

Strategies and Business Models for the Energy Cloud

By **MACKINNON LAWRENCE** and **JAN VRINS**

As the energy grid transforms into a cleaner, more distributed, ever-more intelligent, and increasingly mobile infrastructure, additional opportunities for capital-efficient and customer-centric products and services are emerging. Evolving customer demand, technology innovations, and the rollout of progressive policies and regulation across the electric power industry all indicate that this transformation already is well underway.

At the outskirts of the energy grid, service-based and network-orchestrator business models across fast-emerging combination technology platforms have the potential to scale faster and to yield greater profit margins than the traditional asset-focused and supply models that currently dominate the industry. How can electric companies capitalize on the opportunities offered by these changes? What business models should they pursue to best meet the needs of customers?

Customer-Centricity and the Energy Cloud

With customers sitting at the heart of the electric power industry's transformation, the future will look very different than today's reality. In one scenario, Navigant forecasts that:

- Investment in customer-centric technologies will triple by 2030.

- Large-scale and distributed renewables will account for 50 percent to 100 percent of generation, with electric vehicles (EVs) representing more than 200 terrawatt-hours of load globally.
- The industry will undergo a significant digital transformation in which data, artificial intelligence (AI), the Internet of Things (IoT), and blockchain-enabled networks will become important competitive differentiators.
- Ubiquitous AI and communications infrastructure will transform energy grids into autonomous and self-healing networks that integrate clean, distributed, intelligent, and mobile energy while enhancing safety, reliability, and affordability.
- Network orchestrators, energy service providers, and "prosumers" will emerge as active stakeholders, further enhancing the value of the energy grid.
- Electric company business models will transform from bulk-asset and supply-based solutions to individualized service- and network-based solutions that are more attuned to customers' shifting demands.
- Markets, especially retail, will be far more competitive. Picture an "energy cloud":

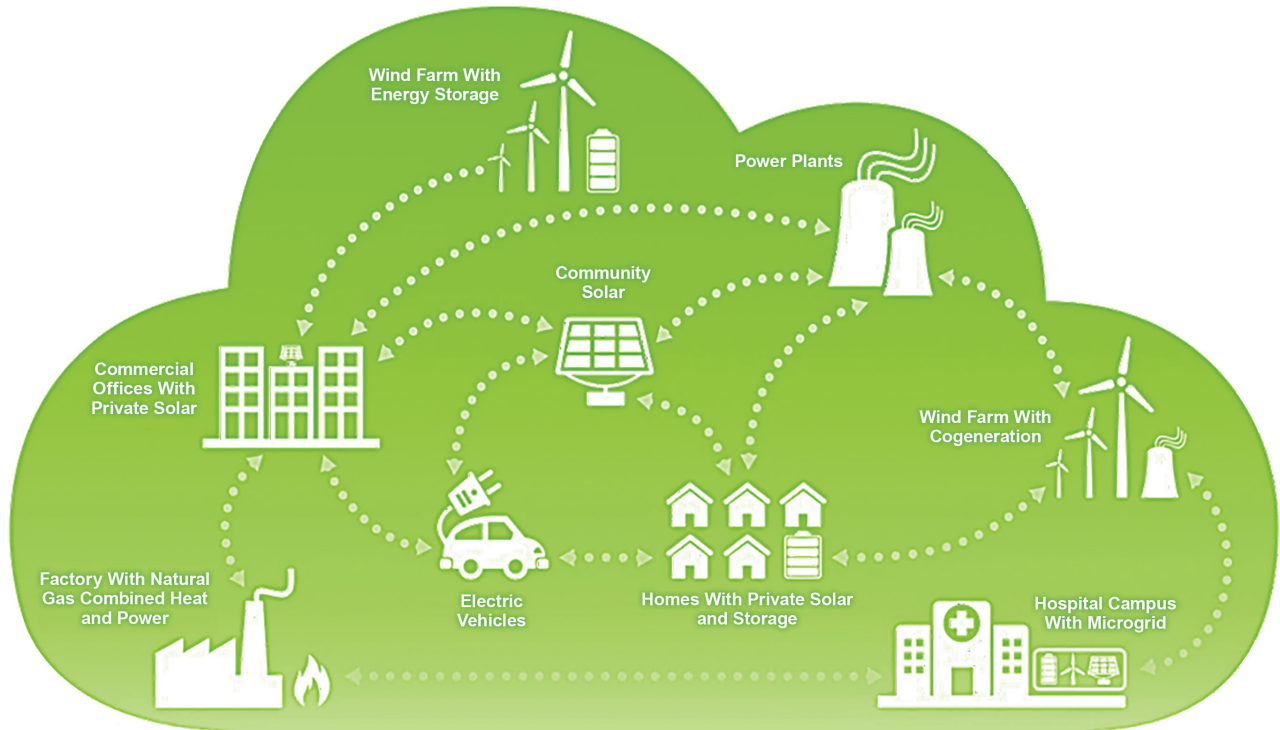
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a highly distributed, networked, and dynamic energy grid in which performance and customer choice command a premium. Platforms managed by network orchestrators will connect electric company customers to a rich tapestry of products and services, with energy as just one source of value.

