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The battle for growth

Establishing a decentralized Power & Utilities market

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Meet the authors

Todd Durocher

Principal, Advisory

Todd, a principal in KPMG's Power & Utilities Management Consulting practice, has more than 20 years of consulting, business transformation, strategy, planning, and program management experience. He is passionate about working in the rapidly transforming power and utilities industry as it evolves into a more dynamic technology-led industry with diverse market participants. He works with utility executives and leaders throughout the world with strategy, transformation, and technology projects related to grid modernization, utility operations, metering and billing, and customer operations. In addition, he is excited to lead KPMG's Agile Utility thought leadership development around the Network Integrator platform.

Kelly Stephenson

Director, Advisory

Kelly partners with power and utilities (P&U) clients to develop and enable operations and technology strategies, and helps them to lead complex transformation programs. He works with client executives and leaders to identify organizational, process, and technology solutions to address disruptive forces impacting companies across the P&U sector. In his more than 15 years of consulting and industry experience, Kelly has supported clients to define strategy and improve performance in key business-line functions, such as customer experience, meter-to-cash, retail operations, market settlement, transmission and distribution operations and gas operations, as well as back-office functions, including finance and accounting, IT, HR, internal audit, and supply chain.

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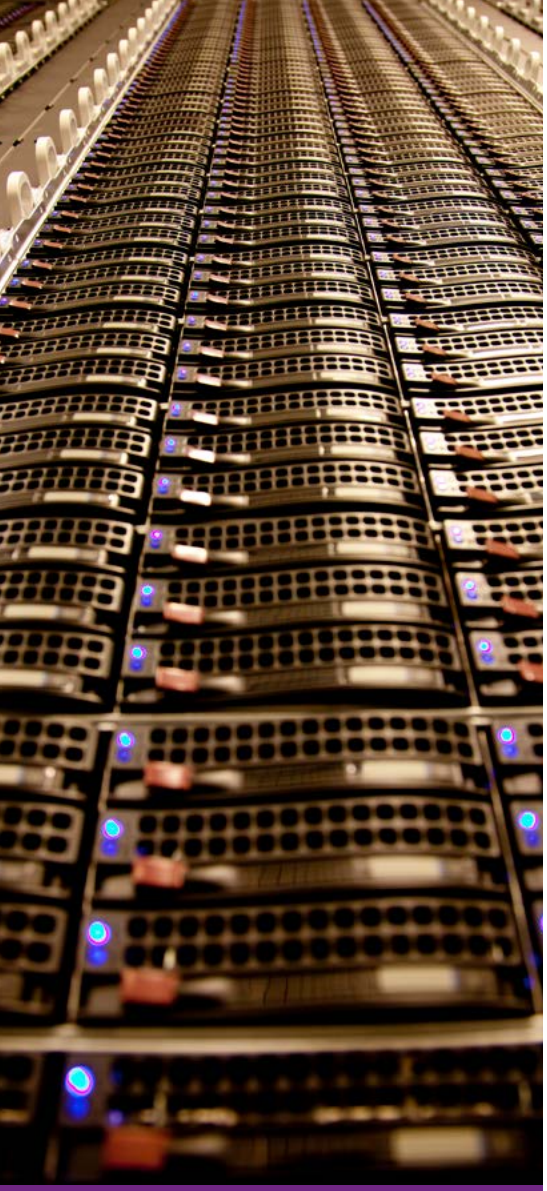

A new industry reality

Fundamentally, not a lot has changed since Edison first began generating and supplying electric power to fewer than 100 customers in lower Manhattan in 1882. Electricity continues to be generated in centralized power plants, moves along high-voltage transmission systems, and comes off the grid at distribution substations, which deliver it to local homes and businesses. Aside from pricing, there has been little room for consumer choice or provider innovation. That's all changing. With the emergence of alternative energy resources, a regulatory shift toward reliability and resiliency, and the influx of nontraditional players offering customized products, services, and experiences, a new industry reality has become apparent.

