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Cross Border Power Trading Model for "Deregulated Electricity Market"

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Abstract- *Throughout the world, power sector industries have been introduced to restructuring and competition. The primary focus is that the system should run in free and fair way so that quality power is served to the consumer at the most economical price through safe, secure and reliable operation of the power system that results in transparent price discovery. There are numerous market models internationally but the same is not directly adopted for Indian cross fringe electricity market. So, a detailed and careful study is required to evolve a model suitable to Indian conditions. The model should be easily adopted, sustainable and should take care of the existing participating nations. In this review, complexity of the power market in cross fringe international model scenario has been analyzed and a new model for cross fringe power trading has been proposed which is suitable for Indian condition. This work also presents shows demand and supply side bidding scenarios. To promote cross fringe power sharing with neighboring countries of India with system reliability and security this thesis play a major role to guide the policy makers , power system designers and market operators.*

Key Words: Power Trading, Congestion control, Power control, Market operators and Transmission network.

1. INTRODUCTION

The electricity board of the state mainly deals with power project in our country. Till 1990, the power part was advanced as monopoly of big utility. There were mainly two ACTS, which provided guidelines in controlling this sector. The power ministry is the governing body in totality which is responsible for various reforms. The job of MOP in corporate making rules and regulations, making qualitative improvements, implementing new laws as regard to the production of electrical energy and it's transmission and distribution and also ensuring necessary interdependency between other government bodies. The electricity ACT 2003 gives proper guidelines for deregulating the power sector. It allows the buyer to purchase electricity directly from the seller in a bulk amount. The buyers and sellers will have a competitive environment [1].

Practically every one of the nation are embracing restructured model power industry [2] so that we can have the best use of our assets and can deliver electrical energy to the consumer at the minimal cost [3] . The south Asian locale has plentiful vitality assets for producing electrical power. Every nation in this area experienced maximum load at different hours of the day. It could be beneficial for these countries if they share their resources and continue to have better management of power generation and distribution. The power utilization in these countries are low and have a degraded quality of energy foundation, On the other hand power is available to the consumers at a comparatively high cost rate. Currently due to restructure model of the power sector, demand for cross outskirt poor trading is increasing to a great extent [4]. The SAARC nations have signed a document pertaining to free power trading across these regions. This idea was supported by USAID. The region of India alongside it's cross outskirt neighboring nations is controlled and kept up by SAARC. The SAARC was made to provide monetary assistance and social improvement. Numerous different nations of Europe are similarly chipping away at cross fringe power exchanging.

In cross outskirts model of power trading, interdependency is there between process of congestion management, exchange of power and security. Each TSO ensures high level of security in its own region giving no attention to the financial aspects of power market. So to deal with this problem an idea of independent system operator is presented in this theory for better management between other TSOs of the participating nations. We can say that under deregulation, one big utility that produces, moves, distributes and sells electricity in integrated way will now separate into unbundled utilities. Each company will function in an open access model and will bring changes in their managerial system so that it matches with the unbundled performances that they have to do. Each part of the company will operate in a new way. Competition will prevail in both generation and retail sector while there will be open access mechanism in T and D sector. Government in general want that there should be competition in the power generation sector and consumer should have lot of choices in retail sector. But

simultaneously government advocates for one transmission and distribution system in any one particular area. In the system of deregulation there is need of an independent authority who will keep an eye on the whole system so that it is in balance. It is the responsibility of the system operator to make sure that the energy generation matches with the energy consumption. It is expected that the operator should be independent as he will neither be involved in the business profit nor can be the owner of any generating firm. He will also not be a part of any financial gains or profits in the market. Appropriately, the framework administrator came to be known as independent system operator (ISO)