The Energy Cloud Revolution

Overall, at least \$1.3 trillion in new revenue opportunities will be created in the energy cloud by 2030, according to Navigant

Emerging: The Energy Cloud (Distributed, Two-Way Power Flows)



Navigant

Research. Most of these transactions will flow through one of seven growth platforms:

1. **INTEGRATED DISTRIBUTED ENERGY RESOURCES (DERs)** are coordinated, aggregated DERs and related programs combined with networking and communications technology across a service territory. This approach encourages customer choice and flexibility while solving for aggregation at the grid operator and electric company level.
2. **BUILDING-TO-GRID (B2G)** is the link between connected building infrastructure and the energy grid. A typical B2G facility includes integrated

controls and automation for internal systems from lighting to HVAC to plug loads and people movers, and supports energy assets such as private or rooftop solar, energy storage, and EV charging infrastructure.

3. **TRANSPORTATION-TO-GRID (T2G)** is the nexus between electrification of transportation (e.g., light-duty vehicles, transit systems, commercial goods movement, port operations), and the energy grid. Associated smart charging infrastructure adds a layer of locational flexibility (and unpredictability) and potentially unlocks value and transformative business models.

4. **THE INTERNET OF ENERGY (IoE)** is an important building block in the energy cloud. IoE leverages sensors, telecommunication infrastructure, and machine learning to provide a digital foundation for the energy industry that touches, or will touch, nearly all aspects of energy generation, transmission, distribution, and consumption.
5. **TRANSACTIONAL ENERGY (TE)** is an energy-based marketplace that facilitates transactions involving the generation, distribution, and consumption of energy among energy customers. TE unlocks peer-to-peer transactions among both active and passive prosumers.

6. **NEURAL GRID** is an autonomous grid that leverages AI, with sensor technologies throughout the transmission and distribution systems to support automation, self-healing, seamless DER integration, customer engagement, and, ultimately, the integration of dispersed markets for TE.
7. **SMART CITIES** are the strategic integration of smart technologies to enhance sustainability, customer well-being, and economic development in urban centers and communities. This can enable a shift to renewable energy and community energy programs and the development of more resilient energy systems.

New Business Models

Each electric company's territory includes unique combinations of stakeholders and customer preferences operating in (mostly) regulatory environments that will prioritize objectives and develop pathways differently. This means that the energy cloud evolution won't be in a straight line, and the transition likely will take five to 15 years, or longer in some cases.

The above platforms are expected to evolve as well, likely at an exponential rate. New value streams will emerge in the form of energy and non-energy products and services. Exponential innovations such as AI, IoT, and blockchain have the potential to unlock additional opportunities and will elevate the role of data analytics and intelligent services. This will impact customer experience, emerging technologies, regulations and policies, business models, and operations. However, electric companies are well-equipped to capitalize on

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their relationships with customers and to create forward-looking business models that embrace the emerging opportunities across the energy cloud, such as:

- **ENERGY AS A SERVICE (EaaS):** EaaS is the comprehensive management of a customer's energy portfolio—including energy assets, operations, and services that span supply, demand, and program management—often incorporating new products, services, and technology solutions. EaaS shares many similarities with today's energy service companies. The market currently consists of third-party vendors, electric

companies, energy service companies, and others. They seek to deploy niche technical, financing, or procurement solutions such as solar power-purchase agreements (PPAs), energy services performance contracts, and electricity market retail brokerage services.

Navigant Research estimates that the commercial and industrial EaaS market will earn \$220 billion in annual revenue by 2026.

- **NETWORK ORCHESTRATOR:** Every company uses one or more of four basic business models: asset builder, service provider, technology creator, and network orchestrator. Among Fortune 500 companies, linear business models (asset builder, service provider, and technology creator) scale more slowly and are less profitable than the platform-focused network orchestrator business model.

The network orchestrator model leverages improved connectivity across the energy cloud, harnessing vast interconnected networks of assets, other service providers, and customers. Across the broader economy, businesses that leverage this model deliver value through a combination of digital connectivity and relationships or network capital. By creating a platform that participants use to interact or transact across the network, companies employing this model may sell products, build relationships, share advice, collaborate, and more.

Adopting network orchestrator best practices (see figure

to the right) enables an expanding opportunity for electric companies to deliver individualized products and services.