A next-generation power network

In previous reports, we suggested that, at the center of this new model, would be a transformed "utility of the future"—a Network Integrator. This transformation has been well underway worldwide from an infrastructure and operations perspective for more than a decade.

A confluence of disruptive forces is driving the evolution of electricity distribution companies from a reactive focus on relevance and survival toward a proactive effort to add value to customers and spur growth. Among the greatest disruptors are advancements in, and the deployment and utilization of, new information and operational technologies, among them real-time data provided by the Internet of Things, the improved insights and automation produced through artificial intelligence, and centralized efficiencies offered by blockchain.

In this developing scenario, the Network Integrator does not merely distribute electricity as a commodity, but enables the hub of a tailored ecosystem of energy products and services, synchronizing the efforts and activities of various stakeholders. As they solidify their infrastructure and restructure operations, distribution companies can move toward selling—or enabling others to sell—differentiated products. Establishing a tangible, next-generation energy market adds value and grows revenue, even if load continues to decrease.

The Network Integrator function is anchored by traditional utility experience in grid operations and maintenance, and is the driver and enabler of new energy markets, standardization, resiliency, reliability, and centralized management of the distribution grid.

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An evolving industry model

We believe the industry dynamic has transitioned to a battle for growth—one that is being waged between companies, as well as inwardly within the individual enterprises, as they work to enhance their capabilities and adjust mindsets.

For distribution companies that aspire to become a true Network Integrator, it's about identifying the needs of their customers, establishing a relevant brand promise on which they can realistically deliver, and defining the parameters of the market.

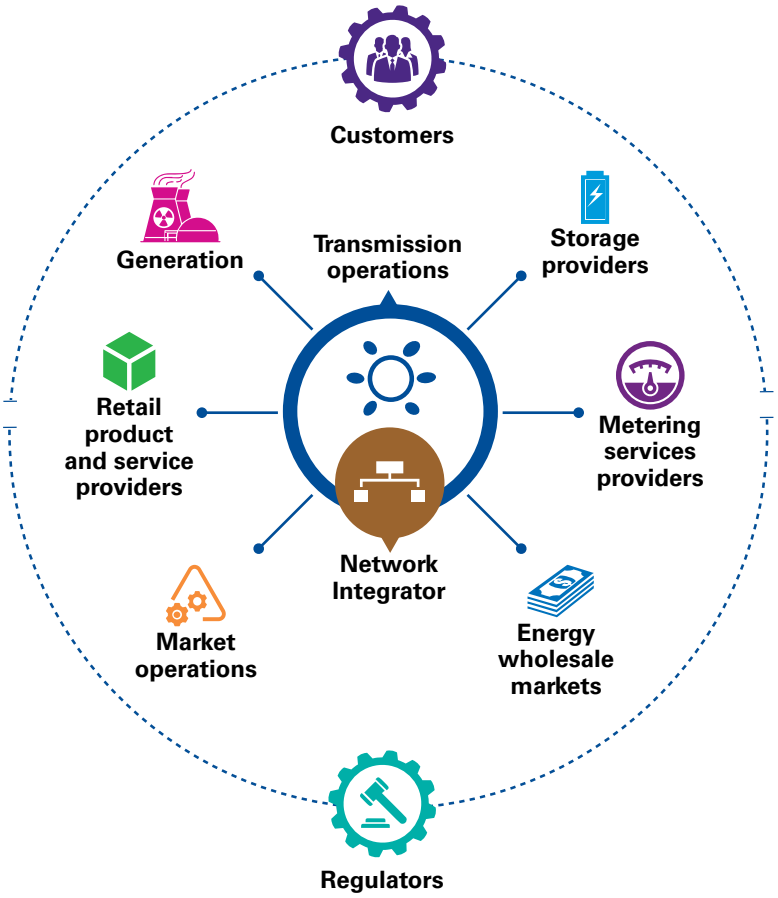
Customers
Consumers of power as a commodity, as well as new product and service offerings from retail providers

Generation
Including traditional, renewable grid-level, distributed generation, customer generation

Retail product and service providers
Marketers and sellers of power as a commodity, as well as "new" products and services

