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Advantages of Restructuring of Power System

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Abstract: ***Now world-wide trend towards restructuring and deregulation of the power industry over the last fifteen years. The competition in the wholesale generation market and the retail market together with the open access to the transmission network can give many advantages to the consumers. These advantages are lower electricity prices and better services. However, this competition also brings many new technical problem and challenges to the operation of restructured power systems. This paper devoted to the development of computational tools for effectively and efficiently operating such restructured systems.***
Keyword: Restructuring, GENCOS, TRANSCOS, RESCOS, ISO, Power Exchange, IPP.

I. INTRODUCTION

Modern power industry operation is difficult to understand due to dichotomy between electricity's business and physical manifestations. From business point of view electricity power is exchangeable commodity which can be traded like rice, wheat. But, in its physical manifestation, electricity is quite different from other tradable commodities. Reason for above difference is : electricity cannot be stored. The institutional debate and issues provides the context for a review of the market rules that can support a logic of competitive electricity market. The competition in the generation market and the retail market can affect the total cost of energy supply. Reliability is the second important thing which is demanded by customers. The key factor of the reliability is response time. In other words reliability and competition is likely to work well for actions that occur half an hour or more in the future. Given this lead time, buyers and sellers can find the price level for each service that will balance supply and demand.

Interconnections through the transmission grid create the necessity for regional organizations that can accommodate competition in services and generation, This preserve the reliability of the transmission system. Alternative models are many, but can be grouped under the general headings of "Transcos," "Gridcos," "ISO/PX," "ISOs," and finally, organizations for transmission loading relief. The different models present alternatives for the mix of responsibility of the necessary system operator. At one end of the spectrum, a Transco is an independent entity both owning the transmission assets and controlling system operations. By contrast, a Gridco is an entity owning the transmission assets but not responsible for system operations. System operations may be separated into a power exchange (PX) and transmission operations, or combined under an independent system operator (ISO). And finally, whatever regional choices are made, there must be institutions for coordinating transmission loading relief (TLR) across the regions.

In this paper it is discussed the main aim and the potential benefits of the deregulation of the power industry. Deregulation will greatly increase power transfers between areas and change the pattern of inter-area transfers and the network will be utilized in a way not envisioned in its design. Electric deregulation is the process of changing rules and regulations that control the electric industry to provide customers the choice of electricity suppliers who are either retailers or traders by allowing competition. Deregulation improves the economic efficiency of the production and use of electricity. Due to competition in the electric industry, the power prices are likely to come down which benefits the consumers.

The important concepts of deregulation are

A. Competition

The competition is at two levels in deregulated power industry: Wholesale (Generation) and retail (Distribution).

B. Deregulation

The rules governing the electric power industry are changed. The new structure introduces competition into the market, in place of a few large regulated companies.

C. Open Access

In deregulation of power system the Independent Power Producers (IPP) are permitted to transmit the power using utility transmission and distribution systems.

The benefits associated with deregulation are:

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Optimization of energy supply will takes place.
Systems capacity will be used efficiently.
Price of the electricity will become clearer.
Consumer choice will be improved.
Bad technologies are ignored and good technologies will be adopted to attract the choices of consumers..
Electricity prices will decrease due to competition.
The usage efficiency is improved due to restructuring in price signals.
Power flow will takes place from surplus areas to shortage areas.
The cost of ancillary services is reduced by reserve sharing.

In the deregulation process, some new entities are expected to appear and hold major rules in power industry. The structural components representing various segments of the deregulated electricity market are:

Companies:

Generation Companies (GenCos.)
Transmission Companies (TransCos.)
Distribution Companies (DisCos.)
Independent Power Producer (IPP)
Independent System Operator (ISO): Power Exchange (PX) & Retail Energy Service Companies (RESCos.)

