

ELECTRICITY MARKET PROFESSIONAL PROGRAM

FUNDAMENTAL MARKET CONCEPTS – TYPES OF MARKETS



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Electricity markets models

- Seeking for simplification
 - **Centralized economic dispatch market** models in which the SO runs an optimization software to determine the merit order list, which also takes into consideration regulated security limits..
 - **Self dispatch market** models in which the SO only takes care of the congestion and through different mechanisms adjust the operation to make it feasible within the regulated security limits.

Centralized dispatch model

- All generators and all the demand have to declare to the MO or M&SO
 - available capacity
 - prices
 - variable costs
 - price (with certain restrictions)
 - pairs of quantities and prices
- SO dispatch generation based on security constrained economic dispatch

Gross Pool – Centralized Dispatch

- **ALL** participants sell and buy **All** their production and consumption in the market at spot price
 - Buyers pay and sellers are paid at the market price
 - In some cases there are nodal market prices
 - Settlement at market price(s) by the MO.
 - Payments
 - through a centralized mechanism or
 - bilateral
 - There could also be bilateral contracts between sellers and buyers. Only financial, settled by the parties
 - SO dispatches without taking into consideration contracts

Net Pools – Centralized Dispatch

- Bilateral contracts **in** the market. Differences traded in the spot market
- centralized settlement only for non contracted quantities
- contracts are settled by the contracting parties
- deviations are settled in the spot market by the MO at the spot market price (established in the Commercial Code or Market Rules)

Self Dispatch Model

- Sellers and the buyers agree bilaterally quantities and prices (also for different periods of time)
- Agreed contracts (only the quantities) are informed to the SO to dispatch the generators according to them
- SO verifies if all contracts fit in the available network without violating the security limits
 - not violated: operation is done according to contracts
 - violated: SO uses mechanisms to accommodate all the generation and the demand in the available network
 - e.g. incremental/decremental quantity/prices mechanism

From Balancing Mechanisms to Spot Market

- When bilateral trading is not mandatory (or less significant) balancing mechanisms will evolve: balancing market or directly spot markets with spot trading
- Pricing can also evolve depending on market maturity:
 - annual, monthly or daily average prices; marginal cost; marginal prices
- Maturity:
 - operators' capacities
 - data availability
 - collection restrictions
 - maturity of tools
 - network restrictions
 - market players capacity to optimize their business

Trading Platforms

- In both markets it is possible to implement platforms
- Trading platforms for eligible consumers and generators with no long term contracts normally are not regulated
- Result: a number of bilateral contracts between the sellers and the buyers
- Actual operation:

In centralized dispatch market

SO dispatches regardless contracts

Deviations settled in balancing market

Essentially financial instruments

in self dispatched markets

SO dispatches physically the contracts

Physical market

What in Terms of Efficiency?

- Centralized economic dispatch: optimal solution for the operation (least cost operation for the short and medium term), taking into account all possible restrictions
- All other types of dispatch, are either less efficient or at best, obtain same total costs as with the centralized economic dispatch model.
- In many cases, pre-existing conditions (like ownership, links with financial markets, etc.) condition the type of market to implement
- Centralized dispatch has proven to be very practical for cases with challenging starting point

Are Mixed Models Possible?

- Nothing impedes it, the point is why mixed approaches?
- Can be seen in international (or inter-regional) transactions
- Used in Europe, regional markets in Latin America, etc.
- India can be considered also a mixed approach, since part of the federal generation is dispatched in a centralized way, while other generation can be considered “self dispatched”

Day Ahead; Intra Day Dispatch (1)

- Balance should be maintained at all times, reserves scheduled, transmission constraints eliminated, etc.
- In centralized dispatch, SO plans the operation for the next day with a Security Constrained Economic Dispatch: this is the day ahead dispatch.
 - Adjustments during operation made using same prices declared by generators: balancing is “naturally” done.
 - The marginal price arises **spot price** is the “market price

Day Ahead; Intra Day Dispatch (2)

- Self-dispatch, the SO needs to generators' "nominations" in advance, conduct security analysis, check necessary reserves, etc., etc. Once closed, the market price is cleared. This is day ahead dispatch
 - The SO also needs to balance the system: intra day dispatch. For that receives additional offers (increasing / decreasing generation / demand) and have the balancing price.
 - There are always two prices: the price cleared in the market before actual operations (day ahead market) and the balancing price (intra day market)

How Often these Markets Used?

- Practically in all world:
 - day ahead market is run, regardless of the market type
 - ex-post price exist (result of the balancing adjustments)
- In between there could be (and there are) as many markets as wished (several intra-day markets)
- International experience shows that the volumes operated/traded in the day ahead market are, by far, more important than those traded afterwards (the relation is 90/10 at maximum).

Settlements in these Markets

- In some cases day ahead and intra-day markets involve financial obligations for both sides
- In some Latin-American markets day ahead price is only for informative purposes: all the energy is traded at the ex-post operations prices only (balancing market price/intra day market price)

Capacity a Different “Product”? (1)

- There is no a single answer to this question. There are defenders in both sides.
 - Energy only defenders (economic theory) if the market is “efficient” there is no need to encourage long term adequacy
 - If the market is “short”, prices will go up: signal to develop additional investments. (however it requires that no limitation are on the market prices = frequent spikes
 - Capacity defenders: the market is imperfect and the signal is not that clear when there is no enough generation that could lead to load shedding
 - some kind of “cost of unserved energy” need to be used for settling the transactions.

Capacity a Different “Product”? (2)

- Empirical experience clearly suggest the convenience of treating capacity as a different product:
 - New generation requires time to develop, so perception of future risks is necessary
 - Regulator usually intervenes against price spikes, this eliminate signals required for developing new generation
 - Extremely difficult to finance projects which expected incomes depend on price spikes.
- Some mechanism is needed to assure future adequacy = capacity treated as a “different product” justified to guarantee the security of supply

How to Handle Capacity?

- Capacity payment received by all generators, defined by the regulator (regardless their trade in the market).
- Add-on to the market price. $LOLP * VOLL$. All market participants contribute to long term adequacy.
- Obligation of having enough capacity contracted for the following “x” years. Penalized in case of non-compliance
- Organized auctions where the suppliers can obtain the capacity they need to comply with their obligations.
- An important number of hybrid (or ad-hoc) mechanisms.
- Any market: short term efficiency (dispatch) – long term adequacy (capacity)