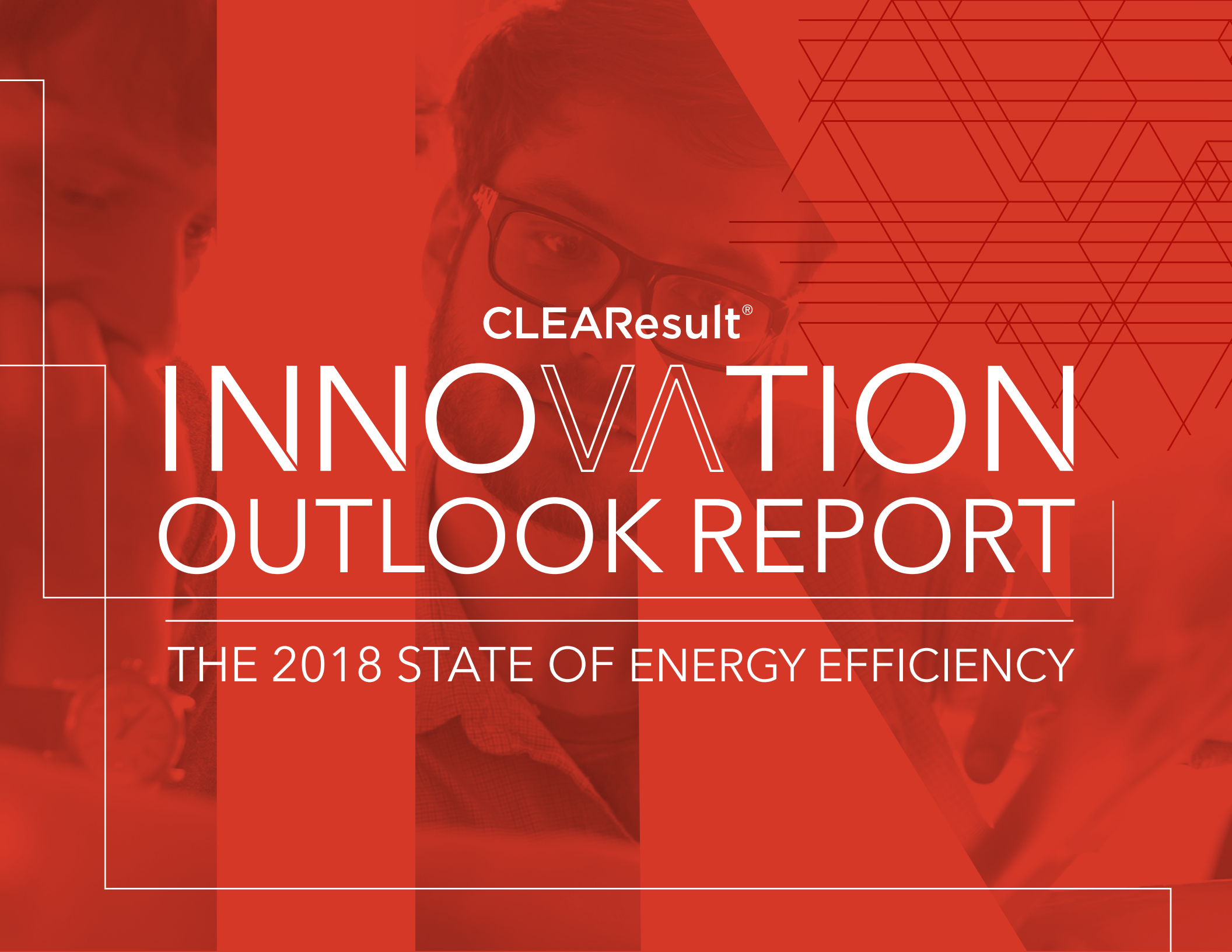


CLEAResult®

# INNOVATION OUTLOOK REPORT

## THE 2018 STATE OF ENERGY EFFICIENCY

# MEET YOUR CUSTOMERS WHERE THEY ARE

Customer expectations, due to new technology and the immediacy and access they provide, have been heightened to a level unseen before in the utility industry. Embracing those advancements will help the industry better serve the empowered customer.

**CLICK ABOVE TO SEE VIDEO**

*"Meet your customers where they are" - CLEAResult CEO Aziz Virani on a rapidly evolving utility industry*

Advancements in technology have made consumers more empowered than ever before. Innovations like smartphones and one-click shopping have permanently changed customers' expectations. So it follows that the utility industry, as a whole, would need to work to better understand these newly emboldened consumers, and to change the way it engages with them. The utility industry, in its actions, must work to become truly customer-centric.

According to CLEAResult CEO Aziz Virani, it's of the utmost importance that we "shed the old way of thinking. We have to go to where the customers are."

To do otherwise is to continue to cede ground to technology companies who are already focused on meeting customers where they are. For the utility industry to thrive in a fast-changing world, its focus must be on providing comfort, convenience and control to its customers.

Without discounting the three existing tenets of the industry—safety, reliability and affordability—our industry must recognize that the old metrics of assessing performance are no longer adequate. In fact, self-proclaimed industry heretic Chuck Caisley, Chief Customer Officer and Vice President of Marketing and Public Affairs for Great Plains Energy and Kansas City Power and Light (KCP&L), believes that the utility industry should no longer get extra credit for what they're already supposed to be doing—providing energy safely, reliably and affordably. New metrics should be defined, and the resulting business models must be centered around the three new principles: comfort, convenience and control. Customer expectations are now being shaped by the seamless, same-day delivery services offered by companies like Amazon.

