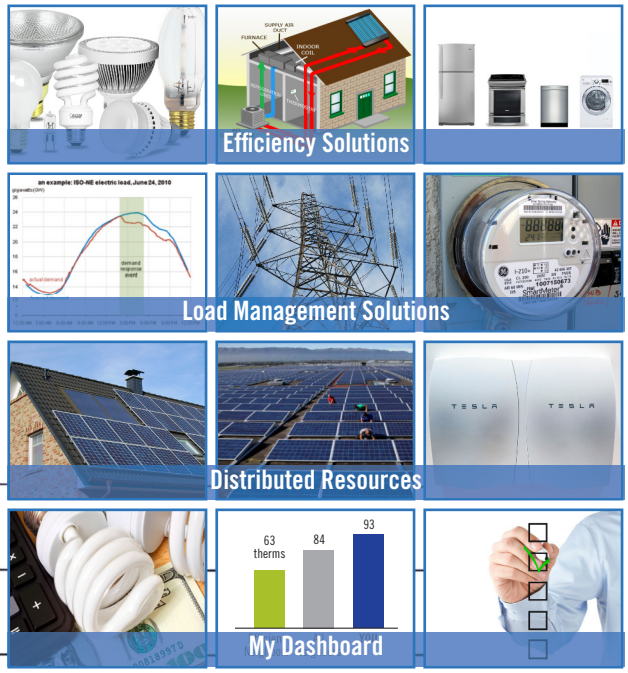
Ceres

Pathway to a 21st Century Electric Utility



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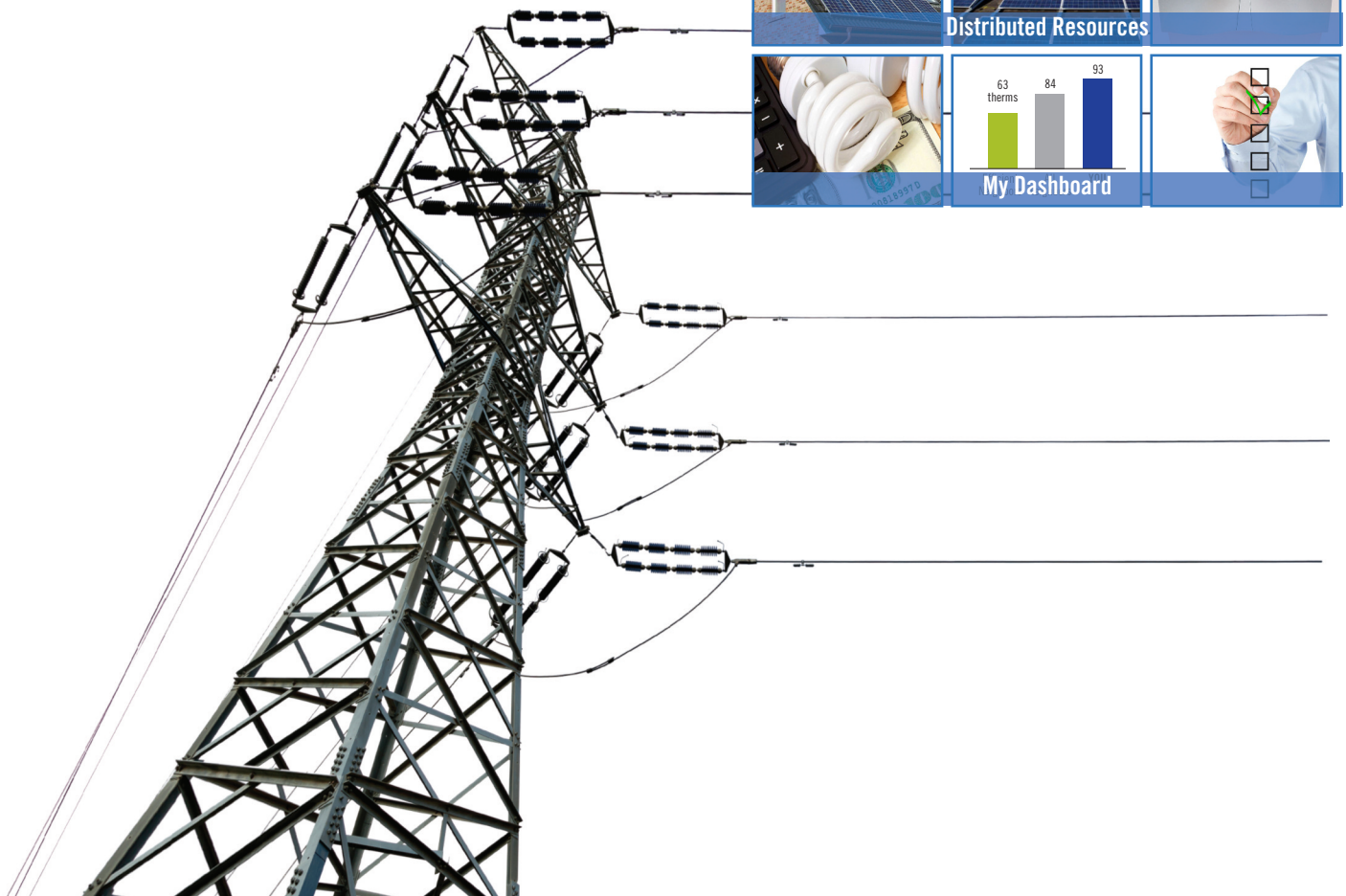

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About Ceres

Ceres is a nonprofit organization mobilizing business leadership on climate change, water scarcity and other global sustainability challenges. Ceres directs the Investor Network on Climate Risk (INCR), a network of more than 110 institutional investors with collective assets totaling more than $13 trillion. Ceres also directs BICEP, an advocacy coalition of 36 businesses committed to working with policy makers to pass meaningful energy and climate legislation. For more information, visit www.ceres.org or follow on Twitter: @CeresNews

This report is available online at www.ceres.org

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Peter is the Executive Director of Energy Infrastructure Advocates LLC, a strategic advisory consultancy focused on public policy supportive of utility and energy sector infrastructure development in a changing energy industry landscape.

Prior to the founding of EIA in 2012, Peter worked for over 30 years in investment banking, with a specialization in utility and power sector finance. Peter's banking experience includes capital markets advisory and transaction execution and strategic advisory services, including merger and acquisition and corporate finance advice. Peter's M&A experience includes all sectors of regulated utility and non-regulated power businesses. Throughout his career, Peter has been actively involved in outreach to regulators and policymakers, including work as an expert witness in regulatory proceedings and forums, presenting at industry and regulatory conferences on financial issues impacting utilities and power producers and in direct outreach on regulatory matters. In 2013, Peter authored a paper on Disruptive Challenges to the utility industry published by the EEI.

Peter's investment banking experience, includes prior experience at Macquarie Group, Bank of America, where he lead the Power and Utilities Corporate and Investment Banking effort, and Citigroup and Kidder Peabody, where he co-directed the Power & Utilities industry teams of each of those firms. Prior to investment banking, Peter worked for Arthur Andersen & Co.

Peter is a Director of the general partner of Enable Midstream Partners, LP, a midstream energy services provider and a Director of NextEra Energy Partners GP, an owner of renewable power generation. Peter is also a Director of Southwest Water Company, an infrastructure fund owned water and wastewater utility.

Peter holds an MBA in Finance from New York University and BBA in Accounting from Iona College. Peter practiced as a Certified Public Accountant until 1981. During 2008 to 2011, Peter was Co-Chairman of EEI's Wall Street Advisory Group.

Table of Contents

Pathway to a 21st Century Electric Utility

Commissioned By: Ceres
Authored By: Peter Kind

As a banker serving the U.S. utility industry for over 30 years, I have long questioned the impact of policy actions and regulatory mandates that threaten the revenue base of utilities and the industry's financial health. In 2013, I authored "Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Energy Business," published by the Edison Electric Institute (EEI). That paper presented my views, looking through the lens of an investor, of the challenges confronting the long-term financial viability of the electric utility industry given its present business model.

Since the release of *"Disruptive Challenges,"* the forces outlined therein have continued to develop, particularly the pace of technological innovation and cost-curve improvements. Importantly, electric customers and the policy community have continued to foster key disruptive forces by confirming their support for customer energy supply choice, net energy metering and opposition to increased fixed utility charges. My positions have evolved in order to find solutions that can promote collaboration and alignment of interests.

In reviewing the constantly evolving landscape, I felt that it was important to provide an updated, more holistic perspective that aligns society's needs with the interests of utilities and their customers. In 2010, Ceres made an important contribution to the dialogue with the release of *"The 21st Century Electric Utility: Positioning for a Low-Carbon Future,"* and it seemed a natural fit to collaborate with Ceres on this new paper.

Utilities are not going away, because we require them to operate the electric grid, so why not expand the scope of their mandate to manage an environment in which consumers use energy and electricity more efficiently to create customer value and optimize the electricity system for the benefit of all?

Utilities do an excellent job of what they are mandated to do—provide safe, reliable and affordable energy. Utilities are not going away, because we require them to operate the electric grid, so why not expand the scope of their mandate to manage an environment in which consumers use energy and electricity more efficiently to create customer value and optimize the electricity system for the benefit of all? In this environment, utilities will be incented to maximize customer and system value, as opposed to simply building infrastructure.

