The Network of a Lifetime

DEPLOY YOUR SMART UTILITY NETWORK FOR DAILY OPERATIONS & FUTURE THREATS

WATER FINANCE & MANAGEMENT | sensus a xylem brand

Navigating Water Challenges Today and Tomorrow

Water utility challenges are perhaps more wide ranging than ever. According to the American Water Works Association's 2022 State of the Water Industry report, renewal and replacement of aging water and wastewater infrastructure remains the top challenge across the board.

The annual report's frequently cited top 20 challenges facing the water sector reveals several critical initiatives for utilities including funding, long-term water supplies, workforce issues, cybersecurity, emergency planning and public awareness. It's a mix of challenges affecting daily operations and future threats more indicative of the modern era that will require strategic planning, funding and technology.

On top of these wide-ranging daily challenges, utilities are increasingly faced with emerging threats, as

well. A recent White House blog post explains that increasing temperatures, sea levels and development in areas vulnerable to extreme weather events are resulting in rising costs associated with climate change. In recent years, the United States has experienced, on average, more than one disaster that has caused over a billion dollars in damages each month. To put that in perspective, the blog states, until the past decade, the country rarely experienced a year with more than a handful of billion-dollar weather and climate disasters.

Data from the National Oceanic and Atmospheric Administration (NOAA) shows that 2021 was reported as the third most costly on record, with 20 weather and climate disasters causing roughly $150 billion in damages in the United States. Even single disasters can have long-term, direct and indirect effects on economic growth.

But despite the threats posed by climate, both optimism and opportunity exist in the water sector, stemming in part from a growing focus on utilities bolstering resilience with digital technology and an influx of federal funding. For example, the Infrastructure Investment and Jobs Act (IIJA) will invest more than $55 billion in water and wastewater utility projects.

"The Infrastructure Investment and Jobs Act is a once-in-a-generation investment," says Al Cho, Xylem Senior Vice President, Chief Strategy and External Affairs Officer. "For too long we have underinvested in critical infrastructure, making it next to impossible for water utilities to deliver safe, compliant, reliable and affordable water to their communities. Fortunately, the digital transformation of the water industry is moving at pace, and more and more utilities are realizing that digital solutions are one of the most powerful tools they have to become more resilient while remaining affordable."

Solution Longevity is a Priority

More than ever, the impacts of climate, workforce challenges, budget issues, and the age of the nation's infrastructure are having an impact on how utilities plan for the future. Over the past couple of years, the COVID-19 pandemic only added to some of the above risks and challenges we've talked about. As a result, utilities are seeking long-term solutions that also combat emergency situations.

"Increasing system visibility fundamentally changes how you manage a water system. All of the benefits stem from informing operational decisions and reducing response time," adds Zac Barkjohn, Product Manager, Utility Solutions, Xylem.

Advanced metering infrastructure (AMI) is known to provide accurate metering, can deliver more frequent readings – such as hourly consumption data to make it easier to identify issues in the system – and increasingly can also offer several other benefits. Seamlessly connecting all those meters with utility operations are smart utility networks, which, regardless of location or population served, are allowing water systems to better communicate, share data and modernize their decision-making processes.

"A smart utility network is a workhorse of data collection," says Barkjohn. "It offers visibility and control across the entire water system. It encompasses, and bridges the gap, between advanced metering infrastructure and more energy-intensive communication networks."

"AMI is so far beyond metering now," adds Adrian Sutor, water distribution supervisor for the City of Walla Walla, Washington. "The metering is well worth putting an AMI system in, but the other applications are incredible," adds Sutor, whose utility in Walla Walla uses the Sensus FlexNet® communication network for near real-time remote monitoring. The city also recently installed Sensus ally® water meters in addition to the Smart Gateway Sensor Interface for advanced pressure monitoring and management, allowing the city to create a pressure profile of its system and conduct remote oversight of pressure and temperature. Sutor says the project and what his team has been able to accomplish is one example of a utility embracing technology that can be a game changer.

"The difficult part of managing a utility is trying to sell a $20 million, $50 million or $100 million project," he says. "But fortunately, it is getting easier with more utilities coming on board adopting these systems and other applications like Pressure Profile and remote shutoff – these are all 'beyond metering' benefits."

This article was compiled by WF&M staff.

