Electricity theft

Electricity theft is the criminal practice of stealing electrical power. The practice of stealing electricity is nearly as old as electricity distribution. Electricity theft is accomplished via a variety of means, from methods as rudimentary as directly hooking to a power line, to manipulation of computerized electrical meters. Electricity theft is most common in developing countries where power grids deliver inadequate and unreliable power.[1] The global cost of electricity theft was estimated at $96 billion every year.[2] Some punishments for the crime include fines and incarceration. The electricity losses caused by the theft are classified as non-technical losses.

Posters explaining the illegality of the theft of electric cables, outside of a mosque in Tonghai County, Yunnan.

Contents

History

On March 27, 1886 it was reported that electricity espionage was accomplished by unscrupulous persons tapping into Edison Electricity in New York. The Superintendent of the power station sent a power surge into the line to burn out or destroy foreign objects trespassing on the line.[3]

Types

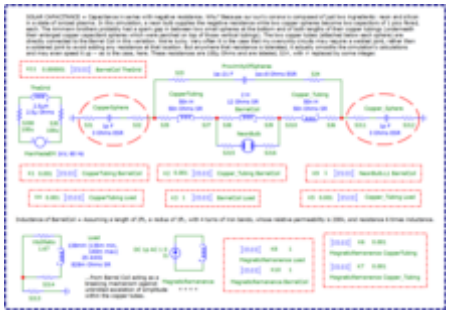
There are various types of electrical power theft, including Tapping a line or bypassing the energy meter. According to a study, 80% of worldwide theft occurs in private dwellings and 20% on commercial and industrial premises. The various types of electrical power theft include:

Direct hooking from line

What's known as "cable hooking" is the most used method. 80% of global power theft is by direct tapping from the line. The consumer taps into a power line from a point ahead of the energy meter. This energy consumption is unmeasured and procured with or without switches. It can cause severe electric shock or fire outbreak.

Inductive Coupling

Energy can be stolen from the utility grid[4] [5] by a mutual inductance[6] induced between a transmission line and a parasitic circuit which specializes in reversing its current out-of-phase with its voltage by one-half cycle of oscillation, or 180°. This reversal is equivalent to the definition of an electric generator since it pumps energy from the transmission line into the parasitic circuit much like a vacuum pump moves air *against* a pressure gradient. The difference is that a parasitic circuit makes use of electric and magnetic reactance to improve efficiency and reduce its energy expenditure to almost nil. Consequently, the magnetic coupling need not be placed directly on top of the transmission line. It may be located at a considerable distance depending upon the efficiency of the parasitic circuit.



Schematic (https://ufile.io/7sidu1df) of a parasitic circuit which steals electricity from the utility grid simulated (http://www.spectrum-soft.com/index.shtm) within a 64-bit operating system. Any CPU less than 64-bits tends to give false positives.

Bypassing the energy meter

In this method, the input terminal and output terminal of the energy meter is bridged, preventing the energy from registering in the energy meter.[7]

Injecting foreign element in the energy meter

Meters are manipulated via a remote by installing a circuit inside the meter so that the meter can be slowed down at any time. This kind of modification can evade external inspection attempts because the meter is always correct unless the remote is turned on.

Physical obstruction

This type of tampering is done to electromechanical meters with a rotating element. Foreign material is placed inside the meter to obstruct the free movement of the disc. A slower rotating disk signals less energy consumption.

ESD attack on electronic meter

ESD tampering is done on electronic meter to make it either latent damage or permanent damage. Detection can be done correctly in high end meters only.

Detection

A number of approaches to detect electricity theft have been proposed. The predominant direction in research and development is employing artificial intelligence, and in particular machine learning methods, to detect customers that steal electricity.[8]

By country

According to the annual *Emerging Markets Smart Grid: Outlook 2015* study by the Northeast Group, LLC, the world loses US$89.3 billion annually to electricity theft. The highest losses were in India ($16.2 billion), followed by Brazil ($10.5 billion) and Russia ($5.1 billion).[9]

India

President of Northeast Group Ben Gardner stated: "India loses more money to theft than any other country in the world. The state of Maharashtra—which includes Mumbai—alone loses $2.8 billion per year, more than all but eight countries in the world. Nationally, total transmission and distribution losses approach 23% and some states' losses exceed 50%."[10]

Pakistan

Turkey

In Turkey electricity theft is mainly concentrated in the Southeastern and Eastern Anatolia regions, meanwhile in the Aegean Region it has the lowest prevalence. Dicle and Van Gölü companies were the most heavily effected electricity distributors in the country. In 2020 Mardin (72.7%), Şırnak (70.9%) and Diyarbakır (65.4%) provinces have had the highest use of stolen electricity. In contrast Denizli (1.3%) have had the lowest prevalence among Turkish provinces with regard to electricity theft.[11]

The cost of the electricity theft is compensated nationally, where users in every province pay an equal amount of electricity theft tax, independent from the prevalence of theft in respective province. Since 2013 there had been efforts to regionalize the theft tax, but these were not implemented. The national tax system is planned to be continued until the end of 2025.[12]

In popular culture

Katiyabaaz (Powerless), a 2014 Indian documentary film, dealt with issue of power theft in the city of Kanpur, Uttar Pradesh.[13]

See also

- Electricity theft in Pakistan

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External links

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