

SMART METERING TECHNOLOGIES HELP REDUCE ENERGY THEFT

By Fabio Dominguez

Advanced metering infrastructures (AMI) using two way mesh networks can help utilities control energy theft and reduce revenue losses.

Since electrical energy became a commodity available to the public, energy theft has been a problem that many utilities have experienced. Over the last 30 years utilities have become more focused on the magnitude of their revenue losses from energy theft, and have developed programmes to protect revenue.

In some Latin American countries, it is estimated that up to 20% of the energy utility companies deliver is stolen. Many countries in the Caribbean, Central and South America have economies that are directly driven by tourism and/or industry; for them to stay competitive in a global economy, a dependable and economical source of electrical power is essential.

HOW UTILITIES DEAL WITH ENERGY THEFT

Visit any utility company's web site and you are likely to find a web page on energy theft. There is a common message utilities are sending out to their customers – energy theft is dangerous, costly and illegal, and utilities are asking their honest customers to help them catch customers who steal energy.

In many countries it is not easy to detect energy theft or take action against energy thieves, and revenue losses from energy theft are significant. This is especially true in the Latin American region. Many electricity utilities are owned and controlled by the state, and are often viewed by consumers as a 'social service' rather than a 'utility service'. Raising rates on electrical service to recover revenue losses is thus not an available option.

Utilities in Latin American regions are faced with some tough challenges that prevent them from reducing energy theft. One obstacle is that energy theft occurs in many ways and on two levels – the technical level and the consumer level. On the technical level, energy theft occurs when a customer has tampered with a meter or system components. Energy theft on the consumer level occurs because customers will not pay their utility bills, or they make efforts to block access to the meter.

Detecting energy theft can be a difficult task, but the good news for utilities in today's global energy market is that cost-effective residential and commercial smart

metering technologies are available that allow utilities to detect and prevent energy theft. One smart metering technology available today is two way controlled mesh networks.

Smart electronic meters on a controlled mesh network give utilities a two-fold advantage that can help them detect meter tampering. First, the communications are usually embedded in the meters, so the system does not require additional expensive ancillary equipment that can be tampered with. Second, smart electronic meters have numerous functions that can help utilities identify tampering, such as detecting inverted meters, outages, reverse energy flow and illegal connections.

COMMON TAMPERING METHODS

Two common methods of tampering are either to bypass the meter, resulting in zero energy registration, or to invert the meter, causing it to run backwards and negatively register energy usage. A meter that is bypassed or removed can usually be detected through analysis of zero usage patterns. With appropriate AMI technologies these meters can be read daily and such patterns easily detected. Smart electronic meters can measure both delivered and received energy in separate registers.

An inverted meter will show received energy which can easily be detected and alarmed by the system. Lastly, modern meters can be programmed to measure either summed energy (delivered plus received) or net energy (delivered minus received). Thus a meter programmed to register summed energy will continue to fully register all usage, even if the meter is inverted, and the separate received energy register will indicate the possible inversion. As a final check, most smart meters also have outage counters that are monitored by the AMI system. These can easily detect meter removals and distribution circuit problems.

While some of these features can themselves eliminate energy theft, the primary advantage of smart meters and AMI systems is their ability to allow utilities to rapidly detect and correct problems before they result in large revenue losses.

Some smart metering systems on the market today feature electronic meters with the remote connect/disconnect switch inside the meter. These meters look like normal electric meters. Additionally, to prevent back-feed short circuits and detect illegal connections, the meters with a connect/disconnect switch can sense the voltage on the load side of the service, preventing the switch from closing when voltage is present.

There is no doubt that energy theft has a big impact on the profitability of utilities throughout the world. While it may be impossible to stop energy theft completely, there are cost-effective sophisticated smart metering technologies available that can help utilities detect energy theft and recover lost revenue. ■



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ABOUT THE COMPANY: Elster Electricity offers integrated, cost-effective solutions including advanced electricity meters, communication solutions and metering automation systems for residential, commercial, and industrial applications. Elster's products include advanced high accuracy ANSI and IEC electricity meters, the EnergyAxis System with intelligent two-way communications and controlled mesh network, and the ALPHA® meter line.

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