SMART GAS METERING:

You've Decided to Deploy It. What's Next?

A playbook for a successful gas AMI implementation

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Upgrading to gas AMI is a crucial part of digitally transforming a gas or combination utility. It enables these utilities to leverage new efficiencies and opportunities, and also to enhance safety and long-term planning.

The business case for gas AMI is most obvious for utilities that still rely primarily on manual meter reading, but significant benefits are available even for gas utilities that have already adopted "drive-by" automated meter reading (AMR) technology. For instance, AMI can support transformation of the gas utility workforce. It not only empowers employees and contractors to get more work done faster; it also creates a more digitalized work environment across all departments—appealing to many younger or technically savvy workers new to the gas utility industry.

In the bigger picture, it's impossible for a gas utility to significantly digitally transform its business and operations without adopting gas AMI. The data from gas AMI enables advanced analytics, automated regulatory compliance, more accurate forecasting, a better customer experience, and greater insights for long-term business strategies.

So, what does a successful deployment of smart gas metering look like, and how can your utility get there?

This playbook features interviews with utility professionals who have deployed gas AMI to their customers, as well as vendors and consultants. It offers proven expert advice for a successful gas AMI deployment, including the key components of any gas AMI rollout and critical questions to consider as you build the foundation of your gas AMI program.

1 People First: Assemble a Cross-Functional Planning Team

Although deploying gas AMI is essentially a technology/equipment project, the best way to start is to assemble a planning team that represents all critical project roles. That team should include at least one representative from each of the following departments or roles:

- **Metrology** for expertise in metering equipment and techniques
- **Information technology (IT)** for expertise in software, data and systems integration
- **Operations technology (OT)** for expertise in impacts to field equipment and gas network operations
- **Executive leadership** to ensure that AMI aligns with high-level business goals
- **Field operations**, including maintenance, repair, outage response and equipment upgrades
- **Asset management** for equipment, buildings, towers, vehicle fleet and other physical resources
- **Regulatory compliance** to ensure AMI system supports regulatory requirements
- **Gas procurement** since AMI data can impact forecasting, purchasing and storage
- **Billing** and other departments with legacy systems and processes that must be updated/integrated to accommodate AMI systems and data
- **Customer service** since AMI data availability will change how they respond to customer inquiries and complaints

The planning team will also coordinate with key external partners. For instance, local government may include gas AMI in a smart cities initiative, or offer resources for siting communication equipment, or have additional uses for the AMI communication network. Regulators might advise on how AMI data and functionality could best support current and future compliance requirements.

If the gas utility is part of a combination utility, it may be possible to realize efficiencies and synergies from existing or planned AMI for electric customers, or to expand AMI to water customers. The AMI vendor is also a key partner that can enhance every part of the gas AMI planning process, as well as anticipating ongoing needs after deployment.

The planning team includes all key stakeholders, and coordinates with external partners.

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2 Meter Strategy: Where to Augment vs. Replace Meters

It's crucial to clarify the likely scope of the gas AMI deployment at the very beginning of the project. From an equipment perspective, upgrading to gas AMI doesn't necessarily require a utility to replace all existing meters. In many cases, a radio-enabled transceiver device can be added to existing diaphragm meters which have significant remaining useful life. For instance, Long Beach Energy Resources' AMI deployment included the installation of 156,000 Sensus SmartPoint transceivers, and smaller number of Sensus Sonix IQ smart meters to test advanced capabilities, such as automatic or remote shut-off.

Only older meters, incompatible models, or locations that cannot easily accommodate a transceiver must initially be replaced with fully digital smart meters with built-in radios. This reduces the cost and complexity of the initial AMI deployment. Over time, all original meters will be replaced with smart meters as they reach retirement.

Therefore, one of the first steps in upgrading to gas AMI is to inventory and validate existing installed meters. This can be based on a representative sample; it's not necessary to visit and review every installed meter. Meter readers and other field personnel can identify specific meters where access difficulty or limited space would warrant meter replacement.

3 Choose the Right **Communication Network**

Another key early decision for gas AMI is: What kind of communication network would best suit the utility's resources and needs?

- **Fixed networks** rely on centralized radio communications. Each meter communicates directly with at least two elevated base stations to provide redundancy for reliability. Base stations gather meter data and relay it to the system head-end: software that's either on-premise or in the cloud. They also relay commands back to specific meters.
- **Mesh networks** rely on the nearby meters or transceivers to transmit messages to each other ("hops"), to route data and alerts to base stations, and ultimately the system head end—similar to how data is routed on the internet.

