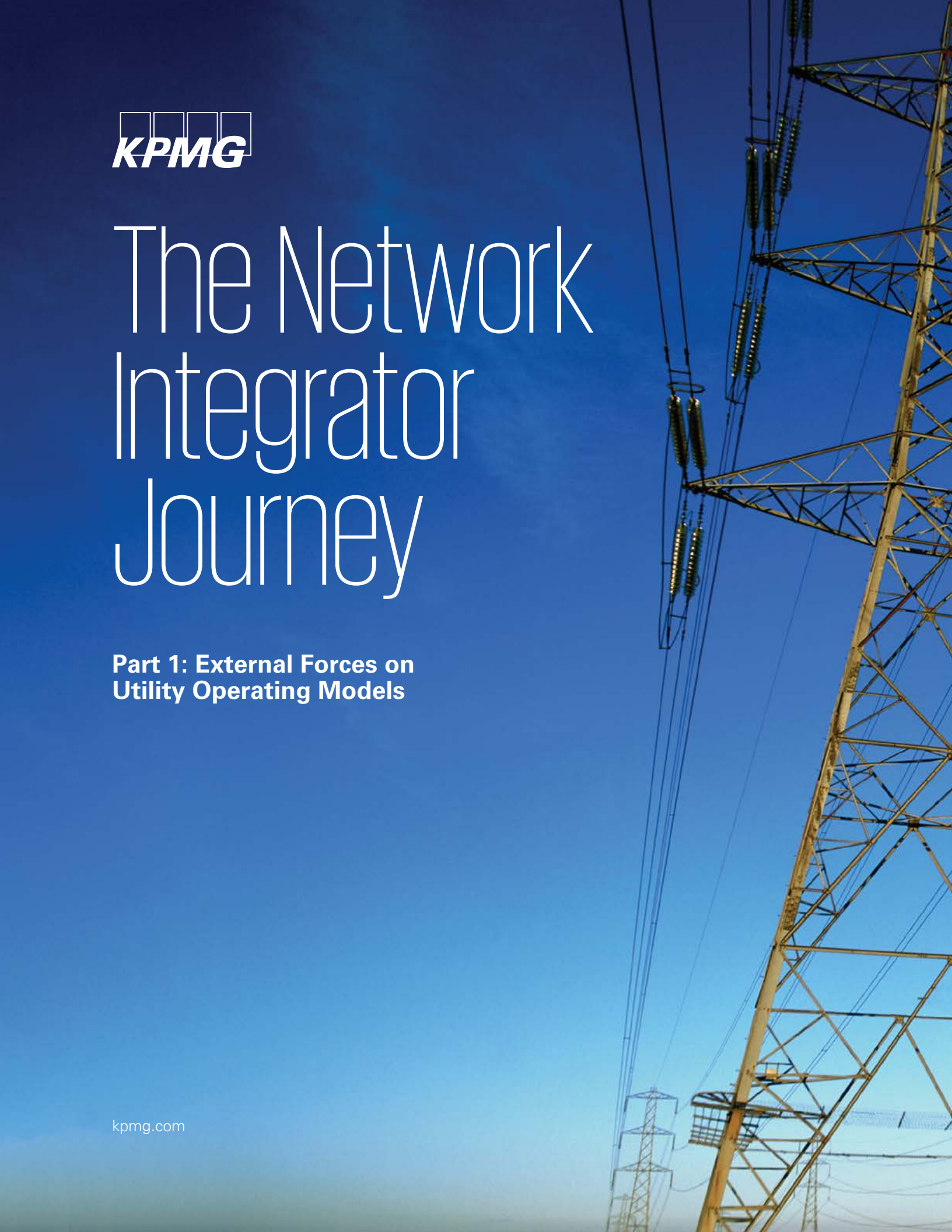

KPMG

The Network Integrator Journey

Part 1: External Forces on Utility Operating Models

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The value chain is evolving

The traditional energy value chain led to the business and operating characteristics of the current electric distribution company. There was a single flow of energy with suppliers providing resources to meet demand and create value, independent of customer behavior or choice. There was a limited amount of information sharing through the energy chain, leading to the utility managing all aspects of the customer relationship and focusing on internal, and often siloed, data to manage operations.

This three-part series explores the journey from a traditional distribution utility to a Network Integrator. In this first part, we discuss how industry changes continue to impact utility operating models.

