
A review on Power Transmission and Distribution losses

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ABSTRACT:

In whole country, available of electricity power has been the most powerful source for relieving of our country economic, Industrial and social development of others state. Basically, the Electric power is transferred through the transmission line which deliver lot of power from generating statics to load centers and consumers. During of my side studying, the different types of losses are in numberless electrical transmission. In the Technical losses consist of the corona loss, Joule effect, Magnetic losses and skin effect. Wire the Non-technical losses included, electrical substation, poor meter reading, poor accounting and record keeping, etc. For Electric power to get to the final consumers in a proper way form and quality, transmission and distribution losses along the line must be reduced to the barest minimum.

Key words: Electric losses in power transmission and distribution, technical losses, T&D losses

I. INTRODUCTION

Generally, electric power system has a big and complex electrical network all over the world. The electrical power reaches to the consumers through the united network included in transmission lines, transformers, distribution lines, small, grid stations, overhead lines, cables and other equipment. Through energy is a basic or most requirement for the unique economic development source of the nation. In there have many types of energy for the economic development of the nation, but electrical energy is most important type of economical development. A contemporary and educated society, so much trusty on the use of electrical energy. Task, which relates to the generation of electricity, transmission and distribution of electricity have to be assign the highest importance in the national planning producer of any nation because of the importance of electrical energy to the economic and social development of the society. Power plants planning in a way to meet the power network load demand is one of the most important and essential issues in power system. As we know that transmission lines connect generation plants and substations in power network, the exploration, calculation and decrease of transmission and distribution losses in these power networks are of great concern to electrical engineers.

$$\text{T\&D Losses} = \frac{(\text{Energy Input to feeder (Kwh)} - \text{Billed Energy to Consumer (Kwh)})}{\text{Energy input kwh}} \times 100$$

II. ELECTRICAL POWER LOSSES

There are mainly two types of electrical power losses during the generation, transmission and distribution which is the following below (Fig. 1):

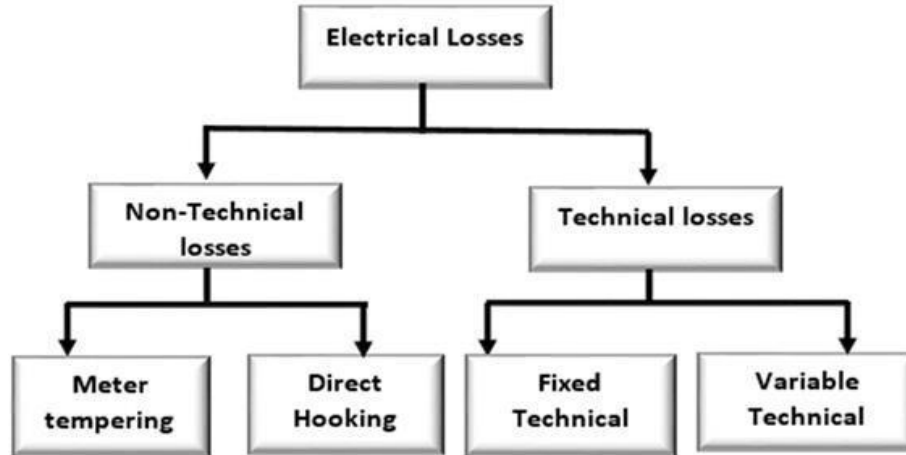


Fig. 1: Electrical power losses

In the above digarm shows, there are two types of power losses first one is Non-technical which included in this losses are given meter tempering and direct hooking and other one is technical losses which included in this losses are given fixed technical and variable losses.

(Fig. 2) shows the electricity distribution and transmission from source to distribution points. Where lot of losses occurred due to many type of reason like as length of wire, transformer heating, grid Station distribution and meter tempering and modification.

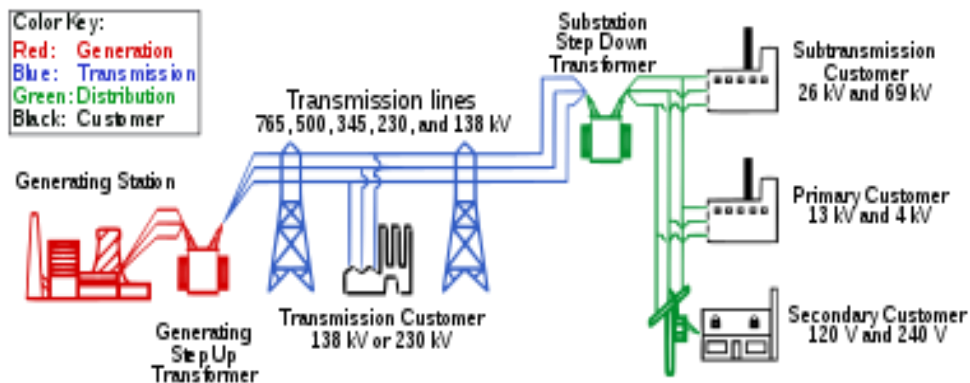


Fig. 2: Generation and Distribution simplyfy

III. NON-TECHNICAL LOSSES

Non-technical losses are caused by actions external to the power system and occur from basically:

