

Advanced Metering

Accurate Meter Reads Are Just One of Many Merits

By Paul Lekan, PMP

Year after year, deployment after deployment, one thing I hear from the water utilities that have implemented advanced metering infrastructure (AMI) is this: It does what they wanted it to do and more.

In fact, many utilities consider meter reading just the first step in leveraging an AMI system. The true value of such technology comes from all of the applications beyond meter reading that improve customer service and utility operations.

Lost and Found Benefits

Take Boston Water and Sewer Commission, for example. That utility installed Aclara's STAR Network meter reading system on nearly 90,000 meters between 2002 and 2004. At the time, a primary goal for the system was improved customer service. With meters located inside customer homes, meter readers often couldn't gain access to record actual consumption. On average, 54 percent of the utility's customers were getting bills based on estimates, not reads.

Those estimates generated most of the call center's workload. In fact, call-center volume dropped from 22,100 before advanced metering to 9,500 calls after the system was deployed — a 57 percent reduction. When managers looked at calls involving metering issues alone, call volume decreased 71 percent.

With the deployment of AMI, utility managers also had hoped to reduce lost revenues due to under-registration on meters, most of which were more than 10 years old. Consequently, during the AMI installation, they also replaced all 5/8-inch and 2-inch meters, or nearly 75,000 meters altogether. The move has delivered substantial savings for the city.

Along with stopping those under-registration losses, the move allowed the utility to record the condition of each service. That provided data to use in planning capital improvements, such as repairing leaks or replacing lead service pipes with safer materials.

Called SmartRead, the advanced metering system in Boston collects data four times per day from each meter. Such frequent-interval data are what give utilities benefit beyond meter reading savings.

On the operations side of the utility, engineers use the data to compare billed consumption to water that flows into the system at various metered points. After factoring in hydrant usage, sewer flushing and other discrepancies, utility personnel can pinpoint losses and find system leaks.

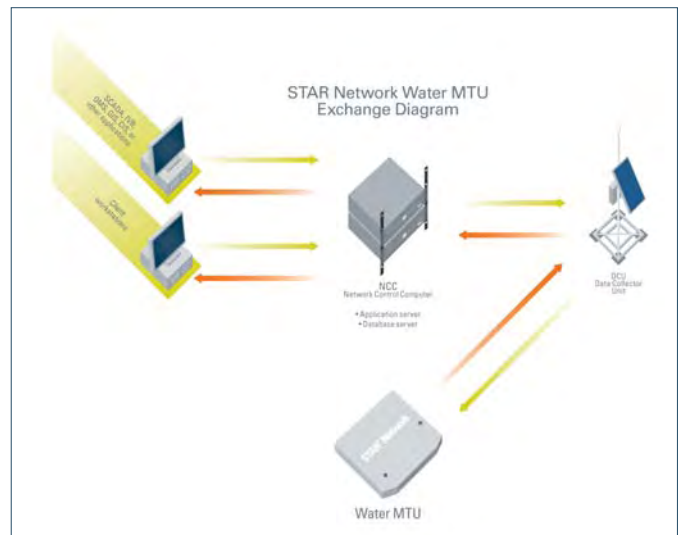
On the customer service front, Boston has used the metering data to proactively alert customers to leaks. Instead of spending all their time fielding complaint calls, call-center representatives now spend time contacting customers when the metering system's reports show unusual consumption. In one case, the utility contacted a public school during a break and helped build-

ing managers find an open backwash valve in a swimming pool that, undetected, could have chalked up a water bill in the thousands of dollars.

The city also posts data online for consumers so that they can track their own usage, spot problems and anticipate costs. Utility managers have garnered thanks from landlords who monitor consumption at properties, colleges that compare usage at various dormitories as an analytical tool and others. Customers like having access to this data. It gives them more control and conservation power.

Automation for Service Upgrades

The District of Columbia Water and Sewer Authority (WASA) is another progressive utility that has used its network to empower customers. Here, too, consumers have online access to consumption data so they can track water use. Before WASA had completed its AMI installation on 125,000 service connections, nearly 30 percent of customers had signed up to have online access to their account data. Some 10 percent were regularly logging in to check their water use.



Data is collected by a device called a meter transmission unit (MTU) that is connected to each individual meter in the network. The MTUs transmit data to the utility via a series of data collector units (DCUs) that are located throughout the utility's service area. Data is sent on a defined schedule back to the utility, where it is used in billing, customer service, analyses and other application.

Along with graphic depictions of usage — a feature also offered by Boston — WASA has downloadable data, so customers can import their meter readings into their own programs for analysis and consumption management.

Like Boston, WASA also uses the data for proactive leak notifications. When daily consumption reports flag services for high or low consumption, managers immediately reach

out to customers with a call or e-mail. Since a leaky flapper on a household toilet might push a bill up by hundreds of dollars, it's no surprise that utility managers get regular thank-you notes for this service.

