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Can “Round 2” of Energy Infrastructure Modernization Meet—and Beat—Expectations?

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The first round of AMI that began over a decade ago—“AMI 1.0”—delivered on the promises of complex billing and customer service enhancements, but was limited in providing anything further. While utilities’ challenges have only increased since then, new and innovative solutions are now giving utilities a fresh start at moving beyond AMI 1.0 and supporting their new challenges.

Energy infrastructure in the US—from power plants to electricity distribution to streetlights—has undergone more changes in the last two decades than in the entire preceding century. The old hub-and-spoke model, in which the local utility was the generator, transmitter, and seller of electricity, is morphing into a matrix of new technologies, players, and business models. Technologies such as rooftop solar, on-site energy storage, and electric vehicles (EVs) generate new push-and-pull of electricity along the grid. Expanding demand response (DR) programs and distributed energy resources (DER) require accurate and of-the-minute calculating and reporting of power usage. Streetlights that were once static cost centers are becoming dynamic, sensor-enhanced data terminals. On the horizon lies the growth of microgrids, emergence of neighborhood power purchasing systems, new third-party energy aggregators and suppliers, and yet-unknown solutions, technologies, and business modes that will affront the status quo in the years to come.

Over this time of intense change, utilities have increasingly turned to “smart” infrastructure solutions that incorporate sensor data with advanced analytics. While these technologies are present across most of energy infrastructure, investment has focused on power distribution and related endpoints, such as smart meters and automated metering infrastructure (AMI), distributed energy resource management systems (DERMS), and, increasingly, smart lighting.

“Smartening” Energy Infrastructure

The first generation of AMI systems provided more accurate and timely billing and reduced the costs of manual reads. These systems also provided data and connectivity for use cases such as remote disconnects and time of use (TOU) rates. However, those first generation systems now struggle to keep up with the industry’s evolution and requirements.

Utilities recognize they need to quickly upgrade their AMI 1.0 installations to account for changes that affect customer power usage, grid efficiency and system safety. “Smart Grid 2.0” will need to integrate and help facilitate green energy solutions for states and utilities to meet renewable power targets. Smart Grid 2.0 will also have to be “future-proof”, allowing both user and utility to incorporate a surging number of IoT devices, energy-related apps and third-party solutions efficiently and securely.

While the need to upgrade is apparent, the road to do so is less clear, and these upgrades can be expensive: Full replacement of an AMI system can incur costs that include capital hardware and software (data management, communication hardware and systems), installation, and maintenance. Internal teams such as customer information (billing, servicing), grid operations, outage management, IT and security will depend on the new and old systems integrating quickly and flawlessly.

Complexities also abound around data and systems: Utilities will need to manage where legacy data resides and how well it will integrate with the new system. Existing AMI systems are already far from consistent within utilities. Many utilities conducted their rollouts in phases, with different technology partners. Utilities often operate in different states, and grew through acquisitions of market participants that already had their own AMI systems. Along with different AMI solutions that offer different levels of technical sophistication, they may have data in silos in different departments, and offer the same type of customer vastly different services based on where and when these original rollouts occurred. Inconsistency can lead to high and growing data storage costs, and multiple IT and customer service teams. It also results in a lack of visibility across an organization, leading to missed opportunities to gain the insights and scaling benefits of consistent data and operations.

Exhibit 1: **Complex Challenges that Utilities Face**

Source: Frost & Sullivan

For example, imagine a utility that operates in three states, has acquired several entities, and rolled out its AMI1.0 system over a decade of expansion and acquisitions. It has different vendors stemming from different rollouts, as well as some that predated their acquisition. Each AMI system may allow different levels of real-time information, which can create different levels of capabilities and business processes across the system. A subset of installations may have been one-way meters and cannot easily accommodate complex billing for rooftop solar or EVs. The utility may not have the same level of detail on usage and outages across its entire customer base. It may also have different renewable energy and efficiency targets for the different states in which it operates. All these variables prohibit the utility from having a uniform, detailed, and accurate picture of its operations. It also limits any consistency it can provide in service and offerings to its customers.