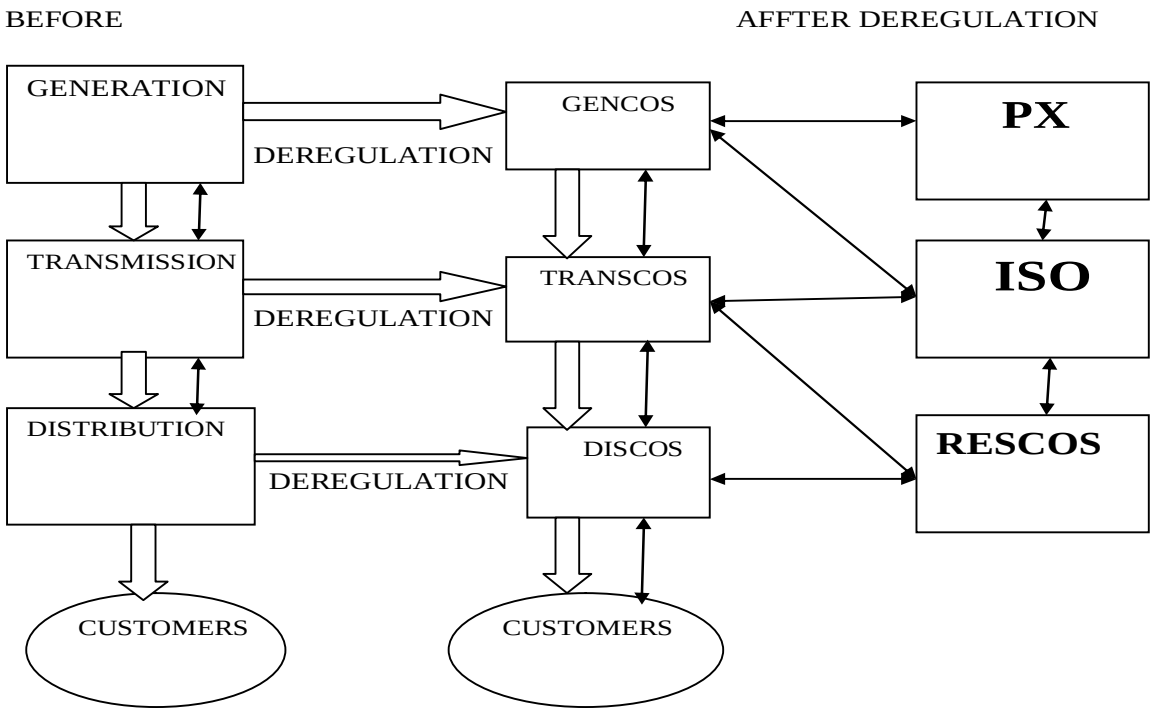


Figure 1. Structure of Deregulation (Comparative)

In the deregulated electricity market, increased infrastructure utilization increases capital returns and increased competition increases economic energy transactions. Due to introduction of less costly sources, there will be new power flow patterns. New transmission difficulties will be created and some existing transmission constraints will be binding more often and with more economic significance. The interconnections are used at their capacity due to increased interchanges in power markets.

