Analysis of Non-Technical Losses in Distributed Transformer System

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Abstract

Electrical Energy Audit consists of Studying, Assessing, Measuring and Analyzing electrical utilities. In short, the audit is designed to determine where, when, why and how energy is being used. This information can then be used to identify opportunities to improve efficiency, decrease energy costs and reduce greenhouse gas emissions that contribute to climate change. Just as financial accounting is used for the effective management of an organization, energy accounting is critical to energy management. It can be one of the most cost-effective tools for industries to cut energy costs.India's power sector is characterized by inadequate and inefficient power supply. In this we have to proposed survey of power losses in Okhala station. We have to survey 24 DT's of Okhala station. Result is analyzed by Matlab tool. Graph of different DT's is analyzed according to different months & total power losses.

**Key Words:** -DT, Matlab, Power Losses, Bar Graph.

Introduction

The power distribution utilities in India suffer from a huge revenue loss on account of both technical and commercial losses. Many power distribution utilities in India like UHBVN, DHBVN, UPPCL, TPDDL and BSES etc., have high T&D losses. These losses occur due to both technical and commercial losses. The average T&D loss % of India is about 32%, however, some utilities/states of India have very high T&D loss %.i.e. above 45 %. Energy audit in a power distribution system is to measure the input and output energy, identify mismatch, i.e., energy losses, segregate losses into technical & commercial losses and finally suggest an action plan to minimize these losses. Let us take an example for energy audit done at 11kV feeder. Firstly, account for the energy available at 11 kV feeders, then find the amount of energy consumed by end-consumers and finally determine the mismatch & check for permissible limits of loss %. India's power sector is characterized by inadequate and inefficient power supply. Since the country's independent consumer are confronted with frequent power curs, and fluctuating voltages. In addition, system losses are high throughout India's T&D networks, in addition to these enormous direct losses and indirect losses in terms of lost productivity and trade, sagging economic activity, rapidly shrinking of domestic and foreign investment in the power sector [20]. The main work in this dissertation is to collect the data and estimate the T& D loss % based on DT.The rest of the paper is organized as follows. Section II outlines the complete design of Viterbi Decoder. Proposed Algorithm to analyzed BER is discussed in Section III. Section IV is concentrated on the simulated result of Viterbi Decoder. The conclusions are given in Section V.

Energy Sources

Power generation and public distribution started in Calcutta in 1899.then power generation started with a necessary act named electricity act 1903.Subsequently this act was replaced by Indian electricity act 1910, which act is still in force today although with a number of amendments. India followed suit in 1948 and except for some other states like Mumbai, Kolkata, Ahmedabad and Surat. The entire industry was nationalized by virtue of the foresaid act of 1948, which laid down the electricity industry in the independent India.
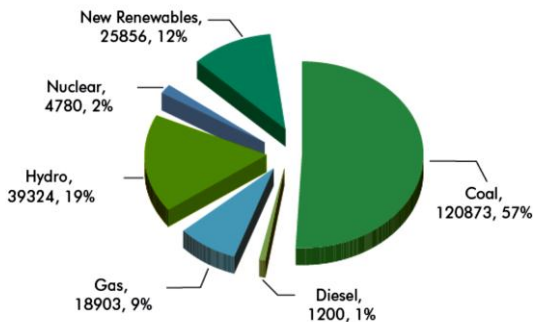
Source-Indian Electricity 2016

This act triggered the formation of state electricity board to handle generation transmission and distribution of electricity within the state .after first electricity act government enacted the electricity act 1948,till 2001 eight states unbundled their respective SEB's in to separate entities for generation ,transmission and distribution .recently electricity act 2003 was enacted to consulates the laws related to generation transmission and distribution, trading and use of electricity and largely for taking measures conductive to development of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficiency and environmentally related policies.[3].

DT Used In Current Survey

A distribution transformer provides the final voltage transformation in electrical power distribution system, stepping down voltage used in the distribution lines to the level used by the customer. The number of customers fed by a single distribution transformer varies depending on the number of customers in an area. Several homes may be fed off a single transformer in urban areas; rural distribution may require one Transformer per customer. Large commercial or industrial complexes will have multiple distribution transformers. Padmount transformers are used in urban areas and neighborhoods where the primary distribution lines run underground.

Many large buildings have electric service provided at primary distribution voltage. These buildings have customer-owned transformers in the basement for step-down purposes Distribution transformers (DT) are the important elements in the distribution network where energy distribution takes place. Some system parameters are calculates or logged by DT meter in energy audit of distribution system i.e. half hourly logging, KW readings, KVA and voltage (phase wise), half hourly logging of KWh. These are the detection from DT meters.one more logging is that power availability and the power outage during each interval means off/on time for power.

Delhi Power Sector Scenario

The Delhi Vidyut Boardwas formed by the Government of NCT Delhi in 1997 for the purpose of generation and distribution of power to the entire area of NCT of Delhi except the areas falling within the jurisdiction of NDMC and Delhi Cantonment Board. On July 1, 2010.The Delhi Vidyut Board (DVB) was unbundled into six successor companies:

Delhi Power Supply Company Limited (DPCL)- Holding Company;

Delhi Transco Limited (DTL) – TRANSCO;

Inderprastha Power Generation Company Limited (IPGCL) – GENCO;

BSES Rajdhani Power Limited (BRPL) – DISCOM;

BSES Yamuna Power Limited (BYPL) – DISCOM;

North Delhi Power Limited (NDPL) – DISCOM.

