ENERGY

ELECTRICITY: PREPARE FOR CONTINUOUS DISRUPTION

Most ratepayers know little about their electricity's fuel source and have had limited ability to buy "greener" electricity from their local utilities or to bypass those utilities entirely in favor of competing providers. Digital transformation will allow commercial, industrial, *and* residential customers to shape—and increasingly control—both services and pricing. Although just beginning, the increased flexibility and functionality made possible by digital transformation, Big Data, and predictive behavioral algorithms will increasingly disrupt the production, transportation, and use of electricity, and present both extraordinary risks and opportunities to incumbent utilities, competitive suppliers, and consumers.

The last major disruption to the energy sector was in the 1990s, when some states authorized retail customers to buy power directly from competitive suppliers. Digitalization of the power grid dramatically increases the degree and variety of customer choice. In response, utilities have developed increasingly energy-efficient and reliable products and have sought regulatory approvals to capture these opportunities.

The World Economic Forum estimates that digital transformation could unlock $1.3 trillion in value through 2025. The big questions are who is best positioned to capture that value, and will they be allowed to succeed. The first is a commercial and technological question. The second is a regulatory question that has yet to be fully addressed. Regulators influence market behavior both by creating or choosing between market structures and by selecting the kinds of companies allowed to participate, as well as the products and services that could be offered in these markets. Those positioned to take advantage of digital transformation will therefore have to wage both commercial and regulatory battles to secure their success.

RISE OF THE CONSUMER TECH FIRMS

"Household-name consumer technology and e-commerce companies that possess both enormous quantities of granular customer data and sophisticated data-processing capabilities are poised to disrupt the electric power industry," says Larry Eisenstat, chair of Crowell & Moring's Energy Group. "Their competitive advantage lies not in their ability to generate electricity, but in their knowledge of customers' purchasing habits, demographics, and energy-usage patterns. They use data and software to understand and predict customer behavior and to communicate with customers—directly and in real time—by means of digital platforms (including in-home interactive personal assistant devices) as to what kind of electric service the customers want, when they want it, for what uses, in what amounts, and at what cost. Over time, this advantage will increase, particularly as the lines between federal/wholesale/transmission and state/retail/distribution services are blurred."

Initially, says Eisenstat, customers will make the decisions, but eventually companies will offer products to make decisions on behalf of customers, similar to a stockbroker with full trading authority. "These companies will continue to learn more about their customers' needs, activities, and tendencies," he says. "When are they home? What appliances do they use? How interested are they in renewables or energy efficiency? Once you know usage patterns and behaviors, you can develop the right infrastructure mix and produce targeted offers that provide value to the customer and profits to the company."

Using Big Data, a provider could combine customer-specific home information, smart meter data, and predictive analytics to offer a fixed price for electricity—with discounts for energy conservation. It could notify customers that a dishwasher is inefficient, for example, guarantee that a new machine would save a set amount on their electricity bills, and sell them that appliance.

Delivering on solutions like these may require collaboration. For example, German power supplier E.ON teamed up with Microsoft to develop an AI-powered smart home platform to manage everything that uses electricity (appliances, solar panels, cars, etc.) and to optimize the levels of self-generated electricity versus "excess" electricity market sales.

The winners in consumer-facing energy technology will offer solutions without requiring the consumer to have any technical know-how, Eisenstat says, by making strategic use of consumer data. "These technologies will tell you how to manage your energy better," he says. "They'll do it automatically, using algorithms and predictive analytics. And they can sell you the right supply mix, services, and equipment."

OUT ON THE EDGE

Big Data is being used to integrate distribution systems whose inputs include traditional central-station power delivered over the interstate transmission system and a plethora of so-called distributed energy resources, including everything from rooftop solar arrays and other customer-owned "micro" generators to energy storage and electric vehicles.

Digitalization and data analytics are keys to optimizing

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electricity production and consumption, Eisenstat says, and could reduce grid reliance on older, less efficient power plants to meet "peak" energy demand. Digitally integrating distributed energy resources (including storage) can defer or avoid capital expenditures on new peaking plants and transmission lines. For example, he observes, a smarter energy grid would obviate much of the need for constructing large gas plants to firm up intermittent renewable power resources such as wind and solar.

A connected, efficient, and decentralized grid (aka the "energy internet") has the potential to be more stable and less vulnerable to terrorism or natural disasters. Power plant owners could also extend assets through smart-grid strategies, including predictive maintenance. For example, GE's new "Forever Turbine" initiative combines computer simulation, artificial intelligence, and 3-D printing to extend the useful life of its turbines decades beyond their current projected useful life of 30 years. The World Economic Forum estimates that digitizing asset lifecycle management could create $480 million in value through 2025.

WHO WILL WIN?

Transformation of the electric grid, when combined with customer expectations, is a recipe for industry disruption, particularly where that industry is heavily regulated, highly interdependent, and in many areas dominated by large utilities. Eisenstat believes that, as in the mid-1980s, when competitive power was in its infancy, fighting for the right to compete against incumbent utilities, the electricity sector is again at an inflection point. Issues pertaining to ownership and control of the electricity delivery system, the types of infrastructure and technology required to power that system, the rules regarding customer and competitive access, and the creation and pricing of new products and service offerings will again be hotly contested. The outcome of this inevitable conflict between incumbents and disruptors again will determine who captures the lion's share of market opportunities.

"Who should own the solar panels, the charging stations, the smart meters?" Eisenstat asks. "Competitive suppliers? Incumbent utilities? Should incumbent utilities be limited to providing the conduit to the customer? What will the customer be able to control directly?" These are just some of the things that regulators must figure out.

Ownership and control of customer data is another key issue. While utilities have the most direct access to customer usage data, that doesn't mean they should be the only party that can utilize it. What rights do customers have to this data? What rights should third-party companies have? How should privacy and cybersecurity considerations factor into decisions about control or distribution of such data? Eisenstat says that "while regulators must ensure a level playing field, not all competitive providers are necessarily entitled to receive all customer-related data in a utility's possession. They shouldn't be allowed to access a utility's information system without agreeing to abide by cybersecurity protocols designed to protect that system from third-party intrusions. However, regulators must also ensure that these protections don't themselves unreasonably restrict competitive entry."

Regulators are grappling with such questions in both federal and state markets. Eisenstat points to hearings conducted as part of New York's statewide energy strategy, dubbed "Reforming the Energy Vision." Discussions are also occurring in California and Maryland, among other states, and he believes still more states—and the federal government—will explore these questions.

Incumbent utility companies start with an advantage in these discussions because they are known to the regulators, have political firepower, and traditionally roll their equipment and advocacy costs into base rates. Nevertheless, Eisenstat says, all stakeholders, especially new electricity sector companies, should do more than monitor or react to regulatory proceedings. "The new players, in particular, must proactively propose and advocate for regulatory regimes that catalyze the digital transformation of the electricity sector," he says.

KEY POINTS

Customers Rule

Consumer technology companies are poised to capture value in a disrupted energy sector.

Grid Optimization

Digital transformation will optimize grid usage and defer or eliminate the need for costly new infrastructure.