appointed by the ISO, and its objective is to determine bids that would be feasible in terms of transmission constraints and that would maximize revenues for the transmission network use.

ROLE OF SYSTEM OPERATOR IN ELECTRICITY MARKET

- System Operator manages the Generation, Transmission and Distribution resources of the Electrical Power system, with the aim of supplying affordable electrical energy to all customers at usable voltage and frequency in an efficient manner.

- System operator therefore, does the physical Transactions of the market by managing the Power System in the short term, from less than a day to resolution of fractions of seconds in a continuous basis, matching production and demand.

- In the vertically integrated system, the Transmission System Operator has been a controlling agency that coordinates the dispatch of generating units, to meet the expected demand of the system across the transmission grid

- After deregulation, the requirement of Independent operation of the grid for a competitive electricity market necessitated the establishment of the ISO. A special purpose entity (non-profit corporation), charged exclusively with the clearing and settling electricity transactions.

- In power markets, the ISO functions using Grid Code and Market Rules developed by the regulating authority. The ISO, in conjunction with the RTOs maintains system security, coordinates maintenance and scheduling in large geographical areas.

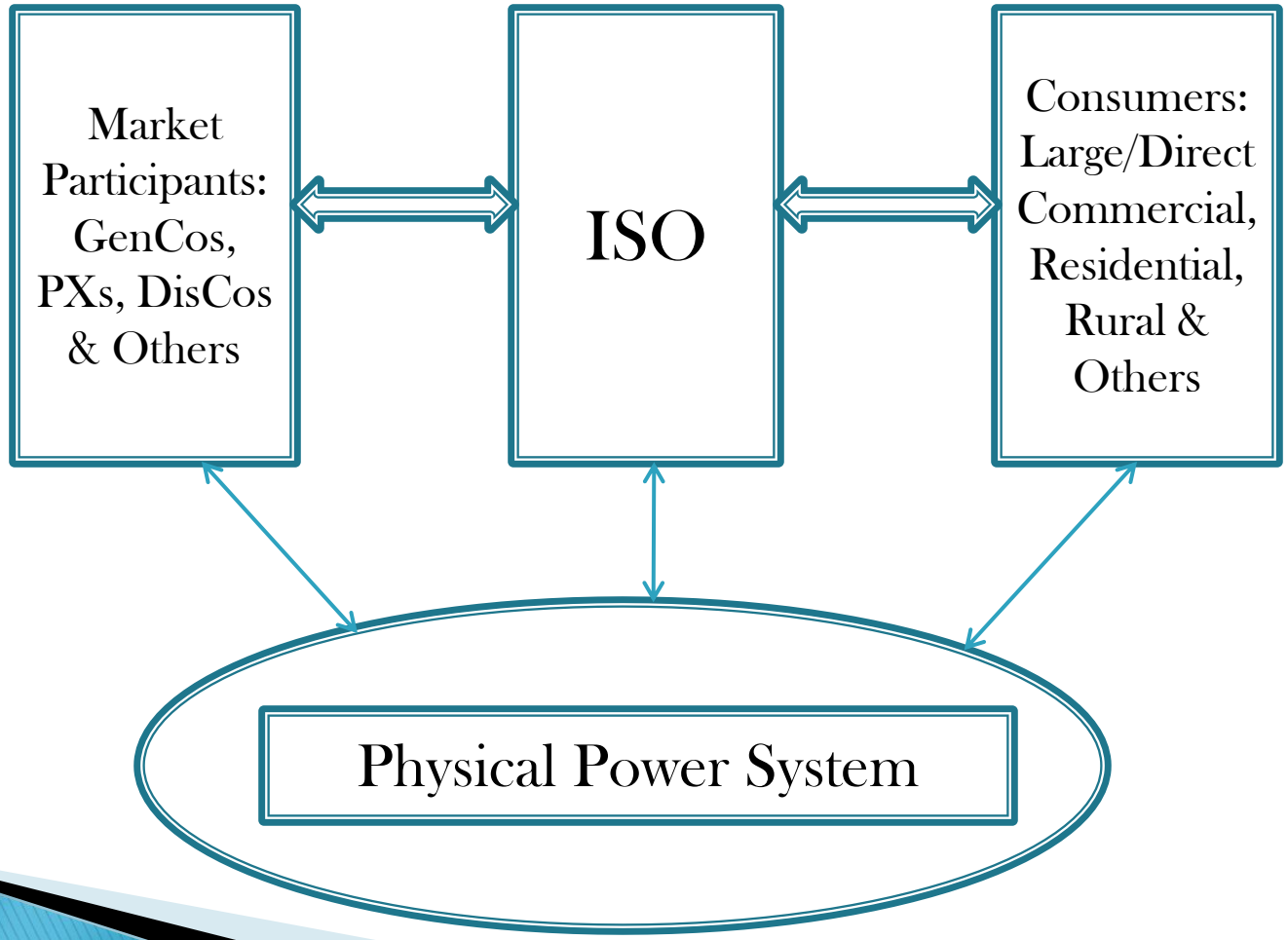
- Two possible structures of the ISO exist depending on its objectives and authority.