Consumers are not impressed by the bare minimum of service reliability. With an average service disruption rate of around 0.0002 percent, Chuck Caisley suggests that we, as an industry, are "spending billions of dollars on improving this service disruption rate, a metric that's impossible to improve and will not address the true needs of the new type of customer," illustrating an imbalance between the way the

**CLICK ABOVE TO SEE VIDEO**

*"Focus on what can be done" - Industry "heretic" and KCP&L Chief Customer Officer, Chuck Caisley wants utilities to adopt new metrics for measuring success*

At CLEAResult, we believe that a customer-centric utility model is required to survive the changes brought about by technological innovation.

utility industry is deploying its money and the prevailing trends of the day. Currently, the bulk of the industry's expenditure goes toward capital expenditures (capex) for generation, transmission and distribution ($60.6–$74 billion). Only about 2.7–3.9 percent of that money is being spent on customers (mainly on advanced metering infrastructure, or AMI). "Something," as far as Caisley is concerned, "is off in this equation."

At CLEAResult, we believe that a customer-centric utility model is required to survive the changes brought about by technological innovation. Utility executives who are willing to think differently and explore new opportunities will create these new models. An example of this shifting paradigm is one being championed by KCP&L: the electric-vehicle charging infrastructure project. KCP&L got ahead of the market by deploying electric vehicle (EV) charging stations ahead of actual market need, and now Kansas City leads the US in EV adoption.[1] The city saw a 95 percent increase in adoption of EVs in Q1 2017 compared to Q1 2016, with 950 charging stations deployed.

**95% increase in adoption of EVs in Q1 2017**

We recommend that utilities think holistically about their end-to-end customer experience across the full spectrum of demand side management (DSM). These consumer experience improvements should encompass demand response, distributed energy resources, energy efficiency, smart homes and their role in building resilience into the grid, electrifying transportation and overall grid modernization.

1 Kansas Leads the Nation in Electric Vehicle Adoption: BizJournals, June 2017

The CLEAResult Innovation Outlook Report lays out our viewpoint on the customer developments and technology advancements that are impacting the utility business model. Along the way, we'll incorporate insights from external thought leaders, who offer their perspectives on a rapidly evolving industry. This report should serve as a reference source, intended to guide and assist utilities as they develop strategies to navigate the industry's ongoing changes. We'll share a variety of paths forward for utilities, from the current approach of providing 'safe, reliable and affordable,' to bringing customers the comfort, convenience and control they want most.

# HOW DOES REGULATORY INNOVATION FIT INTO THIS?

While most discussion of innovation is focused on technology, equally important are regulatory models that provide financial incentives for utilities to empower their customers to control their energy use and lower their bills.

While the impact of the Trump Administration on energy efficiency (EE) is still not fully known, the fact is that most regulations occur at the state level. This insulates the industry from federal regulation to some degree. For her part, Sue Gander of the National Governors Association is exploring innovative energy technologies. She believes that the next energy frontier needs three main ingredients: "Entrepreneurs, innovative utilities and conducive state policies." She adds: "The old utility regulatory model is no longer viable; we need to figure out the new models."

While utilities typically love efficiency programs because they are a great way to delight their customers and build customer loyalty, EE ultimately means selling less of their product. Thus, without the right regulatory treatment, EE can actually harm utilities' growth prospects. States have been working to solve this problem for decades, and innovation has picked up in recent years.

These new models continue to evolve and are as diverse as the states that develop them, but they do typically have some common attributes. CLEAResult's recent white paper, "Creating Customer and Investor Value Through Energy Efficiency," co-authored by CLEAResult's VP of Regulatory Affairs and Market Development Doug Lewin and Peter Kind, Executive Director at Energy Infrastructure Advocates, shares some new business models in use in Utah, Maryland, Illinois and Michigan.

Utility representatives from DTE Energy, Baltimore Gas and Electric (BGE) and ComEd explained how legislative and regulatory changes recently made to their respective models have provided financial opportunities to their utilities as they reached higher levels of efficiency. Most states employ cost-effectiveness tests designed to ensure that EE is achieved at lower costs than other resources, creating benefits for all customers. Further, customers who participate in EE programs reap even more rewards, with lower bills and increased comfort, control and convenience.

According to Chris Walls from BGE, utilities need "to continue to reinforce that this is the least-cost alternative for our customers." One out of every three BGE customers has directly participated in an EE program. The changes made by the Michigan legislature in 2016 provide additional opportunities for Detroit-based DTE Energy to grow their EE programs, as the law incentivizes programs. Similarly, ComEd, headquartered in Chicago, has reported that the changes made in the Future Energy Jobs Act passed by the Illinois legislature in 2016 allow ComEd to earn a rate of return on programs they run. Their return on equity (ROE) increases to the degree they exceed goals, providing powerful motivation for program delivery excellence.

A majority of states now have some kind of incentive in place for EE. Current best practices employ the three-legged stool of cost recovery, lost revenue recovery, and meaningful earnings opportunities. With these in place, utilities can move aggressively toward a customer-centric model, pursuing demand side solutions that cost less, and cleaner energy resources that directly benefit customers and the broader economy. And all these business models will be enabled by the advancements in technology that start to move the industry toward a clearer approach in measuring the value of EE.

# THEME 1
# TECHNOLOGICAL ADVANCEMENTS

The pace of technological advancements continues to open up questions about how the utility industry can utilize these technologies to improve operations and grow business. An understanding of these technologies is the first step toward capturing the value they can provide.

Over the last decade, the utility industry has changed substantially. This is due to the interrelated trends of:

- The increased share of renewable energy as a source of electricity for customers
- The plummeting costs of the underlying technologies to provide these renewable sources
- EE as a tool for reducing customer demand becoming a mature market
- The proliferation of sensors everywhere, and the subsequent digitalization of everything

The concept of "behind-the-meter generation," a phrase that speaks to the still utility-centric perspective the industry has in its engagement with the customer, is also gaining ground as more customers deploy solar panels, buy electric vehicles and install battery storage in their homes. A more customer-centric industry will have to think from the perspective of the energy consumer.

