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A Review on Calculation of Technical Losses in Transmission and Distribution System

Sachin Lohan[1] and Dharam Niwas[2]

[1]M. Tech. Scholar, Indus Institute of Engineering and Technology, Kinana, Jind, Haryana (India)
sachinlohan89@gmail.com

[2]Asstt. Prof., Indus Institute of Engineering and Technology, Kinana, Jind, Haryana (India)

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Abstract

The main aim is to identify all the losses in the transmission and distribution system. In this thesis we calculating the all losses of mayapuri industrial area and after calculating all data we have separate out all different types of losses like technical and non – technical losses on the basis on top – down and bottom up approach / load factor and loss load factor. And the final measure will be suggested to reduce the technical and non-technical losses to increase the efficiency of the system. and overcome the shortage of electrical in future the demand is increasing day by day because dependent on energy is increasing .it occupies the top position in the hierarchy. There are certain losses which affect the economy of power system. In India the percentage of transmission and distribution losses has been quite high. The term distribution losses refers to the difference between the amount of energy delivered to the distribution system and amount of energy consumer billed.

Keywords: *Top down and Bottom Top Approach, Technical and Non–Technical losses, Distribution Losses.*

1. Introduction

Electrical energy is the most efficient and popular form of energy and the modern society is heavily dependent on the electric supply. The life cannot be imagined without the supply of electricity. At the same time the quality of the electric power supplied is also very important for the efficient functioning of the end user equipment.

The term power quality became most prominent in the power sector and both the electric power supply company and the end users are concerned about it. The quality of power delivered to the consumers depends on the transmission and distribution of the power. If there is any deviation in the transmission and distribution of the electric power delivered from that of the standard values then the quality of power delivered is affected due to the different types of losses.

The thesis first aimed at identification of the T&D loss percentage of distribution system of Mayapuri industrial area. Then the segregation of technical and non- technical losses based on Top-Down and Bottom up approach/ Load factor and Loss Load Factor. [1]

The first demonstration of electric light in Calcutta was conducted on 24 July 1879 by P W Flurry's & Co. On 7 January 1897, Kilburn & Co secured the Calcutta electric lighting license as agents of the Indian Electric Co, which was registered in London on 15 January 1897.

A year later, the company was renamed the Calcutta Electric Supply Corporation. The control of the company was transferred from London to Calcutta only in 1970. Enthused by the success of electricity in Calcutta, power was thereafter introduced in Bombay. Mumbai saw electric lighting demonstration for the first time in 1882 at Crawford Market, and Bombay Electric Supply & Tramways Company (B.E.S.T.) set up a generating station in 1905 to provide electricity for the tramway. The first hydroelectric installation in India was installed near a tea estate at Sidrapong for the Darjeeling Municipality in 1897. The first electric train ran between Bombay's Victoria Terminus and Kurla along the Harbour Line, in 1925. In 1931, electrification of the meter gauge track between Madras Beach and Tambar was started. [2]

Now-a-days with the advancement in technology there is a drastic improvement in the transmission and distribution devices. With this improvement the transmission and distribution devices got a permanent place in the power sector helping to ease the control on overall losses in the system. In the transmission and distribution of both types domestic and commercial, there are different types of losses which we have to more improve to increase the efficiency of the transmission and distribution system.

There are many topics to study about different types of losses in the literature like- technical, non- technical. In this project the use of different method used for the computation of losses in the transmission and distribution is studied and analyzed.

2. Literature Survey

In India, the T&D loss% of the power distribution utilities is very high. The power utilities are facing power shortage, huge amount of losses in millions of crores, poor and unreliable power etc. Power system losses comprises of technical losses, non-technical losses & revenue losses. The reasons for the technical losses are lack of inadequate T&D capacity, too many transformation stages, improper load distribution and extensive rural electrification etc.

For the proper and accurate measurement of power losses in the power distribution utilities, we have to identify and found different power losses like technical and non-technical losses. This is the today's need of our developing country is more important where total T&D loss % loss are very high. The power distribution utilities should estimate the losses where the data for computing the technical and non-technical losses are generally not available.

Non-technical losses represent a significant portion of electricity losses in both in developing and developed countries. These losses not only occur in the developing countries but also in the developed countries. For example in in United States NTL ranges from 0.5% to 3.5% of the gross annual revenue. These figures are very less as compared to the developing countries like India, Pakistan, and Bangladesh. [13]

It is apparent that knowing how to identify the cases of NTL accurately is a vital for many utility companies in world wide. Such an identification providing the means of devising and implementation of preventive and corrective mean of reducing the losses involved. Knowledge of electricity customer that provides the understanding of their behaviour has become increasing popularly important in electricity industry, especially in deregulated market. With this knowledge to hand, individual service provider can improve their decision generally making as well as develop innovative strategies and product based on customer demand as a mean of differentiating themselves from their competitor. Nizar represented a new approach to nontechnical losses analysis for utility using the modern computational technique extreme learning machine (ELM). Non-technical losses represent a significant proportional of electricity losses both in developing and developed countries. ELM uses the load profile of the customer expose the abnormal behaviour that is known to be highly correlative to non-technical activity. This approach is superior to SVM. [14]

Carlos A. Dortolina, Senior Member, IEEE, and Ramon Nadira, The Loss That Is Unknown Is No Loss At All: A Top-Down/Bottom-Up Approach for Estimating Distribution Losses in IEEE transactions on power system, vol. 20, No. 2, May 2005. The accurate evaluation of losses in power systems has important technical, economic, and regulatory repercussions. For example, losses are increasingly becoming one of the most important measures of system performance, especially in connection with private sector participation (PSP) in the distribution segment of the industry. This paper proposes a top-down/bottom-up approach for accurately estimating technical losses in power distribution systems when a complete set of modelling data is not available. The results of the recent application of this approach in a developing country are also presented. [1]

MIDAS: Detection of Non-Technical Losses in Electrical Consumption Using Neural Networks and Statistical Techniques, Inigo Monedero. Felix Biscarri, and Rocio Millan, Escuela Technical Superior De Ingenieria Informatics, Department De Tecnologia Electronica, Avda, Reina Mercedes S/N, 41012 Seville (Spain) , Endesa, Avda. Borbolla S/N, 41092 Seville (Spain).Data mining has become increasingly common in both the public and private sectors. A non-technical loss is defined as any consumed energy or service which is not billed because of measurement equipment failure or ill-intentioned and fraudulent manipulation of said equipment. The detection of non-technical losses (which includes fraud detection) is a field where datamining has been applied successfully in recent times. However, the research in electrical companies is still limited, making it quite a new research topic. This paper describes a prototype for the detection of non-technical losses by means of two datamining techniques: neural networks and statistical studies. The methodologies developed were applied to two customer sets in Seville (Spain): a little town in the south (pop: 47,000) and hostelry sector. The results obtained were promising since new non-technical losses (verified by means of in-situ inspections) were detected through both methodologies with a high success rate. [15]

3. Conclusion and Future Scope

This paper study the case study of Janapuri division of BSES Rajdhani power limited, a power distribution utility of Delhi was considered. Firstly, we calculated the technical losses for HT feeders, power transformers, and secondary distribution system using load factor and loss load factor approaches. For this load profile of power and distribution transformer and HT feeder data was taken .Finally, we presented the top-down and bottom-up approach for accurately estimated the technical losses of the Janakpuri division of BSES power distribution utility. The utilities will have to concentrate on other mathematical approaches and advanced technologies for the accurate estimation and reduction of non-technical losses and the technical losses.

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