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DISTRIBUTED INTELLIGENCE KEEPS UTILITIES IN CONTROL OF CHANGING GRIDS

By Tim Driscoll, Itron, Inc.



Harnessing operational insights is at an incredible inflection point in the utility sector. As of 2018, over half of all U.S. energy customers have a smart meter installed. The investments made in advanced metering infrastructure (AMI) have improved operations and electricity management for utilities and customers.

Yet, utilities and their customers are facing new challenges with the modernized grid. The next-generation distribution grid has upended the traditional, centralized generation and transmission network model. Today's grid has multidirectional power flows in the lower-voltage network, which is created by renewable energy such as wind and solar generation, electric vehicles, and storage systems.

Fortunately, this creates opportunities for new business models based on energy balancing, reactivity and customer

focus. Therefore, energy utilities need new tools to remain the first choice of their customers.

Utilities have one monumental advantage: distributed intelligence. Also known as edge intelligence, it extends power and control of the grid out to edge devices, rather than concentrating power and control solely in the back office.

What value does distributed intelligence provide for electric utilities? Here are three key drivers behind why utilities should take notice:

I A different operating model

The smart meter in traditional AMI applications is now an intelligent device that gives utilities network monitoring and control with real-time insights. Today, the emergence of distributed intelligence is allowing utilities to better predict and manage energy needs across the entire network in real-time. Distributed intelligence provides an unprecedented level of intelligence regarding consumers' use of electricity,



as well as monitoring and managing energy and the power grid.

The intersection of the proliferation of solar-powered electricity production and recent regulations have enabled consumers to generate their power, even allowing them to sell excess energy to consumers across the distribution grid. The shift in the production and demand model of electricity markets leaves utilities with growing responsibilities and a severe lack of funding to execute those responsibilities. The added regulatory mandates for utility companies to maintain distribution infrastructure, and the emerging transactive energy marketplace of solar-powered electricity, put the traditional utility business model in jeopardy.

As with any industry market shift, utilities will need to innovate and identify new ways to provide value to their consumers. If utilities are to survive and thrive amid these disruptive and competitive challenges, they will need to turn these challenges into business opportunities. By leveraging their “energy incumbency” and relationships with customers, utilities can remain central in an increasingly distributed and transactive grid.

Fortunately, today’s edge intelligence-enabled meters, sensors and other devices on the distribution network can communicate and manage these transactions and power flows in real-time, keeping utilities relevant and in control of their distribution systems and financial transactions.

2 Transforming customer expectations

There are three key trends in utility customer transformation: The first is that consumers expect more from companies they do business with, from shopping and entertainment to their relationships with service vendors. For utilities, this means moving away from strict pricing models, in favor of proactively offering energy savings or giving customers more of a choice in their service mix.

The second driver is competition from nontraditional players. As giant tech and communication network companies invest in the energy management space, it has become clear that their goal is to step between the utility and the customer and own the local transactions that will occur in the distributed grid. Their goal is to be the first point of contact with customers with local-market-capable technologies.

The third consumer transformation driver is the emergence of the prosumer. Consumers are owning power generation on an increasingly large scale. Also, regulatory agencies are beginning to allow distributed generators to sell their power directly to consumers. This imperils the traditional volumetric utility business model and means that utilities may be left with regulatory requirements to maintain distribution grids, without receiving any of the needed funding.

If utilities are to remain profitable and competitive, they must flip these challenges into business opportunities and leverage their “energy incumbency.” That means maintaining existing customer relationships in this increasingly distributed and transactive grid. This is yet another reason that distributed intelligence is crucial for utilities today. Edge intelligence at the meter can manage prosumer transactions and power flows in real-time. This ensures that the utility remains in control of their distribution system and any financial transactions.

3 Operational efficiency and grid stability

There are many opportunities for grid operational efficiency, but the costs to achieve these efficiencies traditionally exceed the benefits. In many cases, these improvements, particularly in the low-voltage network, would see the return on investment measured in centuries, not years.

Utilities can take advantage of distributed intelligence applications



to deliver proactive savings and environmental responsibility programs to meet customer needs. These include building specific applications to be installed at the meter that provide much more granular insights. This can include local load disaggregation-based energy audits that can identify load signatures down to the device — enabling services such as active demand response or to monitor the health of large appliances. There is even the opportunity to allow more-rapid customer communication and electricity reconnections if a consumer loses power.

While unprecedented, utilities can also address the emergence of edge transactions and solar power competition with advanced distributed intelligence applications. For example, installing a real-time market application ensures that utilities have the infrastructure and capabilities in place to manage real-time local transactions.

There are utility distributed intelligence business cases providing savings against real operating expenses that can help manage grid operations and safety. Examples include high impedance, broken neutral and theft detection, and detecting transformers that overload.

Because the cost of distributed intelligence at the edge is available for the same price as a traditional “smart” meter, these efficiencies have become practical to implement, which makes it a software change versus a complete shift in hardware.

Looking ahead

Utilities must rethink their strategies and operational approach to ensure grid stability and to meet demand from consumers. They also must address the technical and business challenges associated with distributed generation and disruptive technologies. Strategically implementing edge intelligence into distribution networks enables utilities to provide competitive differentiation and value in the energy market.

Edge processing is a hot topic and with distributed intelligence, utilities, cities and consumers alike can better manage their energy usage. The technology is being rolled out by early-adopter utilities, while other utilities are in the testing stage. There are those too that are in the early stages of understanding the ROI of this transformation on energy grids.

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