

THE CASE FOR SMART WATER AND WHY IT'S A NO BRAINER

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THE CASE FOR SMART WATER

The American Society of Civil Engineers (ASCE) "2013 Report Card for America's Infrastructure" gives water and wastewater systems in the US a grade of D. Aged pipelines well beyond their useful life are still in service across the country, many times breaking and leaking, interrupting service to customers and driving up costs. Waste water plants built in response to enactment of the Clean Water Act have aged and deteriorated from years of use. To mitigate the issues identified:

- The American Waterworks Association estimates the cost of replacing the buried infrastructure would exceed \$1 trillion.
- The cost for replacing wastewater infrastructure is estimated to be \$298 billion.
- The Environmental Protection Agency (EPA) estimates a capital spending gap exists at nearly \$225 billion and an O&M gap of nearly \$310 billion over the next 20 years.

The need for increased spending paired with decreasing base water use, source of supply issues, and tighter regulations is proof that this industry is in significant disarray. Companies should be looking at process improvements and efficiency gains to lower operating costs and help offset the required spending on infrastructure replacement that is inevitable.

As the use of smart infrastructure in the water industry continues to grow, municipal utilities, in particular, can and should apply the lessons learned (both positive and negative) from electric utility AMI deployments. The core benefits of advanced meter reading technology are obvious in the ability to reduce labor costs for meter reading, fewer customer calls, fewer manually handled (estimated, exception) bills, improved customer service ability, and thus higher customer satisfaction. The emerging challenges and opportunities include:

- Managing capital and operational costs associated with an AMR/AMI investment;
- Managing the complexities of configuring and deploying equipment to serve water customers through AMI technologies;
- Improving the production, storage and distribution of water;
- Deepening the understanding of water consumption and flow patterns for customers and water suppliers;
- Decreasing non-revenue water by detecting water loss both in the distribution network and at customer end-points;
- Applying advanced strategies to address water scarcity/conservation;
- Improving theft protection;
- Improving billing processes including streamlined bill generation; and
- Addressing the increasingly sophisticated needs of customers regarding utility service as AMI technologies become more available.



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These challenges are similar in many ways to the same issues that the electric industry has faced and begun to address through the deployment of advanced, two-way meters, AMR/AMI, and related advanced technologies. Over the last decade, the full scope of AMR/AMI network applications across the electric utility sector has become much more commonplace, including the prevalent use of advanced meter reading, remote connect/disconnect, voltage monitoring, transformer monitoring, distributed automation, and substation automation. However, while the needs and potential benefits of the water industry closely align with those of the electric industry, similar technology deployments for water utilities has been much slower to materialize.

This delay does, however, provide water utilities with an opportunity to benefit from the electric industry's experience and lessons learned with AMR/AMI. There is little history with advanced metering solutions on which to base business decisions and that can make water utilities—which are traditionally conservative, budget constrained, and risk averse—particularly hesitant to adopt something new. Rather, until forced to make a change, water utilities generally will seek to focus solely on delivering water supply to their customers via the existing infrastructure. There are several problems with that scenario, including:

- The increasing scarcity and rising costs of water supply that are projected over the next 30 years and are already experienced in many parts of the country from California to Atlanta and to the Northeast where droughts have already caused water conservation and shortages...
- Existing water infrastructure is typically older than electric or gas utility infrastructure and is in desperate need of being updated;
- Water utilities cannot afford to continue to take huge revenue losses;
- Increasingly customers will demand detailed information about their water usage and resulting water bills, a demand that cannot be met based on monthly or even less frequent meter readings.

All of these factors point water utilities in the direction of advanced metering, but it remains somewhat unclear exactly what that would entail. Certainly, all utilities are unique and one model for an AMR/AMI system would not meet the needs of all water utilities. However, when examining the full scope of an AMI deployment, the architecture itself would look very similar to the electric system, as it would include the following six key components:

- Advanced meters capable of interval usage reads;
- Measurement and sensing devices that collect data on water flow, pressure, quality, potential leaks;
- Real-time communication channels for two-way communications between smart devices and the utility back office;
- Data management software to process and aggregate collected data;
- Real-time data analytics and modeling software; and
- Automation and control tools to enable water utilities to conduct network management tasks remotely and automatically.