Given the importance of revising the utility industry model for the benefit of customers, society and utility investors, this paper is an expression of my evolved views in an effort to find common ground that will support a robust 21st Century Utility model.

Challenges Facing the Electric Utility Business Model

Over the past decade, a confluence of challenges facing the electric utility business model has stimulated active discussion among utility industry stakeholders. The challenges are the result of economic, demographic, behavioral, policy and technology trends, and are not expected to reverse. In fact, they are continuing to gain momentum, particularly the development of new technologies, continued reductions in renewable energy costs, and policymaker support for a revised vision of utility service that supports customer choice.

Utility sector investments, however, continue to trade close to all-time high valuations based on low interest rates. Threats to the utility sector are still in the early stages because customer adoption of new energy technologies remains low, but are growing. Furthermore, customers, rather than investors, are bearing the near-term cost of disruption through increased utility rates, somewhat offset by lower fuel costs.

Once investors begin to experience these challenges as a direct impact on the economic-return potential of their investments, however, the cost and availability of capital to fund the utility sector will suffer. Given that the industry relies on 30-plus-year investment recovery cycles, it is essential that capital deployed today be planned and rationalized to avoid future stranded costs, or investments that are no longer economical.

The current 100-year-old utility business model does an excellent job of keeping the lights on, but it often does not align interests and behaviors or facilitate the policy goals and customer dynamics that exist in 2015. To create the clean, efficient and sustainable energy future that all stakeholders seek, we must revisit the industry model to ensure alignment with customer and policy goals, while also ensuring that utilities and third-party providers are properly motivated to support their customer, societal and fiduciary obligations.

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Policy and industry stakeholders in most states are neither proactively addressing industry model challenges from a comprehensive policy perspective, nor seeking the collaboration of all stakeholders to find a solution that benefits all parties. In New York, a closely watched initiative has policymakers defining a future in which the utility role involves managing the grid and acting as a platform provider for third parties. This role is not as investor friendly as utilities would desire. In many states, despite customer and policy opposition, electric utilities are proposing increases in fixed charges, which discourage energy efficiency and impact low-income customers. This lack of progress in stakeholder collaboration is ***not*** in our collective best interests.

While the cost structure of electric distribution utilities is predominantly of a fixed nature (i.e., not meaningfully impacted by volumes or operating variability), utility rate structures have typically authorized a small fixed-charge component. Pursuing an increase to fixed-charge recoveries is a tariff design tool that utilities have actively pursued since 2013 to mitigate revenue risk from the challenges they face.

However, there has been meaningful opposition on the part of customer interests and policymakers to utility proposals to significantly increase fixed charges. The policy of adopting monthly fixed-charge increases has several flaws—principally that such increases would remove the price signals needed to encourage energy efficiency and efficient resource deployment—that need to be considered when assessing alternatives through a lens by which all principal stakeholders benefit. This paper proposes several solutions to address the utility revenue challenge as an alternative to increased fixed charges, such as inclining block rates, reforming net energy metering, use of bidirectional meters, time-of-use rates, accountability incentives and identifying new revenue opportunities for utilities.

More broadly, this paper proposes a **new pathway to a 21st Century Electric Utility system** that creates benefits for customers, policymakers, utility capital providers and competitive service providers.

The key differentiators proposed in the pathway toward a new utility model are as follows:

a) engage the distribution utility to be at the center of integrating resources and stakeholder collaboration to achieve customer and policy objectives through accountability and incentives;

b) shift regulatory oversight to focus on integrated distribution system planning and development of transparent accountability metrics;

c) ensure that utility revenues will reflect incentives (or penalties) earned for accountability of results and new energy management services sourced through new resources, such as an energy management applications store; and

d) pursue cost-effective planning to identify the most efficient technologies to be employed, and cap customer incentives based on the most economical alternatives to achieve policy goals.

The paper first sets the stage by identifying the stakeholders and potential participants in a new industry model, summarizing the objectives and considerations of stakeholders, and reviewing the debate that is playing out, including actions by several of the more proactive states. It then lays out a vision for the 21st Century Utility and identifies foundational principles to support this vision before proposing the pathway. Given that we have over 50 states and districts that regulate our utilities, there will be no one-size-fits-all solution.

This paper proposes several solutions to address the utility revenue challenge as an alternative to increased fixed charges, such as inclining block rates, reforming net energy metering, use of bidirectional meters, time-of-use rates, accountability incentives and identifying new revenue opportunities for utilities.

The **vision** proposed for the 21st Century Utility model is relatively straightforward, and includes:

- enhanced reliability and resilience of the electric grid while retaining affordability;
- an increase in cleaner energy to protect our environment and global strategic interests;
- optimized system energy loads and electric-system efficiency to enhance cost efficiency and sustainability; and
- a focus on customer value, including service choices and ease of adoption.

Instead of maintaining our current policies, which encourage increased electric consumption and capital investments, the objective of the vision is to develop a model that enables customer value and service and achieves policy objectives to position us for the certainties of the future—particularly that the current concentration of fossil fuels in our energy mix poses significant risks to our economy and environment.

Because there is no reasonable threat over the foreseeable future of significant customer grid defection, a robust electric grid is a key component of a 21st Century Electric Utility, and thus, financially healthy utilities will be essential to maintaining and operating the grid.

The **foundational principles** or ground rules to support the achievement of this vision are as follows:

- financially viable utilities are essential to fund and support an enhanced electric grid;
- policymakers must promote clear policy goals as part of a comprehensive, integrated jurisdictional energy policy or 21st Century Utility model;
- commitment to engaging and empowering customers can help them make intelligent energy choices, including third-party engagement and access to necessary data; and
- equitable tariff structures promote fairness and policy goals.

The **pathway** proposed is one wherein policymakers task utilities with the **responsibility for** being at the center of coordinating and accelerating the refinement of our model for a 21st Century Electric Utility, and holds them accountable with penalties and incentives. On this pathway, policymakers will collaborate with stakeholders to develop and authorize

the vision for the industry's future for customers and providers. Policymakers will then outline a comprehensive plan to realize their 21st Century Electric Utility model. The proposed pathway shifts regulatory oversight from being administered primarily through periodic rate cases to a forward-looking focus on planning, accountability and financial incentives for results achieved. Tariffs will be refined to address fairness, policy goals and provide price signals, consistent with enhancing system wide efficiency and environmental protection.

Regulators will create incentives and penalties to encourage and hold utilities accountable for achieving transparent goals and metrics to be outlined for measuring progress and success. **Technology innovators and third-party service providers** will collaborate with customers and utilities to create and refine products and services that support policy goals, engage customer interest and integrate efficiently with the grid. **Utilities** will partner with third-party providers and customers to provide reliable, affordable, clean energy in the most efficient way possible. **Customers** will be educated as to opportunities to deploy new services to enhance the value of their electric service and achieve societal benefits, such as reducing their environmental footprint.

Energy efficiency and system optimization, for example, have been an area of focus since the 1980s, and while progress has been made, the majority of customers have not taken advantage of the opportunities that can be realized. The American Council for an Efficient Energy Economy (ACEEE) estimates that a 40 to 60 percent reduction of electricity sales could be achieved by 2050 by harnessing the full suite of opportunities. On a pathway to a 21st Century Utility, we must redouble our efforts to achieve these savings by increasing customer education and giving utilities incentives to engage their customers in adopting such technologies. Because increased efficiency strikes at the revenue base of utilities, the proper incentives must be adopted so that utilities will be at least indifferent to the loss in electricity sales and ideally, be motivated to encourage energy efficiency.

In order to realize the societal benefits of a clean and efficient electric industry, each state should move forward now on a pathway to a 21st Century Utility model. Each state will have different challenges to confront, but the goal would be to develop several robust models that can be tested, compared and refined over time.

The Environmental Protection Agency's newly released **Clean Power Plan (CPP)** provides an excellent opportunity for states to consider their utility model as a component of their CPP compliance plan filings. The CPP sets standards for reducing greenhouse gas emissions from existing and new power plants, and calls for each state to provide its compliance plan by September 2016. The CPP will enable each state to reconsider its energy future and align state compliance plans with a pathway to a 21st Century Utility. Longer-term, customers, society and utility investors will benefit from proactive solutions.

Utilities have remained committed to their historical obligation to provide customers with safe, reliable and affordable service. As dynamics have evolved, society now expects that utilities will confront new priorities, such as protecting our environment and assisting customers in being more efficient with their energy usage. These new priorities challenge utilities' revenue and profitability levels and, thus, utility fiduciary obligations to their investors. A new industry model will need to provide opportunities for utilities to earn a reasonable return while providing society and customers the services they seek.

The proposed pathway shifts regulatory oversight from being administered primarily through periodic rate cases to a forward-looking focus on planning, accountability and financial incentives for results achieved.