These changes further dampen the demand side and consequent volume of sales the utility industry uses to run business as usual. These advancements have had an enormous, albeit negative, impact on the business model that most of the industry still relies on. Adopting and integrating these distributed energy resource (DER) options into the generation mix will constitute a big part of the strategic decisions that the utility will have to make in the short and medium term.

While the electricity side of this discussion is covered in more detail, as CLEAResult looks to the future in the gas industry, there are some clear requirements that the advancements in technology enable the gas utility to address. These are:

- Utilizing the advancements in mobile technology to streamline customer processes and increase engagement
- 'Smartening' up the gas network with sensors and updated equipment, with the view that this will enable improved service quality to all customers, especially those in spread out locations
- Taking advantage of the decarbonization of transportation trend by partnering to facilitate fleets of clean, low-emission natural gas vehicles across the country
- Procuring non-pipeline alternatives to meet needs by reducing demand where it is more cost effective than adding supply

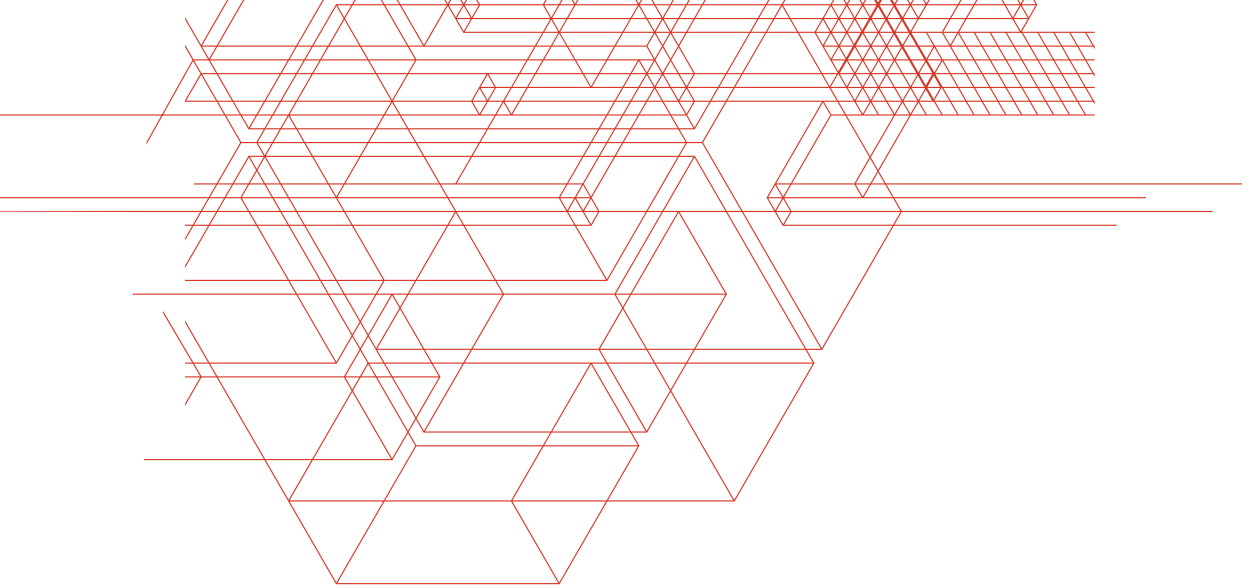
These changes will require business model changes and infrastructure updates, to integrate smarter technologies, by both the power and gas utilities. As Chuck Caisley of KCP&L suggests, there is a need to recognize the reduction in future transmission and distribution (T&D) investments. And, as a result, future investments in the industry will be in the technologies consumers are adopting (e.g. smart thermostats) and in new ways for customers to engage with the grid—even as the grid itself changes from a centralized network to a digital and distributed network.

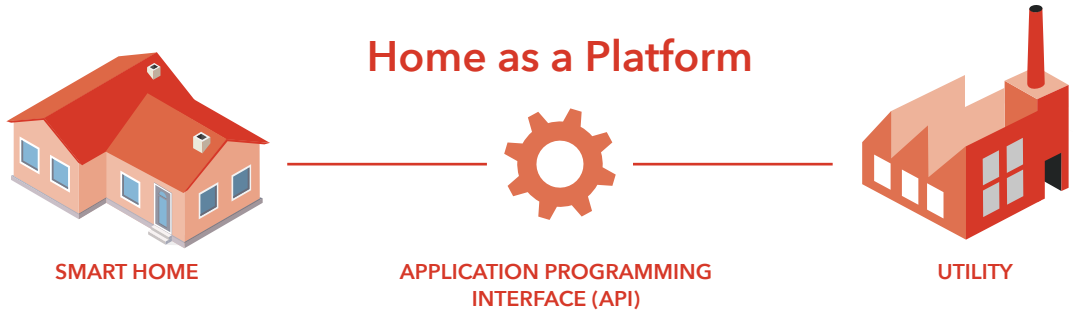
The most profound technological changes have come from the lives of the consumers themselves. At no point in history have consumers had as much technological capability in their hands as they do now. People can now make the largest purchases of their lives with a few clicks on a mobile phone. These same consumers can also order products from the world's largest ecommerce companies and have those products delivered on the same day. These advancements have led to a heightened level of expectation that the utility industry has never had to deal with before. In its current state, the utility industry is incapable of meeting customers' expectations.

Expectations will be further increased as customers start to get services and products based on the application of new technologies such as devices for the connected home, powered by artificial intelligence (AI), blockchain (a distributed ledger) and integrated demand side management technologies that leverage the data analysis methods of AI and machine learning (ML). This all adds up to an industry-wide transformation. What remains uncertain is the pace and direction of this change. For this, utilities will need a deeper understanding of consumers and advancing technologies. At the same time, they'll need to develop strategies to embed technologies within day-to-day operations in order to formulate new and viable business models. There is great uncertainty about business models in general, especially as disparate assets are brought together in an increasingly decentralized grid. Despite all this uncertainty, what is clear is that all these technologies point to the continued empowerment of the customer. Customer centricity is the key to navigating this future successfully.

