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SMART CITIES START WITH SMARTER UTILITIES:

The role of smart grid

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KENNY O'DELL
Director of marketing, electric metering
Sensus

For generations, the delivery of electricity has been a one-way operation. The utilities obtain, process and supply. Consumers receive and use. As utilities adopt "smart" technologies, processes become increasingly automated.

"Renewables are changing everything," says Kenny O'Dell, Sensus director of marketing, electric metering. From renewables like solar panels or through micro grids, electricity gets injected into the distribution system. "Electricity flowing onto the grid from consumers changes variances," O'Dell continues, "so the future must be about handling injection into the grid."

The rising complexity of electricity

The state of California exemplifies this growing complexity. Utilities are still delivering energy to people, but consumers are also generating power and being paid for the power they inject. Although consumers are generating their own power, the utility still maintains the grid, meters and operations. So how can the utility be equitably paid for those services? Consumer-generation also creates power inconsistencies, unlike power from the utility, because of weather events and other disruptions, so even the self-generating customers will still require power from the grid at some point.

Creating a smart answer

The key to addressing this modern grid intricacy is smart grid. According to O'Dell, "Smart grid allows us to manage these new complexities of electricity: we get more data and make better decisions to maintain the quality of services customers are used to. Today's distribution grid must be enabled to provide data, communicate more information and optimize energy delivery to customers."

Transformers and power lines make up the traditional distribution infrastructure. But a smart grid system is also comprised of a communication network, meters and sensors. Smart meters take information management and operations to incredible new heights. Utilities have more control and can collect voltage data, measure usage and monitor quality of service. The latest devices and sensors obtain real-time data, so they know what's going on and what's going wrong.

But even the latest, greatest meters and sensors cannot perform as designed without an effective communication network as their foundation. "The smart grid network must be secure," O'Dell explains. "With a private network owned outright by the utility, the utility data is not mixed with public data, so that hacking risk is eliminated."

Smart results are the bottom line for smart grid utilities:

- Better management of the grid
- Collection of real-time quality data
- Continuous improvement in services
- Decrease in operational costs

An ideal smart network should be high-capacity and able to grow with both technology and user quantity, allowing additional utilities to share the network. According to O'Dell, "The communication network for smart grid should be made to collaborate with other utilities, so lighting, gas, water and electric can work together." Here's where network privacy is imperative. "Without a private network, the system can be hacked and the hacker can take control of the grid," O'Dell warns. Even when multiple utilities are using the same network, data from the respective utilities and municipalities must never cross the firewalls.

Smart grid yields smart results

Utilities are primed to implement smart grid systems with mandates from both the US Department of Energy and state-level public utilities commissions. The powerful impact of a secure, efficient smart grid is beneficial to both the utility and the consumer. "The bottom line for utilities is that they are able to better manage the grid and collect real-time data needed for continual service improvements," says O'Dell. As the quantity and quality of data increase and service automation grows, operation costs decrease, creating a more efficient system.

Although the operational and fiscal advantages to utilities are motivational, according to O'Dell it's consumers who really benefit from smart grid. "With the system in place, consumers have the opportunity to add solar power to their homes and know that the utility will still maintain power when necessary." With the automation and information resulting from the smart grid, real-time data is able to drive decisions on how and when the utility provides support. The benefits also extend to environmentally-conscious electric vehicle owners. These vehicles create high stress points on the grid, but instead of these consumers paying excessive costs, the smart grid allows utilities to manage their use with the renewable sources being injected onto the grid.

Choosing smart wisely

When utilities are ready to move forward with smart grid or expand their current AMI networks, there are many options. O'Dell advises, "As the environment continues to change, utilities must be sure to consider four key elements as they implement smart grid: network infrastructure, interoperability, integration and cybersecurity."

Consider these key elements when implementing a smart grid:

Network infrastructure

Interoperability

Integration

Cybersecurity

Network infrastructure

- EXPANDABILITY: The system needs to support growth, new applications and new data requirements.
- EXTENSIBILITY: The network needs to add new standards and protocols as adopted by the industry.
- COMPATIBILITY (backward-compatible and future-ready): The network must keep pace with an evolving grid without stranding existing assets.
- RESILIENCY: The communications system must continue to operate during critical times and support power restoration efforts.