- The MinISO, whose objective is restricted to system security with no market role and modest authority,

- The MaxISO ensures competitive market place by running auction for electricity trades and calculating market-clearing price (MCP). It has a wide range of authority.

ISO AS A DECENTRALIZED SYSTEM

ISO



ELECTRICITY TRADING IN NIGERIA

- Following the Electricity Power sector Reform Act of May, 2005, Market Operations (MO) was created under the Transmission Company of Nigeria (TCN), charged with the responsibilities of running the commercial arrangement of the Electricity Market.

- The Nigerian Electricity Market, according to the Business Plan generated by BPI, was to go through three different stages:

  - Pre-Transitional
  - Transitional and
  - Medium Term

PHYSICAL MARKET TRANSACTIONS BY SO

- Physical market transactions are being conducted in a coordinated manner at the National Control Centre (NCC), Osogbo. Trading activities are preceded by the following activities on a daily basis:

- Prediction of active (MW) power requirement of the grid based on actual System generation capability which is captured at 06:00Hrs.

- Production of a workable generation schedule to meet this requirement; through the review of plant availability declared (nominations) by all Gencos. This schedule is to provide for an effective spinning reserve to contain the largest contingency that may likely to occur.

Market transaction contined……..

- Generate Grid load allocation based on NERC template, as provided for in the MYTO II Distribution Order within the confines of the above workable generation schedule.

- Instructing the generators to commit their units according to the schedule and on continuous basis monitor the system to ensure compliance in load allocation by Discos.

TOOLS IN MARKET OPERATION

- Operating the market securely and efficiently by the SO and the ability to discharge its duties in an unbiased manner, couldn't have been possible without facilitation by a number of software tools:

- Short Term Load Forecast (STLF) Module which is used mainly for generation schedule, forecasts the system load accurately to guarantee that there is enough energy to satisfy the load and enough ancillary services to ensure the reliability of the physical power system.

- The security constrained unit commitment (SCUC) software, helps in operating the markets (the energy, ancillary services and the transmission markets) to fulfil some operational responsibilities, such as, the ancillary service auction and transmission pricing etc.

Market Tools continued……

- State-of-the-art technology of Supervisory Control and Data acquisition System (SCADA) for efficient and on line monitoring and control of the grid system

- Information and Communication Technology (ICT), for efficient and reliable communication facilities including (websites) with high speed internet facilities.

TRANSITIONAL ELECTRICITY MARKET

- As the Nigerian Electricity Market is at the verge of entering into the second stage, SO has established a Transitional Electricity Market (TEM) Desk at the National Control Centre (NCC). TEM Desk works in coordination with SO Desk, SP team & other Market Participants. It is fully operational for 24 x 7.

- The routine functions of the Desk in include:

- Energy data collation from Gencos and Transmission Area control Centres

- Collation of Day Ahead declarations (nominations) from Generating Plants

- Uploading Load Allocation, Morning Broadcast and other stakeholder information on System Operation Website www.nsong.org
- Load Allocation revision as system demands
- Monitoring of Ancillary service delivery (Spinning Reserve and Black Start)
- Sending/reconciling Capacity and Energy data to MO and NBET at the end of the month for monthly billing and payment.
- Collation and confirmation of demand forecast from Distribution companies

OTHER SO OBLIGATIONS TO MARKET PARTICIPANTS

- During TEM and beyond, SO must:
- Operate the grid as securely as possible with the unlikely event of system collapse
- Monitor the market on continuous basis to prevent the exercising of “Market Power” by any participant.
- Permit Distribution Companies to bilaterally contract for power;
- Allow open entry to generation market subject to technical obligations and within the context of the Grid Code and market Rules;

- Permit Power Station to compete in power dispatch into the pool,
- Facilitate Electricity trading energy balancing in the market
- Deliver power to Discos according to the Interface and contractual Agreements.
- Evacuate power from Gencos according to the Connection and contractual Agreements.
- Apply the OPs developed for TEM to minimize the effects system constraints on the market performance.

Thank you