As new entrants join the market, the value chain has evolved to support the two-way flow of both energy and information that requires more sophisticated integrated planning techniques to support resource and load shaping and balancing throughout the system. This two-way flow is causing power distribution leaders to rethink how to support and influence enterprise value decisions through a more closely-linked supplier, service provider, and customer process. The emerging value chain includes varying degrees of integrating distributed energy resources (DER), micro-grids, supply and customer-side renewable energy aspirations, and new product and service providers.

Technology and regulatory action are key driving forces

Two key forces are driving the emerging value chain are technology changes and regulatory pressures.

Technology and foundational information infrastructure

Technology advances within the past several years, particularly when combined with communication and information infrastructures, have been a primary driver in altering the value chain. For example, smart meters were deployed largely to reduce meter reading costs, but these devices also provide customer usage data in near real-time that can support better outage detection and response, innovative demand response programs, and faster integration of retail energy products and services.

Foundational information architecture has been evolving, including smart grid communication networks and advanced grid applications, and is driving the pace of evolution toward the emerging value chain. The communication networks are critical for data collection, monitoring, and control, and integration with customers, suppliers, and markets. Utilities have been expanding their networks to achieve the breadth, reliability, and latency required for advanced applications that help make sense of the new data.

These foundational capabilities require new investment and business cases on which utilities, regulators, and customers must work together during planning. The GridWise Alliance, an organization that represents a broad range of the energy supply chain, states in their third annual Grid Modernization Index report "Without a number of foundational capabilities for modernizing the grid in place, many states are not well positioned for the added diversity

that energy systems will see in the coming years from the growth of distributed generation, storage, microgrids, grid-connected electric vehicles (EVs), and other elements. Without offering pricing incentives, for example, utilities are unlikely to see beneficial customer behavior changes, such as reductions in energy consumption during peak demand periods."[1]

Regulatory and legislative pressures

While the two can sometimes conflict, there is no doubt that state or federal involvement within the industry is also driving changes in the value chain. For example, the Environmental Protection Agency's (EPA) Clean Power Plan[2] (CPP) has prompted more emphasis on coal-fired plant emission reductions, impacting wholesale markets and supply side planning. The Department of Energy (DOE) continues to promote research and development (R&D) in grid modernization, having recently announced an award of up to $220million for 88 "innovative and cross cutting R&D grid technology projects" in coordination with public and private sector partners.[3] Individual state renewable mandates across the country have also increased pressure to invest in utility-scale renewable projects.[4] These types of efforts introduce new players, business opportunities, and integration points into the value chain.

Most importantly, we are seeing an increased recognition by states to change the traditional utility business models to reflect a more customer-choice oriented view. This view promotes the use of a portfolio of Distributed Energy Resources (DERs), empowering customers to optimize electric usage while stimulating new product and service growth. For example, the New York State Public Service Commission approved Gov. Andrew Cuomo's 10-year, $5 billion Clean Energy Fund to support the governor's proposed mandate for utilities to generate 50% of their electricity from renewables by 2030. The commission also approved the governor's proposals for utilities to develop new energy efficiency programs, establish a cost benefit analysis framework to evaluate energy projects, and include existing nuclear power in the proposed clean energy standard.[5] Innovative network rate models, termed the RIIO, have been established in the United Kingdom. The RIIO performance-based model is designed to reward network companies for innovative cost reduction, incorporating environmentally sound low carbon objectives and including all stakeholders in the decision making process.[6]

However, the regulatory climate has also become more contentious in some states given that traditional rate-making policies can threaten utility revenue streams in terms of net-metering and retail rate design. Commercial and industrial customers have had the advantage of being early adopters by working with third parties to deploy DERs, particularly solar.[7] Those efforts have helped prove the business case and allow the market to expand to residential. Many states embraced retail customer DER solutions through pilot programs. These solutions are becoming more prevalent as solar technology and battery storage costs decrease and third-party competition for providing these services increases. Some states are attempting to change rate policies to be more reflective of incremental cost-of-service tariffs that reduce the perceived credits available to solar owners and limit the basic subsidies paid by non-solar owners under traditional rate-making.[8] For example, New Hampshire lawmakers are considering legislation to review established solar policies for prior customer participation limits and new net-metering rate structures.[9] California utilities are contending recent administrative law judge rulings to keep net-metering structures in place.[10]

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1 3rd Annual Grid Modernization Index, GridWise Alliance, January 2016, page 15.