Fig. 1.2 depicts the common picture of deregulated power framework. It shows how the exchange of data and monetary gains occur in the system. This is not the ultimate system common for all countries. Each nation may have different system of deregulation. This system is quite complex and tedious in nature. Establishment of restructured model has been conceivable because of the quick advancement in the field of correspondence and data during the nineties decade. To develop a model in the electricity market this will facilitate trading of power between the neighboring countries of India. It is a quite difficult task for the planners and designers of the power system. We have scrutinized and investigated the financial aspect of the cross fringe electricity trading mechanism and have found out a mechanism to set market clearing pricing in the competitive market

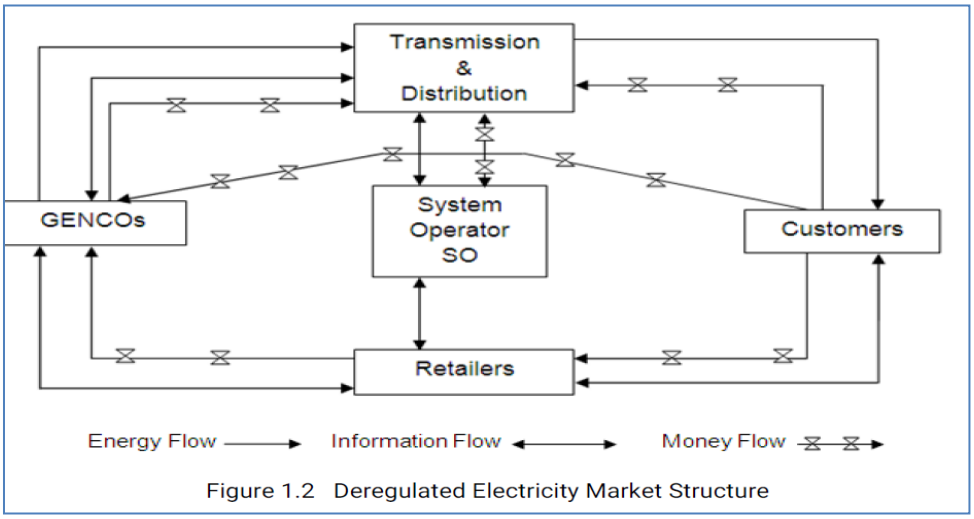

Figure 1.2 Deregulated Electricity Market Structure

1.1 Cross border power trading

Cross fringe power exchanging sector is constantly developing. So, the participating nations must be updated with the latest development in this sector which is bounded by a regulated framework and with enable the operator of the power plant to trade efficiently. Now more and more companies are taking keen interest in trading power across borders as the market is developing fast and new opportunities are arising rapidly cross border trading is governed by different rules and regulations through this concept of trade and investment, South Asia can have energy security. Investment and corporation can stimulate increased reforms in this sector which will support increased investment. In this new scenario, it is new possible that power can be imported across the border and use it in the regional market. A regulatory body has been formed which is named as central electricity regulatory commission (CERC). This body announced major charges in the policy of power trade, CERC also allowed inter country trading which enabled power trading between India and the other neighboring countries like Sri Lanka, Nepal, Bhutan, Bangladesh, Pakistan. In the past, there was hardly any instance of power import across the border .Tata power had developed Tale Transmission Project for PGIL which brought power from Bhutan to Delhi. The biggest company in India which is involved in transmitting power is power Grid Corporation of India Ltd. In recent times Tata Power had signed Power Purchase Agreement (PPA) In Bhutan. This will be accomplished through some changes in the policy matters [5].

1.2 Cross border power trading model

The electricity markets have undergone, development through various reforms which were done based on the needs of the particular country. This has led to formation of various market concepts which is suitable for particular social, political and economic conditions. The most important and common feature between all the developed power sector reforms in the developing countries are that a competition is created in the power market. Competition leads to greater efficiency and it

should be introduced slowly in a systematic manner. Government has implemented EA 2003, and many other reform initiatives. Government has also formulated suitable framework for the all round development of power market by the concept of competition. In this section a deregulated electricity market model has been presented for cross border power trading within the legal framework [6].