# Innovations in Technology and Platforms

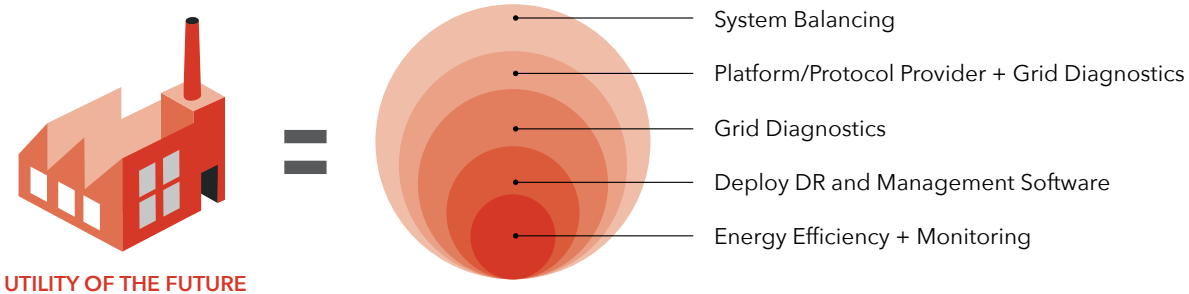
Two core factors are driving the changes in our technological capabilities as a society: the widespread use of sensors, which manifests in the form of the Internet of Things (IoT) and Industrial Internet of Things (IIoT), and the deluge of data that results from those sensors. These two factors are also at the core of why companies like Tesla, Amazon and even Google could be considered by some as competitors to the traditional utility. These companies are using data to determine and anticipate customers' needs, and, in turn, developing products to serve them. While this is a challenge, it also presents an opportunity for the utility industry, which generates a tremendous amount of data from the utility grid including customer premises. Now, with the mass adoption of devices like smart meters and thermostats, the amount of data from the customer side is increasing exponentially. The challenge, and the opportunity, for the utility is to position itself as a platform provider that captures value by managing this data deluge for all the stakeholders and new entrants into the industry.






As discussed in "The Platform Revolution,"[2] the most innovative and dominant companies in the world today are taking a platform approach to serving their customers' needs. According to the book, 'pipeline' companies control a linear set of activities, which result in an end product. These pipeline companies tend to be industry incumbents. What 'platform' companies do to disrupt the pipeline companies is to provide the pipeline value but also add a marketplace and customization element, where the producers and the consumers interact in an exchange of data, transactions and feedback. The consumer end of the marketplace provides the data on their needs and this feeds the platform companies' approach to developing a product or end-to-end service that the customer is happy to pay for. Uber, for example, built a platform on top of what was otherwise a pipeline approach to hailing a taxi.

2 The Platform Revolution: Parker, Van Alstyne and Choudary




UTILITY OF THE FUTURE

**CLICK ABOVE TO SEE VIDEO**

*"A better model for the future" - CLEAResult's Colin Gibbs offers a different perspective for the utility industry*

The call is for utilities to adopt a platform approach. For example, CLEAResult Director Colin Gibbs believes the connected home to be a platform through which the utility industry can continue to add value in the future. What do utilities need to do to bring value to these platforms? What technologies are turning the customer's home into a hub from which the utility can create an engaged relationship? Understanding these technologies, and where they fit in the platform equation, reveals some business model opportunities for the utility. The key to the proper utilization of the technologies discussed below is the recognition that they are all elements that contribute to engagement and relationship building with customers. We'll highlight five of those technologies that will be important in any utilities' attempt to become a platform. The key is to recognize that these technological advancements and their adoption, or lack thereof, is being driven by the need to better serve empowered customers. Some of the technologies discussed, which will be covered below, include:

- Data capture technology, intelligent IoT and IIoT devices—thermostats, connected lights, and smart appliances are a few examples
- Demand and supply technologies such as electric vehicles and charging stations
- Big data and analytics technology like blockchain and AI

These technologies will enable the industry to identify new business models, designed to help all parties involved to provide comfort, convenience and control to a new type of customer while increasing system reliability, efficiency and intelligence.

**CLICK ABOVE TO SEE VIDEO**

*"More than an emerging trend" - CLEAResult's Dain Nestel says the connected home is sprinting toward widespread adoption*

# IoT/ IIoT and Voice Interfaces

According to McKinsey,[3] 29 million US homes will have a connected device by the end of 2017. As Dain Nestel, CLEAResult's Senior Director of National Operations, says, the connected home is a trend that's "not just emerging, it is sprinting" toward widespread adoption. These connected devices, also known as Internet of Things and Industrial Internet of Things devices, are seeing a 31 percent compound annual growth rate. This growth is expected to continue as big technology companies pay more and more attention to what they see as a lucrative opportunity: greater access to the minds and wallets of consumers through a connected home that serves comfort, convenience and control.

3 The Connected Home: McKinsey 2017

The increasing rate of IoT product purchases is fueled by improvements in the underlying technology of intelligent assistants and voice/ natural language interfaces.[4] Alexa, the voice assistant powering Amazon's Echo devices, has become part of the common lexicon when the smart home is discussed.

There are four layers in the technology stack of voice-activated IoT devices. These are: the interface (which used to be the keyboard, and is now moving toward primary voice control); the messenger layer; the platform itself; and the application programming interface (API). APIs enable the providers of these devices to interface with other product developers to serve additional functions through the IoT devices. Moreover, APIs can enable the utility to partner with product providers to serve customer needs, and would enable the utility to further ingratiate themselves in the minds of customers.

