



WATER UTILITY INFRASTRUCTURE MANAGEMENT

Smart Metering

Hardware, Software Innovations
Drive Intelligent Decisions



Water Management, Energy Efficiency
Being Smart About Being Green
Sued: A Quick Lesson in Litigation

Get Smart!

Utilities Invest in Smart Grid to Save Water, Ensure Data and Find Revenue

By Graham Symmonds

Many utilities are suffering the triple pressures of fiscal austerity, water scarcity and aging infrastructure. In the fight to save water and replace or upgrade infrastructure, utilities are at the proverbial intersection of Rock Street and Hard Place Avenue. Utilities need to invest in critical infrastructure to save money and water, but cannot find the money to do so. And the problem is only getting worse:

- The American Society of Civil Engineers estimates that by 2020, the capital infrastructure funding gap for water and wastewater will be \$84 billion (and \$144 billion by 2040).

- The United States Geological Survey has reported that US water systems experience 240,000 water main breaks annually, resulting in the loss of 1.7 trillion gallons of water every year. The USEPA has estimated the cost of non-revenue water (NRW) to be in the order of \$2.6 billion per year.

- The USEPA reports that large utility breaks in the Midwest increased from 250 per year to 2,200 per year during a 19-year period illustrating the fact that our infrastructure is nearing the end of its service life. In 2003, the City of Baltimore, Maryland, reported 1,190 water main breaks – an average of more than three per day.

Faced with the mounting infrastructure costs and the need to provide environmental stewardship for our most precious natural resource in an increasingly stringent regulatory environment, utility managers are turning to the Smart Grid for Water. With the Smart Grid, they aim to both provide both the necessary data to manage their systems and the revenue to fund them.

Data, Systems and Processes

Meter reading and billing systems are, in many cases, the most antiquated IT platform in a utility. The reason for this is that they are typically large, cumbersome legacy systems, too critical to be stopped for anything but the most fundamental maintenance. In addition, most utilities lack the specialized skills to update and maintain these systems, while many vendors have eliminated support for these legacy systems. The result is that these systems achieve a

level of functionality and remain static for the remainder of their operational life, and the utility operates on processes and data models that are ill-suited to the 21st century. This is unfortunate because these critical systems are key to achieving both resource sustainability and revenue assurance.

These antiquated systems can result in significant “data voids.” For example, in some cases the meters are completely missing from the data system. Or, they have incorrect parameter definition, such as billing multipliers, sizes, consumer class or ancillary attributions (sewer, garbage, pressure zone, etc).

Without access to modern data systems like GIS and without sufficient safeguards in place to validate the data, it is not uncommon for the electronic records used for billing and the physical installations on the ground to become decoupled. The result is that some connections never make it into the billing system, which means no revenue, increased water loss and frustration for the utility manager.

Completing a Smart Grid for Water installation allows these discrepancies to be identified and corrected, while providing the systems, processes, checks and balances necessary. This will ensure that the physical and electronic systems remain directly coupled through continuous comparison with GIS data, including planning and zoning, taxation rolls and satellite imaging.

Equally important is the need for greater granularity of data for water accounting. By ensuring all water is measured, tracked and billed, the utility can ensure that all water is monetized, reducing revenue leakage. A Smart Grid for Water installation allows utilities to track, in near real-time, where exactly each molecule of water is. With a system designed to provide hourly consumption information, utility managers can – for the first time – perform daily reconciliations of water accounting. They can also immediately identify leaks or unaccounted for water in order to protect revenue and resources.

However, the impact extends well beyond water. Many utilities bill other services in their water bills, such as sewer charges, trash charges, incremental tax assessments

and service charges. Each of these is an important aspect of achieving the utility's revenue requirement.

In one utility deploying the FATHOM™ Smart Grid suite of technologies, the incremental revenue increased as a result of “data voids” exceeding \$16,000 per month (figure 1). This is a substantial revenue increase for a utility of 35,000 meters. Throughout the first six months of operation, as the full benefit of the internal processes and systems was realized, the incremental revenue has been in the order of \$1.63 million (figure 2).