Market operations
Traditional ISOs and RTOs that manage grid interconnections, and perform energy market settlement and other activities

Network Integrator
The "transformed" distribution utility that will serve as the integrator of the diverse mix of generation entities, transmission entities, and retail and customer demand



Transmission operations
Traditional high-voltage, interstate transmission grid operator

Storage providers
Both grid-level and local storage, such as battery, compressed air, thermal, and other storage technologies

Metering services providers
Including metering and device maintenance, service connects and disconnects, and meter data storage and analytics

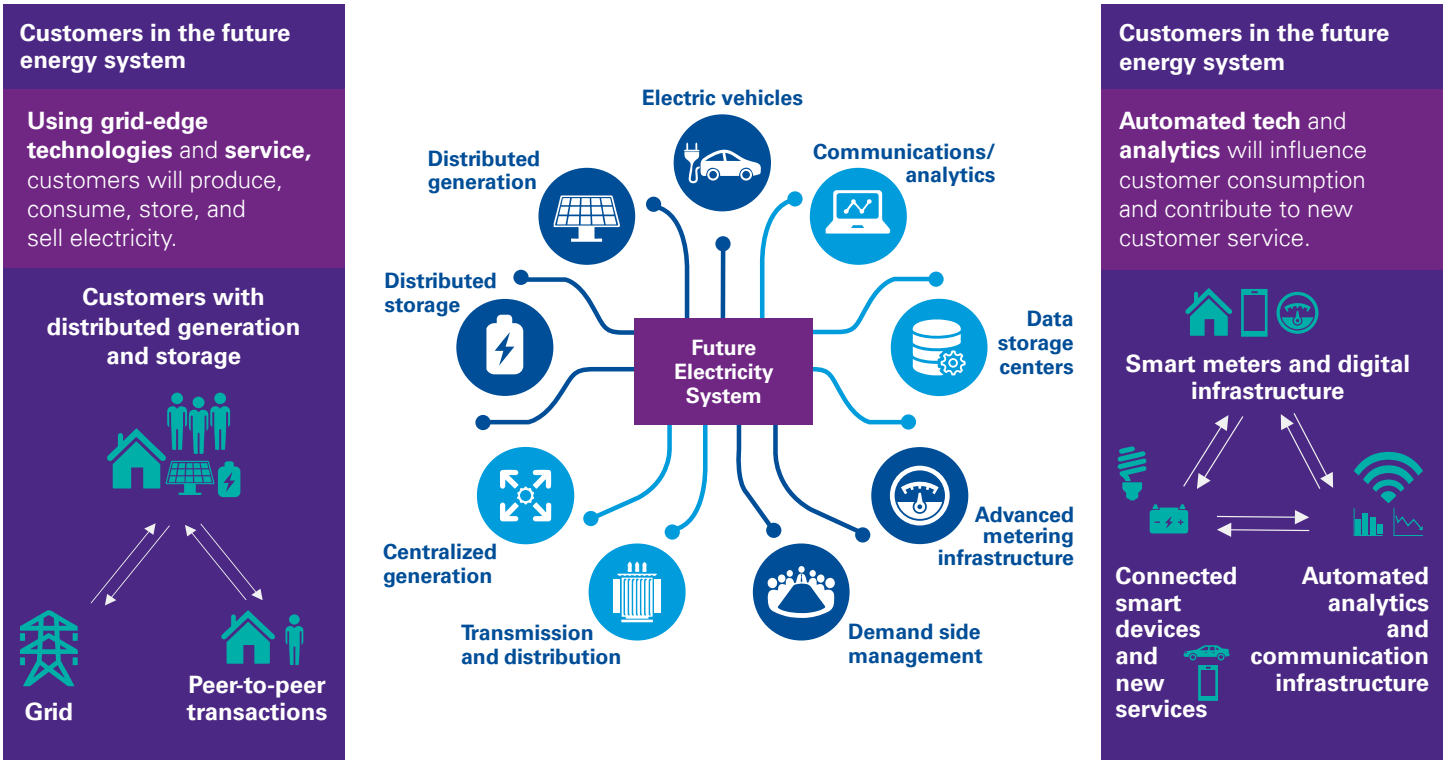
Energy wholesale markets
Including wholesale operators, utility traders, investment banks, and financial traders that participate in energy markets