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There are a number of options for water utilities to consider as they evaluate AMR/AMI, including the integration of CIS, SCADA, asset management/work order management, GIS, and other analytic engines. In any combination, water utilities have a great opportunity to improve overall performance through advanced technologies broadly captured under the banner of AMI. System performance in the field, coupled with utility programs to enable consumption and efficiency that utilize customer data, create a powerful combination that has the potential to transform the water utility industry much in the same way that it has and will continue to transform the electric industry. Some of the benefits that water utilities can anticipate through the business case and financial analysis that is a key part of the exploration process include:

REDUCTION IN REVENUE LOSS

Revenue loss results from a variety of reasons—thrift, unaccounted usage, leakage—typically increases as the water infrastructure ages and accuracy of usage tracking declines. Other revenue losses are occurring due to a decline in customer demand. Water utilities face new challenges in forecasting and preparing for future water demand, staying fiscally solvent while providing fair prices, incorporating conservation and efficiency, and communicating clearly to customers about rates and service. To address these challenges AMR/AMI technologies can support conservation measures, measurement and operational efficiency.

WATER SCARCITY AND CONSERVATION

Advanced water metering solutions can enable water conservation through more accurate metering and billing. They also provide the basis for new rate structures to be built around dynamic pricing which enables energy efficiency and demand response programs. The interval data can also be used to raise awareness and enforcement of irrigation regulations and standards.

ENHANCED WATER MANAGEMENT CAPABILITIES

Water utilities that upgrade to AMI should immediately see improvements around their water management capabilities that cannot be achieved through traditional infrastructure or AMR. The improvements found through AMI can include: enhanced tracking of water consumption and flow patterns; ability to track and predict changes in trends and demands; ability to shift water consumption to different time periods; and identify anomalies in distribution or customer usage.

LEAKS, PRESSURE MANAGEMENT, AND WATER QUALITY

By including acoustic monitoring with AMI, leak detection becomes a regular part of doing business. Identifying leaks before they become breaks, cause outages, significant damage, and expensive repairs, allows operations the flexibility to proactively repair leaks on a schedule. Having the ability to repair these leaks reduces cost significantly, and results in less damage to streets and private property, shorter outages that can be planned around customer needs, and less lost water. Without an AMI system in place, water utilities typically have little insight into where water leakage is occurring across their system, and oftentimes



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leaks occur without detection leading to unexplained water losses. Pressure monitoring at numerous locations becomes feasible with fixed base system providing better operations, better service levels, early warning of developing problems, and increased security. In addition to the real time benefits, having significant pressure monitoring points improves the ability to hydraulically model the system, forecast demand, and improve load balancing from sources to potentially reduce electric costs needed to run water pumps.

GREATER BILL ACCURACY

Budgets remain tight for cities and counties across the United States, many of which have the role of providing water service to residents in their areas. Both AMR and AMI technologies enhance the capability to more precisely track water usage and bill for it accurately. If we think of the meter as a utility's cash register, then the accuracy of usage measurement that can be achieved through AMR/AMI would naturally be very attractive to water providers.

ENHANCED CUSTOMER SERVICE

Customer service benefits—and expectations that customers increasingly will demand from their water utility include: enhanced billing accuracy, efficient resolution of bill inquiries with real-time data; timely notification of customer premise leaks; customer information (web) portals; and innovative payment options such as pre-payment. The traditional systems being used by water utilities simply cannot provide this level of granularity and real-time insight as to usage patterns. AMR/AMI technologies are the foundation for providing enhanced customer services.

Like electric utilities, water utilities are well positioned to benefit from advanced metering technologies to help deal with the unique industry challenges, better predict where underground investments need to be made and reduce operational costs over time.

West Monroe Partners believes that AMI especially when combined with other operational technologies will result in a quality data management system providing utilities what they need to meet the multiple billion dollar challenges facing them.

REFERENCES

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