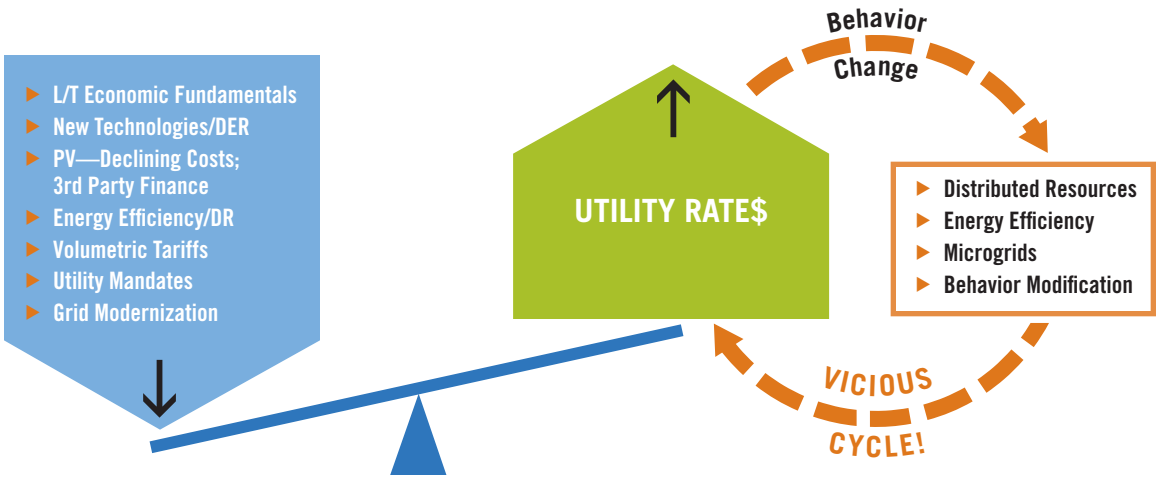
The Case for a 21st Century Electric Utility Model

Disruptive Forces—A Quick Review

Over the past several years there has been active discussion among utility industry stakeholders as to the confluence of challenges facing the industry business model. These challenges are considered long-term forces that are not expected to be reversed, and they encompass economic, demographic, behavioral, policy and technology trends. The principal challenges facing the utility model can be summarized as follows:

- slowing demographic (U.S. population) and economic growth opportunities have reduced electric consumption growth and customers' disposable income levels;
- customer interest in reducing energy usage and environmental impact has gained attention and interest, particularly among Millennials;
- public-policy goals seek to increase energy-efficiency adoption and clean-energy production and to reduce environmental emissions;
- price inflation and costs to deploy new grid technologies are increasing utility capital budgets and requiring increased electric rates (although rate increases have not in general outpaced inflation);
- customers now have enhanced options to save on their energy bills through programs that reward adoption of clean technologies (e.g., solar distributed energy resources combined with net energy metering programs); and
- U.S. regulatory models that are energy-usage based, regardless of load or time of day, constrain prospects for utility revenues and financial health.

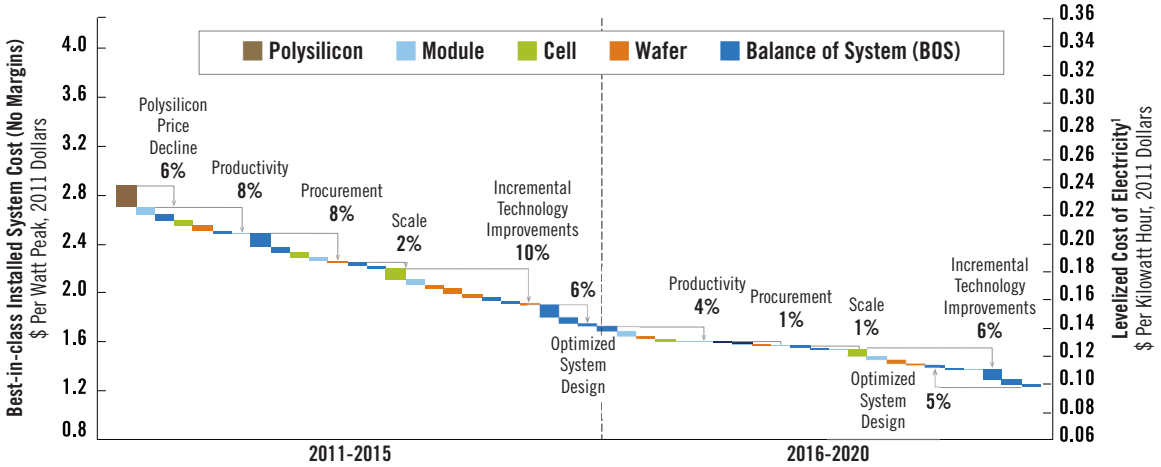
Figure 1: Disruptive Forces—Impact and Feeding of the Vicious Cycle



A confluence of factors are posing disruptive threats to the traditional utility business model.

All of these dynamics are at play while distributed energy resource (DER) economics continue to improve, due to improved technology, market competition and the advent of attractive customer financing options (see **Figures 2 and 3**, below). Left unattended, these challenges encourage a vicious cycle in which customers are motivated to self-generate (such as by rooftop solar) to avoid increasing utility prices, thereby leaving the cost to fund the electric grid to an increasingly smaller group of customers. And yet the grid is essential for DER technologies, particularly rooftop solar, because it allows customers to sell their surplus energy back to the utility. A 2013 study commissioned by the California Public Utilities Commission found, in fact, that due to net energy metering, residential DER customers in California paid approximately 50 percent less toward the fixed cost of providing utility service.[1]

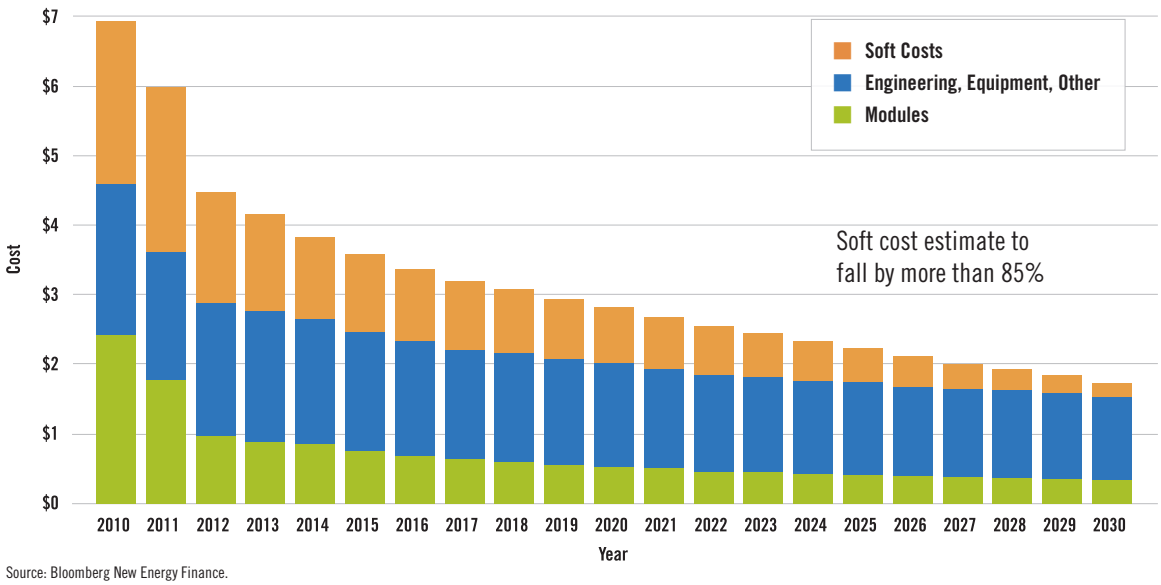
Figure 2: PV Cost Improvements—Innovation and Scale Drive Opportunities



1 Levelized cost of energy; assumptions: 7% weighted average cost of capital, annual operations and maintenance equivalent to 1% of system cost, 0.9% degradation per year, constant 2011 dollars, 15% margin at module level (engineering, procurement, and construction margin included in BOS costs).

Source: McKinsey & Company.

Figure 3: Average USA Price Per Watt for a New Solar System



Source: Bloomberg New Energy Finance.

1 Energy and Environmental Economics, Inc., "California Net Energy Metering Ratepayer Impacts Evaluation," Prepared for the California Public Utilities Commission, October 2013.

Clearly, the electric grid will continue to be essential to virtually all customers for the foreseeable future. In fact, the viable solar rooftop market—after factoring in home ownership, credit scores, locational positioning and suitability and NEM favorability—is currently projected to be approximately 20 percent of US households.[2] Thus, utilities must retain their financial viability to attract the capital required to support the grid. Most investors are not focused on these issues today due to low, though increasing, penetration of DERs and allowed cost recovery of "lost revenues" in future rate cases.

Other disrupted industries have reached the tipping point at which new products and services attain a penetration level and trajectory that challenge the viability of an old-line business and its access to capital. At that point in those challenged industries, financial access and viability are forever threatened. Kodak and Polaroid are prime examples of how disruptive forces (primarily technology in those cases) can destroy a company's financial value and capital access. Given the essential nature of utility services, however, a death spiral for the electric utility industry is not expected in the foreseeable future. Stakeholders must nevertheless be proactive to protect utilities' financial viability, given the industry's vital importance to our energy future.

Other disrupted industries have reached the tipping point at which new products and services attain a penetration level and trajectory that challenge the viability of an old-line business and its access to capital.