Regulators
Government regulatory commissions, inclusive of new or transformed regulatory bodies at the federal, regional, and state level

Building blocks of a customer preference platform

Future energy systems will drive innovation in this emerging ecosystem.
Facilitating transactions between customers, enablement of storage and distributed generation, operation of a digital economy, overall grid automation, and enhanced data collection and analysis are among the ways traditional utilities can become the hub of this new system. Network Integrators that develop and enable this platform will be positioned to grow their offerings, transform their brand, and facilitate the evolving energy ecosystem, thereby creating a mechanism for growth.

The future of electricity distribution



World Economic Forum, "The Future of Electricity: New Technologies Transforming the Grid Edge" (March 2017).

In this scenario, the Network Integrator will enable the customer to choose suppliers, products, and services based on their personal needs, priorities, and experiences, creating a preference-based market. The challenge will be not only creating this market, but also reinforcing it and marketing it as an element of the brand.

The new energy platform

Infrastructure

Envision this new system as an interconnected, multi-tiered platform. The base of this platform, infrastructure, enables companies to operate a robust and reliable grid. From a technology perspective, connectivity will be enhanced by the Internet of Things—real-time metering, smart sensors, theft/leakage detectors—which integrates the physical and digital worlds to produce insight-laden data. For example, advanced distribution management systems, powered by Internet-enabled devices, can provide greater advance notice of outage events, fleet issues, equipment failure, and other critical events.

Operations

Network Integrators must be both effective and cost efficient to deliver power where, when and how customers want it. As such, operations is at the heart of this system. The enabling technology of the new energy platform will be artificial intelligence—machine learning, natural language processing, cognitive computing—which can facilitate pattern recognition, search, inference, and planning. When the network evolves to a point where participants can be both consumers and producers we will need a way to manage those peer-to-peer financial connections, as well as balance the network.

Marketplace

It is within the top tier of the platform where a new energy marketplace is forming and where the utility of the future truly distinguishes itself through a mix of offerings such as ancillary services, transactional administration, market enablement, and management of customer preferences. In the new marketplace—which can only occur if infrastructure and operations are solid—Network Integrators must be prepared to help customers identify and select their preferences. From equipping their homes with renewable energy solutions, electric vehicle charging, and storage products to managing peer-to-peer settlement and new kinds of energy transactions, the new market will be enabled by über-efficiency and blockchain technology.

As energy needs and products and services evolve, it is clear that engineers and planners with a clean slate would likely design a different power grid, characterized by distributed generation, storage, and virtual components, etc. However, considering the evolution of the power grid prior to the introduction of many of the new innovative technologies, utilities should leverage the current infrastructure to most effectively enable customers to access the products and services they desire.

Functional building blocks	Enabling technologies
Infrastructure — Real-time grid balancing — Smart metering — Robust & reliable grid — Advanced distribution and DG management systems.	**Internet of Things** — Increased grid transparency — Real-time data.
Operations — EV infrastructure — Dynamic settlements — Centralized grid management, asset management, and optimization.	**Artificial Intelligence** — Machine learning for improved insights and efficiency.
Marketplace — Market enablement — Distributed ledger — Customer preferences — Transaction management — Ancillary services.	**Blockchain and market platform** — Secure and efficient transactions — Centralized market enablement platform.