The main power generation companies are given by table 1.

Table 1 Installed Capacity of Delhi

Company	Power Plant	Type	Installed	PLF
IPGCL	Rajghat Power House	Thermal-C	135 MW	53.69 %
IPGCL	Inderprastha Power Station	Thermal-C	247.5 MW	43.92 %
IPGCL	I.P Gas Turbine Power Station	Thermal-C	282 MW	67.36 %
PPCL	Pragati Power Station	Thermal-C	330 MW	91.53 %
Dedicate Power Plant Delhi	Badarpur Power Plant (Thermal)	Thermal-G	720 MW	93.6 %

Methodology and Data Collection

The methodology used in this paper for identification of the T&D loss % and suggestion to reduce these T&D losses based on DT or LT feeder approach is as:

Identification and selection of DT/LT feeder

DT energy collection using CMRI for the selected DT's

Consumer tagging for each DT

Consumer energy collection using PSD and CMRI for each DT.

Analysis and data collection of consumer billed energy.

Generation of % T&D losses based on DT.

Reasons for high technical and commercial losses.

Prepare an action plan for reducing T&D losses based on DT/Lt feeder approach.
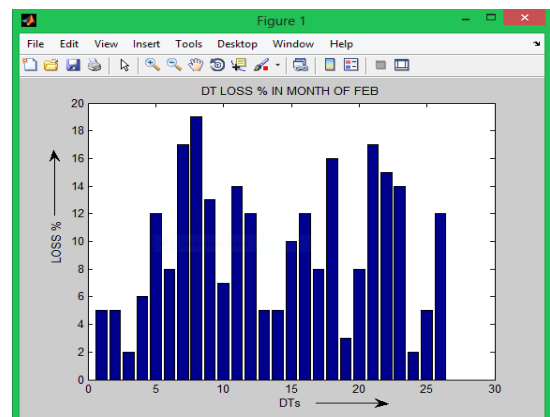
For applying this methodology, a comprehensive study was carried out .For the sake of simplicity, we choose OKHLA industrial area. The study of 24 Dt's [5]
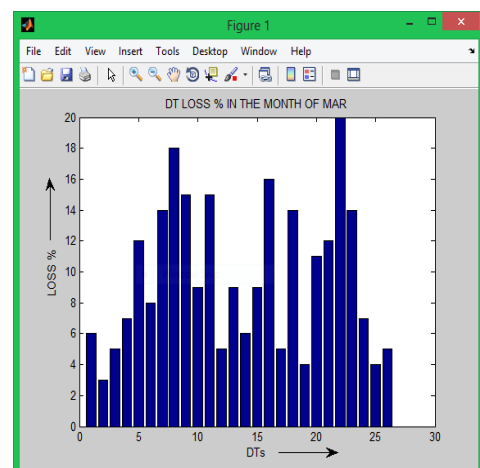
Result Analysis

Comparison graph of different DT's is shown by fig 1, fig 2& fig 3 respectively. These graphs give losses according toMonth wise. Fig 4 gives total power losses by all Dt's.
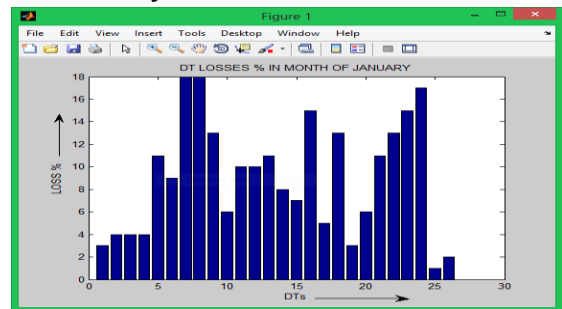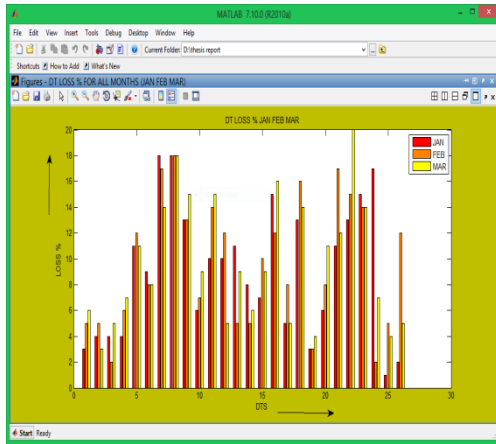

Fig 1 DT % Loss in Month of Jan

Fig 2. DT % Loss in Month of Feb

Fig 3 DT % Loss in Month of Mar

Fig 4 % Losses of All Months

Conclusion

Energy audit in a power distribution system is to measure the input and output energy, identify mismatch, i.e., energy losses, segregate losses into technical & commercial losses and finally suggest an action plan to minimize these losses. Energy audit in a power distribution system at the secondary distribution system is a tedious and continuous process. Presently, the distribution utilities in India like UHBVN, DHBVN, UPPCL, TPDDL and BSES etc. calculate T&D loss % on the basis of 11kV feeders. The average T&D loss % of India is about 32%, however, some utilities/states of India have very high T&D loss %,

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