



Prepaid Smart Electric Meter Curbs Power Thefts and Improves Indian Economy: Review

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ABSTRACT

Producing electric power is a gigantic challenge and controlling power theft is another cumbersome task for the government. India loses more money to theft than any other country in the world. The power thefts cause huge revenue losses, short circuits cause fires, and loss of human lives. This is another disastrous domain, which needs to be addressed properly by government policies. The Prepaid Smart Electric Meter is an electronic device that controls power thefts, customer will consume the electricity economically, and saves billions of dollars annually if these smart electric meters are properly implemented. This device evades the complex paper billing processes, generates business for charging centers, and creates employment in the country. This paper presents the systematic study and solutions to tackle electricity thefts and government reforms to curb electricity thefts.

Keywords: Smart electric meters, controls power thefts, generates revenue, avoids harassment, saves electricity and money.

1. Introduction

The energy sector plays a major role in the development of a country in terms of infrastructure, economy, industry, agriculture, and other sectors. India produces electricity from different conventional sources like hydro, natural gas, oil, and thermal and non-conventional sources including wind, solar, bio-waste, etc. The electricity demand increased every year from 949 TWh in 2015 to approximately 2338 TWh by 2030.¹ Surely, India can achieve this target by installing Smart electric meters throughout India and trapping all available energy sources in the country. The world's most populous country India has the most people lacking electricity. The present Indian government, in 2014 realized that 32 million homes in the rural area are still in the dark.² They took it as a challenge for rural electrification by sanctioning a \$2.5 billion program in bringing electricity to every citizen through new reforms using smart meters to control power thefts. In the present modern scenario of digital transactions, the electricity is an indispensable item to use, but it cannot be given freely, but it has to be purchased.

2. Power Thefts

All efforts are for the soul and body. All government policies and infrastructures are meant to protect humans and provide their livelihood, then the country is said to be a developed country. In this process, the citizens must also cooperate with Government. But it is unfortunate to see the number of illegal activities in various sectors and especially the electricity thefts in India are a serious concern that needs to be addressed soon (Fig.1)¹⁵. Over 20% of total electricity produced in India is lost to thefts³ and it is nearly equal to US\$16.20 billion annually, which means nearly INR 1.24 lakh crores, losing every year⁹. This unruly behavior of cheating is not a localized issue but it is spread out to rural areas and is more prominent in urban areas also. The government authorities have been trying to minimize power thefts. Saving the power is almost like generating power.



Fig.1. Power thefts from Electricity Poles

Power losses are generally caused due to technical and non-technical things. The technical losses are mainly due to the power dissipation in the electrical systems such as power transformers, transmission lines, measurement systems, etc.^{11,12} These are natural emission losses, sometimes which can neither be rectified nor controlled. Other non-technical losses are due to the additional external loads. These thefts are mainly for illegal users for monetary benefits. People use extra wits and tricks to steal the power⁴, by 1) direct hooking from the power lines or at some other places where electrical wires are not properly insulated, 2) bypassing the meter, connecting the input of the meter to external usage, during any function where powerful electric music systems and lights are used or where power full-electric tools or machineries are used at the construction sites, etc. 3) injecting foreign elements in the meter so that the speed can be slowed down 4) permanent damage of the meter so that line output is directly connected to the output of the meter, till electric meter gets repaired, 5) corruptive nature of technical officers or linemen, who harass customers unnecessarily, 6) political rallies during elections 7) promises of political leaders for free or subsidized electricity to farmers for electoral winning 8) billing irregularities 9) not paying or exempted the electric bills due to the dominance of local leaders or unity of the people in the area and any other illegal methods to steal and get free electricity.

The state governments which control and maintain electricity supply, sanction free or subsidized power to rural homes and farmers as a political tool, which might lead to bankruptcy in due course of time. The financial losses due to the power thefts are burdened and compensated by industries and citizens. The electricity thefts are more in the states where governments and their policies are weak. The Fig.2 histogram represents as per the North East Data 2014, nearly 102 countries in the world losses the huge amount US\$89.3 billion annually due to the electric power thefts, whereas the five major countries contribute to US\$38.69 billion annually, in which the highest losses are in India nearly US\$ 16.20 billion, followed by Brazil at US\$ 10.5 billion, USA at US\$6.0 billion, Russia at US\$5.1 billion and Pakistan \$0.89 billion.^{10, 13}

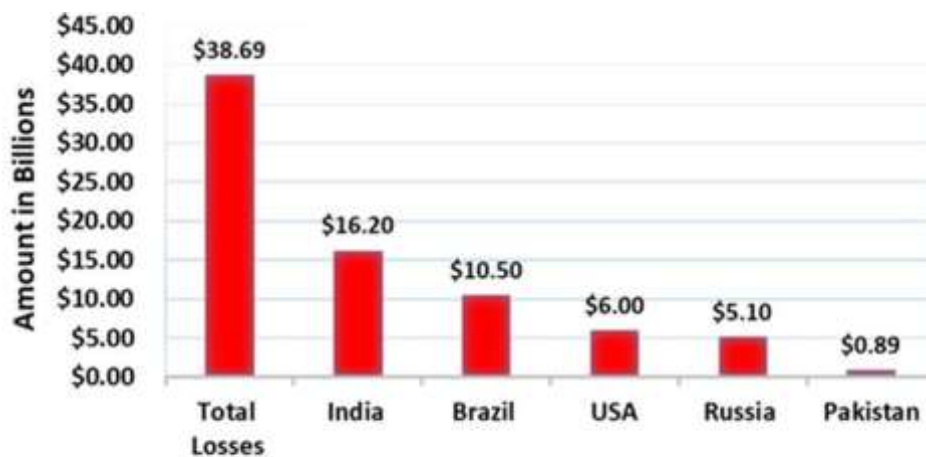


Fig.2. Loses due to the Electricity Thefts

The Fig.3 histogram shows the state-wise electricity thefts, which are 67.35 % in J & K, 43.58 % in Bihar, and the minimum is 11.84 % in Pondicherry.³ On average 15% of power supply losses in urban areas and more than 25% losses in rural areas of India, either from transmission lines or thefts. during the year 2005-2006¹⁴