Value and Future of the Electric Grid

While the "Disruptive Challenges" paper and others have drawn parallels between landline telephone deregulation and the electric utility model, there are important distinctions between the two. First, there is no known technology today by which electricity can be transported from location to location without a wire. Second, for many customers, installing the technology to disconnect from the grid would be prohibitively expensive, and/or they are not in the proper location or lack the ownership control (i.e., rent their homes) to deploy current DER technologies. In addition, industry experts believe there is great societal value created from the development of a robust grid and that grid defection creates barriers to enhancing and maintaining the electric system we require.

While industry discussion, including "Disruptive Challenges," gives examples of a scenario whereby certain customers could disconnect their access to the grid, or new construction could be grid independent (e.g., DER customers with storage), there is no reasonable scenario for **significant** customer exit from the grid for the foreseeable future. The only way to sell power back to the grid is to be connected to the grid. For DER customers, as an example, every time a new

Figure 4: Examples of Technology Disrupting Main Line Industries

2 GTM Research and Vox

customer installs rooftop solar, he or she is likely basing that economic decision on the ability to sell surplus renewable power back to the grid for at least 20 years.

The grid acts to enable the benefits of distributed resources through the sale of electricity to others and to enable commercial opportunities and transactions through the powering of our entire economy. In addition, the grid provides needed backup support for DERs and storage when renewable resources are not functioning or when demand exceeds system capacity. Thus, the electric grid is, and is expected to remain, the backbone of our electric energy system.

A robust electric grid is therefore required to achieve the greater reliability sought by all customers and to enhance access to additional bidirectional power inputs for DER customers. A study by Brattle Group, commissioned by the EEI in 2009, projected that the U.S. electric utility industry will need to invest between $1.5 and $2 trillion between 2010 and 2030 to maintain current levels of reliable electric supply.[3] To maintain a robust, responsive and resilient grid, we must have a structure in place that supports financially healthy utilities capable of attracting the significant capital required. Thus, the question of structuring tariffs to support the grid and other valuable services provided by utilities must be considered (see **Ratemaking and Tariff Design**, page 29).

The Stakeholders in a 21st Century Electric Utility Sector

It is critical that any attempt to develop 21st century approaches seek as much alignment as possible among the key stakeholders involved in electric utility planning. The stakeholders in electric utility debates continue to evolve as priorities and key issues are refined or emerge, and today include residential, commercial and industrial customers, technology sector providers, utilities and their shareholders.

Residential Customers

Residential customers continue to have significant clout in the evolution of policy due to their voting power and large numbers. Groups representing low-income residents and seniors (who often live on a fixed income) tend to have influence because service cost is a high priority. Another prominent voice in the residential class debate is environmental advocacy groups that seek a focus on environmental stewardship and sustainability. Between these groups, there is alignment that aims to avoid high fixed charges for utility services and supports well-designed inclining block rates. Inclining block rates aid low-income residents and seniors by creating a progressive rate tariff: the more you use, the more you pay per unit. From an environmental policy perspective, inclining block rates provide an incentive to conserve energy usage by charging higher rates to the higher energy users.

Commercial and Industrial Customers

Although large commercial and industrial customers lack voting clout, they are active voices in the development of energy policy. Policymakers need to be aware of large customers' impact on the economic growth and vitality of a region; low utility rates will retain and attract them. While energy prices and availability are not the only factors in the drive for corporate competitiveness, large businesses can relocate when the local policy environment does not support their competitive position. In addition, large commercial and industrial customers (including General Electric, Procter & Gamble, Microsoft, Coca Cola and Walmart) are increasingly focusing on their sustainability profiles, including procurement of renewable energy. Thus, as stakeholders consider how to retain current business customers and develop and attract new industries, energy prices, reliability and access to clean energy will be key factors.

Policymakers

Policymakers and regulators tend to be attuned to their most vocal customers, because their voting power controls the ongoing "seat" of the policymakers. It is clear from the wide array of state-mandated renewable portfolio standards, energy-efficiency programs, net energy metering tariffs, and inclining block rates that policymakers are focused on clean energy, consumer choice, efficiency and price signaling. One question this paper seeks to address is whether policymakers are doing all they reasonably can to accelerate programs to optimize these objectives.

Technology Sector Participants

A recent entrant into the energy policy debate is technology sector participants, particularly renewable-energy providers. These entities are selling their products to customers directly and, as a result, customers use less electric service from the utility. While many of these providers understand that they need to cooperate with utilities to provide customers the benefit of their product offering, there is typically no clear, approved path for these competitive providers to partner with utilities to promote their offerings in a way that benefits both the technology provider and the utility. The interaction between technology and utility providers is often adversarial, with the technology provider seeking to sell products that will limit electric sales and thus adversely impact utility revenues. Utilities have therefore been hesitant to partner

3 Brattle Group, ","In Transforming America's Power Industry, The Investment Challenge 2010—2030," (2009).

with these third-party providers, which have built strong policy advocacy efforts and industry organizations because such activities are essential to their future viability.

Utilities and Their Investors

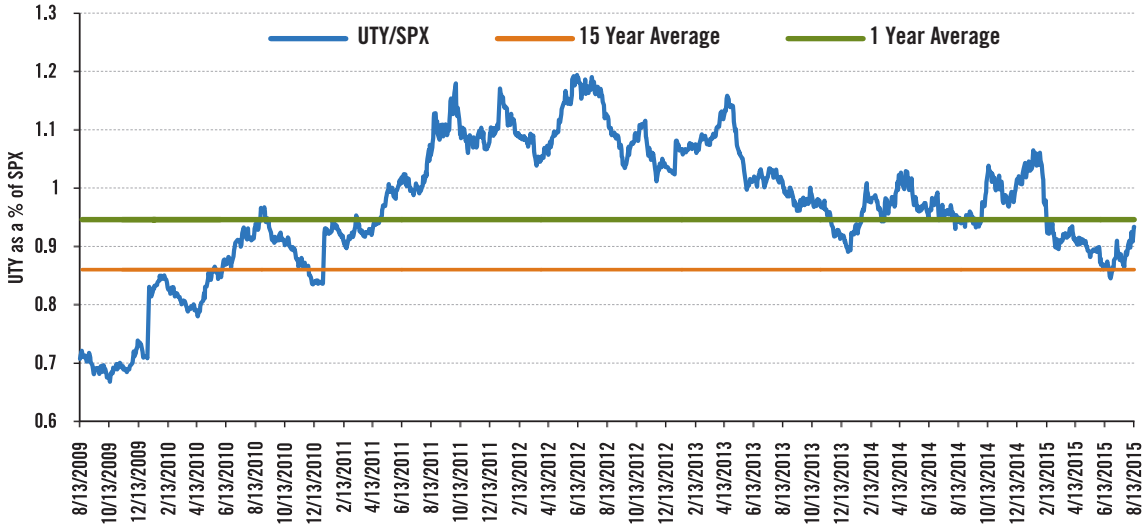
Utilities have many masters, but their principal obligations are to provide safe, clean, reliable and affordable electric service to customers and to earn a fair return on capital invested. Electric utilities generally do an excellent job of meeting customer-service expectations. A comprehensive study, "Exploring the Reliability of U.S. Electric Utilities," showed that reliability, despite extreme weather events, averages above 99.9 percent.[4] However, extreme weather events, such as hurricanes Katrina (2005), Irene (2011) and Sandy (2012) and devastating tornadoes such as Joplin (2011) are examples of the need for enhanced electric grid "hardening" and resilience to protect our citizens and economy.

Achieving an adequate return on capital, in particular in the short term, depends upon selling more energy, because that is how tariffs tend to be structured. Utility boards of directors typically structure utility management compensation programs based on achieving reliability factors and a larger weighting to financial returns. This is more customer friendly than other industries, in which executive compensation is based solely on market share and profit goals. While 25 states offer incentives for efficiency results,[5] these programs tend to offer limited financial incentives to utilities for promoting energy-efficiency services or clean technologies.

For example, while California has been proactive in providing incentives to utilities for encouraging energy efficiency, the incentives reported in 2014 were less than 1.25 percent of pre-tax operating income for the largest California utilities, or less than 0.1 percent in additional return on equity (ROE), after tax. Locating the disclosure of earned incentives in the California utilities' SEC filings is like finding a needle in a haystack. That makes it hard for investors to reflect in their valuation assessment a material, recurring, transparent and timely (in California there is a several-year lag in calculation) incentive mechanism. **While incentives should align behaviors, insignificant and nontransparent levels of incentives will not drive behavioral change and realization of optimal results.**

While utilities are interested in and impacted by the debate on regulatory models, their interactions are challenged by a skeptical policymaker environment, which often presumes that any position by an electric utility reflects a self-serving benefit. Thus, utilities are in a challenging position when it comes to leading or proposing solutions. As a result, utilities tend to be defensive in their approach and often lack the vision or motivation to identify areas where the business model can be enhanced for the benefit of their customers and investors. Instead of arguing for incentive mechanisms, many utilities have been seeking to increase fixed charges, while customers and policymakers are vehemently opposed to such action. An evolved approach would focus on common ground with win4 (i.e. beneficial to customers, policy, competitive providers and utilities) opportunities.