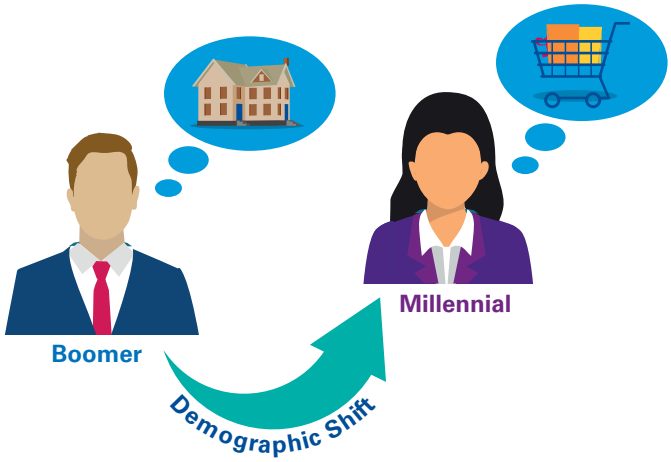
It's all about the customer

Consumers are more engaged, demanding, and connected than ever before, and they clearly are looking beyond merely "keeping the lights on." In today's technology-based business environment, utilities functioning—or seeking to function—as Network Integrators must not only embrace, but progress digital transformation. That means actively managing the customer experience and working to meet increased expectations for better information, a broader portfolio of services, flexible pricing, and improved responsiveness.

How can Network Integrators improve the customer experience and increase and maintain customer loyalty?

Get inside the demographic dynamic

Today's utility customers are changing based on demographic shifts, particularly among the two largest generations, as millennials enter their prime spending years and baby boomers downsize and retire. Both shifts will continue to impact the utility industry, in terms of both the volume demand for power, and how that power is delivered.



Regardless of their priorities—from maximizing their access to energy and flexible pricing to near-perpetual connectivity and socially conscious energy consumption—consumer expectations are ever evolving and are tightly aligned with demographics, a reality Network Integrators must grasp and leverage. Consumers are demanding experiences that involve minimal time and effort, meet their fluid expectations, demonstrate integrity, empathy, and authenticity, achieve resolution quickly, and are personalized.

Measure customer profitability

As in the old fairy tale, "Goldilocks and the Three Bears," satisfying the customer entails the challenge of getting the experience "just right." Mitigating the risks of overserving or underserving customers includes an accurate understanding of the financial and emotional ramifications inherent in managing the customer experience. These costs can be influenced by many factors—service and support, perceived quality, access, and reputation, to name a few. Utilities that get it right consistently will see their perception evolve beyond commodity status and earn the right to up-sell, cross-sell, or partner with customers on new product and service offerings—and the associated higher margins—from which they might otherwise be excluded.

Collect, study, translate data

In this new market, Network Integrators must be adept at analyzing customer data gathered from the Internet of Things-powered smart devices and extracting insights that inform action. Forward-thinking utilities are developing connected customer enterprises (CCE) that incorporate advanced data and analytics in an effort to reach customers wherever they are. Utilities that develop effective CCEs integrate information from both online and offline customer interactions and data; implement innovative customer-centric tools and services; and leverage data for real-time, personalized interactions and ongoing messaging. In addition, these utilities leverage customer-focused marketing metrics, such as customer lifetime value and customer effort scoring, to learn more about how they can continue to upgrade their offerings.

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Potential speed bumps

While many utilities enjoy several strategic advantages, such as long operating histories, established assets and resources, and existing customer relationships, the developing Network Integrator model presents several key challenges:

Regulatory roadblocks

The intersecting disruptions in generation, storage, enabling technologies, and customer demands have created an industry environment that is evolving faster than adequate regulatory changes can take place. It has got to be a two-way street, a partnership. Growth and investment is problematic without a clear understanding of future cost recovery structures, who the key stakeholders will be, and the technologies that will emerge as leaders. It's not about a specific rate case, it's about the framework of the utility/regulator partnership that will enable the industry to adapt to new thinking quickly, and provide incentives for utilities to invest for innovation.

Reliability and security

As more distributed energy resources connect to the grid, the potential for outage and security events grows, raising the question of accountability. Consider a single grid with a single operator—a cyber threat can take down the entire operation. Conversely, if that grid has 100 or 1,000 operators and 10,000 people with access to the network through their various devices and systems, every one of those connections poses a vulnerability. How do utilities navigate that world? How do we keep it reliable? The market will demand fewer points of failure, with greater control. Network Integrators will need advanced capabilities for managing the resiliency and both physical and cyber security of the grid, and for providing sufficient assurances to regulators and customers alike.