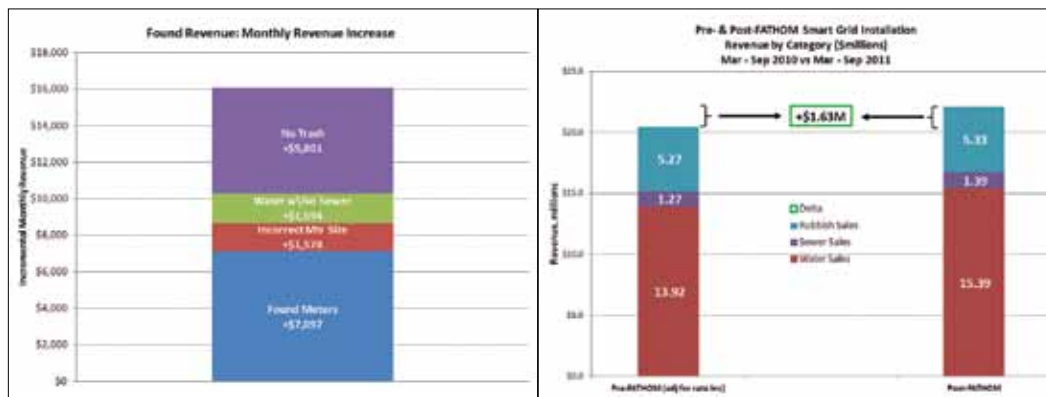


Figure 1 and 2: Incremental revenue increase as a result of Smart Grid installation

Meter Integrity and Accuracy

Meters certainly degrade over time as a function of component failure, wear and tear, water quality, etc. This is an important element of utility non-revenue water (NRW) control and revenue protection. Inaccurate meters directly impact the utility's ability to monetize the water cycle. Replacing meters with AMI-capable units can have a dramatic impact on utility revenue.

In a recently completed Smart Grid installation, replacing meters resulted in significant increases in the volume of water registered by each meter for billing. In this case, the new meters registered an increase of 6.95 million gallons – a 24.6 percent increase over the old meters (figure 3).

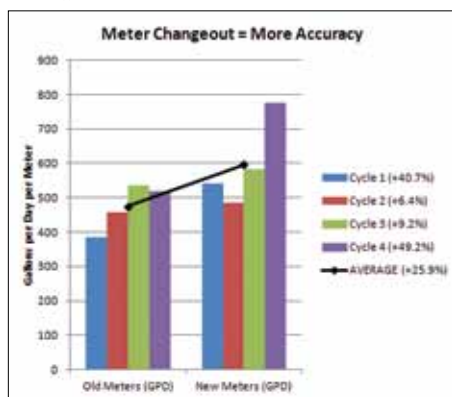


Figure 3: Increases in consumption measured by new meters vs old meters

meter is failing? A Smart Grid for Water installation can answer this question.

As the data environment becomes richer, it is possible for meter diagnostics to be performed without actually visiting the meter. That is, we now have the opportunity to use statistical methods to evaluate the integrity of metering systems. A Smart Grid for Water system allows for the first time, a means of understanding, in real time, the

performance of individual meters within a distribution system. We can use this knowledge to proactively identify impending failures of metering systems – without knowing the actual condition. In the process, we can also secure utility revenue.

The impact of monitoring for meter degradation is particularly important in large commercial meters. Many people outside the water business do not understand that large meters can represent a significant volume of the water delivered to consumers. In one of Global Water's utilities,

10 of the 17,500 meters in the community consume 23 percent of the entire delivered volume. In fact, one meter represents over four percent of the annual consumption. It's clear then that ensuring the accuracy, precision and reliability of these large meters can have a significant impact on revenue.

A recent survey of 50 commercial meters in one utility system found:

- 50 percent of commercial meters tested failed to meet the AWWA meter accuracy standard .

- 16 percent of the tested meters registered less than 50 percent of the actual volume passing through them.

- Eight percent of the meters in the survey group registered zero volume.

The revenue impact of this degradation is staggering:

- The annualized revenue loss from the survey group amounted to \$280,000.

- The annualized water loss from the survey group amounted to 53 million gallons.

Conclusions

Continuity of revenue is of paramount concern for utilities in order to address both current financial constraints and future infrastructure needs. As such, they must focus efforts on monetizing every drop of water in their portfolio. To do so requires investment in bringing the utility's information systems into the 21st century – moving their data systems to a Smart Grid for Water model.

The benefits of the Smart Grid for Water on non-revenue water are compelling. But the “found revenue” aspects of the installation can be truly liberating for utilities. In some cases, the installation can be self-financed through this increased revenue. The result is a significant improvement in data integrity (more accurate and timelier data), protection and continuity of revenue and better overall customer service.

For more information or a demonstration about the Smart Grid for Water call 1-800-FATHOM1. Or go to www.gwfathom.com.

Graham Symmonds, PEng., is the Senior VP of Regulatory Affairs and Compliance and Chief Technology Officer for Global Water. He has a degree in Mechanical Engineering from the University of Toronto. He has spent the last 17 years in a variety of utility engineering operations and executive roles after having served for 9 years as a Marine Systems Engineering Officer in the Royal Canadian Navy.