Figure 5: Utilities Are Valued Above 15-year Averages and Comparable to S&P 500

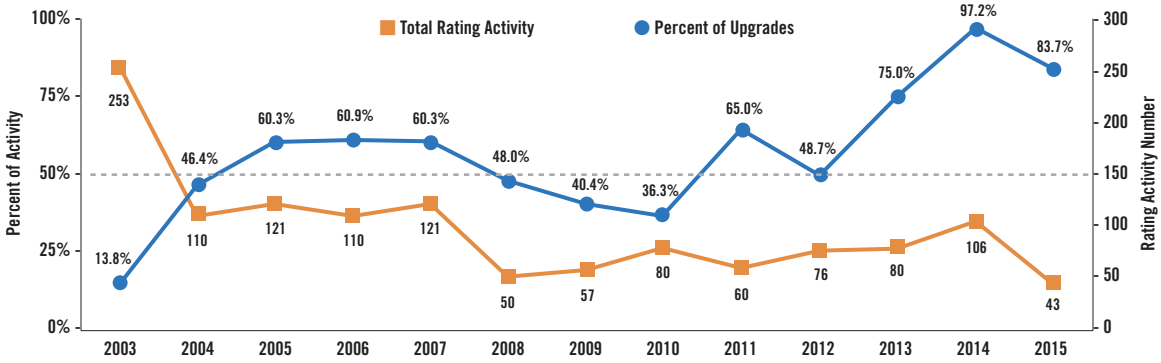


Source: BofA Merrill Lynch Global Research, Bloomberg

4 Larsen, Sweeney, LaCommare and Eto, "Exploring the Reliability of U.S. Electric Utilities," (2012).

5 ACEEE Economy, "Beyond Carrots for Utilities: A National Review of Performance Incentives for Energy Efficiency," June 2015.

Figure 6: Credit Rating Agency Actions Suggest Improving Credit Quality



Source: Edison Electric Institute, Fitch Ratings, Moody's, Standard & Poor's

Utility investors as a group are not interested in change, because the results they have realized from their investments in the sector have provided stable returns. Investors fear that any change could lead to an adverse impact on short-term results and that the defensive investment attributes they have sought—low price volatility, stable economic returns and cash dividend yields—may be compromised. As stated above, boards have structured the bulk of utility management compensation on achieving profit objectives, in addition to reliability performance. Investors are generally comfortable with the transparency of the utility model, despite the argument that the industry model may no longer be appropriate or viable in a changing environment. In fact, utility stock prices today are near all-time highs on a price and valuation multiples basis. Current valuation metric levels (See **Figure 5**) suggest that investors continue to view utilities as an attractive place to deploy capital.

If a material change in business financial performance were to be realized, investors would likely become less sanguine about deploying capital in the sector. But the majority of utility-sector investment analysts and rating agencies see little to be concerned about as long as the penetration rate of efficiency and clean-energy resources is low and regulators allow utilities to recover lost revenues in the near future. In fact, utility credit ratings have solidified over the past several years, particularly distribution utilities, as the economy has stabilized and industry restructuring volatility from the 2000 - 2005 era has been resolved. (See **Figure 6)** So, while short-term dynamics are the current focal point of the investment community, longer-term dynamics should be a key consideration in order to avoid disruption to the utility industry, its customers and our economy.

So, while short-term dynamics are the current focal point of the investment community, longer-term dynamics should be a key consideration in order to avoid disruption to the utility industry, its customers and our economy.

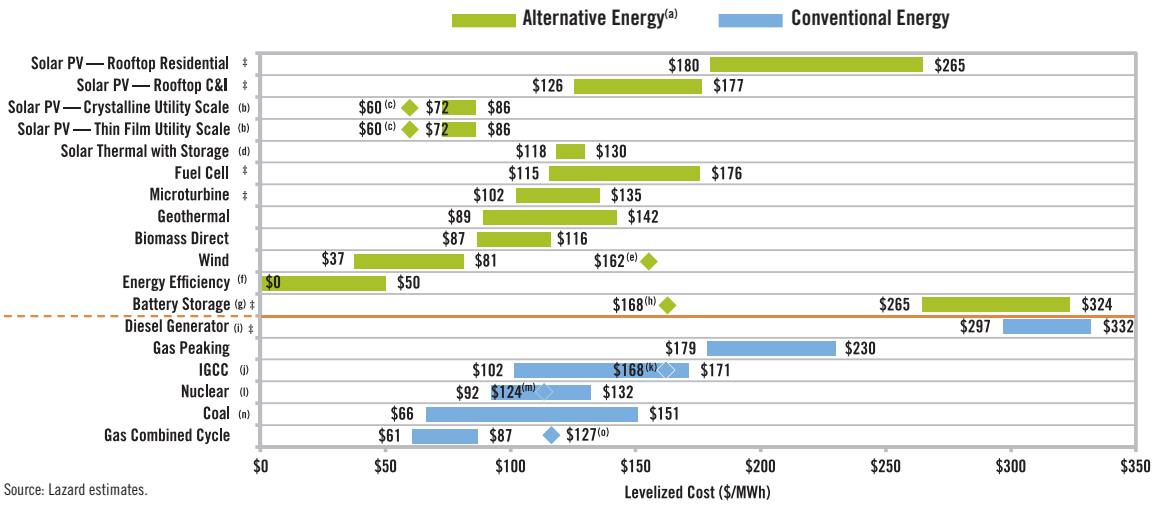
Utility investors, individually or as a group, are not often at the table in discussions on energy policy. Many institutional investors prefer the current utility business model and deal with change by selling the sector or certain investments when it starts to evolve in a way that appears more risky. While some investors, such as those in the $13 trillion Investor Network on Climate Risk (INCR) have become involved in clean-energy policy advocacy, it is still rare to see major institutional investors show up to address a state regulatory policy issue or to support a utility rate case.

Key Stakeholder Issues

Although unanimous agreement on the objectives for a 21st century electric utility industry model is not likely to be achieved, there appears to be solid customer, policymaker and utility support for key foundational objectives for the future industry. Key objectives include improved reliability and resilience of electric service, a cleaner sustainable electric supply and customer cost stability.

Customer cost stability is difficult to achieve in a regulatory construct that seeks (i) usage-based pricing, (ii) customer choice for self-generation of electric supply, compensated by non-DER customers, and (iii) limits on utilities' ability to serve and earn revenues from new 21st Century Utility services. Moreover, the investment required to harden the grid to improve reliability and resilience and provide a cleaner mix of energy resources will increase the cost of

Figure 7: Unsubsidized Levelized Cost of Energy Comparison—September 2017



Source: Lazard estimates.

Certain Alternative Energy generation technologies are cost-competitive with conventional generation technologies under some scenarios; such observation does not take into account potential social and environmental externalities (e.g., social costs of distributed generation, environmental consequences of certain conventional generation technologies, etc.) or reliability-related considerations (e.g., transmission and back-up generation costs associated with certain Alternative Energy generation technologies). Diamonds typically represent expected cost in 2017, wind is for offshore, for more information see https://www.lazard.com/media/1777/levelized_cost_of_energy_-_version_80.pdf

providing service. Despite improving economics, the cost of clean energy, excluding externalities, will likely be more expensive than the current embedded cost of existing generation, because investment and backup capacity are required to support renewable supplies, which are intermittent. Given current utility pricing policies that do not consider externalities, the cost of electric service is expected to increase over time. However, as shown in **Figure 7**, clean energy is expected to become increasingly competitive with traditional fossil energy sources, even before considering carbon costs.

One of the key disputes in the discussion of a 21st Century Utility is the value of clean energy resources. Currently, neither the cost of carbon nor the system wide benefits of a clean-energy strategy, such as reduced system losses and transmission needs, are fully factored into the price of electric power. When the cost of carbon and other externalities are reflected in the cost of energy, the cost to customers will likely prove the long-term benefit of a clean-energy strategy. With the appropriate policies and alignment of interests, the value of electric service can be enhanced. For instance, optimizing our system and the use of energy can reduce the need for new peaking capacity and related incremental infrastructure.

Additional objectives, of policymakers and engaged customers, include system and energy-efficiency optimization, price signals to encourage economic efficiency and optimization, and regional economic growth. But without encouraging efficiency (via technology, price signals and targeted incentives) it will be quite difficult to optimize the primary objective of enhanced price stability, given that incremental resources and investment would be required to support incremental consumption.

J.D. Power, a leading global market-research firm, evaluates industries to understand what drives customer interests, loyalty and retention. In J.D. Power's recent rankings of utility customers, their analysis prioritizes customer attributes as follows:

	Customers	
	Residential[6]	Business[7]
Power Quality and Reliability	1	1
Price	2	4
Billing and Payment	3	2
Corporate Citizenship	4	3
Communications	5	5
Customer Service	6	6

Residential customers are primarily focused on power quality, reliability and price. Interest in new technologies and environmental stewardship does not reflect separate categories but rather contributing factors in the price and

6 J.D. Power and Associates, 2015 Electric Utility Residential Satisfaction Survey.

7 J.D. Power and Associates, 2015 Electric Utility Business Customer Satisfaction Survey.

corporate citizenship scores. Industry data show that a relatively low percentage (less than 1 percent nationally)[8] of utility customers are currently seeking new technologies and choosing to self-generate from renewables. Customers' primary focus today is on reliability and price. A much smaller subset of customers are **proactive** in initiating the adoption of energy-efficiency and clean-energy technologies, but it is a group that is growing rapidly and is expected to increase dramatically in the coming years.