- Electricity theft
- Inaccuracies in metering equipment
- Prepaid metering
- Automatic meter reading

(Fig. 3) shows the non-technical losses which mainly four parts are given below:

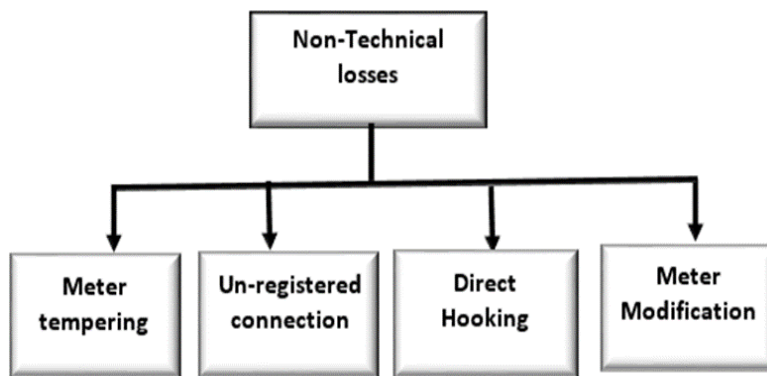


Fig. 3: Non-Technical losses of power system

IV. TECHNICAL LOSSES

Technical losses occur naturally and are dependent on the system characteristics:

- Electricity demand
- Physical characteristics
- Magnetizing Current in equipment
- Corona losses due to bad weather – Transmission lines
- Power plant auxiliary losses- Fans, pumps, blowers.

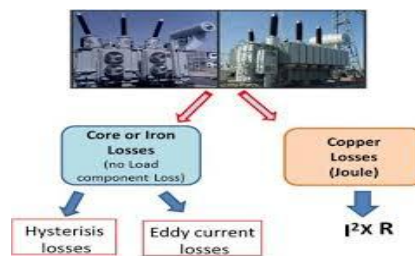


Fig. 4: Technical losses of Power System

Technical losses are two types given below:

- **Fixed Technical losses:** fixed losses are due to these reason which are following, Corona losses, Leakage current losses, Dielectric losses, open circuit losses and losses produced by continues load of measuring or control elements.
- **Variable Technical losses:** It has been suggested that optimal average utilization rate on a distribution network that considers the cost of losses in its design could be as low as 30 per cent. joule losses in lines in each voltage level, impedance losses, losses caused by contact resistance.

Which due to case of power losses?

Overhead transmission lines have following losses due to

1. Corona discharge in EHV lines.
2. Dielectric loss.
3. Radiation loss
4. Coupling loss
5. Skin effect.
6. Core loss.

V. T&D LOSSES IN INDIA

Energy losses occur in the process of supplying electricity to consumers due to technical and commercial reasons. The technical losses are due to energy dissipated in the conductor, transformers and other equipment used for transmission, transformation, sub-transmission and distribution of power, These technical losses are inherent in a system and can be reduced to a certain level. When Commercial losses are added to Technical losses, it gives Transmission & Distribution (T&D) losses. (**Fig. 5**) shows the T&D losses or AT&C losses,

Transmission & distribution losses (T&D losses):

$T\&D \text{ Losses} = \{ 1 - (\text{Total energy Billed} / \text{Total energy Input in the system}) \} \times 100$

Aggregate technical and commercial losses (AT&C losses):

$AT\&C \text{ Losses} = \{ 1 - (\text{Billing Efficiency} \times \text{Collection Efficiency}) \} \times 100$