II. SYSTEM OPERATION IN A COMPETITIVE ENVIRONMENT

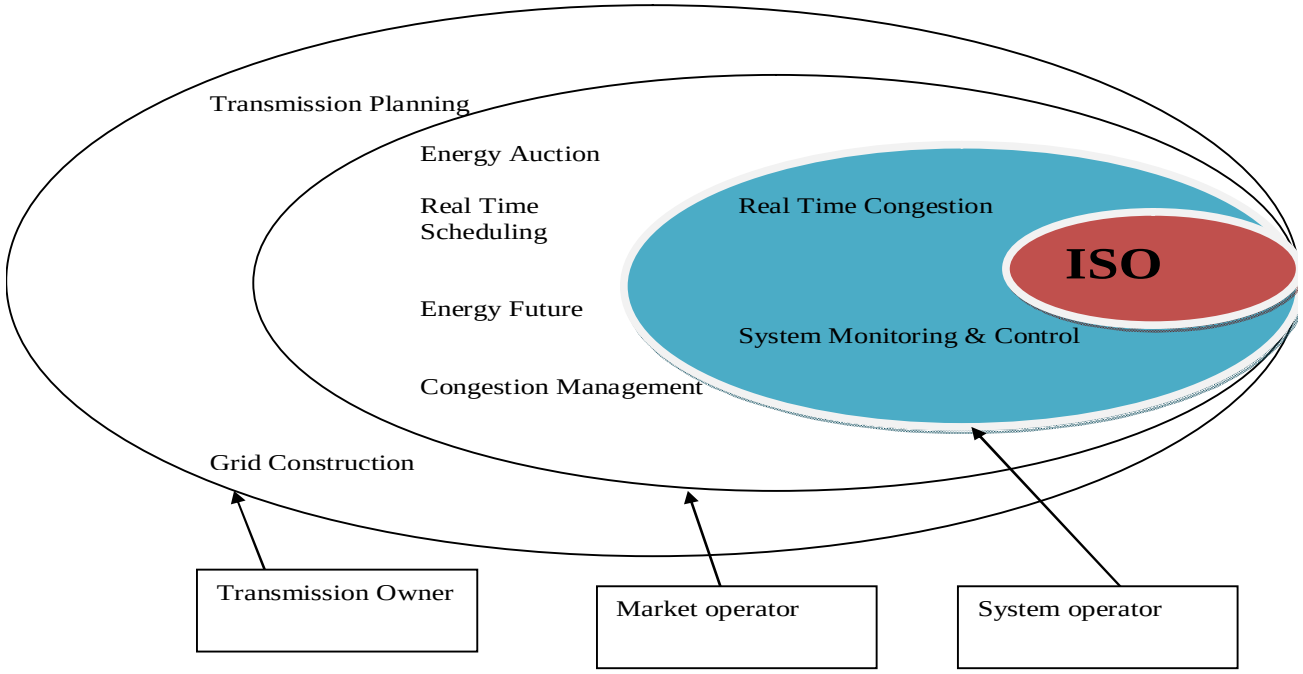
Regardless of the market structures that may emerge in various parts of the world, one fact that seems always to be true is that transmission and generation services will be unbundled from one another. The generation market will become fully competitive, with many market participants who will be able to sell their energy services (or demand side management). On the other hand, the

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operation of a transmission system is expected to remain a regulated monopoly whose function is to allow open, non-discriminatory and comparable access to all suppliers and consumers of electrical energy. This function can be implemented by an entity called the Independent System Operator (ISO) . Although electricity markets may have many different ISO designs and approaches all over the world, there are nonetheless elements that are necessary to all types of ISOs in order to meet their common basic requirements. Basically, the ISO has responsibility for the reliability functions in its region of operation and for assuring that all participants have open and nondiscriminatory access to transmission services through its planning and operation of the power transmission system.

The minimum functions of the ISO should include the operation and coordination of the power system to ensure security. In this case, a separate market operator (for example, the Power Exchange) is needed to perform the market-related functions. On the other hand, the maximum functions of the ISO will include all the reliability-related and market-related functions mentioned above and in addition the ISO is the transmission owner (for example, the National Grid Company). The functions of the ISO at various sizes and time scales are shown in Figure 2.



III. RELIABILITY-RELATED FUNCTIONS

The reliability-related functions include two aspects: System operation and coordination. The ISO should perform system security monitoring functions and redispatch generation as necessary to eliminate real-time transmission congestion and to maintain system reliability, including taking all necessary emergency actions to maintain the security of the system in both normal and abnormal operating conditions. Transmission planning and construction. The ISO should carry out reliability studies and planning activities in coordination with the transmission owners and other market participants to assure the adequacy of the transmission system. The ISO should publish data, studies and plans relating to the adequacy of the transmission system. Data might include locational congestion prices and planning studies that identify options for actions that might be taken to remedy reliability problems on the grid and cost data for some of these actions.

IV. MARKET-RELATED FUNCTIONS

First of all, an ISO must be a market enabler with no commercial interest in the competitive generation market. The market-related functions of an ISO must be carried out according to transparent, understandable rules and protocols. The following operational functions are necessary to enable a competitive generation
market:

A. Determine Available Transmission Capability (ATC) for all paths of interest within the ISO region.

B. Receive and process all requests for transmission service within and through the ISO region from all participants, including

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transmission owners.

C. Schedule all transactions it has approved.

D. Operate or participate in an Open Access Same Time Information System (OASIS) for information publishing.

E. Establish a clear ranking of transmission rights of all the participants on the ISO transmission system. Facilitate trading of transmission rights on its grid among participants.

F. Manage transmission congestion in accordance with established rules and procedures for generation redispatch and its cost allocation.