Energy Efficiency—A Growing Opportunity

One of the most significant opportunities to enhance both customer value and environmental benefit is the expansion of energy efficiency. Presently, however, customer adoption rates are low. Policy frameworks need to develop incentives for overcoming the barriers to adoption.

A study by the Edison Foundation on the impacts of energy efficiency at a national level shows that energy efficiency is increasing, but amounted to only 3.4 percent of total 2012 electric energy sales.[9] Another study prepared for the Edison Foundation found that when energy-efficiency savings are combined with enhanced building codes and standards, such savings will increase by 2035 from current levels to 5.6 percent of total electric energy use.[10] While any increase in the adoption of energy-efficiency tools is a positive development, economic studies indicate that much more is achievable and would benefit both customers and the environment.

The opportunity to increase energy efficiency is substantial, but will require the focus of stakeholders to overcome the barriers to adoption.

Leading factors in the low adoption rates for energy efficiency include a lack of general awareness of opportunities (particularly because customers cannot price-shop for another utility provider), lack of trust in third-party providers (due to ongoing "junk" mailings and cold calling), the cost to implement new technologies or services when up-front investment is required, and the fact that customers are too busy to learn about opportunities that may be consistent with their long-term economic and environmental interests.

A recent study by the ACEEE, for example, found that energy-efficiency opportunities could reduce electric sales by 40 to 60 percent from current 2030 forecasts, based on intelligent efficiency advances, zero-net-energy building standards and improved efficiency of appliances and technology. The study also noted significant progress in the energy intensity of our economy from 1980 to 2014 due to structural changes (e.g., the reduction of our manufacturing base) and improved efficiency of appliances, new buildings and electric infrastructure.[11] Thus, the opportunity to increase energy efficiency is substantial, but will require the focus of stakeholders to overcome the barriers to adoption.

Large (commercial and industrial) customers, being focused on profit, are savvier than the residential class as to their awareness of cost-saving opportunities. Given capital availability constraints, however, commercial customers tend to demonstrate high return-on-investment hurdle rates (i.e., short payback periods) to invest capital in activities not directly related to their core product or service offering. This factor limits implementation of investments that would be of long-term benefit to the customer specifically and for society overall.

Policymakers and regulators are clearly intent on promoting customer choice of energy supply and increased renewable energy output. Twenty-nine states have Renewable Portfolio Standards (RPS), 24 states have energy-efficiency resource standards and 43 states have net energy metering.[12] Yet the approach to realizing this objective has primarily relied on customers taking the initiative to investigate new opportunities or responding to utility mailers regarding pilot programs, which are adopted by a very low percentage of customers. While there are many providers in various markets that are seeking to sell their technologies and services, customers often don't know whom to trust in this complex arena and are not familiar with the alternatives.

Why not engage utilities and offer them incentives to assist in accelerating these objectives? Utilities are well positioned to assist their customers in learning about and deploying energy-saving technologies, but they need both increased incentives and accountability for doing so. What we see from the success of smartphone applications ("apps") is that customers want "low-touch" solutions that can be implemented and monitored with ease. While that may not be possible for all services, the smartphone app

8 Solar Electric Power Association, 2014 Power Statistics

9 Edison Foundation Institute for Electric Innovation, "Summary of Electric Utility Customer-Funded Energy Efficiency Savings, Expenditures and Budgets", (2014).

10 EnerNoc Utility Solutions Consulting, "Factors Affecting Electricity Consumption in the U.S. (2010–2035),"), (2013).

11 ACEEE, "Energy Efficiency in the United States: 35 Years and Counting," June 2015.

12 ACEEE website, State Energy Efficiency Planning.

is today's gold standard for engaging customer interest. The exciting news is that the advancement of sensor technology and automated controls is creating new possibilities for low-touch efficiency applications in the energy sector (e.g., Nest, a learning, programmable thermostat).

Many observers believe that there is a meaningful aversion on the part of regulators to determining how utilities should be compensated for providing such new services. Thus, the utility role is neglected in favor of competitive industry players, who are *not* well known by customers, to drive this important objective. In fact, there is a logical scenario, to be outlined later, in which competitive third-party providers collaborate and partner with utilities to accelerate the adoption of their products and services.

Finally, although utilities are interested in providing excellent service to customers, they also have a fiduciary obligation to support their investment value by earning a fair economic return on the capital employed in the business. In most jurisdictions, utilities earn revenues based on capital invested, and such revenues are recovered through customer usage. By promoting activities that reduce usage, utilities are working against one of their core missions and their fiduciary duty, which is to earn a fair return on invested capital. Thus, achieving stakeholder objectives regarding energy efficiency and clean-energy technologies may be best accomplished by providing incentives to customers and providers. In most business models, businesses are motivated to sell new services because this enhances revenue. In our present utility business model, utilities realize a "penalty" to their revenues by encouraging the deployment of our current policy objectives, such as energy efficiency. This creates an inherent conflict that requires logical solutions, such as "revenue decoupling," described later, which breaks the link between energy sales and revenue, to align utility and customer interests.

A Vision for the 21st Century Electric Utility

If we could start with a clean sheet of paper, how would electric utility services be structured? We would want to ensure that there was alignment of policy, customer and investor goals in order to structure a product offering that satisfied the best interests of all major stakeholders, a win4. Such a service offering would maintain and build on the high electric reliability we have today; allow customers to benefit from the latest, most economical technologies to optimize the efficiency of their energy service; be environmentally friendly; and seek efficient economic deployment of resources and, thus, capital investment.

Policymakers would seek optimal economic deployment of the system to ensure reliability and capital efficiency. They would expect deployment of resources consistent with local, regional and national environmental policy goals. They would ensure that price signals be provided to customers so that the system was used efficiently to manage systemwide costs (both embedded and future deployment). Finally, policymakers would want to see fairly stable customer prices, to provide customers more certainty and help realize a competitive cost of service that promoted economic growth in the region.

Utilities in this optimal environment would aim to offer a suite of products and services to achieve customer and policymaker objectives, and they would earn at their cost of capital (as deemed appropriate by the marketplace), or be given incentives to earn above it, for meeting these objectives. In a transparent and predictable business environment the cost of capital is lower, and the availability of capital is greater, than for less transparent, less stable businesses. Investors seek a business that offers growth potential as well, because a business without growth offers only a bond-like investment.

Competitive service providers would partner and collaborate with utilities to refine their products, optimize customer-acquisition costs and increase their share of market. In other words, they would partner with utilities to enhance their collective profit potential. To aid in identifying opportunities, competitive providers might avail themselves of defined, non-customer-sensitive electric system data. Policymakers would decide what information could be provided without compromising customer and system security.

This efficient deployment of renewables, consistent with a utility cost-effectiveness plan, would seek the most economical and location-efficient technology to provide the best resource base for the benefit of the entire system.

How would a 21st Century Utility operate? It would target optimal use of diverse (hydro, solar, wind, biomass, efficiency, demand response, storage and Combined Heat and Power (CHP) renewable or low-cost electric energy resources that would be backstopped and supported by other clean, baseload energy sources. This efficient deployment of renewables, consistent with a utility cost-effectiveness plan, would seek the most economical and location-efficient technology to provide the best resource base for the benefit of the entire system. For example, in addition to residential rooftop PV solar systems, which do not consider optimal location or technology efficiency, the resource base would include a significant component of DER, community or utility-scale solar, intentionally located to enhance grid and system efficiency. The system would look to include efficient deployment of demand response and microgrids in those areas where reliability was of paramount importance (e.g., regions with high concentrations of hospitals, senior centers and schools) to protect them from weather and other emergency events.

Energy Management Applications Store

Over the past several years we have witnessed explosive success and customer interest in software applications that integrate with smartphones and tablets to provide easy and fun access to powerful software tools. These apps provide an array of services and information at the touch of a button. Why not create a customer-focused energy management application page, or "store," that would allow customers to explore a range of product and service alternatives to save energy and money? The objective of such a store would be to:

1) introduce an available product or service alternative;
2) provide information to educate the customer;
3) highlight quality vendors to provide the service, as appropriate;
4) provide click-through to order the product, arrange for an estimate or get further information; and
5) monitor results from using the product.

Ease of access to robust information and service ordering would be effective in engaging and empowering customers. Customers could be offered demand response, load management and time-of-use products that could be operated from their smartphone or other device. "My Dashboard" icons could support "shadow billing" to assess the potential savings from efficiency applications and other service opportunities. Customers' ability to arrange for the installation, operation and oversight of these services would be as easy as the touch of a button. Their total savings would be presented on the app so that they could see the benefit of their actions and understand how their usage and savings opportunities compare to their neighbors. This vision is not futuristic, because such tools and products exist today. The 75 percent of Americans with smartphones (expected to reach 80 to 85 percent by December 2015) or 87 percent with Internet connections would be able to access these services easily.[13]

The question remains: Who is best positioned to host the energy management app store—the government, the utility or some other sponsor? There is no reason that such an approach need be exclusive to one provider. The challenge is how to achieve the most traction from such an effort and create an environment in which customers have confidence that the information is objectively presented. Given an objective of increasing customer adoption of new technologies, utilities appear best positioned to be a logical host of this application store. They have the ability to provide usage data and objectively present information on services. In addition, utilities are best positioned to track and aggregate results of products and services to present to current and potential customers.