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Both fixed and mesh networks offer benefits and tradeoffs. Notably, a fixed network (such as Sensus FlexNet) may leverage licensed radio spectrum, which can increase speed, support channelized messages, and reduce noise. They may also use public radio bands or telecom networks. However, elevated base stations present a challenge resource challenge at many gas utilities.

"For gas-only utilities, the biggest problem is where to locate base stations and other communication network devices," said Jeff Buxton, managing director for operational technologies (OT), smart grids and AMI at Black & Veatch Management Consulting.

"Generally, gas-only utilities don't have access to poles, towers or many buildings throughout the service area. They also don't have bucket trucks. Usually, they need to negotiate access agreements and fees with large customers, local governments or local utilities. Commercial cell phone towers are an option, but usually the most expensive one."

Mesh networks can have lower up-front equipment and personnel costs. However, they often have higher network latency, since each message may require several "hops" to arrive at its destination. Also, mesh networks typically use unlicensed public radio spectrum, more prone to interference or noise.

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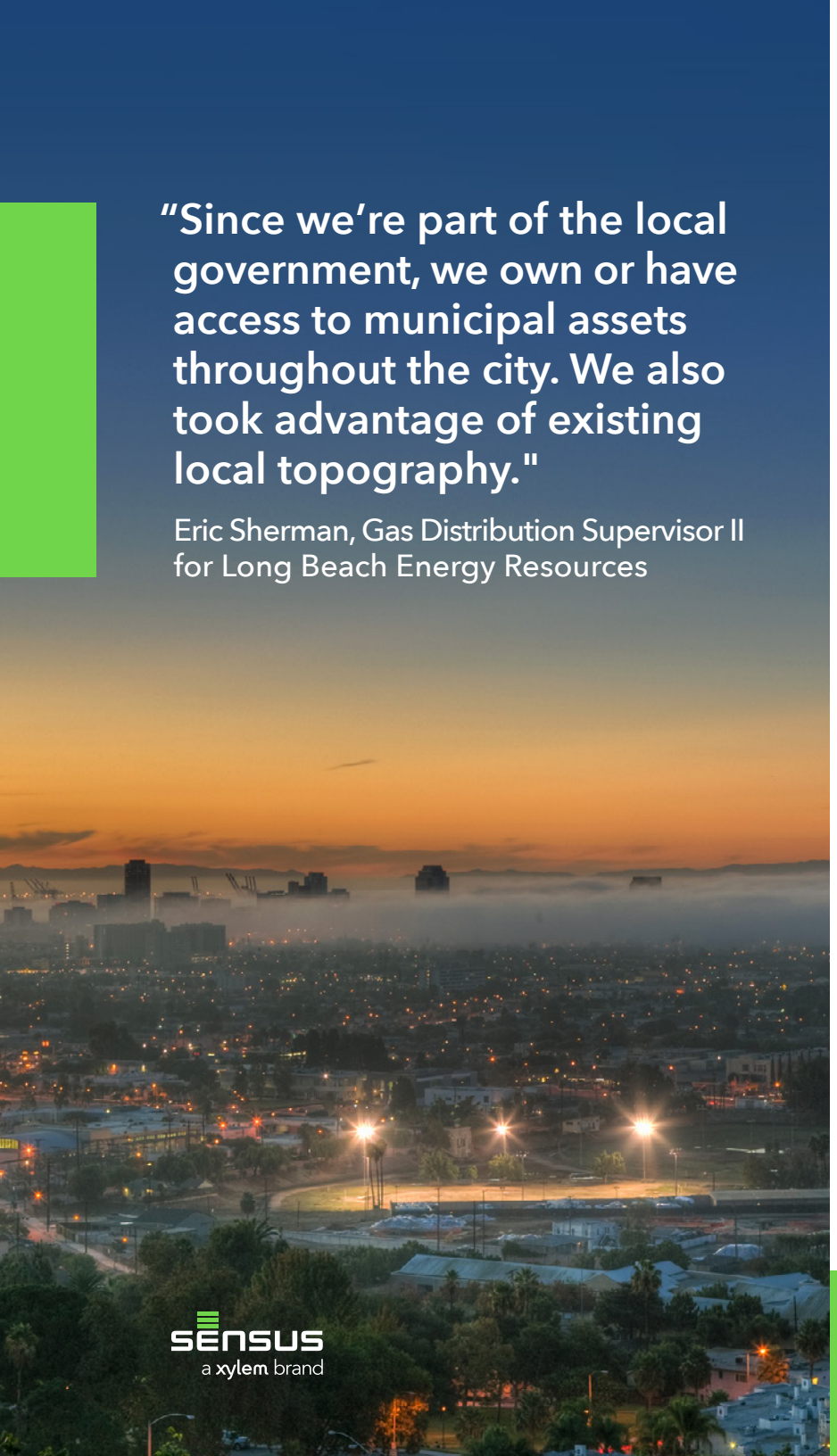

