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# Electricity Theft in India: Its Measure and Solution

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***Abstract: The paper discusses the power theft problem occurring in the Indian scenario and the problems associated with it. The power theft is categorized as the non-technical losses. The amount of power theft in India varies with different states. In this paper effect of power theft on distribution of power is analyzed. Intensity of usage of tube wells, linked to unmetered electricity use by farmers increases the power theft. Methods of power theft are discussed and various measures to control is discussed in this paper.***

***Keywords-Non Technical Losses, Prepaid Meters, Power Theft.***

## 1. INTRODUCTION

In India, average T & D (Transmission & Distribution) losses, have been officially indicated as 23 percent of the electricity generated. However, as per sample studies carried out by independent agencies including TERI, these losses have been estimated to be as high as 50 percent in some states. In a recent study carried out by SBI Capital Markets for DVB, the T&D losses have been estimated as 58%. This is contrary to claims by DVB that their transmission and distribution losses are between 40 and 50 percent. With the setting up of State Regulatory Commissions in the country, accurate estimation of T&D Losses has gained importance as the level of losses directly affects the sales and power purchase requirements and hence has a bearing on the determination of electricity tariff of a utility by the commission.

### 1.1 COMPONENTS OF T&D LOSSES

Energy losses occur in the process of supplying electricity to consumers due to technical and commercial losses. The technical losses are due to energy dissipated in the conductors and equipment used for transmission, transformation, sub- transmission and distribution of power. These technical losses are inherent in a system and can be reduced to an optimum level. The losses can be further sub grouped depending upon the stage of power transformation & transmission system as Transmission Losses (400kV/220kV/132kV/66kV), as Sub transmission losses (33kV /11kV) and Distribution losses (11kV/0.4kv). The commercial losses are caused by pilferage, defective meters, and errors in meter reading and in estimating unmetered supply of energy

### 1.2 LEVEL OF T& D LOSSES

The officially declared transmission and distribution losses in India have gradually risen from about 15 percent up to the year 1966-67 to about 23 percent in 1998-99. The continued rising trend in the losses is a matter of serious concern and all out efforts are required to contain the them.

 

## 2. TECHNIQUES OF ELECTRICITY THEFT

- **Direct connection from the pole**: Since the meters and equipment in this section are in the 220 V systems, where customers are mostly houses and small businesses, a direct connection from the pole is much easier than the high-voltage system. Well, at least safer, a pair of rubber gloves could be all the necessary protection and a ladder and knife all the necessary tools, as opposed to climbing up HV lines. This is by far the most common method of electricity theft.
- **Use of Remote** : Some Chinese remote is available in the market which slow down the meter speed.
- **Phase-to-phase connection**: This is similar to using an alternate neutral line, except that the system voltage becomes the phase-tophase voltage at 240 or 380 volts.
- **Using alternate neutral lines:** The single-phase system often has only one wire going into a house, the "hot" line. Neutral is usually grounded (electrically connected to the earth) and is sometimes provided by the foundation of the house to be more generic. So if a person could manage to use a small transformer and use that as the "neutral", the meter that uses the very same neutral source would read the incoming voltage lower than it really is, resulting in a reduced unit count.
- **Meter tampering/breaking seal:** This is basically the same thing that happens to the HV meters.
- **Other methods of electricity theft include:** Tapping off a nearby paying consumer, damage done to meter enclosures, and using magnets to slow down the spinning discs in the meter housing.

### 2.1 UNMETERED SUPPLY

Unmetered supply to agricultural pumps and single point connections to small domestic consumers of weaker sections of the society is one of the major reasons for commercial losses. In most states, the agricultural tariff is based on the unit horsepower (H.P.) of the motors. Such power loads get sanctioned at the low load declarations. Once the connections are released, the consumers get into the habit of increasing their connected loads, without obtaining necessary sanction, for increased loading, from the utility. Further estimation of the energy consumed in unmetered supply has a great bearing on the estimation of T&D losses on account of inherent errors in estimation. Most of the utilities deliberately overestimate the unmetered agricultural consumption to get higher subsidy from the State Govt.and also project reduction in losses. In other words higher the estimates of the unmetered consumption, lesser the T&D loss figure and vice versa. Moreover the correct estimation of unmetered consumption by the agricultural sector greatly depends upon the cropping pattern, ground water level, seasonal variation, hours of operation etc.
To increase the food output, almost all the State Governments show benevolence to farmers and arrange supply of electric power for irrigation to the farmers at a nominal rate, and in some States, without charges at all. In view of this, most Electricity Boards supply power to agriculture sector and claim subsidy from the State Govt. based on energy consumption.

Since the energy supplied to the agriculture sector is a generous gesture by the State Govt., all the electricity boards have eliminated energy meters for agriculture sector services. The absence of energy meters provides ample opportunities to SEBs to estimate average consumption in agriculture sector at a much higher value than the actual. In the absence of energy meters, most of the SEBs resort to fudging consumption figures to include not only the under estimated T&D Losses but also energy theft from their system. The extent of fudging is more in the States where agricultural activity is high. The benefit derived by these boards is not only the extent of subsidy from the respective States but also self-praise, by showing much less T&D losses. Further the boards are ignoring the inefficiency in operating the distribution system by blaming the agricultural supply for all ills and raising the tariff of other consumers.