Companies like ecobee and Nest, which have positioned themselves as utility partners, bring the control that the customer wants, and can help curate the desired experience for the customer's home. Many non-utility companies are vying for the central position in the connected home, but the goal of the utility should be to partner. The opportunity is for the customer and the utility to have a real, positive, platform-based relationship.

4 Clova voice-activated device launch

A good example of partnering to improve the customer experience could soon come from ComEd. Customers are already using connected devices to get information and take simple actions; energy could easily fall within that realm. ComEd envisions a digital experience where a customer easily gets info, like energy bill balances and actionable steps for better managing their energy usage and costs, from their Amazon Echo device. The takeaway here is that there are ways to continue to leverage some of these competitive IoT devices to ultimately provide control to the consumer.

# APIs

APIs give utilities the flexibility to meet customers where they are, by enabling a seamless service across the web, phone and mobile apps. APIs enable the utility "to connect processes, services, content, and data to channel partners, internal teams, and independent developers in an easy and secure way."[5] APIs, as mentioned above in the IoT example, enable the utility to serve their customers by partnering with entities—CLEAResult, ecobee, Nest, et al—who will enable the utility to deliver more engaging experiences.

The business value that utilities can get from APIs is the flexibility to meet customers where they are across many channels with a consistent message.

5 API for Dummies: Wiley

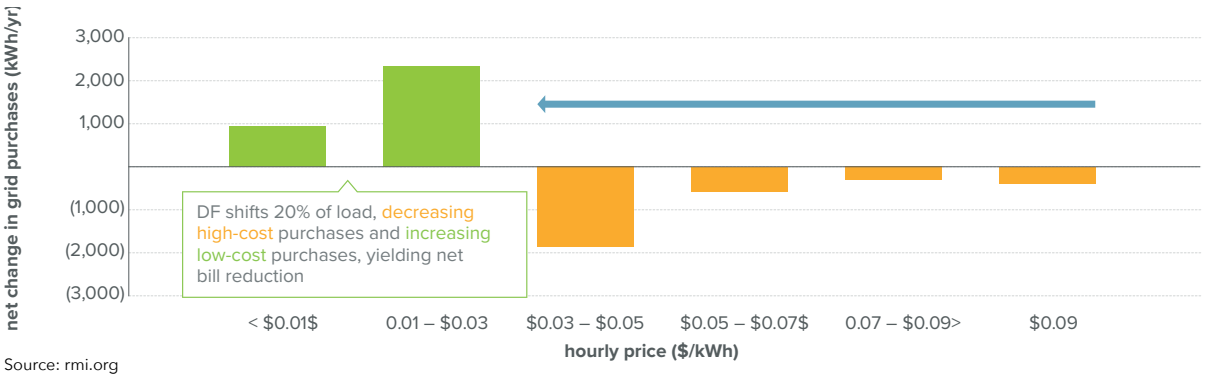
# Artificial Intelligence (AI)

AI is considered to be the next general purpose technology in terms of how it will be embedded in every technology we use. According to Harvard Business Review, "The most important general purpose technology of our era is artificial intelligence, particularly machine learning (ML)—that is, the machine's ability to keep improving its performance without humans having to explain exactly how to accomplish all the tasks it's given."[6] This exponential capability provided by AI/ML is fueled by the access to data. This is actually aided by the utility's traditional approach to data ownership: the utility manages and stores the data on energy, usage and pricing for millions of customers. This data ownership provides a critical input for the effective utilization of any AI system.

In the simplest of terms, an AI system works in the following way: data is fed into a model to train it, the model learns patterns from the training data and uses what it learns to predict patterns in other data, or makes recommendations based on existing patterns in the data. An AI system by itself is not intelligent, it requires reams of data in order to provide the superior level of insights that we expect. Few players in the utility ecosystem have as much of this training data on hand as the utilities themselves do, which gives the utility a unique advantage in providing a customized service to a customer without increasing the cost of delivering that service.

6 The Business of Artificial Intelligence: Harvard Business Review, The Big Idea

**FIGURE ES4**
SHIFTING LOADS TO LOWER-COST TIMES THROUGH DEMAND FLEXIBILITY
DF SHIFTS LOAD FROM HIGH-COST TO LOW-COST HOURS




Source: rmi.org

ML provides the ability to analytically and predictively serve the needs of customers. Some of the approaches toward customer centricity where AI/ML can be applied within the utility industry are already being used by companies outside the utility industry. For example:

1. Google uses DeepMind AI to reduce energy usage/increase cooling efficiency at data centers by 15 percent. This is a service that a utility can provide to its large industrial customers right now by embedding AI.

2. Insurance companies are using ML to automate and improve customer support. This is also immediately applicable to the customer-facing services that utilities provide to their customers.

3. Trading firms are optimizing their trades with neural networks—another approach under the ML umbrella—due to the ability to determine optimal pricing. This capability is applicable to wholesale power trading.

AI is also the technology behind more customized 'virtual assistant' customer service capabilities. This improved service includes the ability to use virtual agents, trained on the service history of a customer, to provide improved service or flag and assist with possible bad debt situations.

