



A new framework for utility meter infrastructure investments

Timely, high-resolution consumption data is a foundational building block for addressing multiple challenges in the energy and water utility industries, from affordability and customer equity to decarbonization, resiliency, load flexibility, and the customer experience.

However, although utilities across North America have successfully deployed hundreds of millions of advanced meters—both drive-by (AMR) and smart meters (AMI)—over the past fifteen years, the promised benefits of this equipment still haven't been fully realized. To solve the problems associated with advanced meters and rapidly wring new value from existing utility infrastructure at lower cost, a modern strategic framework called AMx can support utilities, regulators, and customers by offering a new way to prioritize investments.



DEFINING AMX

AMx—in which “x” is a variable intended to encompass nearly any type of meter, from yesterday’s drive-by AMR meters to contemporary AMI and the advanced meters of the future—is a strategic approach to collecting, managing, and using electric, gas, and water utility consumption data that unlocks new value from existing utility infrastructure.

AMx delivers on the long-promised benefits of more granular and timely consumption data while layering on new value streams and minimizing system costs so that utilities can keep rates low and invest capital expenditure budgets in more critical areas such as system resiliency and decarbonization.

At its core, AMx is about converging infrastructure—for example, by leveraging existing broadband networks—to get even more out of current metering technologies and support a best-of-breed data ecosystem. It encompasses a pragmatic, modernized approach in which data is collected from nearly any type of existing meter and shared instantly with utilities, their partners, and their customers without having to rely on proprietary networks and systems. This approach wasn’t possible when smart meters were first deployed, but technology interoperability has come a long way since then.

By supporting a best-of-breed ecosystem, AMx helps ensure that each participant delivers the most benefits at the lowest cost. Rather than encouraging meter vendors to build communications networks or try to force app-based customer solutions into ever-more-complicated meters (resulting in shorter useful lives), this kind of approach fosters a renewed focus on simply collecting the best possible data at the lowest cost. Other specialized vendors can then focus on system elements like data communications and cloud-based analysis and insights that can better empower grid operators and consumers alike. As just one example, third-party solutions providers are already developing new machine learning and AI-based algorithms to generate a suite of invaluable new insights from this kind of data—but only if they can access it in a timely fashion.

Finally, the technology-agnostic approach AMx enables also makes it easier for utilities to manage infrastructure in a more incremental and agile fashion, such as replacing small groups of meters as they near end-of-life with whatever solution best fits current needs, rather than resorting to a more comprehensive rip-and-replace approach through a single vendor that may be unnecessarily expensive and time-intensive to implement.



UTILITIES, CUSTOMERS, AND TECHNOLOGY VENDORS ALL BENEFIT

AMx offers substantial and immediate benefits for utilities and regulators by enabling them to:

- **Ensure that precise and timely energy or water consumption data is available down to the distribution extremities (premise level, also known as the “last mile”) by increasing the quality of data collected from existing meters and the speed at which it’s shared with both the utility and its customers.**
- **Reduce costs by avoiding premature meter replacements, identifying opportunities to converge infrastructure, and finding new ways to make better use of the myriad existing data streams already being created.**
- **Increase flexibility and spur new innovations by moving away from the proprietary communications networks of previous generations of AMI deployments to a more agnostic approach that allows mixed meter portfolios and lets utilities quickly replace smaller groups of meters as they near end-of-life with whatever solution best fits current needs. Maximizing utility flexibility to meet a diverse array of emerging needs by taking a cloud-first approach to data management and analysis.**
- **Coordinate planning between electric, gas, and water systems by collecting apples-to-apples data from different meters using the same data collection and management system to support emerging reliability, resilience, and decarbonization goals (particularly strategic building electrification), and identify opportunities to realize cross-system benefits through the so-called water-energy nexus.**
- **Reduce cybersecurity risks by keeping meters focused on data collection, not communications or edge-computation, and shifting to more secure and cost-effective cloud-based data analysis and AI-powered insight generation.**
- **Better support distributed energy resource (DER) coordination and management through a technology-agnostic approach that can instantly share consumption data wherever it’s needed to enable optimal control strategies under evolving system conditions.**



For utility customers, AMx offers the potential to:

- **Better understand actual consumption patterns to support increased transparency, reduce mid-cycle bill uncertainty, and enable improved choice and responsiveness to new rate designs (particularly time-of-use and dynamic pricing) or carbon signals.**
- **Lower energy or water bills as a result of both utility system efficiency improvements and relevant messaging in such areas as efficiency tips, peak usage alerts, and anomalous usage notifications**
- **Access near-real-time data to provide critical insights into what kinds of end uses consume the most energy, particularly during peak periods, and get immediate updates when there's an unexpected change (such as a water leak or faulty electric/gas appliance). Coordinate planning between electric, gas, and water systems by collecting apples-to-apples data from different meters using the same data collection and management system to support emerging reliability, resilience, and decarbonization goals (particularly strategic building electrification), and identify opportunities to realize cross-system benefits through the so-called water-energy nexus.**
- **Receive more relevant information and insights on their energy and water use from utilities and/or third-party solution providers they give permission to, including relevant demand-side management (DSM) and income-qualified program offerings that are likely to better meet their needs.**
- **Experience the hassle of meter replacements less frequently.**

Finally, even meter vendors and utility solution providers can benefit through more agile purchase and deployment strategies (meaning fewer all-or-nothing sales deals and more predictable, incremental revenue generation) and new opportunities for increased competition between specialized vendors that can open the door to smaller companies with lower-cost or more innovative solutions.



AMx improves the frequency and granularity of data collected from existing meters

Whether utilities have invested in AMR or AMI, granular data is already being continuously collected in the meter—it just may not be available to utility employees or their customers. In the case of AMR, consumption data is often transmitted as often as every 30 seconds, but is typically only received by the utility once every month or two depending on when trucks happen to drive by to receive the signal. With AMI, data is shared more frequently, but latencies in existing mesh networks mean that, often, the best available data utilities can receive is yesterday's 15-minute data (even if their customers are able to access the data more quickly, such as every 30 minutes). Some of the newest smart meters may offer 5G connectivity to speed up the data backhaul, but that comes at a much higher cost. AMx eliminates the data latency of AMR and AMI by using existing broadband networks for communication and supports centralized utility control of new grid-edge assets through existing ADMS systems, putting utilities back in control of their own assets when compared with a grid-edge control approach.

Taking an AMx perspective also allows for fundamentally different views of new meter hardware. As an extreme example, new scalable wireless data collectors could potentially enable deployment of next-generation AMR meters that deliver benefits comparable to—or better than—the most sophisticated smart meters while offering lower costs, longer useful lives, and improved cybersecurity. Such a shift in perspective allows utilities to make ongoing and long-lasting moves to more cost-effective and resilient hardware and communications systems while avoiding being tied to individual vendors for years or even decades—something that can raise costs and slow the rate of innovation.

Fitting AMx into ongoing utility planning

As a flexible strategic framework, AMx is well-suited to meeting utilities where they are. For instance, utilities that are already in the process of meter replacements may employ AMx concepts to help “bridge the gaps” during the rollout and enable a more gradual, agile approach to meter deployment that nonetheless yields the expected benefits of timely data more quickly and supports multiple hardware vendors and systems throughout the transition. For utilities that remain unconvinced about whether to replace existing meters with new smart meters—particularly gas and water utilities that have already realized substantial benefits from the AMR meters installed throughout their territories—AMx can enable them to try out different meter technologies at low cost and risk without having to fully deploy redundant communications networks. In many cases, utilities may even find that they can get the full value of new smart meters without having to upgrade or retrofit their existing AMR meters simply by using new technologies for wireless data collection and sharing (an approach that can also help bolster cybersecurity even as it helps keep costs low).

Utilities across the US and Canada can vary widely with regards to metering hardware and approach to data collection and management. However, all can benefit from the flexibility of a pragmatic AMx strategy that delivers myriad new benefits faster and at a lower cost than traditional large-scale rip-and-replace meter upgrades. By using modern technology to help meet a wide range of current and emerging needs—from affordability and decarbonization to reliability, resiliency, and an improved customer experience—AMx serves as a critical new core strategic shift that will underpin the electric, gas, and water utilities of the future.

