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ENHANCEMENT OF TRANSMISSION CAPACITY IN DEREGUALTED POWER SYSTEM-AN OVERVIEW

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ABSTRACT
In this paper review of few pioneer for transmission planning in deregulated environment is been studied and most critical observations are marked. Expansion planning of approaches may be different and it depend upon the type of market is been used for making deregulated environment. Two models are very much possible one is fully adopted in UK and other in US. The two models are discussed in a great detail in literature. Broadly speaking there are only two transmission planning approaches are possible deterministic and non deterministic.

KEYWORDS: Transmission expansion planning, Power system deregulation, Uncertainty, Monte Carlo simulation, Probabilistic load flow, Probabilistic reliability criteria, Scenario techniques, Flexibility, Decision Analysis

INTRODUCTION

The deregulated power system divides the total power system into three major entities Genco, Transco and Disco. The advantage of having deregulated in the competitiveness and increased competition. In this scenario customer will get benefitted, considering customer benefit only deregulation was made mandatory in Indian Electricity ACT 2003. Planning of power transmission is major part of the electric power system. Especially in the deregulated power system (DPS). The role of Transco Company is to facilitate competition amongst the participants of the power market. Therefore it is mandatory to do transmission expansion planning (TEP) should be done well in advance and in proper way. In restructured or deregulated environment power industry to address increased uncertainties. Hence, new approach and new criteria for design of transmission expansion planning are needed. In this paper few techniques related to transmission expansion planning are considered and discussed with relevant advantages and disadvantages. The proper approaches for TEP is been reviewed in this paper.

DESIGN APPROACHES FOR TRANSMISSION EXPANSION PLANNING

Transmission system expansion planning is divided in following viewpoints

1. POWER SYSTEM UNCERTAINTY

1.1 Deterministic approaches

The probable conditions of the system are never considered in this approach. The systems failure is the only final outcome considered and the planning is done accordingly to come out of the situation. Many times the failure occurs due to certain reasons. The uncertainty may come once in a while or may not. These all conditions are not considered in this approach.

1.2 Non Deterministic approaches

In this approach the basic study of the conditions may arrive will be considered. This method considers the occurrence of the condition arrived. If there is very less possibility of the uncertain condition to arrive, then it is not the part of priority planning in this approach.

2. STRUCTURE OF THE POWER SYSTEM

2.1 Approaches for regulated power system
2.2 Transmission expansion planning based on model of deregulated power system

3. HORIZON OF POWER SYSTEM

3.1 Static techniques
3.2 Dynamic techniques

As non deterministic approaches are adopted more widely and hence focus is more on the non deterministic is discussed

Non deterministic approaches:

This approach can be applied with following methods

a. Probabilistic load flow

The occurrence of the certain condition is always considered in this method. This is less or more similar to the load flow except the probability considered. A complete analysis of the load is done and the all the conditions seem to be uncertain are considered in this approach.

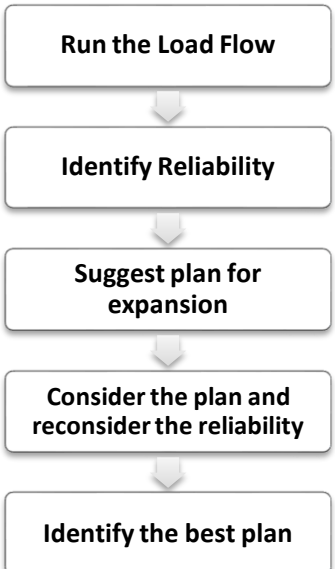

Figure1: Probability Load Flow

b. scenario techniques

In this method the planning of the system is done on the basis of the decisions made. All the conditions are considered depending upon the various affecting factors to the system.

Fig.2: Scenario technique

c. decision analysis

Here the flexibility is the most preferred parameter while preparing the plan. The cost also considered while planning for the system. The made decisions must be cost effective and should be changed as per the need of the system for betterment. The chain of the decisions will be followed to make the system perform better with every decision.

d. probability reliability criteria

This method deals with the reliability of the probable occurrence of the events. Some parameters reliable for the better performance are identified. The probability of such factors is considered while implementing any plan for the system.

e. decision on fuzzy rules

This is very important tool and proven to be sustainable for implementation. This approach deals with the consideration of the problem, all parameters affecting it and the identifying the other possible parameters to be optimized in order to solve the problem.

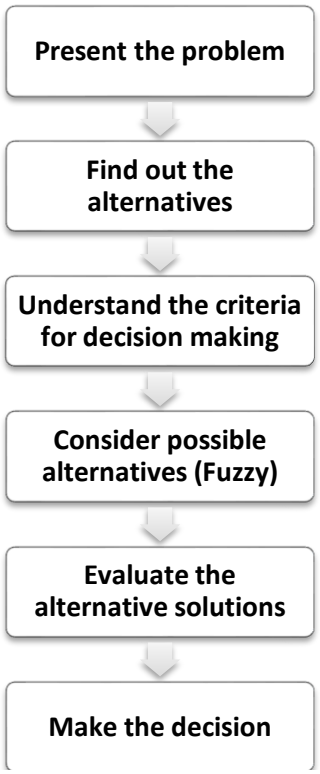

Fig.3: Decision on Fuzzy Rules

As using deterministic approaches puts some limitation the usage of non deterministic is more prominent. Non deterministic methods works of assigning based on probability of occurrence or it can also assign the degree of importance to each of the node and by doing this network can accomplish history of past experience, future decision capability and it can be also used for uncertainties in the system.

CONCLUSION

There are various differences in characteristics in the deregulated power system and it may be completely different from those of regulated power system. In the deregulated environment the risk of transmission planning and expansion has increased a lot. The risk of account investment and it lead probabilistic development of transmission expansion planning. In this paper few remarkable points related transmission

expansion planning are discussed in great detail and reviewed from few pioneers' paper of transmission expansion in deregulated power system.

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