

A Proactive Approach to Detecting Energy Theft, Now

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Automatic Meter Infrastructure (AMI) promises to assist utilities in the identification of energy theft cases when it is deployed in the coming years. In fact, most AMI business cases take advantage of this potential by including an operational efficiency that reduces "Unaccounted for Energy (UFE)" which is a pleasant description of energy theft. Specifically this means that AMI will help identify situations where energy is used but not paid for. The percentage of overall operational efficiencies attributed to UFE is in the range of zero to 20 percent, with most being in the 8 to 10 percent range.

Curtailing energy theft is not only important for justifying AMI, it is critical to current utility operations. Economic conditions have caused utility customers, both residential and commercial, to act in ways that they have not done in the past. Energy theft in both the residential and commercial sectors is rising rapidly across the country, and has become a major financial burden to utilities at a time when revenues from legitimate energy use are dropping. Utilities must find ways to efficiently find these cases now, not in

five to 10 years when AMI is fully deployed.



An example of a meter in which the phase with the most load was rerouted around the meter.

Data analytic technology exists today that can learn customers' energy use behaviors and identify deviations from their norms and from their peers. Additionally, information is available about customers (real estate transactions, county assessor data, business listings, etc.) that allows for automatic differentiation between theft situations and valid energy use deviations. This technology has been deployed by leading utilities around the country who have recovered significant losses using only billing system data. Some of these utilities have installed Automatic Meter Reading (AMR) systems and get additional theft detection capabilities in the form of tamper flags. With AMR, data analytics are still required to filter out the massive volume of false positive flags, but these flags can be valuable if analyzed correctly. AMI data will further enhance theft detection capabilities for utilities when it arrives, but the strategy should begin now.

A Strategy for Now and Then

A proactive approach to energy theft detection begins with getting customer and consumption data in a place where it can be analyzed with the latest tools available. This includes integrating data from other sources to better understand the expected energy use of each home or business. Hosted software applications are the quickest and cheapest way to accomplish this. One of the greatest benefits to moving customer and metering data to an external system is that the later transition to AMI becomes seamless. Energy use history is critical to energy theft detection analytics. Through the approach of storing the data in an external system, not only is the history not lost as AMI is deployed, it is actually enhanced. The aggregated daily reads, or monthly billing read, from the AMI system can be added to the history obtained from the billing system before AMI. Energy theft detection techniques that are providing value to many utilities today will only be improved as the AMI data begins to flow.

There are many other benefits to deploying a proactive energy theft detection solution ahead of an AMI deployment. These solutions can identify lost revenue before the meters are changed, can help alert meter installers of potential problem accounts, and can even monitor the quality and completeness of the AMI meter installations.

It seems a shame to swap out millions of meters when the few that have issues could bring in new revenue if problems with these meters could be identified before the meter exchange. Proactive analysis and inspection of problem meters typically brings in millions of new dollars in revenue annually, most of which would be lost with a blind meter exchange. It typically takes several years to identify and resolve most significant theft cases, which aligns well with a typical AMI deployment.

Less significant or lower-probability theft accounts can be logged for inspection as part of the AMI meter exchange rather than sending dedicated resources to the field ahead of time. Energy use patterns and comparison to peers can even suggest the type of issues that the meter exchange personnel might encounter when the site is visited. Erratic as well as low overall consumption might indicate intermittent tampering. The AMI meter installer would be instructed to look for a broken or missing seal and worn meter blades, or for a hole drilled in the glass where a wire has been inserted to periodically disrupt disk rotation. Other analyses would indicate a bypass around the meter, potentially from the weather head. These accounts can easily be inspected as part of the meter change process with good planning and a proactive analytical approach. Each identified incident would result in a back billing situation, and would add to the bottom line of the utility and the return on investment from the AMI deployment.

The final, and very important, component of a proactive and transitional meter monitoring strategy is watching the energy use of each customer as AMI meters are installed. This monitoring is also a significant reason for utilizing a proactive meter monitoring system throughout the AMI transition. All meters are monitored continuously using monthly data from the billing system prior to an AMI installation, at which time the data can begin to flow from an AMI or meter data management system. A change in consumption that corresponds to the exchange of a meter is easily detected because of the account history had been established. Only a small percentage of installed meters have problems, but they do appear. Examples of real world cases are test switches left open after the exchange on three-phase meters, incorrect meter and socket match, and even meters installed upside down. All of these problems can be identified and resolved quickly since the new AMI data can be automatically compared to historic patterns to determine an anomaly. Although meter installation monitoring does not typically find theft, it identifies lost revenue quickly.

Benefits that Grow Over Time

There is no question that AMI will provide additional data that will enhance utility operations including energy theft detection. But why wait? Solutions exist today that can deliver significant value in this area today, and provide a seamless transition to AMI data over time. The initial benefits of theft identification before the meter exchange, pre-exchange planning and post-exchange monitoring are further enhanced when hourly data begins to flow. This interval data, although overwhelming to the human eye, enables the next generation of analytical tools for finding lost revenue.

Comments

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Smart Energy Meters are most important tools in the hands of power engineers. Even before GE got patents Smart Energy Meters made in China were introduced in India seldom for preventing theft more for recording higher consumption than actual by Private Sector Utilities.

In BSES Mumbai while Technical and Commercial losses remained around 12% but in seven years 2000-01 to 2007-08 peak demand in MW increased by 17%, energy sold in MU increased 71% and gross revenue increased 170%.

Self testing consumer friendly features are disabled.

Smart meters must be used fairly and intelligently to inspire trust between consumer and energy company and most importantly to use Smart Meters to save energy and reduce GHG emissions.

Above all like in Canada or other countries Energy Meters must be regulated by independent state agency - Inventor and Consultant.

***About the Author:** Michael Madrazo is the founder and President of Detectent, the pioneer in developing analytical revenue protection solutions. Detectent has helped utilities across the country increase the efficiency of their revenue protection efforts by implementing proactive theft detection tools and services.*