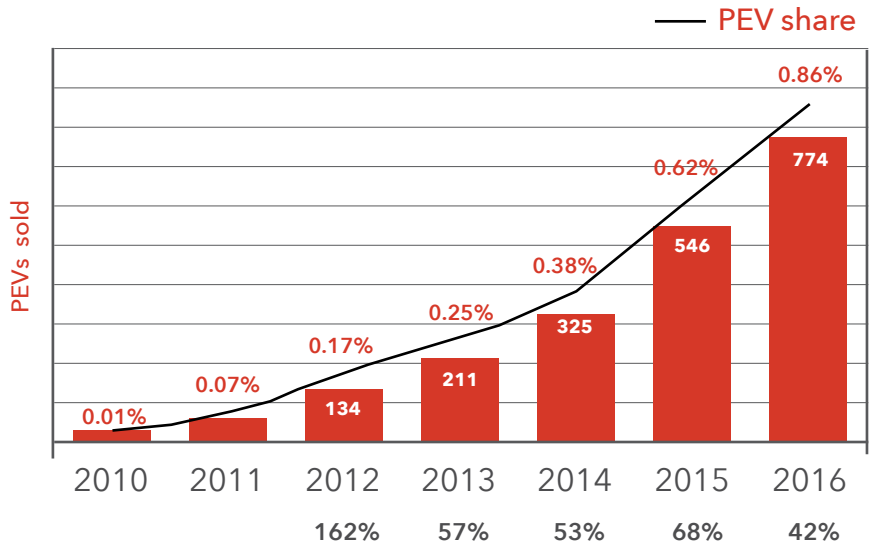
Some additional examples of where AI can be used to improve utility operations include taking data from sensors on generation equipment to improve generation efficiency in real time. ML can also be used to integrate renewable energy into the grid through improved demand and supply forecasting.

# Electric Vehicles

EVs, and the charging station infrastructure that is required to serve them, provide both demand and supply side opportunity for the utility. Every industry *but* the automotive industry has already undergone electrification, and now it's taking place, with companies like Tesla, BMW and Mercedes ramping up their EV capabilities. Even companies like Shell, traditionally an oil and gas company, are showing interest in the industry. In October, 2017, Shell acquired NewMotion,[7] the largest electric vehicle charging station company in the Netherlands. Analysts suggest that EV adoption rates at the start of the S-curve, with estimates suggesting that should this rate continue, 8 of 10 cars sold in 2030 would be EVs.[8] Effusive as it might sound, the 42 percent growth rate in EV adoption in 2016 suggests a lot more interest than at any other time.

7 Shell Acquires NewMotion, Reuters Oct 2017
8 Global Plug-In Sales in 2016, EVvolumes

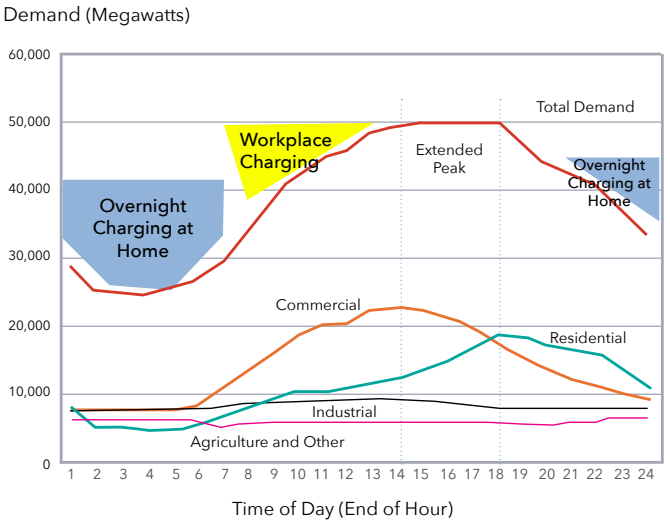
**GLOBAL ANNUAL PLUG-IN ELECTRIC VEHICLE SALES**




Source: EVvolumes.com

Due to the intermittent nature of energy generation from renewable sources, the push on the utility side should be more focused on demand side management—digitally managing the demand to match the available energy supply. The ability to physically do this is provided by EV charging stations themselves. Research is showing that EV charging infrastructure is a leading indicator for the adoption of EVs in an area. This is already proving to be the case for KCP&L; after the deployment of charging stations, the Kansas City area leads the nation in EV adoption. Utilities will have to work with regulators to ensure that programs and rate structures that encourage load management are adopted in their jurisdictions. This infrastructure will also have to be managed through a platform that is set up to enable demand response and grid beneficial charging.

**Typical System EV Load Profile (without solar)**




Source: LBNL

Ken Colburn, of the Regulatory Assistance Project, suggests that implementing time of use rates and providing EV charging infrastructure that corresponds to the lives of customers are approaches that the utility industry will have to quickly adopt. In particular, the ability to flatten the grid load profile by providing workplace charging was mentioned as a benefit that the utility can gain from owning, or working with partners who own, EV charging stations.

# Blockchain

Blockchain is, basically, a distributed ledger. The value it provides is the ability to use algorithms to reliably and anonymously record transactions, with every transaction recorded and timestamped just once. It is also considered to be a self-sustaining, peer-to-peer database technology for managing, reducing and eliminating intermediaries and recording transactions with no central bank or clearinghouse involvement.[9]

According to Alex and Don Tapscott in their book "Blockchain Revolution,"[10] the blockchain is a distributed database that contains a list of data records called 'blocks.' The blocks are timestamped, shared, unalterable and connected to preceding blocks. Each block is distributed, public and encrypted. Transactions are verified by computers run by other computers in the network called nodes. To modify a contract, the whole blockchain would have to be reconfigured at every node. This would be an impossible task for even the most committed fraudster.

While this technology is new and it seems undoubtedly futuristic to most in the utility industry, some utilities in markets like Germany are already testing applications of the technology in process optimization, including billing, sales and marketing, automation, metering and data transfer, mobility, communication and grid management.[11]

While Michael Quinn, CTO of Oncor, believes the benefits of blockchain and transactive platforms like blockchain can be adapted to the energy industry, he is concerned that significant elements of the conversation or implementation are not being considered. Critical conversations in the following areas seem limited: meshing of the blockchain platform with the larger wholesale settlement mechanisms, enhanced and more real-time metering, compensation to wires companies for the physical delivery of the energy (regardless of the source), and how a transaction gets confirmed if there is a physical system outage that prevents delivery of the energy.