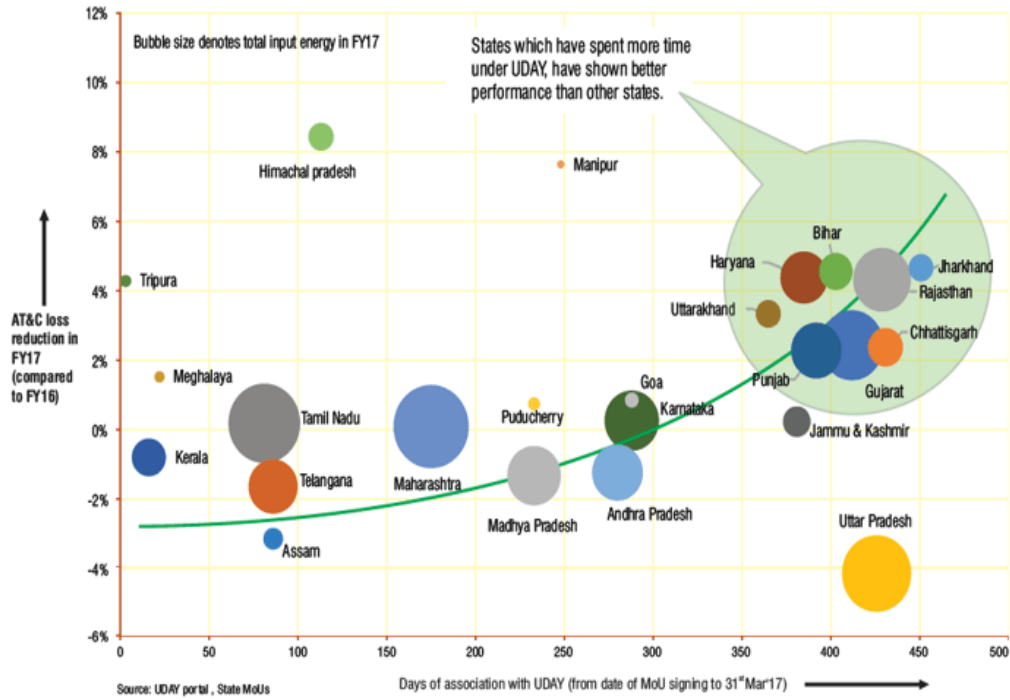


Fig. 5: T&D losses in power system

(Fig. 6) show the power losses in India up to 2019. In 2017-18, energy deficit in the country was 0.7%, and peak deficit was 2%. However, the deficit situation is exaggerated in certain states, and the north-eastern region, in particular. The capacity utilization of thermal power plants (also called Plant Load factor or PLF) has declined from 78% in 2009-10 to 61% in 2018-19.

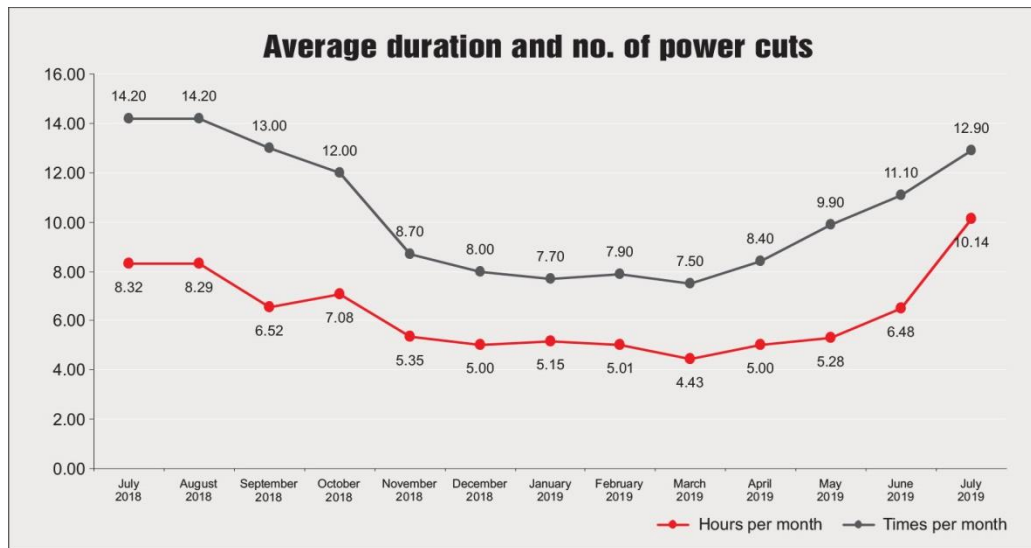


Fig. 6: Yearly gaps in power losses of India

VI. REDUCED POWER LOSSES

For Transmission System:

- Optimization of existing controls for transformer taps, generator voltages, and switched shunt capacitor banks reduces current flow and minimizes losses.
- In power grid more addition of shunt capacitor banks, fixed and switched, at points on the system closest to the reactive load source reduces current flow and minimizes losses.

For Distribution System:

- For equipment sizing (initial installation of distribution transformers and conductors) reduces transformer core and coil losses.
- Phase balancing reduces line
- Natural conductor losses
- In distribution power system to improve the feeder power factor reduce line losses.

VII. EFFECT OF NEW TECHNOLOGY ON LOSSES

The electric power grid is dynamic in nature with permanently evolving technology improvements and enhancements. The following the effect the new technologies are given below,

- Advanced metering
- High-voltage Direct Current (HVDC) Transmission
- Gas Insulated Substations

VIII. CONCLUSION

From in this page, there are many factors responsible for T&D losses that are eliminated. By government the approaches taken over the to all years in India has made an inefficient distribution system having very high T&D losses and very poor quality and reliability of power supply to consumers. In the power sector, the focus has rightly been shifted to upgrading the transmission its efficiency to reduced these losses.

To perform this, a new technologies should be implemented to more then reduced losses which to advance metering, HVDC, gas insulated substations. These technologies are implemented in developed countries like United States etc. Finally, this may contribute in the process of overall national development.

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