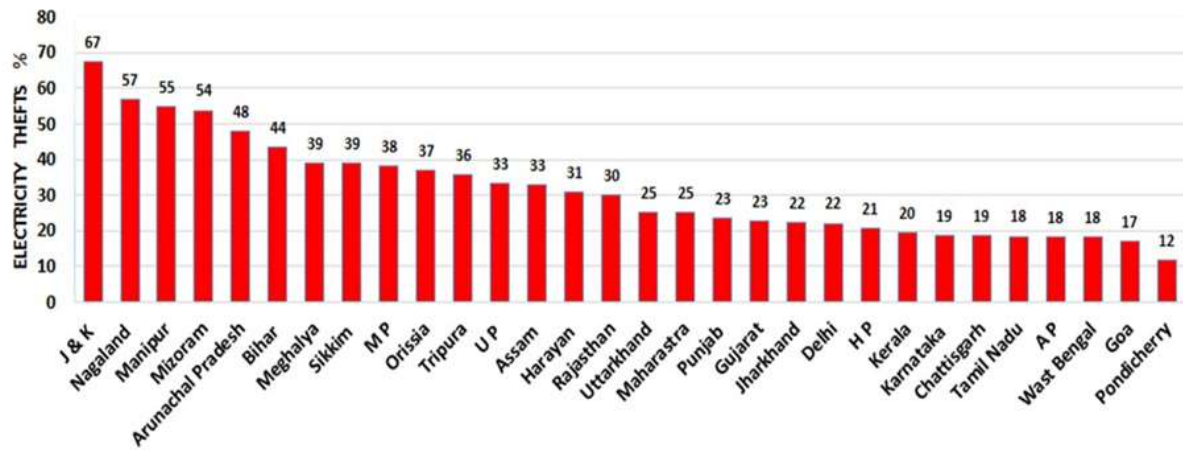


Fig.3. Electricity Thefts in India

3. Prepaid Smart Electric Meters.

The prepaid smart electric meter (Fig.4)¹⁶ is an electronic device consisting of LCD, keyboard option push buttons to feed the pin digits⁵, to know the balance amount and consumed electricity units. The name suggests making the payment before using the electricity. It is designed in such a way that as long as the amount exists in the meter, the electricity supply continues, once the prepaid amount is exhausted, the supply is completely cut off from the mains, resulting in no electricity in the house. It is similar to a prepaid mobile phone. An alert is also sent to the consumer's mobile phone when the balance amount is low, reminding him to charge the electric meter. The recharging amount can be done either atomically through an authorized mobile phone or manually by purchasing a coupon from a vendor.⁶ The coupon consists of the amount and 20 digits PIN. The user can buy any amount multiples of Rs 50/, Rs 100/- and 500/ and should enter the PIN on the keyboard of the Smart electric meter which is installed in the house.



Fig.4. Prepaid Smart Electric Meter

The prepaid meter is the most convenient device and it has some benefits like one can use the facility whenever he/she wants as per the required amount, protects from harassment by electricity authorities, is easy to handle, and one can see the reduction of balance amount as and when electric light bulbs, tube lights, fans, and ACs and other electric appliances are on the operation mode. Thus one can use the electricity economically, and one can save the electricity and money. This device avoids the complex billing process and manpower in collecting the meter readings and printing papers for electricity bills.

4. Government Plans

The literature says as per the Central Electricity Authority of India, over 27 % of all power produced in India is either lost in FY 2015 due to the dissipation in the transmission lines or theft. That is about 261.130 Gigawatt/hour annually, which will be sufficient to light up New York for nearly two years.⁷ The central Government is seriously considering alternative methods to curtail revenue losses and planning to implement stringent rules and install prepaid smart electric meters in the first phase by December 2023 in a few states, and in the second phase in all of India, by 2025. The Government of India is providing funds to the states for the implementation of smart metering under the National Smart Grid Mission (NSGM) and Integrated Power Development (IPDS). It is the most serious reform undertaken by the Central Government in the distribution sector and launched "Revamped Distribution Sector (RDSS) on 20th July 2021 and deployment of nearly 25 crores smart prepaid meters for domestic consumers by March 2025."⁸

5. Conclusion

The power thefts due to the illegal method results in huge financial losses every year. The power companies are forced to increase the unit electric charges for genuine customers as well as industries. The harassment from the electricity authorities and the huge amount of financial losses can be monitored by introducing stringent policies in promoting the industries as well as introducing new prepaid smart electric meters in India. The central government has taken strong reform steps in installing smart meters throughout India by 2025. This would inculcate the customers to use the electricity economically, avoid the rifts between the owner and tenants, and avoids the billing process. These new reforms generate business for charging centers and create job employment in the country. The more the usage, the more the payment and vice versa, as the balance amount is displayed on the smart meter. If these are well implemented, we may be paying fewer amounts than what we pay now.

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