Interoperability

- VALUE: Application-level interoperability ensures every device communicates regardless of the generational changes in communication protocols.
- OPPORTUNITY COST: Beware of lowest-common-denominator technology, as this creates security risk, eliminates agility to adapt to generational changes, and necessitates extensive and expensive integration efforts.
- SYSTEM SUPPORT: The network must have proven additional application support and plans for the future.

Integration

- PROVEN ABILITY: The solution should have been tested and evaluated for end-to-end performance, able to drive customer satisfaction and add value throughout the organization.
- DETERMINING SUCCESS: Define goals and understand the technology required to connect old and new technologies, as well as integrate with evolving devices.
- FUTURE OPPORTUNITIES: Determine how to leverage integration to extend asset life, expand equipment possibilities and engage multi-utility communication opportunities.

Cybersecurity

- PROTECTION: Ensure that all points of entry to the network are protected.
- VULNERABILITY: Make reconnaissance difficult from the inside and limit points of vulnerability.
- DATA SAFETY: Thwart attempts to misuse or compromise the network and the data it transmits.

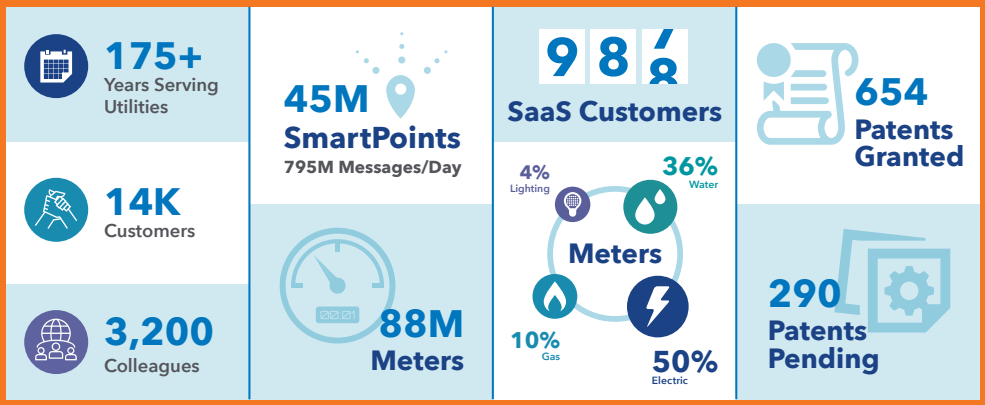
As the management and delivery of electricity changes, so do all the surrounding factors—population, consumer needs and choice, regulations and the technology landscape. So utilities must remain flexible as they implement smart grid applications.

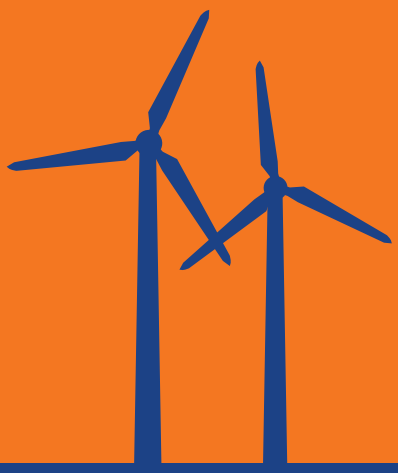
"Smart grid is continuing to evolve," O'Dell says, "and we are seeing progression from utilities as they check the 'tech' boxes of auto-billing and auto-shutoff. But the vision must now expand to include prepayment, renewables, additional storage and an overall greener perspective."

About Sensus

Sensus, a Xylem brand, helps a wide range of public service providers–from utilities to cities to industrial complexes and campuses–do more with their infrastructure to improve quality of life in their communities. We enable our customers to reach farther through the application of technology and data-driven insights that deliver efficiency and responsiveness. We partner with them to anticipate and respond to evolving business needs with innovation in sensing and communications technologies, data analytics and services. Learn more at sensus.com and follow us on Facebook, LinkedIn and Twitter through @sensusglobal.

Sensus by the numbers





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EVP-10023-03