1.3 Power trading model

In the restructured power market, many consumers buy power from a group of generators using a single common power system. The main objective of the power trade is that all the generators should get their payment for their production and all the customers should pay for their consumed power. The salient features of the power trading markets are:-

The old system of regulated power market, power is bought by the consumers from the local power company. Deregulated power market the buyers and sellers buy and sell power through a power pool. The power pool provides the market for buying and selling power. The power pool ensures that power is traded efficiently and reliably. It is a centralized power market. All the generators sell electricity to the power pool. The same power pool then sells it to the consumers B trading of electricity is done by submitting bids to the power pool producers submit their sales bid and the consumers submit the purchase bids to the pool. There is a system operator who independently manager and operates the pool. The system operator also predicts the consumption and buys the predicted amount of power from the pool if the consumer fails to submit their bids. In this way the system operator serves as a retailer for the customers. New Zealand's power market is an example of centralized market. Bilateral power market which enables the players to trade among each other and also they can trade through the power pool [7].

In the European Union, the old regulated market is no more. Through the process of deregulation, markets have been liberalized. In the European Union directive, some common rules are laid down for the electricity markets. This ensures that competition in the market in increased, decreased price is obtained and increase in the service standards. Some rules and regulations are also set regarding different players of the market. Fig.1.3 shows the Cross Border Power Trading Model

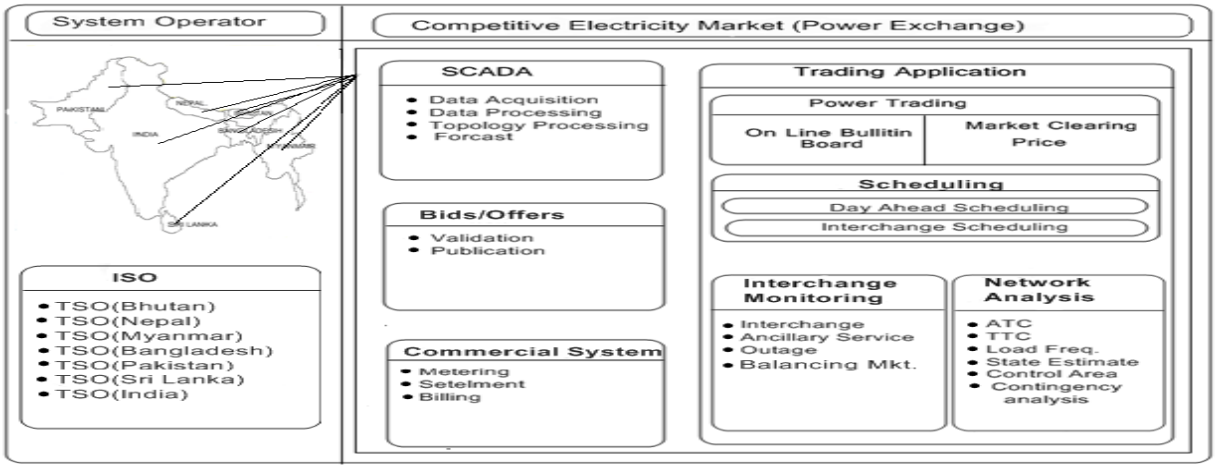

Fig 1.3 Cross border Power Trading Model

2. CONCLUSIONS

In this paper the design concept of cross border power trading model in competitive power market has been introduced by taking consideration of major issues faced by present power traders in Indian electricity market. This work focuses on trading arrangements, operation of power exchange and effectiveness of proposed pricing mechanism which is tested on linear demand and supply side bidding scenarios of market model. Suitable mathematical models are developed for calculations of market clearing price (MCP) and market clearing volume (MCP) simulations. This thesis could be guide line for the policy makers, power systems designers and market operators to promote the cross border power trade in South Asian countries with system reliability and security. Such type of model can be applied to the South Asia by promoting competition. Each country in south Asia has different peak load .timings. So such type of model can also be used in importing and exporting the electricity in South Asia.

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