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>
> Eric Sherman, Gas Distribution Supervisor II for Long Beach Energy Resources

Some gas utilities have easy access to resources for base station siting. Eric Sherman, Gas Distribution Supervisor II for Long Beach Energy Resources, observed that they had little difficulty siting FlexNet base stations. "Since we're part of the local government, we own or have access to municipal assets throughout the city: fire stations, park facilities and satellite government offices," he said. "We also took advantage of existing local topography. At 110 meters (365 feet), Signal Hill is situated in the middle of Long Beach. Though Signal Hill resides in a separate city of the same name, the cities of Long Beach and Signal Hill jointly operate communication towers atop the peak. Part of why we chose a fixed network was our topography."

When planning a gas AMI communication network, the planning team must consider:

- **Topography.** Might hills or tall buildings obstruct signals, requiring additional base stations?
- **Siting resources.** Does the utility have access to towers or buildings in the right locations? What's their condition? Should new structures be built, or old ones upgraded?
- **Optimal coverage.** How many base stations are needed, in which locations, to provide optimal coverage and redundancy within budget?

4 IT: Software, Data and Integrations

AMI has several IT implications for gas utilities, all of which can be addressed either by utility IT staff, the AMI vendor or a third-party:

- **Head-end software and data storage.** On-premise vs. hosted in a public or private cloud.
- **Integration.** Initially with legacy utility systems (especially billing, meter data management and customer service), adding more systems later.
- **Management.** Digital configuration, monitoring, maintenance customization, troubleshooting and upgrades.
- **Analytics.** Configuring and customizing prepackaged analytics, and creating new analytics as needed.
- **Cybersecurity.** For data and for all systems connected physically or virtually to AMI.
- **Workforce tools.** Computers, servers, mobile devices, apps and dashboards, so all departments can leverage AMI data.

How a gas utility manages its budget affects planning for ongoing system needs. Some AMI vendors, including Sensus, offer fully managed service plans (for AMI software, hardware, maintenance and analytics) for a predictable periodic fee. However, if capital expenditures (CapEx) primarily drive the business, a utility might opt instead for on-premise system licensing with contingency planning for ongoing costs.

Following AMI deployment, IT investments are for downstream system integrations.

According to Buxton, gas utility IT, departments should be engaged in AMI planning so that existing systems are prepared for initial integrations. Even if the utility contracts with the vendor to operate and maintain its AMI, IT will still need to be involved with ongoing system integration issues and equipping the workforce with devices and virtual tools.

"As utilities get beyond the initial AMI deployment, later IT investments will be about increasing the business value of AMI through further integrations with downstream IT and OT systems," said Buxton. "This often involves systems like automated work dispatch, asset management, workforce management, and geographic information systems."

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5 Gas AMI Deployment Tips

The gas AMI experts consulted for this playbook offer these tips for a successful rollout:

- **Agree on the project timeline.** The cross-functional team must plan, and get consensus across the enterprise, for the AMI rollout timeline. "The timeframe should be driven by business considerations, especially ROI," said Anne Mushow, senior director of Deployment Services for Sensus. "With at least a rough timeline, it's easier to determine labor needs, integration points, testing requirements, and ongoing billing and service needs."
- **Pace yourself.** The rollout timeline should be neither too slow nor too fast. Staggered deployment streamlines future maintenance by all batteries not needing to be changed at the same time. Also, when installers rush to meet tight deadlines, more (and more costly) errors happen.
- **Understand process impacts.** Early on, a business process workshop can help map and model existing processes that will integrate with (or be affected by) AMI, and predict needed analytics. This helps departments across the utility decide which types and granularity of data are needed, as well as plan for data storage and access.