Policymakers would have to decide how to compensate utilities for providing this service. The Apple model is worthy of consideration. Apple hosts the App Store on its system and earns a fee from application developers (e.g., competitive energy solution providers) when users download apps. In the energy management model, third-party providers could compensate utilities for each customer click or purchase of a product or service. This model would likely result in a cost-effective tool for third-party providers to reach customers.

Importantly, the energy management application store by itself will not be sufficient to drive results without continued efforts by third-party providers to develop new efficiency technologies and by policymakers and utilities to design programs and customer education initiatives.

Figure 8: Energy Management Applications Store

13 comScore, "U.S. Smartphone Market Share Report,", February 2015.

Incentives would optimize expenditures and thereby moderate customer rate increases to help reform the utility model and manage behaviors. By realizing efficiency and system-load optimization, and considering tools such as the UK's Totex (see **Experiences in Selected States and the UK**, page 25), we should be able to moderate capital investment levels. For utilities, these incentives will offset reduced growth opportunities for investors and, most important, encourage the achievement of customer and policy objectives.

The challenge is that we are not starting from a clean slate, and while we have an excellent quality of essential utility service, the shift to the 21st Century Utility model requires complex transitions that will be heavily debated by stakeholders.

Examples of such transitional issues include:

- phasing in new clean-energy resources while phasing out less clean resources;
- phasing out current subsidy structures for DER users to an economic-value-driven incentive model;
- enhancing customer engagement in pursuit of optimal use of efficiency resources through continued focus on awareness, education and customer incentive programs; and
- regulatory reform to align interests, incentives and metrics for achieving accountability of results.

In order to achieve these goals, we need to create a transition plan that embraces the end-state vision. For that we need policy leadership, clear goals, alignment of interests and accountability.

The vision for the 21st Century Utility can be summarized in four simple points:

- enhanced reliability and resilience of the electric grid while retaining affordability;
- an increase in cleaner energy to protect our environment and global strategic interests;

Technology Game Changers

Although it is a mature industry, the electricity sector has become increasingly dynamic. New forms of technology are in development that will significantly shape the future of the utility business. Given the large capital investment required to fund this sector, and its essential and pervasive involvement in our communities, an important consideration to factor in to the development of the 21st Century Utility industry framework is how customers and utilities will deploy and address new technologies, including those on the horizon that have not yet achieved commercial viability.

Policy will be an enabling driver of many of these game changers. Policymakers should be proactive in considering how best to accelerate each of these opportunities in a 21st Century Utility model to maximize their potential economic and environmental benefits. Potential game-changing technologies such as the following could dramatically reshape the utility business.

- **Grid scale and customer-owned battery storage units** allow electricity to be stored when not required for immediate use and thereby dramatically enhance the value of intermittent resources, such as solar and wind power. They also allow customers to buy power from the electrical grid when prices are lowest and use their own energy at more expensive times. This is a technology-driven opportunity.
- **Electric vehicles** create potential for substantial additional electric demands (expected to be off-peak) for charging batteries and could discharge energy back into the system when the charge has more value as a pure electric energy source. This is a technology-, policy- and customer-preference-driven game changer that could significantly reduce pollution from the transportation sector.
- **Combined heat and power** standards for all large, continuously deployed energy loads (hospitals, hotels, prisons, etc.) optimize BTU consumption by leveraging waste heat into electric energy and steam-heating loads. This is a policy-driven game changer using incentives.
- **Enhanced building standards** can promote energy efficiency and strive to reach net-energy-neutral status. This requires policy to mandate that new construction and remodeling achieve higher efficiency standards. According to a study prepared for the IEEE , aggressive building codes and standards would achieve a 17 percent reduction in electric usage by 2035.[14]
- **Appliance standards** can compel all new major energy-using appliances to operate at best-in-class efficiency levels and support Internet adoptability for purposes of controlling technology use. This is a policy-driven game changer.
- **Big data analytics** can be leveraged to enable intelligent efficiency technologies. This is a technology- and policy-driven game changer.
- **Cost-effectiveness planning protocols** can be applied, both for resources and systemwide, including renewable adoption, promoting the most efficient resources to provide systemwide benefits. This is a policy-driven game changer.

Most of these game changers will allow for more efficient deployment of system resources (e.g., storage, CHP, building and appliance standards). While electric vehicles will increase off-peak electric consumption, they offer the opportunity for storage optimization. All of these listed items will require incremental capital investment, either on the grid or behind the meter.

14 EnerNoc Utility Solutions Consulting, "Factors Affecting Electricity Consumption in the U.S. (2010–2035)," (2013).

- optimized system energy loads and electric-system efficiency to enhance cost efficiency and sustainability; and
- a focus on customer value, including service choices and ease of adoption.

Reliability and Resilience

Few question the priority and importance of enhancing the reliability and resilience of electric service. While our electric system is highly reliable, recent weather events and the reliability needs of our increasingly technology-dependent economy are ample proof that we require exceptionally high reliability and resilience to fuel our economy. As in most areas of strategic importance, we cannot just maintain the status quo, but must be committed to continuous improvement of our electric system to support new technologies and the competitiveness and growth of our economy.

Increased Clean Energy

Most Americans believe that preserving a clean environment and addressing climate change are essential priorities. Gallup polling shows that only 24 percent of Americans have no concerns as to the quality of the environment (which is down from 29 percent in 2010).[15] Opposition to developing a cleaner energy mix tends to highlight the near-term economic impact (jobs and costs to customers), but momentum is clearly building toward a cleaner energy mix. In support of a clean energy future, (i) 36 states plus D.C. have either renewable portfolio standards (29 states plus D.C.) or renewable portfolio goals (7 states), (ii) 23 states have energy efficiency resource standards, and (iii) the US EPA recently released the Clean Power Plan (which aims for a 32 percent reduction in greenhouse gas emissions by 2030).[16]

Optimized Energy System

Optimizing the use of our energy infrastructure will enhance our economic growth potential by increasing customer discretionary income and reducing costly energy emissions. Optimization of resources includes efficient energy consumption, spreading usage to off-peak periods and reducing the need to invest in incremental energy infrastructure. In doing so, current and future costs of electric service can be proactively managed to enhance value for customers. System energy loads should be optimized, not simply individual customer energy loads. For example, if there are better ways to enhance the efficiency of the grid (vs. behind the meter), all customers benefit equally from this investment. Examples include community solar and grid-level storage, as compared with customer DER application of such technologies. *This is not to suggest that we mandate one renewable resource over another, but that we pursue the most cost-efficient energy sources, either through new-construction plans or by capping incentives on DERs consistent with the most cost-effective clean-energy options.*

Optimizing the use of our energy infrastructure will enhance our economic growth potential by increasing customer discretionary income and reducing costly energy emissions.

Customer Value

This is a new area of focus for utilities. Prior to DER and efficiency applications, utilities were responsible for meeting system needs, and customers were viewed as "ratepayers." When customers have alternatives, service providers must focus on providing customer value. Utilities are in the process of transforming to customer-focused organizations with an expanding choice of energy technology options. This is a work in progress, and many utilities may not understand the significance of this change. The focus on customer value also includes ease of product adoption. We live in a complex world in which many interests compete for our time. Value to customers is not just about product quality and cost of service, but includes making it easier for customers to learn about and, if appropriate, adopt alternatives.

To build such an industry, we will need foundational principles to support the vision and a pathway to reach it.

Con Ed's Brooklyn-Queens Program

An interesting example of deploying innovative solutions to achieve the goals of a 21st Century Utility is Con Ed's Brooklyn-Queens Demand Management Program (BQDM). The BQDM seeks to reduce demand by 52 megawatts via customer-side and utility-side solutions in order to avoid spending $1 billion on a new substation and related electric infrastructure. This initiative will provide incentives to participating customers and to Con Ed and will result in lower utility rates for all customers.

15 Gallup, Gallup Social Series: Environment, March 2015.

16 ACEEE website, State Energy Efficiency Planning.

Foundational Principles to Support a 21st Century Electric Utility

A durable building or organization requires a strong foundation to support its structure. The prior section outlined the vision for a 21st Century Utility industry, but we cannot create this without solid foundational principles, which are as follows:

- financially viable utilities are essential to fund and support an enhanced electric grid;
- policymakers must promote clear policy goals as part of a comprehensive, integrated jurisdictional energy policy or 21st Century Utility model;
- a commitment to engaging and empowering customers can help them make intelligent energy choices, including third-party engagement and access to necessary data; and
- equitable tariff structures promote fairness and policy goals.

Financial Viability

Enhancing our electric grid to achieve our reliability objectives will require significant investment. The Brattle Group estimated that $75 to $100 billion per year (in 2009 dollars) will be required to maintain reliability levels. The industry, however, has operating income of $30 billion per year before paying dividends, which means it needs access to external capital to raise the significant funds (in excess of $50 billion per year) to support the existing business and make the required future investments. Accessing capital of this magnitude requires investment-grade credit ratings (BBB- or above, using Standard and Poor's parlance). The better the financial health of the utility, the larger its potential audience for capital and the lower the cost of capital realized. Thus, financially healthy utilities are a key foundational component of a 21st Century Utility model. Importantly, financial health is built over many years of experiencing a transparent and durable operating environment, with consistent policies and financial performance.