Most of the methods being employed by SEBs for estimating the unmetered energy consumption are as follows: -

- Load factor based estimation.
- Estimation based on feederwise theoretical calculation of losses.
- Estimation based on readings of meters installed at all the Distribution Transformers located on a feeder.

However, none of these methods provide correct estimation of unmetered consumption.

## 3. MEASURES FOR REDUCING NON-TECHNICAL LOSSES

Research carried out on utilities worldwide indicates that service quality, customer relationships, and overall service satisfaction can minimize revenue losses. This has been demonstrated in Pakistan where rampant power theft has contributed financial crisis for WAPDA (Water & Power Development Authority). The World Bank and Asian Development Bank which had supplied the bulk of WAPDA's development loans wanted the authority to recover its unpaid dues, cut power theft and reduce its T&D Losses. Accordingly WAPDA was forced to raise power rates.
But instead of improving the financial situation, this action resulted in increased financial crisis of WAPDA due to increased incidence of theft and unpaid bills. In view of this, the authority applied extreme measures to curb power theft. The Chairman of the authority (a serving army officer) deployed 35,000 troops to tackle the crisis. The troops were instructed to identify and arrest people responsible for power theft.

 

There are a range of methods being employed by utilities the world over to mitigate power theft. Some of these measures are given below.

- Set up vigilance squads to check and prevent pilferage of energy.
- Severe penalties may be imposed on those tampering with the meter seals etc.
- Energy audits should be introduced and personal responsibility should be fixed on the district officers (executive engineers) for energy received and energy sales in each area.
- Installation of tamper-proof meter boxes and use of tamper-proof numbered seals.
- Providing adequate meter testing facilities.
- A time bound program should be chalked out for checking the meters, and replacement of defective meters with tested meters.

### 3.1 PREPAID ENERGY METERS

Indian power sector is facing serious problem of lean revenue collection as against energy supplied due to energy thefts and network losses. All the steps taken so far, regarding the improvement of the revenue collection did not yield satisfactory results. It is reported that the most faulty sub system is the metering and meter reading system. The traditional billing systems are discrete, inaccurate, costly, slow, and lack flexibility as well as reliability. Therefore, several attempts were made to automate the billing systems. Even though accurate and fast readings are obtained, bill payment is still performed based on the old billing procedure. They require an individual/agent to physically come and take down the readings and report to house hold/office the amount one has to pay.

Energy meters, the only direct revenue interface between utilities and the consumers, have undergone several advancements in the last decade. The conventional electro-mechanical meters are being replaced with electronic meters to improve accuracy in meter reading. Asian countries are currently looking to introduce prepaid electricity meters across their distribution network, buoyed up by the success of this novel methodology in South Africa. The existing inherent problems with the post-paid system and privatization of state held power distribution companies are the major driving factors for this market in Asia.

Over 40 countries have implemented prepaid meters in their markets. In United Kingdom the system, has been in use for well over 70 years with about 3.5 million consumers. The prepaid program in South Africa was started in 1992, since then they have installed over 6 million meters. Other African counties such as Sudan, Madagascar are following the South African success. The concept has found ground in Argentina and New Zealand with few thousands of installations

**The Figure 3. 1** shows the Prepaid Energy Meter.

**Fig 3.1 Prepaid Energy Meter**

## 4. SUGGESTIONS TO MINIMIZE NTL

Non-technical losses in distribution systems comprised about 2-3%, of the total system losses. Total distribution system losses equals technical losses plus non-technical losses.

Following are the non-technical strategies by which non-technical losses can be minimized or mitigated:

- Up grading of electricity meters to meet standard accuracy must be conducted to support reduction of non-technical losses thru statistical analysis.
- Smart card technology can play an important role in minimizing the theft of energy.
- Integrated billing system and prepaid energy meters are the choices which need to be accomplished by the utilities in order to reduce the non-technical loss reduction.

 

- Technical training to the operating personnel must be given plus enhancing employee's loyalty will be there to eliminate pilferage in the distribution system.
- Statistical monitoring of energy consumption per sector, per class and geographical setup must be employed and statistical evaluation of meter readings must be done.
- Statistical analysis of electricity meter readings must be done so that sample data from electricity meters can be analyzed statistically over time to estimate significant deviation from usual meter readings. This will help the operating personnel to keep track the energy usage of its consumers and will have a benchmark in case significant meter reading deviation especially at the totalizing meters is observed.

## CONCLUSION

Whenever an extra tapping is done on the distribution line the current in the distribution line increases which results in losses i.e. a large amount of power is wasted as the losses. From the calculations we observed that as the value of tapped load is increased in any phase, the current of that phase increases. The non-technical losses due to the unmetered connection is very large and also due to the behavior of many people in society the non-technical losses occurs in the large amount. To prevent this the central or the state governments should draw plans to provide financial support to the utilities for installations of meters on at least all the distribution transformers in a phased manner and The central or the state governments should draw plans to provide financial support to the utilities for installations of meters on at least all the distribution transformers in a phased manner also Schemes for incentive awards to utilities who are able to reduce T&D losses beyond a certain pre-fixed limit.

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