2 The Supreme Court recently issued a "stay" of the EPA CPP rules effective February 10, 2016

3 "DOE releases new blueprint for grid modernization", SmartGrid Today, January 18, 2016

4 The Energy Information Association (EIA) predicts that utility-scale renewable projects will account for 14% of U.S. electric generation in 2016.

5 SNL Financial news article, January 22, 2016

6 See www.ofgen.gov.uk for more information regarding network regulation and the RIIO model

7 For example, Whole Foods announced a program to install rooftop solar units on 100 stores and distribution centers in partnership with NRG Energy and Solar City – Energy Central article, March 8, 2016.

8 The Public Utilities Commission of Nevada recently established new net-metering tariffs – Energy Central article, "Cloudy Forecast: Nevada solar rulings spur concerns about chilling effect on investment", January 22, 2016

9 Energy Central article, "Officials: Net metering plan vital to 8.5 megawatt solar plan", February 29, 2016

10 Energy Central article, "Solar groups claim Calif. Utilities want to derail PUC move to keep net metering", January 22, 2016

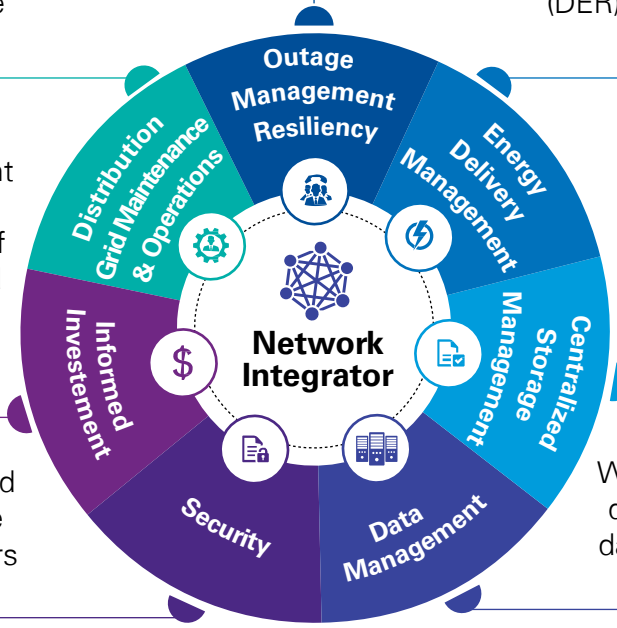
These changes are confirming the utility's Network Integrator Role

These changes confirm our view that utilities will evolve into Network Integrators, as depicted in the following diagram. While the transformed distribution utility will continue to perform many of the same functions, they will also need to serve as air traffic controllers, coordinating all of the participants in the value chain.

Will perform functions to support proactive and predictive outage management across the low voltage network, disaster planning and recovery, critical event management, and other activities related to outage restorations

Will serve as the primary owner and operator of distribution infrastructure, and will manage asset optimization across the distribution network

Will assume a greater role in managing the dispatch of distributed energy resources (DER), in effect functioning as local ISOs or RTOs



Will be responsible for the development of an investment plan for the distribution grid, they will navigate the array of distribution technologies and strategies available to make informed, cost-effective resource planning decisions

Will manage the dispatch of storage resources at the substation level and the storage markets that may arise

Will aggregate intelligence and effective collaborate with the public and private sector actors to minimize security threats

Will collect, analyze, and deploy distribution grid data for improved stake-holder engagement

As Network Integrators, utilities will need to rethink their decision models because they will be delivering value at different points within the system and customer environments. For example:

- **System Supply**. Utility-scale renewables will become more pervasive, requiring utilities to invest in the processes and infrastructure to monitor supply levels and safely integrate the most efficient load into the grid.
- **Market/Wholesale**. Distributed Energy Resources (DERs) will require utilities to build the models to identify, manage, and dispatch load from other providers, in addition to billing for those services.
- **Customer**. The customer-side interface with the distribution system will become the ultimate driver of strategic investment and the development of operations and infrastructure. Customer requirements not only for electricity but also for the power to engage new products and services will be more predominant. The future utility will shift its thinking from serving ratepayers toward coordinating services for energy customers.

Expand on Part 1: External forces on utility operating models by viewing this video.

About the GEI

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