While blockchain might not be cost-effective for managing transactions between residential customers, since there is a fee involved, it might be worth considering for wholesale markets where commercial and industrial customers are starting to look to outside providers for their renewable energy demands—especially if these same customers decide to start selling their power back to the grid.

9 How Blockchain Will Transform Our Cities: The Conversation.

10 Blockchain Revolution, How the Technology Behind Bitcoin Is Changing Money, Business, and the World: Don Tapscott, Alex Tapscott

11 Blockchain in The Energy Transition: dena/ ESMT

# THEME 2
# CUSTOMER EMPOWERMENT

Customer centricity should be the utility's standard operating procedure, but how do we get there? Understanding customer behavior – how they make choices and what drives their decisions – is a key to customer centricity.

Adam Alter, an associate professor of marketing at NYU and author of the groundbreaking New York Times bestsellers "Irresistible" and "Drunk Tank Pink," provides relevant insights into understanding consumers on the journey towards customer centricity. Many of the hurdles in the way of customer participation in energy programs can be overcome with a few psychological insights, he suggests. Adam's work focuses on the difficulty and the opportunity in focusing on customer centricity and also provides us a guide toward how we pay attention to the industry's internal customers employees. With data showing that 50 percent of the utility industry will be nearing retirement age or retiring over the next few years,[12] leadership will have to equip the current and the future workforce with not just the tools, but the correct adaptive mindset, to engage with an empowered customer base and ever-advancing technological advancements, both internal and external. The current culture of the utility industry leads to monocultural employees, who are steeped in the language of an industry that focuses on the mantra of 'safe, reliable and affordable.' In "Drunk Tank Pink," Alter suggests that:

*"Culture is a powerful and pervasive ingredient of thought … they are powerful because they're ubiquitous, enveloping us in norms, mores … and we rarely turn our minds to their influence."*

12 Solving the Aging Workforce Dilemma in Today's Utility Industry: ELP 2015

**CLICK ABOVE TO SEE VIDEO**

*"Help customers curate the decision"*
*- Bestselling author Adam Alter shares important consumer behavior insights*

Our industry can retrain its employees—experts in their own right—to think in customer-centric ways, by borrowing from other cultures where customer centricity is standard operating procedure. To fail to do so would be to merely pay lip service to changing the industry while never truly understanding the customer. So how can the utility industry equip its workers with the adaptive mindset that is required in a world where technology is advancing at a pace like never before? Alter also suggests in "Drunk Tank Pink" that a solution might be found by making employees 'multicultural.' Simply put, this means that utilities should provide opportunities for their employees to engage in learning from industries outside of the utility industry. Immersion in training that focuses on other, seemingly far-out, sectors like data analysis, consumer marketing and branding might be required to recalibrate the industry.

Alter's findings suggest approaches that other industries have utilized as they've pushed towards customer centricity and provide fundamental understanding that CLEAResult believes will play a big part in the shift. These include the understanding that:

- Getting familiar with behavioral economics and the psychology of consumers can have a huge impact on customer engagement, participation and satisfaction. For example, people like things that remind them of themselves; individuals seek constant feedback and it's why we need to make things social; and consumers get overwhelmed with too many options.
- Individuals focus on themselves and are more willing to take risks, while businesses act slower but more rationally than consumers. Regardless of the audience, our first job in any customer interaction is to understand the human motivation that's driving the decision-making.

Based on Alter's logic, one way utilities can provide comfort, convenience and control, is by simplifying decision-making for consumers. By narrowing the number of options, we empower individuals to make easier decisions that they're more comfortable with. And we can narrow those options by analyzing the customer data utilities already own.


## Customer Empowerment in Action

Following 2017's Hurricane Irma, Puerto Rico's Governor Ricardo Rosselló took to Twitter to seek help for his devastated island and residents. Rosselló directed his SOS at Elon Musk, the visionary technology entrepreneur and founder of Tesla, the electric vehicle and battery storage company. Musk answered the call and opened up discussions to quickly help bring power, safety and comfort back to Puerto Rico.

Two months after Rosselló and Musk's conversation was captured on Twitter, Tesla deployed six battery projects to power two islands in Puerto Rico. The result wasn't the original approach, and the project was discrete from Rosselló's government, but the takeaway here is the viability of an empowered customer communicating a need directly to a provider, and that provider delivering a solution as an outcome.

The most critical piece of understanding, among the many shared by Alter, is that consumers see themselves at the center of all things. No one piece of technology has enabled this as much as the smart phone, and this insight about our—for lack of a better word—narcissistic tendencies explains its explosion into the center of all customer behavior. From his book "Irresistible," Alter points to how the innovative design of the smart phones and smart phone apps provides us with a way to view consumers and determine how to engage with them, as some of the largest technology companies have done (a feat most of the utility industry has been unable to repeat so far). Alter writes:

*"Human behavior is driven in part by a succession of reflexive cost-benefit calculations that determine whether an act will be performed once, twice, a hundred times, or not at all. When the benefits overwhelm the costs, it's hard not to perform the act over and over again, particularly when it strikes just the right neurological notes."*[13]

13 Irresistible: The Rise of Addictive Technology and the Business of Keeping us Hooked, extract adapted for Wired Magazine

The ability to impact customer behavior will only come if the customer benefits from comfort, convenience and control. Utilities can partner to offer the control that the customer wants, and doing so will enable the utility to meet customers where they are. These strategic partners, whose business models are based on providing great user experiences, can do so by using smart devices to seamlessly curate the experience for the home. Many companies, from Amazon to Apple, are competing to develop this relationship with customers, but the utility is uniquely positioned to build the platform upon which this relationship will be nurtured, and the pipeline through which any partner can gain access to the customer. The utility industry has large stores of critical data on customer behavior. The goal now should be to change how utilities view themselves, and reorient themselves toward their greatest asset: the data on consumer energy habits as a proxy for how consumers live their lives.