- **Network first, meters second.** "Before installing any meters or transceivers, get your communication network up and running first," said Paul Honchar, senior product manager for Sensus. Install, configure, and test all base stations and communication devices, for optimal and reliable signal transmission throughout the network. "If you deploy meters first, you'll need to visit each meter location twice: once to install the AMI devices, and again to activate and test the radio."
- **Update your analytics.** Every year or so, managers of business and operational departments, and top executives, should review together how the utility analyzes and uses AMI data. Make sure the kind of data being gathered, processed and reported is aligned with today's business objectives and KPIs. Update predictions for the kinds of analytics needed in the next few years, and work with AMI vendors or contractors to ensure that the system is prepared to meet those needs.

Align data collection and analysis with business KPIs.

- **Experiment with new opportunities.** Gas utilities can use AMI data to launch new services or to improve existing ones. AMI often makes pilot projects easier and cheaper. AMI might support more timely and accurate monitoring or troubleshooting of the gas network's performance and safety. Data could inform system models and expansion planning. Customers could access gas consumption data in near-real-time via an online portal, and perhaps set custom alert thresholds. Customer service and field personnel could view a customer's current and historic usage data when answering questions and resolving problems.

- **Munis: Extra potential for partnership and innovation.** Municipal governments often can distribute the cost of gas AMI deployment, or amplify benefits from this investment. For instance, in Long Beach, the municipal water utility will leverage the gas AMI FlexNet network for a water metering upgrade. Billing for FlexNet will be shared between the two municipal utilities. Also, AMI can inspire more creativity. "We could use FlexNet with technologies like smart street lighting or gunshot sensors," said Sherman. "And I've been thinking: in our vast park system, workers must go around every day manually locking and unlocking restrooms. We could do that remotely via FlexNet. Once you have a good network, it's natural to think of more ways to use it."

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6 Key Questions to Move Forward with Gas AMI

As your utility proceeds with AMI planning and deployment, these questions are especially helpful to consider:

- **What are our AMI goals, and how will we track progress?** Set goals for AMI deployment and usage: for the first year, three years out, and five years out. What kind of benchmarks and reporting will be required to ensure that contractual and regulatory requirements are fulfilled?
- **How should we redeploy resources, human, and otherwise?** What new roles will AMI create at the utility, and who will fill them? How can the people, vehicles, equipment and budget required by the old metering system be redeployed to support continuing progress toward business goals?

- **How should we explain AMI to customers?** AMI will transform the gas customer experience, from the bills they receive to what happens when they contact the utility with a question or concern. How can your utility highlight customer benefits, such as increased safety? What can they expect from deployment, and when?

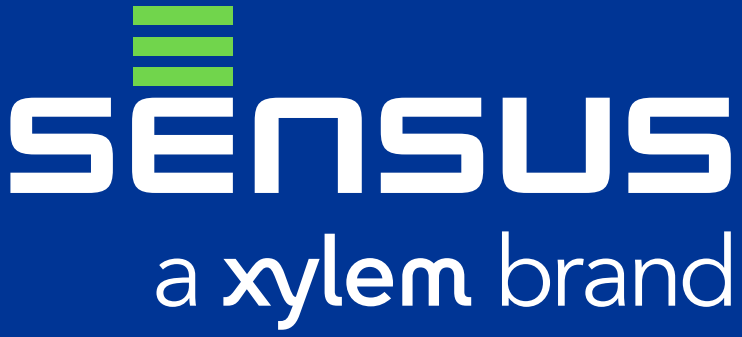
- **Who will be in charge?** Clear accountability supports excellent AMI rollouts. When forming the AMI planning team, one individual should take on the role of project manager for AMI deployment. The project manager will be the chief liaison for the AMI vendor and all contractors.

- **Which expectations should be clarified in AMI contracts?** System reach, minimum percentage of successful daily reads, contingencies for fine-tuning equipment or network needs, and other key points of accountability should be designed collaboratively with vendors and contractors.

In the long run, AMI can support a utility's long-term mission and vision. What kind of an organization do you want to be in a decade, or three decades from now? How might future system requirements, regulations, and customer expectations shape your programs and system? Good data is necessary to realize your vision, and the flexibility of gas AMI will help you adapt to changing times.

Conclusion

While an AMI implementation can be daunting, the best practices covered in this playbook can accelerate a positive return on your utility's investment in smart metering. Pulling together all key stakeholders early, and keeping them informed and engaged throughout the planning and deployment process (and beyond) ensures that your gas AMI system will be able to support the long-term success of your utility.



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