‘Beyond the Meter’ with a Two-Way Communication Network

OPTIMIZE WATER DISTRIBUTION LONG-TERM & BE READY IN EMERGENCY SITUATIONS

Now that we’ve addressed some of the industry challenges both old and new, let’s take a look at how exactly a smart utility network can help water utilities optimize efficiency beyond the meter.

Xylem’s Chris Thomson, Director of Vertical Marketing, Utility Networks, says for utilities looking to take advantage of AMI or a smart utility network, it starts with addressing your aging assets and building from there.

“Many of the meters and network systems that were installed 15-20 years ago are now due for upgrades. That is certainly on the minds of utilities we serve,” he says. “We have a number of customers both in the southwest and even the northeast that are talking about drought. With the climate swings we are seeing, I think people are much more mindful of water resources and measuring and accounting for it accurately.”

What Other Capabilities Are Utilities Looking For?

Smart meters and networks provide benefits to utilities looking to fulfill carbon neutral goals, as data collection through networks largely eliminates the need for regular truck rolls to the field for meter reading, thereby eliminating emissions. And Thomson reiterates that utilities are in fact going beyond the meter-to-cash transaction and can now get a number of ancillary benefits such as monitoring the distribution system for pressure, finding and reducing non-revenue water, monitoring flood and surface water levels, monitoring stormwater levels, and more.

Thomson explains that water utilities today are looking for longevity and the benefits of additional data. “Every utility wants the ability to convert meter data to revenue,” he says, adding utilities want the ability to share data across multiple departments in the organization while also “democratizing” or, platforming, that data in one place.

Thomson adds: “Traditionally, if I worked for a water utility, I either wore a water shirt, or a wastewater shirt or a stormwater shirt. And I didn’t talk much to the other departments. Now, more and more, utility operators are wearing ‘one water’ shirts, and they want data to share data from one department to another.”

Another attribute water systems are looking for, Thomson adds, is the ability of the meters, sensors and network to remain operable during adverse conditions.

Two-Way Communication for Ultimate Utility Control

Xylem says one of the key tools available that is helping address these issues is its Sensus FlexNet communication network, a two-way network that allows sensors and smart meters to securely transmit and receive more frequent data about the water distribution system.

FlexNet allows remote shut-on/off capabilities, can conduct on-demand readings for consumption, pressure and temperature, and can help identify non-revenue water from leaks, unbilled consumption, theft and tampering.

The network uses a private, primary-use spectrum licensed from the Federal Communications Commission (FCC), which allows the network to remain uncluttered while being able to transmit encrypted utility data in both rural and urban areas, regardless of utility size (the FCC is responsible for managing and licensing the electromagnetic radio spectrum for commercial users and for non-commercial users).

Understanding the features of primary-use spectrum has a lot to do with the unique advantages FlexNet offers.

"When a customer uses a FlexNet system, they are the only ones communicating on that particular part of the spectrum in that geography. There is no other noise in the airspace," Thomson explains. This allows utility staff using FlexNet to easily send and receive data across the system using the meters and network sensors. The data is collected by base stations throughout the system area. Each Sensus base station can have a range of 10 sq-miles or more, which Sensus says is far greater than other systems.

FlexNet was specifically built for utilities. Each application receives its own frequency and different data types are designed to operate on dedicated channels.

"This also allows us to offer 20-year warranties on our endpoints because we don't have to ramp up our output to overcome interference," Thomson adds. For the same reason, he says, the system easily preserves battery life because it's operating in a 'quiet environment' without interference. Such interference may otherwise occur in the case of secondary-use operators of a licensed spectrum or in the case of cellular where frequencies are competing with other devices.

"Everything we do for AMI is because we can control the airwaves," says Joe Rogers, Director, Global Smart Metering Solutions and Services, Xylem.

"Because we have the dedicated spectrum and the network that's specifically built for meter reading command and control, we can go to a utility and say 'you never have to worry about cell density in an area,' for example, because we've designed the network to handle everything that might get thrown at it."

FlexNet's point-to-multipoint design allows network redundancy at all levels of the solution. Data in the field is collected by battery-powered devices with internal memory; base stations come standard with backup power; and two data centers provide total end-to-end redundancy. The network reliability is especially advantageous during emergency situations or severe weather events (see Jacksonville, Texas, example below).