## Human behavior is driven in part by a succession of reflexive cost-benefit calculations.

For an industry that has used the consumption of energy as the primary metric for how well things are going, the slowed growth and projected drops in load over the next few years point to a need for much deeper understanding of the end-use consumer. What do they want? How can we serve their needs? What does all this data we have about the customer tell us about what they truly want from us? As the utility industry figures out how to create and capture value from becoming more customer-centric, innovation should be viewed as an enabler of positive change, not as something simply happening to the industry. It is no coincidence that the research and market guides for better serving customers start with the need for businesses to base analysis of their customers on mining the data they already have on said customers. This guides the CLEAResult view on what the utility industry must focus on in the short term. The questions above form the basis from which the authors of "Machine, Platform, Crowd: Harnessing Our Digital Future" (McAfee and Brynjolfsson) suggest that any business must start to assess changes in technology, and how these changes better equip companies to deliver value to customers.

# THEME 3
# NEW BUSINESS MODELS

With an empowered customer and technological advancements that are changing the long-held beliefs about the value that the traditional utility provides, where are the new business models? Where are the opportunities to continue to create and capture value in this new paradigm?

While we at CLEAResult very much support the idea of the utility augmenting its core value proposition of supplying safe, reliable and affordable electricity to customers and focusing on comfort convenience and control, to adopt the platform approach to creating and providing value in a digitalized grid will require a shift unlike the industry has had to make before. We must recognize that data is the currency from which the utility will be able to capture new value streams. New value streams will offset the lost opportunity as a result of declining load. What the platform approach also provides is the ability to more flexibly manage customer demand and DER supply. Mark Dyson, and his colleagues at Rocky Mountain Institute (RMI), using research from the RMI report on "The Economics of Demand Flexibility" believe that "electric loads that demand flexibility shifts in time can be called flexiwatts—watts of demand that can be moved across the hours of a day or night according to economic or other signals." This level of flexibility can be achieved if the utility works with partners through an information-retrieval API that allows the utility to optimize usage in a smart and connected home in real time.

So what does this future look like? Most likely, it is a distribution system platform provider model, in which the utility provides the three-pronged services: grid operations management, integrated systems planning (physical asset management) and market operations (financial considerations). As suggested by the NYPSC Technology Working Group in 2015:

*"The utilities acting in concert will constitute a statewide platform that will provide uniform market access to customers and DER providers. Each utility will serve as the platform for interface among its customers, aggregators, and the distribution system. … Simultaneously the utility will serve as a seamless interface between aggregated customers and the NYISO (MDPT 2015:21)"*[14]

Defining new metrics for assessing success in the utility industry is necessary for adjusting to the new paradigm. At CLEAResult, we believe the traditional approach to EE programs implemented by utilities should be upgraded to an approach based around strategic energy management, or SEM. Traditionally, EE is project based and equipment specific; SEM is an approach whereby programs are management driven within a customer organization, and have a site-wide scope supported by the utilities' capabilities. SEM requires a change in the value proposed for the project, where the traditional EE value propositions that the utility offered the customers were incentives or payback. The value should go beyond energy cost reduction into more strategic energy stewardship goals and a change in organizational culture. This will require a mindset shift at the utility and the customer organizations.

Current revenue will continue to come from the ownership and management of the physical assets that make up the current grid system. But, similar to the most successful digital platforms, the utility industry will supplement and eventually surpass its current revenue by acting as a platform that charges for the delivery of power (which will, in some cases, still go through the current grid distribution network) and the microtransactions (calculated using the data the utility manages) that occur between all parties on the grid. This new model is, of course, based on the capabilities afforded to utilities by the incorporation of new technologies.

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# Conclusion

In chess grandmaster Garry Kasparov's "Deep Thinking: Where Machine Intelligence Ends and Human Creativity Begins," he tells the story of a transition he noticed in the late 1990s: the more traditional chess grandmasters held on to their boxes of handwritten notes, which they used to prepare for competitions. Meanwhile, the younger generation of chess grandmasters, who'd grown up as true digital natives with personal computers, prepared by analyzing thousands of chess scenarios between games, utilizing powerful computer programs that were now available from the most advanced analytics companies and research institutes. In hindsight, Kasparov says he's not surprised he lost his championship to Vladimir Kramnik in 2000. Analysts, and Kasparov himself, suggest that (without taking anything away from Kramnik) a huge part of Kramnik's superiority over Kasparov was as a result of his higher level of preparedness from using more sophisticated technology.

Bringing the analogy home, the traditional chess grandmasters would be the incumbent utility and the digital natives would be potential competitors like Tesla and Amazon, who are better prepared to take advantage of the modern technologies that are raising expectations of customer service. These 'digital natives' were borne out of the premise that 'customers are the central element' and this DNA makes these competitors formidable. It's where we find ourselves with advanced technology and its impact on the utility industry; companies and competitors that are more familiar with these technologies (AI, blockchain, IoT, etc.) are in a position to win the race for customer mindshare and wallets because they are better prepared. With some of these technologies, we are still in the early days despite all the hype. What we as an industry need to do is focus on the promise of the technologies that will further empower consumers and determine where we will play. For that reason, the utility industry should invest in the future, embrace innovation, enhance the customer experience with new technologies, and explore new business models.

The technology is here, the customers are expectant, and, while regulatory adjustments have to be made, the utility is well-positioned to transition into this future. As Aziz Virani, CEO of CLEAResult, believes: "We need to be in the business of providing comfort, convenience and control." Let's get to work.

**CLICK ABOVE TO SEE VIDEO**

*"Lead the charge" - CLEAResult CEO Aziz Virani issues a call to action for utilities*

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