And, deploying advanced metering allowed WASA to sub-meter certain services that don't discharge all their used water back into sewer lines. As many utilities do, WASA uses consumption reads as a proxy for sewerage charges, but utility managers know that's not a fair approach when billing customers who use water for something like large irrigation areas or cooling towers. Consequently, the utility added sub-meters where appropriate when installing the network. Now, customers get charged only for water used and sent back into sewer lines.

Power Move

One of the newest uses of AMI water-consumption data is happening in Ann Arbor, Mich. Last year, utility managers tested new rate structures on 200 commercial and industrial accounts, then introduced these rates to all commercial and industrial accounts this past July. The rates constitute a move out of the electric-utility playbook. Ann Arbor created a water-utility version of "demand response" pricing.

Demand response prices use rates to ensure that those who contribute most to peak demand pay more for it. The rates also aim to get consumers to lower their consumption during peak hours. For example, an electric utility might have a "critical peak" rate that, on just a few days per year, spikes up charges to be seven, eight or even 10 times higher than rates during low-consumption hours. Such rates usually give customers breaks the rest of the time, thereby offering savings overall. They're designed to reflect the costs a peak demand incurs and reduce peaks so that the utility doesn't need to build plants as quickly.

With similar goals, Ann Arbor designed rates aimed primarily at charging customers appropriately for the demands they put on the system. The utility used a year's worth of data from the city's network to determine peak-to-average consumption ratios and charge higher per-unit rates to customers who tend to use more water during high-demand days.

To determine the rates, utility workers tracked daily consumption on C&I accounts for a year to identify average daily usage. Then, the team identified the top three days of usage for each customer occurring between May and October, the utility's peak-usage months. Finally, the workers identified the top three days of usage for each customer, threw out the top two days just in case they represented some anomaly, and used that third-highest day of consumption to calculate the customer's peak-to-average consumption ratio.

Those ratios were then used to assign customers to one of three tiers of rates. Customers placed in Tier 1 have similar consumption during peak and non-peak months. Those in Tier 2 have peak usage that falls between five and eight times more than average daily usage. Tier 3, the top rate, applies to customers with peak usage that's greater than eight times their average daily usage.

Rates in Tier 1 are \$2.60 per 100 cubic feet (CCF) or 748 gallons. Tier 2 rates rise to \$4.90 per CCF, and Tier 3 are \$8.39.

As mentioned earlier, the intent of these rates is to assign costs fairly. Ann Arbor managers have gone on

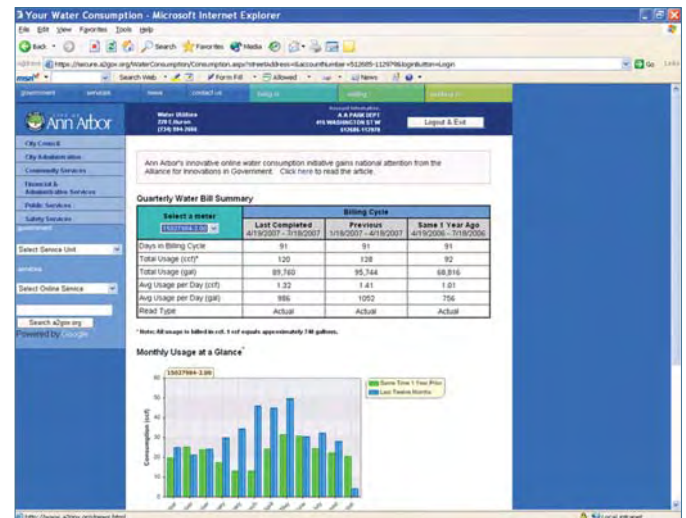
record saying that they consider these "cost-of-service" rates, rates that reflect the cost of building facilities to meet peak demand.

A Human Side of Meter Data

Not all creative applications with meter data rely strictly on automation. In the Village of Norridge, Ill., a suburb of Chicago, customer service representative Diane Pagano has used meter-date reports to add a link to her community's safety net.

Pagano's story appeared in *Government Technology* a few years ago. It recounted how this utility worker routinely reviewed several reports covering her town's 5,000 service connections, and she paid special attention to the zero-consumption reports.

First, she'd check to see how long the customer's premises had registered zero or low consumption. Then, she'd check her own utility records, as well as police records, to see if the customer had given the village a vacation notification. She also checked to see if the local police had an ambulance call. And, if she saw no reason for the low consumption, she'd call the local police and ask for a welfare check on the resident.



The quantity of meter data collected by the City of Ann Arbor allows it to provide customers with more information about water usage. For example, customers can track usage over various time periods.

Through these kind-hearted actions, Pagano was able to find deceased residents, as well as those who were elderly, frail and in trouble. One story she told was about an old man who was no longer able to bath himself, do laundry or keep up with the dishes, which is why his water consumption was so low. She discovered this after she gave the customer a courtesy call to let him know his water usage was below normal. He opened up to her and, with his permission, she was able to send a social worker his way.

It's unlikely that "helping the elderly" was ever a bullet point in any business case for advanced metering. Still, Pagano's story exemplifies just how much a utility can tell about customers with the powerful data that come from AMI systems.

And, there's a flip side to that statement. You can tell a lot about the smarts of a utility by how resourcefully it uses its AMI data.

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