CHAPTER 1

1. DEREGULATED POWER SYSTEM

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 main objectives of the deregulated power sector:

- ✓ To provide electricity for all reasonable demands.
- ✓ To encourage the competition in the generation and supply of electricity.
- ✓ To improve the continuity of supply and the quality of services.
- ✓ To promote efficiency and economy of the power system.

The important concepts of deregulation are:

1)**Competition**: The competition is at two levels in deregulated power industry:

1)Wholesale(generation)

2)retail (distribution).

2)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.

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

In the deregulation process, some new entities are expected to appear and hold major rules in power industry.

1.1 HISTORY OF DEREGULATION

During the nineties decade, many electric utilities and power network companies world-wide have been forced to change their way of operation and business, from vertically integrated mechanisms to open market systems. This can be specifically observed in some countries like U.S, UK, Sweden, Norway, Finland and some countries of South America. The reasons for change have been many and have differed over regions and countries.

For developing countries, the main issues have been a high demand growth coupled with inefficient system management and irrational tariff policies. This has affected the availability of financial resources to support investments in improving generation and transmission capabilities. In such circumstances, many utilities were forced to reconstruct their power sectors under pressure from international funding agencies.

In developed countries, on the other hand, the driving force has been to provide electricity at lower prices and offer them a greater choice in purchasing economy energy.

The goal of changing the way of operation, i.e. re-regulation, or deregulation, as we say, is to enhance competition and bring consumers and new choice and economic benefits.

Under Deregulation, the former vertically integrated utility, which performed all the functions involved in the power i.e. generation, transmission, distribution and retail sales, is de-aggregated into separate companies devoted to each function. The electricity bill for the end consumer now involves at least two components one from the distribution and transmission network operator responsible for the network and services, and the other from the company that generates the electrical energy.

All this seems to be the straightforward at first glance, but there are several complexities involved in restructuring and many issues have been raised.

In the discussion to follow, many restructuring issues have been considered.

The structural components representing various segments of the electricity market are:

- 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.)

In India, 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. This reality has brought into focus the practical limitations of interconnections and the associated problem of transfer capability. All these issues will have to be considered when transmission planning for a project is undertaken. Following explains the transition process from regulated industry to a deregulated one.

The word “deregulation” is relatively new to most of the countries. Due to the fact that it had only been in place in the power market for the past decade, and with the limited number of countries experiencing it, it is yet to be seen whether it is an opportunity or threat to the market. It can be a trend that is beneficial to one country and create problems for another. Constant review and monitoring of all the different markets is done to track the advancement of the power market. Up to date, the future of the market looks encouraging meeting the aims of deregulation. In this topic 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.

1.2 BENEFITS OF DEREGULATION

- ✓ Systems capacity will be used efficiently.
- ✓ Optimization of energy supply will take place.
- ✓ Price of the electricity will become clearer.
- ✓ Consumer choice will be improved.
- ✓ Bad technologies are ignored and good technologies are replaced in their place.

- ✓ Electricity prices are reduced.
- ✓ The usage efficiency is improved due to restructuring in price signals.
- ✓ Power flow will take place from surplus areas to shortage areas.
- ✓ The cost of ancillary services is reduced by reserve sharing.

1.3 PROBLEMS OF DEREGULATION

Electricity is a great campaign point for Government to get to power hence several of them may promise several things towards the electricity industry during this period. In India, the political economy is being played by the incumbent Government when it recently informed the citizenry of the multi-year Tariff Order (MY TO) in which case the Governments will keep increasing the per KWH price of the purchasing electricity in such a manner that the difference shall be paid by it for a period of five years after which the consumers would bear the whole responsibility for electricity. This same idea has shot up the price of electricity in South Africa recently to a level that is beyond the average citizen's economic power. The third world economy is still under severe threats from a number of the world Bank to ensure that the investors in power sector in this kind of economy has value for their money.

Regulation Of The Transmission Section: This is quite good for a growing nation but it has its own unhealthy impact on the mutual trust of the market players especially the generations. This is due to the fact that the electricity cannot be stored in large amount for very long time which means electrical power must be consumed within minutes of its production hence the policy that makes a body to control who uses the transmission access may.

Econometric Of Interest: The fact that the price is not stable in the deregulated environment is a well known fact among the participants and hence there may be times whereby there could be a significant drop in electricity price in the market but this may be kept by the generators as the profit on their generation meanwhile it should have gone into affecting the consumers' payment for electricity for such period. This is a clear case in England and Wales since their privatization experience.

Age Of The Generating Station: One of the major reasons for deregulating a power sector is to ensure that the private investors are encouraged to participate in the supply of electricity. But for the independent power producers to take up the responsibility presented by the existing power generating station in the country would not be financially advisable for a good investor, this is due to the fact that all of the generation stations in the country are quite

old with the earliest being in the neighbourhood of eighteen years old since its installation and commissioning.

Supply Shortage: A supply shortage due to generation outages can cause electricity to shoot up drastically.

Defaults: The default of the participant to complete the transaction can raise the issue of trustworthiness and this also may load to price hike.

Lack of experience: Market participants lack of experience with hedging tools could be another source of risks in industry.

Non choice of selection: To transfer power to consumer, it must be flow with all appropriate and sufficient conditions. Load flow, load diversity, reliability etc factors to be considered. In order to achieve this, at appropriate places we have to construct the load centres. But due to lack of experience, it was selected a wrong discrimination leads to several dangers.

As losses and cost are one of the major problem, in order to rectify it, we taken our research in accordance with the COST AND LOSS MINIMIZATION USING ANTLION ALGORITHM