The Network of a Lifetime

Although we've addressed network dependability, how can smart water utility networks affect the way a utility does business over the long term?

FlexNet reads meters every hour and communicates them every four hours, giving utilities a greater volume of data more frequently. On the customer service side, it can provide customers with billing information, outage notifications and monitoring for tampering or theft. In addition, the Smart Gateway can be tuned to provide even more frequent data for level, pressure, etc. to meet the needs of the utility's application.

Thomson and Rogers both explain how a smart utility network can allow utilities the ability to harness this data and analyze patterns and trends, in their system that they otherwise may not have considered.

For instance, with a greater insight into distribution system activity, a water system could seek to understand water main break frequency by analyzing pressure patterns. Such trends could also be compared against weather patterns or seasonal changes. Over time, these insights about daily operations can be used to inform long-term decisions and where to invest capital.

"I think the water industry is going to take some cues from the electric utility industry. The meter is no longer taking that billing read once in a while," says Rogers. "It's almost turning into a field instrument. And the utility can basically measure service delivery right to the consumer's home and make sure the grid is doing exactly what it was designed to do. A utility can't do that unless they have high-resolution, high- throughput and reliable data sources."

"I think eventually water utilities will get to the same place, especially with things like drought conditions," Rogers continues. "They're going to want to know when the tank goes empty immediately, they're going to want data from a meter exactly when it's measured.

"Things like that are going to change the way utilities manage operations, and the faster we can transmit what's going on in the field gives them more context so they can react faster. And FlexNet provides the reliable communications and control over the long haul that utilities need."

This article was compiled by WF&M staff.

Top 5 Things a Utility Should Look for in a Smart Utility Network

1) **Procurement and Operations Options –** Your utility needs to identify a network that can meet your utility's goals, expertise and finances. Are you looking for Managed Services, Software as a Service (SaaS) or Network as a Service (NaaS)? This is your first step in moving toward the system that will work best for your utility. With the Sensus FlexNet communication network, you have all three options. Choose to procure the network as a capital expenditure or shift procurement to a subscription-based pricing model to grow as you grow. However you proceed, Xylem and FlexNet empower you to focus on what you want to focus on.

2) **Ability to Grow with Your Needs –** A utility's data, needs and services fluctuate over time. We know that the selection of a smart utility network is the purchase of a lifetime for many utilities, meaning we know utilities want more functionalities for the long run. With a variety of applications that can be incorporated into your network over time, you can choose when and how you want to build out your network. So whether you're interested in identifying pressure levels or receiving alerts for leaks — or whatever tomorrow's demands will be — we're able to grow with you.

3) **Backward Compatible –** Your smart utility network should be backward compatible. With backward compatibility, FlexNet is engineered to leave no assets stranded in the field — during your current transition, future transitions or updates. Our solution has the ability to be used for both automatic meter reading (AMR) and advanced metering infrastructure (AMI) – so when your utility encounters an emergency, you're able to read your data in the quickest, most effective way. Our portfolio of products continues to expand and meet your water utility needs. The ally® water meter was purposefully designed with metrology, pressure, temperature and the valve in mind to be compatible with SmartPoints® (a walk-by, drive-by endpoint, a fixed-base endpoint or any combination of these) already in the field. With the control of our own network, you won't have unexpected updates and purchases that will abandon any of your vital assets in the field like with other systems.

4) **Multiple Levels of Redundancy –** Is redundancy integrated into every part of your network? Beyond this, redundancy is found in our Base Stations (data collectors) with battery power as a backup, so your data is always being collected and relayed. But the data doesn't stop at your utility. The data is collected and stored in Xylem's two data centers in the United States. And the most important aspect of our network redundancy – a SmartPoint. The entire FlexNet solution is designed to give you the assurance of data reliability and redundancy.

5) **Lifetime of Assets and Best ROI –** When you're selecting a network, it's vital to identify one that provides long-lasting assets and the best return on investment (ROI). With Sensus, our solution is rigorously tested and backed by the longest warranties in the industry. With your private FlexNet network, you're guaranteed to have the communication you need when you need it most – along with all your other utility tasks. You won't be battling noise to get through to your field assets and collect data. And you won't be required to replace endpoints to take advantage of future upgrades or enhancements like with other systems.

Compiled by Sensus, a Xylem brand.