Perception of power

As we said earlier, many consumers view power as a commodity. Consumers tend not to view availability as a concern, but as recent natural disasters have illustrated, access to power can be threatened with little notice. The evolving, decentralized grid will require and facilitate a change in that perception. In this new marketplace, Network Integrators need to create a brand positioning defined by the value they provide. Ideally, the consumer should connect the power company with the ability to use their devices, drive electric vehicles, use clean power, and enable other lifestyle choices. If current thinking can be successfully changed, power utilities may see an evolution similar to the telecom industry, which moved beyond the perception of simply a phone on the wall. In this scenario, utilities have the opportunity to evolve beyond the on/off switch.

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Real-world use cases

A number of companies worldwide are exploring a broad array of disruptive technologies and new approaches as they seek to become "utilities of the future." These forward-looking companies are working to change the perception of power from commodity to value. Across the sector new players are challenging business models by leveraging data analytics, artificial intelligence, the internet of things, cloud solutions, and the digitization of processes, among other strategies. Here are a few examples:

Market enablement

Australian global energy-tech company GreenSync recently separated 16 homes from the main electricity grid in Victoria, one of the country's most densely populated regions. The homes, including three that had neither solar nor batteries, were able to maintain power by sharing the electricity generated by a self-contained community mini grid, essentially becoming a market unto themselves.

Electric vehicle infrastructure

California's Public Utilities Commission last year approved plans for three of the state's largest utilities—Pacific Gas and Electric, Southern California Edison and San Diego Gas and Electric—to build more than 12,500 electric vehicle charging stations for $200 million.

Real-time grid balancing

DeepMind, the Google-owned artificial intelligence startup, is working with the UK's National Grid to predict supply and demand peaks in the UK using weather-related variables and smart meters as exogenous inputs. The goal is to cut national energy usage by 10 percent and maximize the use of renewable power.

Action plan

What are the key steps for evolving Network Integrators? We see two sets of action items:

Foundational—the "table stakes"

1. **Invest in infrastructure-related technologies**
Keep infrastructure top of mind by devoting budget to technologies such as ADMS, intelligent automation, asset optimization, advanced grid sensors, and enhanced analytics. As the speed at which these tools can supply data ramps up, the closer distribution companies will get to actionable insights in real time.

2. **Strengthen core infrastructure and operations**
You can never spend enough on operations, asset management, and administration of the network. No matter how things play out, these are elemental to satisfying reliability, resiliency, and safety standards. Furthermore, they are necessary to support future energy delivery requirements.

3. **Decrease overall customer costs**
Cost of service for customers has been steadily rising. Utilities must focus on operating more effectively to stabilize and lower customer costs. New technologies like blockchain are helping utilities increase efficiencies, which will help improve service—this is vital in a marketplace that is increasingly value driven.

4. **Simplify rate structures**
Distribution charges are historically aligned with customer consumption. But is consumption really a fair measure of a customer's cost to the utility? With behind-the-meter distributed generation and storage growing more prevalent, opportunities arise to explore rate structures based more on the infrastructure required to support the customer as a fixed rate regardless of the energy flow. Also, while rates likely will remain within a regulated structure, future ancillary and optional services could fall under a deregulated structure. This could enable distribution companies to provide greater customer optionality, thus increasing revenues and enhancing shareholder return on investment ROI.

Strategic—the "big bets"

1. **Evaluate disrupted markets**
Network Integrators would be wise to study industries that have already experienced strong disruption—such as telecommunications, transportation, and others—and learn how successful companies have evolved in terms of competitive position, pricing, talent and turnover, etc., and leverage those lessons to drive their own growth.

2. **Pilot new enabling technologies**
Seeking to create consortiums with other organizations in the network, including universities, product companies, start-ups, and other utilities, to test innovative technologies such as new smart devices and blockchain is another interesting concept we expect to see gain traction sooner, rather than later. These connections will help determine which ideas can be most effective for optimizing power usage, grid automation, peer-to-peer communications, and market enablement.