If the utility were to transition to a unified platform service, it would gain near-instant benefits of better organizational visibility and allow for more responsive, valuable, and consistent offerings for all its customers. Any system expansions or changes to state mandates change could easily be addressed without reducing consistency of service, creating more silos, or requiring massive capital outlays. The right solution provider could also take on data and infrastructure responsibilities thereby further streamlining utility operations.

A Better Way to Upgrade AMI 1.0

Fortunately for today’s utilities, there are better options than another full round of rip-and-replace to upgrade an AMI 1.0 system. New solutions have learned from the pitfalls of the first round and provide flexible and future-proof options that are also easier to install and operate. Utilities can realize AMI 1.0’s potential to create a dynamic and responsive smart grid and integrates additional benefits that avert additional costs and complexities related to owning and

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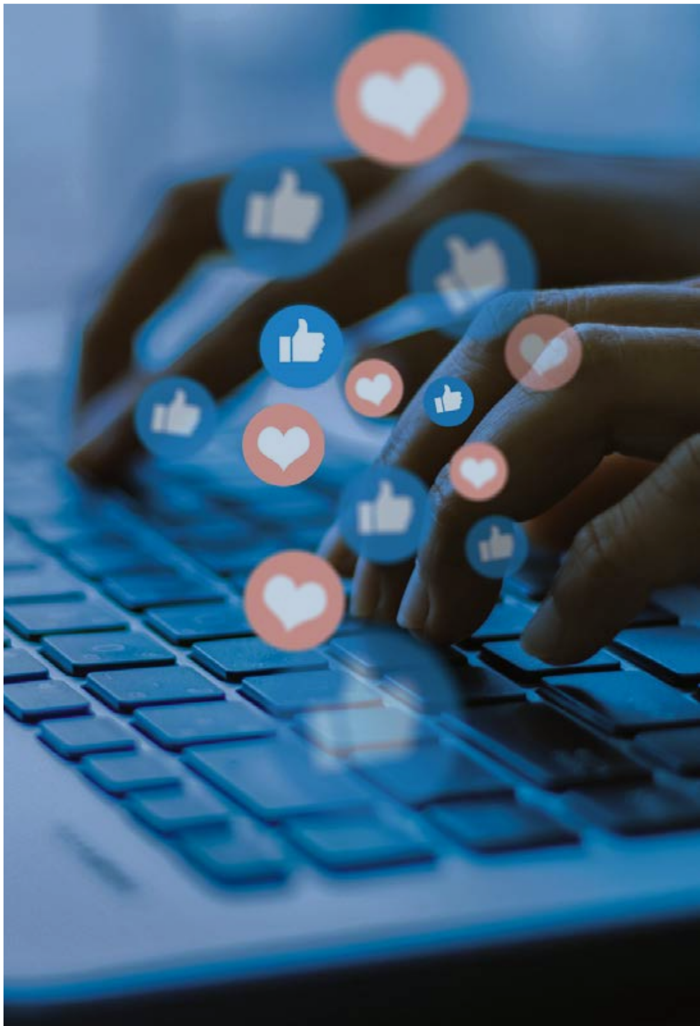

operating the communication infrastructure. They need a fully flexible solution that adapts to both the utility’s upgrade plans as well as how their infrastructure will evolve over time.

From installation to operation, utilities need systems that can be built quickly and efficiently. Other considerations should include:

Near Real Time Capabilities: Does the solution provide near-real time data visibility on power quality, usage, and availability? This is necessary for everything from critical outage notifications to AI-driven analytics that feed into planning and preventative maintenance.

A Fully Managed PaaS: A modern, industry-leading platform-as-a-service soltuion will facilitate easier data and system migration and carry a “pay as you grow” functionality. Such a platform provides visibility into the network and communication as well as the health of each meter, even if there are multiple meter types. It should also be cloud hosted, thereby ensuring there is no infrastructure to manage.