Historic Winter Weather Puts Smart Water to the Test

CITY OF JACKSONVILLE, TEXAS, BOLSTERS RESILIENCE & TACKLES WEATHER EMERGENCY

Early 2021 followed a year of unprecedented events for people around the globe. For those residing in Texas, the theme continued with a historic winter storm that paralyzed the entire state.

In February, freezing conditions down to single digits put the entire state's infrastructure to the test, leaving many cities and citizens without electricity and water. At a time when staying home had become the norm, utility reliability and resilience were more critical than ever.

Faced with unusual circumstances, the City of Jacksonville, Texas, quickly realized its decision in 2019 to replace aging infrastructure with a smart utility network was more crucial than initially predicted.

With atypical temperatures well below 10 degrees Fahrenheit, many Texans were ill-equipped for what unfolded – total loss of power and devastating infrastructure damage caused by the cold snap.

"We were pumping nearly double what the water consumption was normally, we were losing almost more water than we could produce, and we were getting ourselves into some critical situations," said former Jacksonville City Manager Greg Smith.

Prepared for the Storm

Jacksonville's Water and Sewer Utilities team, however, was well prepared for the winter weather emergency. Using the Sensus ally water meter along with

its two-way FlexNet communication network, the team ran near real-time usage reports and discovered some customers were losing up to 28,000 gallons of water per day, compared to normal daily consumption of 100 gallons. The smart technology allowed the city to remotely shut off water distribution to residential customers and protect their homes against flood damage from burst pipes.

In near real-time, the city can detect leaks, pinpoint pressure issues and shut off water remotely with the ally meter anchored by the FlexNet network.

"Without a shadow of a doubt, the system we installed saved us millions of gallons of water," said Smith. "It certainly turned out to be one of the biggest advantages we had during the storm."

Another significant benefit of the ally meter was the built-in functionality to remotely identify pressure points around the city which allowed the team to isolate water main and service line breaks. The city identified and addressed approximately 65 issues, half of which were discovered by data from the smart water meters. Once the largest leak was located and addressed, pressure was restored.

In the span of just 72 hours, Jacksonville was able to identify damage, respond to its customers and repair its infrastructure.

Near Real-Time Data Aids Recovery

Not only did the smart utility network allow for near real-time response to residents and business owners of Jacksonville, but once the city began to thaw, the system's data helped resume normal water service.

"One thing that's unique about Jacksonville, not only do we have roughly 15,000 residential and commercial customers, we also serve four rural water co-ops, which probably serve another 12,000 people around Jacksonville," says Randall Chandler, Director of Community & Public Services for Jacksonville, Texas. "So not only were we trying to maintain our water supply, we were trying to supply these co-ops and surrounding communities."

The city's utility team also used analytics to quantify storm-related damage versus typical water use, resulting in the development of an amnesty policy for those impacted by high water bills.

Pressure data from the city's smart utility network allowed crews to locate and fix issues within a few hours. Before the remotely managed solution, it could have taken as many as three days to identify water loss.

Customers who signed up for the online Sensus Customer Portal could see for themselves their daily water consumption and if it corresponded to any issues caused by the deep freeze.

Just two years before this wicked winter weather, the City of Jacksonville knew it needed a modernization effort with the majority of its meters nearing a 20-year life span. While the purpose of the system upgrade was not initially to address storm resilience, the remotely managed network allowed the city to quickly collect data, locate and assess storm-related damage, and respond before it caused further damage.

"Without the Xylem system, the entire city could have been without water, and our response would have been totally different," said Smith. "The system paid for itself in just that one week."

As a result of providing exemplary customer service during a winter weather emergency, the City of Jacksonville earned the 2021 Texas Municipal League (TML) Excellence Award, which recognizes municipalities for innovative problem-solving, excellent management and high levels of service.

"It was a very, very good project for Jacksonville, and an even a better project for the citizens," adds Chandler. "I'm glad other people are beginning to realize the benefits of AMI technology. It makes me proud that a small east Texas town of our size was able to find the mechanisms to afford this type of technology and do it on a small scale but with the same quality of product on the market."