3. **Partner with regulators**
Working with regulators to progress the industry and build a market seems antithetical. However, utilities need to continue to build good relationships with regulators to facilitate the market restructuring that will enable customer choice for rates, renewables, storage, load sharing and other new developments.

4. **Develop a road map**
Whether you call it "vision" or strategic planning, Network Integrators must have a clear idea of where they want to go and how they are going to get there. So many companies, from senior management on down, can't outline the overall strategy for building the new marketplace and growing their business. All the touchpoints—generation, transmission, distribution, storage, metering, and everything in between—need to be documented, so the entire organization knows what to invest in, what to prioritize, and what standards to adhere to. This attention to detail is the only way to empower the consumer and ensure safety, security, reliability, and resilience.

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Moving forward

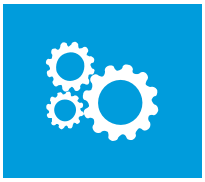
The plan for solidifying a decentralized, next-gen market for growth is not intended to be a 10- or 20-year plan—we believe this could occur over the next few years. It's about recognizing the inevitable changes in the P&U industry and responding progressively and productively.

Much like with personal items, such as shoes or medical care, customers want to buy from a provider who can tailor the product or service to their particular needs, and at the right price. Moving from power as a commodity to enabling a differentiated product marketplace is the context for the next phase of the power and utility industry's battle for growth.

New sources of value for the P&U sector

These are the technology-enabled building blocks that connect all stakeholders across this integrated market.

Growth
- New customer markets
- New products and services
- New brand and value



Services
- Providing other energy products (e.g., electric vehicles, backup power, balancing, product insurance, etc.)
- Connectivity of suppliers and consumers
- Satisfying new customer demands

Revenue builders
- Market transaction fees
- Ancillary service fees
- Product commissions
- Data services

Rate structures
- Infrastructure treated as fixed cost and standardized rate structure
- Transaction rates
- Ancillary rates

Other
- New perceived value for the distribution company in the energy value chain
- Centralized asset management and optimization
- Greater efficiencies by enabling new products, services, and technologies.

How KPMG can help

At KPMG, our team of 700 Power & Utilities experts advise across a broad-spectrum of issues. From M&A in the renewables sector to traditional utility companies, our solutions deliver today, while anticipating the challenges of tomorrow. Our dedicated team of consultants can help your organization with program transformation, supply chain strategy, data analysis and workforce optimization. From smart metering roll out planning, to understanding legislation and incentives for renewable energies, our integrated services will help you distinguish the opportunities from the obstacles.

KPMG Global Energy Institute

The KPMG Global Energy Institute (GEI) is a global knowledge-sharing forum on current and emerging industry issues. Our team of P&U specialists in member firms around the world can help your organization with program transformation, supply chain strategy, data analysis, and workforce optimization. From customer experience strategy, to smart metering rollout planning, to understanding legislation and incentives for renewable energies, our member firms' integrated services can help you distinguish the opportunities from the obstacles.

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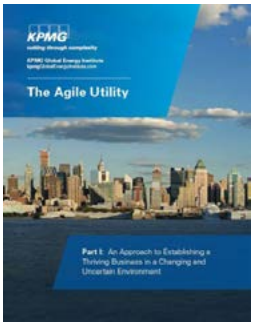
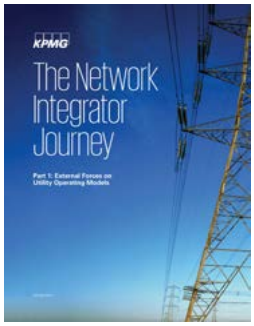
Additional resources

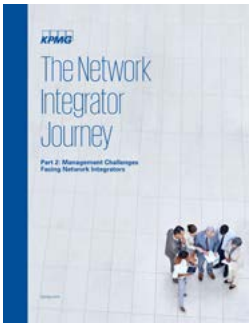


The Agile Utility

The Utility as the Network Integrator



The Network Integrator Journey, Part 1: External Forces



The Network Integrator Journey, Part 2: Management Challenges

The Network Integrator Journey, Part 3: Planning Framework

Winning the race for the customer

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