An Advanced Network: What are the connectivity options, and can the solution leverage existing infrastructure? This benefit goes beyond installation as it helps a utility control operating costs in the long term if they no longer needs to carry communication infrastructure responsibilities. A responsive system can continue to use existing AMI networks as well as migrate to the new technology over time. For example, it can leverage the current connectivity solution upon installation, upgrade to a local 4G LTE network in phases without significant downtime, and eventually transition to 5G as it rolls out. In time, 5G connectivity will be critical for utility applications as it enables endpoint data transfer at faster rates and lower latency that is needed for a fully digital grid. An end-to-end managed solution evolves as technology advances, preventing system obsolescence over time.

Robust Security: Along with carrying the communication infrastructure, can data be securely transmitted, stored, and delivered, both to utility data centers and a vendor’s cloud-based infrastructure? Robust security from endpoint to cloud is enhanced if a system is limited to the utility’s data, as opposed to solutions that may use public, multi-, or hybrid cloud infrastructures that are not solely their own. Security features should also be accessed remotely and securely, such as meter programming or passwords.

Rapid and Comprehensive Meter Migration: Because a public cellular communication system is already in place across most of the US, Smart Grid 2.0 can be rolled out while AMI 1.0 is still in place, thereby all but eliminating the lag time that a full rip-and-replace would incur. This allows meter replacement during the same service call, as it can go online immediately. In comparison, AMI 1.0 rollouts took utilities months and sometimes years to implement.

Modern API: Utilities will gain even more advantages if they choose a platform that can integrate all of their operational systems through API web services, whether back-end systems such as ADMS and SCADA or endpoint-based data streams from DERMS, streetlights, smart transformers, or substations. Sophisticated edge-based compute solutions help utilities get more actionable insights from their endpoints as well. Integrating non-utility equipment expands benefits even further. For example, a solution provider may have a proprietary communications card that can also be made available to device OEMs, such as those building EV chargers, solar power systems, or connected streetlights, who want to offer behind- the-meter application services that will tie into a smart grid offering. This way customers and their utilities can gain streamlined, yet advanced, capabilities to execute building automation systems, smart city initiatives, or grid modernization efforts.

Next Steps

Most power utilities recognize they need to move forward with Smart Grid 2.0, but are stymied by the cost and effort, and discouraged by the lackluster outcomes of earlier AMI iterations. Nonetheless, it behooves utilities to evaluate their current plans and ensure they are on the right track, or make a course adjustment to avoid locked-in solutions that will not stand the test of time:

Evaluate how comprehensive—or discordant—the current meter and AMI system is. Are there multiple technologies and vendors? Do different regions and departments share data and consistent processes, or has this been hindered by silos?

Consider the range of benefits a fully executed and modern AMI system will bring, not only to the direct customer relationship but to the organization overall. Data sharing and consistency, app development support, organizational visibility, integration with other connected IoT devices such as high voltage transmission equipment. Can a system allow for growth of roof-top solar, EVs, and DR programs? Can it help integrate third-party data such as weather and storm prediction? Can it prepare the utility for technologies and business models that are on the horizon, or not even invented yet?

Partner with a solution provider that has "pay as you grow" capabilities from rollout through operations. Can they help avert data and communication infrastructure installation costs and operational responsibilities for the utility? Use a solution that can also overlap with existing systems and reduce any power or data interruption, and enables legacy systems to communicate with each.

About Verizon Grid Wide

Verizon's Grid Wide solution is a Smart Grid 2.0 option that also includes private, secure and advanced network communication, cloud data storage, edge capabilities, and a platform on which utilities can unify their operations. Smart metering with remote operation, demand response, outage notification and restoration, meter data management, and more accurate and flexible billing programs are some of the capabilities Verizon provides. Grid Wide can be integrated across utility end points and systems, and can be used with third party smart meters and even customer equipment. These features, combined with Verizon's network and data capabilities, streamlines utility operations and gives a utility the insights and controls to create a more efficient or effective business.

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