Albuquerque Water Utility Eases the Pressure on System Performance

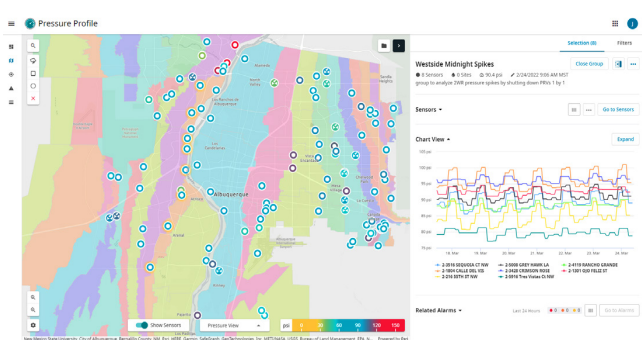
PRESSURE PROFILE SAVES TIME AND RESOURCES

Imagine it's been a long, hot day in the desert sun. A cool shower is in order. You turn on the faucet and instead of a cold burst of refreshment, out comes a measly dribble. A much-needed cool down is replaced by a heated call to the local water provider.

The largest water utility in New Mexico is on a mission to ensure this kind of water service interruption doesn't happen and is transitioning to smart digital solutions to help.

"The goal is to install 25,000 to 30,000 endpoints each year so that our entire system will rely fully on advanced metering infrastructure (AMI) within three to four years," said Joel Berman, chief engineer of the Albuquerque Bernalillo County Water Utility Authority.

The Water Authority first began deploying AMI from Sensus, a Xylem brand in 2011. Utility personnel now manage their water distribution system remotely and in near-real time. Another benefit is tracking consistent water pressure.



The Water Authority team simply logs onto a computer and opens the Pressure Profile application to view the latest data from smart meters and sensors on a map-based interface. Pressure zones, key assets and colored sensor icons offer a visual pulse of the system.

The Water Authority has hundreds of pressure-reducing valve sites across the service area that can now be monitored with the battery-powered Smart Gateway Sensor Interface for timely remote management. Issues can be resolved within hours rather than weeks.

Timely Solutions

"When it comes to water pressure management, proactivity is key," said Berman. "We keep our customers happy by remotely monitoring their water consumption and pressure to ensure any potential issues are identified before they experience them."

The utility's Sensus ally residential water meters report pressure into the easily accessible, cloud-hosted Sensus Analytics Pressure Profile software application.

"This technology has taken many steps out of our typical pressure management process, including administrative tasks and truck rolls," said Patrick Bayardo, an operations and maintenance superintendent at the Water Authority. "Now, we simply log into the website in the morning and the data is right at our fingertips. It's a big time-saver for us."

The application's integration with the FlexNet communication network allows for seamless data collection from smart meters across the system. The data is then aggregated into map-based graphs that visually depict pressure zones and levels within the community at any given time. Automated alerts notify utility crews when pressure deviations occur and they can begin investigating the situation from the convenience of the Water Authority offices.

"A customer noticed his new irrigation system was experiencing lower pressure than usual and just stopped working," said Berman. "Using Pressure Profile, we were able to identify, resolve and restore the system pressure quickly—in only a matter of hours. The customer was grateful and it was a positive experience for everyone involved."

Increased System Visibility

The Water Authority also added the battery-powered Sensus Smart Gateway Sensor Interface at pressure-reducing valve sites to monitor water distribution system performance. The FlexNet-enabled device, along with pressure management software, located the root cause of recurring midnight pressure spikes during the winter months.

"We discovered an open valve—not mapped on our system—that was overpressurizing pressure from one zone to another," said Bayardo. "Pressure Profile brings us the data we need in the timeframe we need it to troubleshoot and optimize each pressure zone for optimal performance."

Berman added, "The application is really a plug-and-play system. It's a seamless solution that our technicians have adopted, installed and programmed without third-party assistance."

Proactive Pressure Management

The utility has found that timely data and convenient access to it is invaluable. According to Bayardo, shifting from a "boots-on-the-ground" approach to digital technology where the data is readily available on their computers has saved the utility service calls and routine maintenance.

"Now we can pinpoint areas and resolve potential water pressure issues within hours in what used to take weeks," said Bayardo.

The adoption of Xylem technology has resulted in tactical shifts for the service provider to continuously improve operations.

"I'm proud to say that in the last decade we've collectively transitioned from being reactive to highly proactive with regards to water distribution pressures," said Berman. "These days, if we don't identify an issue before the customer, something is wrong. It's not just about monitoring the pressure; it's about changing the way we do business."