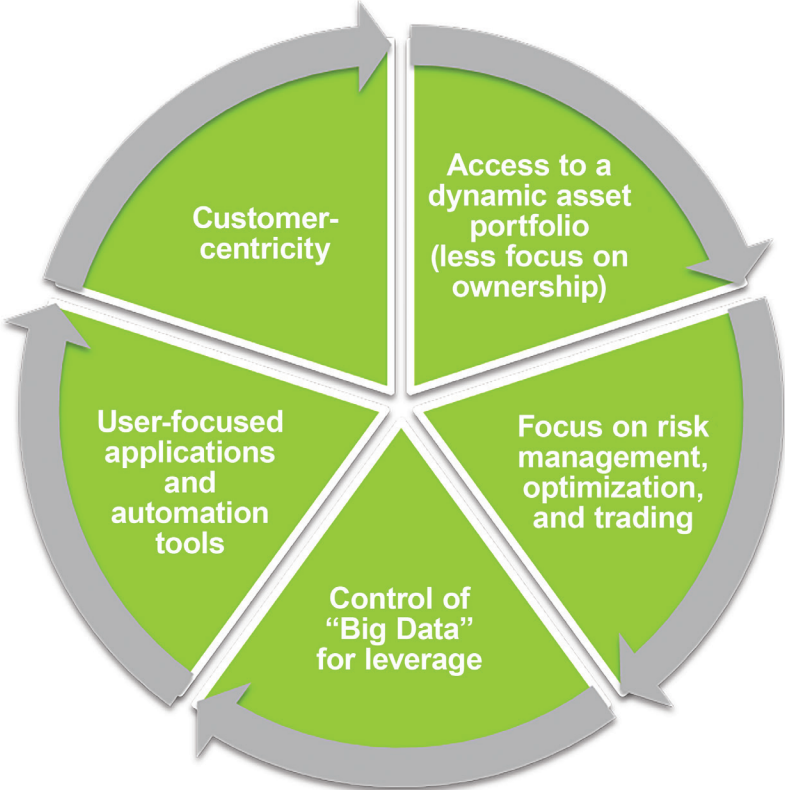
The Data-Centered Electric Company Enterprise

Several jurisdictions—California, Massachusetts, New York, Ontario, and many European countries—are testing variants of EaaS and network orchestrator approaches to improve electric company profitability while supporting higher levels of DER penetration. These approaches range from more conservative efforts in line with existing vertically integrated models to more progressive initiatives that promote a highly transactional marketplace. For example, New York’s Reforming the Energy Vision initiative envisions electric companies as distributed system platform providers, integrating system planning, energy grid operations, and market operations as the three principal domains across their platforms. In all cases, proposed models attempt to introduce an element of flexibility into the system, with the goal being greater customer choice and better service.

However, as analysis from the Energy Institute at the University of Texas at Austin shows, all of these models face challenges in a low-load-growth, high-DER environment.

While DER currently is at the bleeding edge of investment, business model innovation must harness data—both to retain existing customers through more tailored products and services and to navigate the complexity of emerging energy cloud ecosystems.

Electric company as network orchestrator...



...unlocks value across an ecosystem

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Covering Your Bases

Long-term integrated resource plans and five-year strategic plans are not sufficient to address a more dynamic energy cloud; electric companies must update their current strategies and create new ones.

An updated strategy entails:

- Engaging more proactively with customers and regulators to help them understand customer choices vis-à-vis price and reliability.
- Continuing to upgrade the energy grid and to redesign operations to be more flexible and to facilitate the integration of DERs.

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- Finding equitable ways to ensure all customers can enjoy the benefits of DER transmission and distribution services (“the value of the energy grid”) in an unbundled manner relative to today’s regulated rate structure.
- Developing a portfolio of customer, electric company, and third-party-owned renewable and DER assets to appeal to environmentally conscious customers, as well as prosumers.

Even more important, electric companies must:

- Decide in which energy cloud technology platforms they want to invest.

- Create new revenue streams through the development of new business models, products, and services.
- Implement a holistic approach to planning that accounts for both current and future interdependencies across technology, regulation, policy, economics, and customer demands.

Moving forward, electric companies must pursue dual-track innovation. The first track centers on the core business, with a focus on maximizing operational and capital efficiency enhancements. The goal is to free up capital and resources to reinvest back into the second track. Likely, there already is an organizational structure in place to support these efforts. The implementation of this track should be kept separate from the second track, pursuing independent objectives and relying on a separate talent pool.

The second track must be cultivated and resourced appropriately to ensure success. It should be insulated from ongoing first-track initiatives to give new ideas and business models sufficient runway to navigate growing pains. Because we can’t foresee the full range of products and services that will be deemed valuable among customers as the energy cloud and related technology mature, companies will need to focus on rapid deployment of flexible and highly scalable solutions and, perhaps most important, promote a culture that’s nimble and agile.

Final Recommendations

In the energy cloud, things work differently. The way to forecast load growth is different, distribution and transmission planning may need to embrace non-wire alternatives, and generation investment decisions will need to be made very carefully. Also, regulatory frameworks, rules, and ratemaking will require a complete overhaul, as small tweaks will not work long term. Electric companies should develop their own playbooks in addition to five-year strategic plans and longer-term integrated resource planning and investment plans.

While it is too early to predict exactly how the energy transformation will unfold, we can be sure that new policies and regulations, changing customer demands, and technology innovation will yield opportunities far beyond our imagination today. **EP**

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