G. Assure the provision of ancillary services required to support all scheduled delivery transactions.

H. Market settlement and billing functions.

V. CONCLUSION

The main purpose of the deregulation is : to break monopoly of generation, transmission and distribution of the electric power and create competition. The philosophy and technique of planning and operation established over past decades and have begun to change and meet the challenges

VI. BENEFITS OF DEREGULATION

The main objectives of the deregulated power market:

A. To provide electricity for all reasonable demands.

B. To encourage the competition in the generation and supply of electricity.

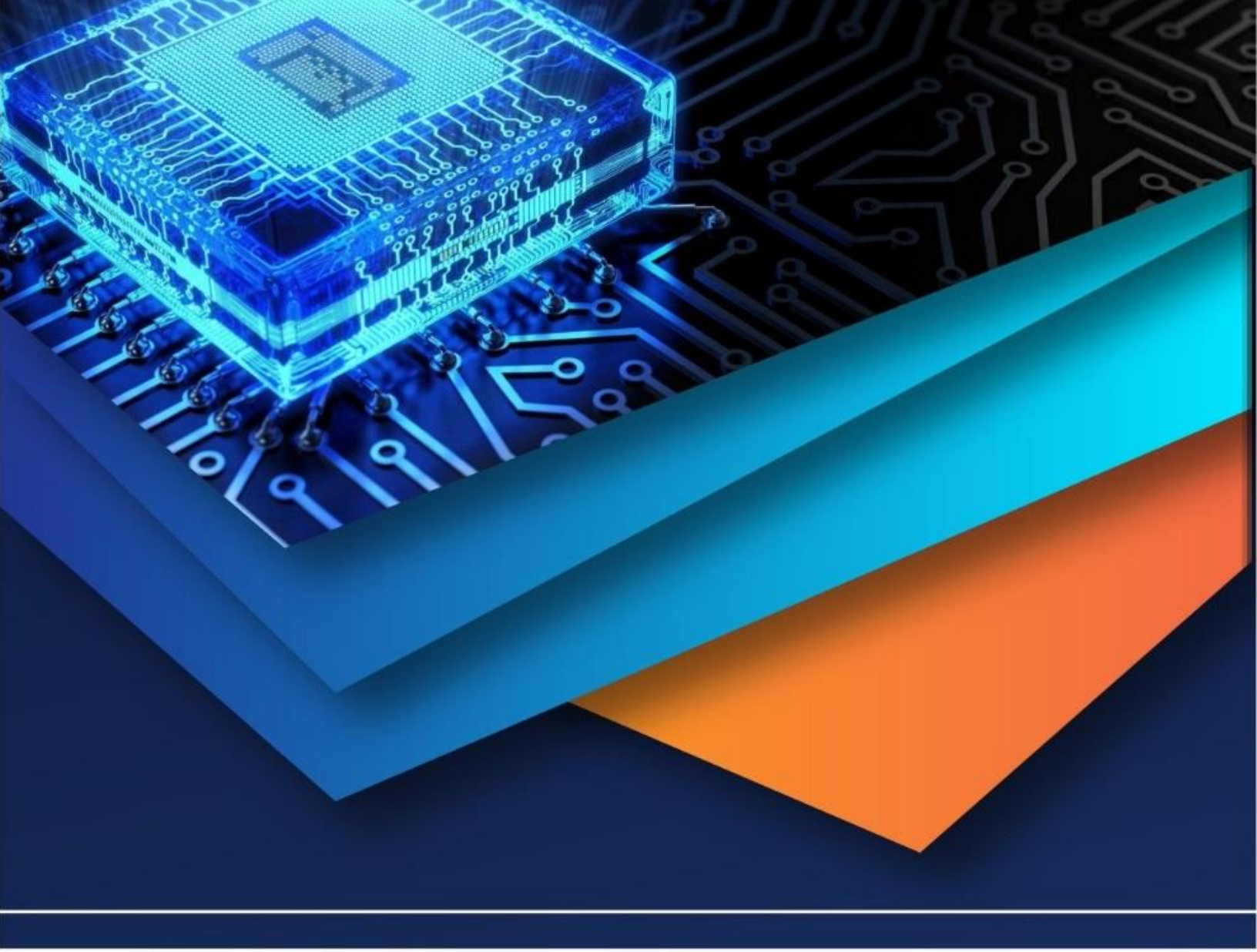
C. To improve the continuity of supply and the quality of services.

D. To promote efficiency and economy of the power system.

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