Clear Policy Goals

The utility industry cannot evolve without rules and regulations that support the desired evolution. Thus, policymakers must assess the landscape and create, through active interaction with key stakeholders, clear policy goals and a program to achieve them. Each jurisdiction will need to fully explore the interests of stakeholders, the policy objectives already in place and the impacts of proposed policy shifts on their stakeholders. The objective is to develop a comprehensive and integrated set of policies that drive toward the desired outcomes while accounting for constraints to reaching the vision. Although several states are exploring the opportunity to refine their utility model (see **Experiences in Selected States and the UK**, page 25), no state to date has implemented an integrated, comprehensive set of policies, with a timeframe and plan to reach an objective. Without a comprehensive set of policies and a plan, a jurisdiction may have a variety of programs, some mandated and others aspirational, to refine utility services. But such plans require appropriate incentives and accountability as a comprehensive package to drive reform.

Customer Empowerment

A commitment to empowering customers to make intelligent energy choices may seem obvious, but it requires proper alignment of stakeholder interests. Traditionally, utilities have been motivated to sell electricity, not support reduced

consumption or investment. We need to remove the model bias that promotes traditional utility financial value and create an environment in which all stakeholders are aligned and benefit from behaviors consistent with the vision. When shared interests are recognized, we have an opening for an environment that supports customer value creation, including promoting actions and tools for customers.

Equitable Tariff Design

Utility tariff structures will be a key component of the strategy to achieve a 21st Century Utility. Tariffs are central to both customer value decisions and recovery of revenues to support utility financial health. The development of tariff structures that support policy-driven objectives and that are fair to all customer classes is a key area of debate. In a model that focuses on efficiency and cost of service, inclining block rates have been a favored tool to mitigate excessive energy use. The problem for utility revenues is that this rate structure feeds customer choice dynamics that reward DER selection and transfers costs to non-DER customers. In the discussion of tariffs that follows, a package of solutions is proposed that is intended to encourage policy goals, fairness to all customer classes, systemwide cost optimization and utility financial stability.

Planning to Accelerate and Coordinate Industry Evolution

The U.S. has more than 50 state/district regulatory authorities overseeing investor-owned utilities, which represent over 70 percent of the U.S. electric industry.[17] To enable the industry to evolve, states have generally taken the approach of setting goals (e.g., RPS) and programs but rely on utility mandates or the competitive marketplace to innovate and provide solutions directly to customers, with the expectation or hope that customers will engage in these products and efficiency behaviors. If we rely on the marketplace to support the future of electric services, the most successful competitive market participants will win, but they may not be the most efficient for customers or society overall, as evidenced by the relatively low penetration of and energy savings from efficiency technologies.

To drive our electric energy future so as to optimize our finite resources (energy and capital), it seems appropriate for policymakers to proactively develop a comprehensive vision and plan for each jurisdiction's energy future. The objective would be for us to take charge of our direction and accelerate the efficiency of activity, and thus mitigate any waste of energy and capital through the transition of the plan to the desired end state. The components of a statewide energy or 21st Century Utility plan would include:

- **vision**—how we expect customers to use and manage their electricity needs in the future;
- **objectives**—comprehensive, integrated policy positions to achieve the vision, including the approach to deploying renewables, storage, DER and microgrids;
- **defined goals**—providing metrics and timeframes for achieving progress toward the realization of the vision;
- **clear participant roles**—who will be held accountable for driving the vision, and how customers, policymakers, utilities and competitive service providers will interface and cooperate;
- **incentives**—quantifying the appropriate level and approach to allocating financial incentives to stakeholders to accelerate and realize the vision;
- **accountability**—ensuring the realization of the vision through metrics, incentives and penalties; and
- **feedback loop**—how often the plan will be evaluated to reflect changing market dynamics and opportunities.

Given their scale, presence and interaction with all stakeholders, particularly customers, utilities appear to be the only logical entity to coordinate and be held accountable for the execution of a 21st Century Utility model and the realization of milestone goals.

Essential to the evolution and acceleration of a 21st Century Utility is the education of customers on the opportunities and benefits of optimizing their energy use (reducing use and/or moving load off-peak), deploying alternative technologies to optimize usage and offering assistance in adopting such new services. The more effective the education and ease of effort to adopt and utilize new services, the more likely that customers will be receptive.

While utilities have offered energy-efficiency programs and services for years, the Internet and smartphones are accelerating customer education and energy optimization. Smartphone apps turn what used to be low-priority chores into fun ways to be productive and share success and opportunities with friends. So although utilities have been involved with efficiency in the past, technology is driving exciting new products and services, and smartphone deployment is making it easier to adopt and manage these new technologies.

17 EEI, EEI website.

The Clean Power Plan

The EPA's newly issued CPP offers states an excellent opportunity to develop their energy strategies for achieving a 21st Century Utility business model. Issued in August 2015, the long-awaited rule governs performance standards for greenhouse gas emissions from existing and new power-generation sources. The CPP outlines the first national standards for CO2 emissions from power plants and seeks to reduce emissions from the power sector by 32 percent in 2030 from 2005 levels. Among its benefits, the CPP aims to improve health by reducing pollutants, supports clean-energy innovation and provides the foundation for a national climate change strategy. Compliance commences by 2022, with phase-in completed by 2030.

While lawsuits have already been filed against the rule, when implemented the CPP will be based on three building blocks: (i) improved performance of existing coal-fired power plants, (ii) substitution of natural gas power generation for coal-fired capacity; and (iii) increased renewable generation to an estimated 28 percent of our energy mix by 2030.

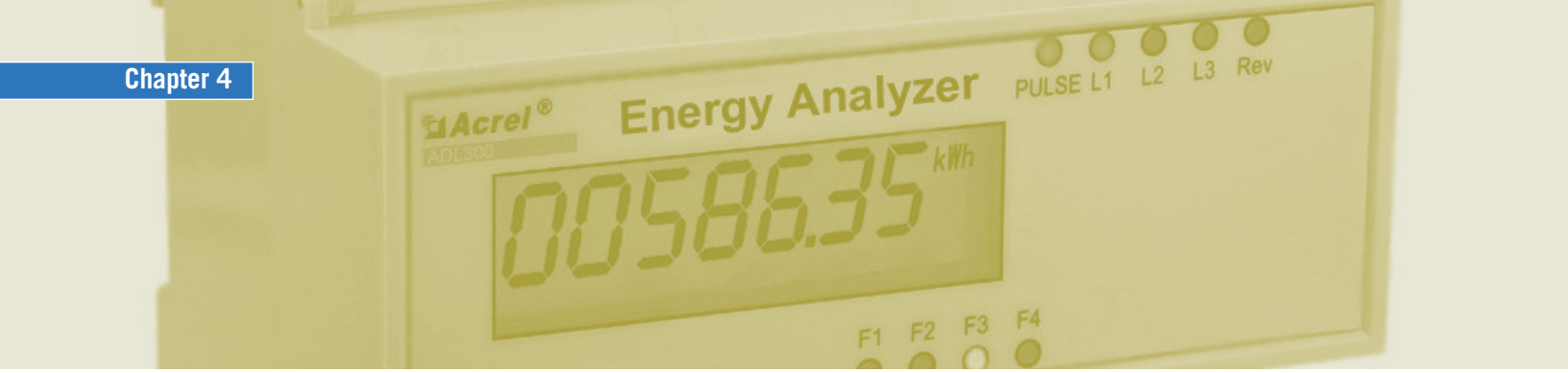
Each state is responsible for developing and implementing a plan that ensures compliance through the phase-in. States have the option to implement plant-specific performance plans or a statewide portfolio approach. While end-user energy efficiency is not a formal building block in the rule, it is allowed as a compliance option. States can also join together to develop multistate solutions, such as the Regional Greenhouse Gas Initiative. The rule calls for state plans to be filed by September 2016, with the potential to seek extension until September 2018.

While the CPP provides significant flexibility to states, the rule will likely lead to reduced coal-fired power generation and a significant expansion of renewables to achieve the targeted CO2 emission reductions. For renewable power generation to grow from 13 percent of our power mix in 2013 to 28 percent in 2030 will require a dramatic increase in renewable-energy capacity and investment.

States will likely consider multiple strategies to encourage an increase in renewable energy, including expansion of RPS mandates to support their CPP implementation plans. Based on projections developed from Energy Information Administration (EIA) data, the renewable capacity required to generate the 2030 goal could stimulate up to 350GW of incremental renewable capacity. This level of capacity expansion will require all forms of renewables to be adopted, but utility-scale renewables will likely be a very large component of the compliance requirement, given their scaling potential and economic advantages.

The timeframe set for state CPP compliance plans provides an excellent opportunity for each state to develop its energy strategy in alignment with the 21st Century Utility model proposed in this paper.

The timeframe set for state CPP compliance plans provides an excellent opportunity for each state to develop its energy strategy in alignment with the 21st Century Utility model proposed in this paper.



The Pathway to a 21st Century Electric Utility

Stakeholders will likely agree on the vision and foundational principles to support a 21st Century Utility model, but the way to achieve it will be more heavily debated. This paper introduces a pathway for accelerating the realization of a 21st Century Utility by setting clear policy direction, assigning accountability for results and shifting the focus of regulatory oversight from litigated rate proceedings to forward planning and accountability with incentives and penalties. The following pathway points are not an á la carte menu of choices but are intended to be a combined package of actions to support and integrate realization of the vision.

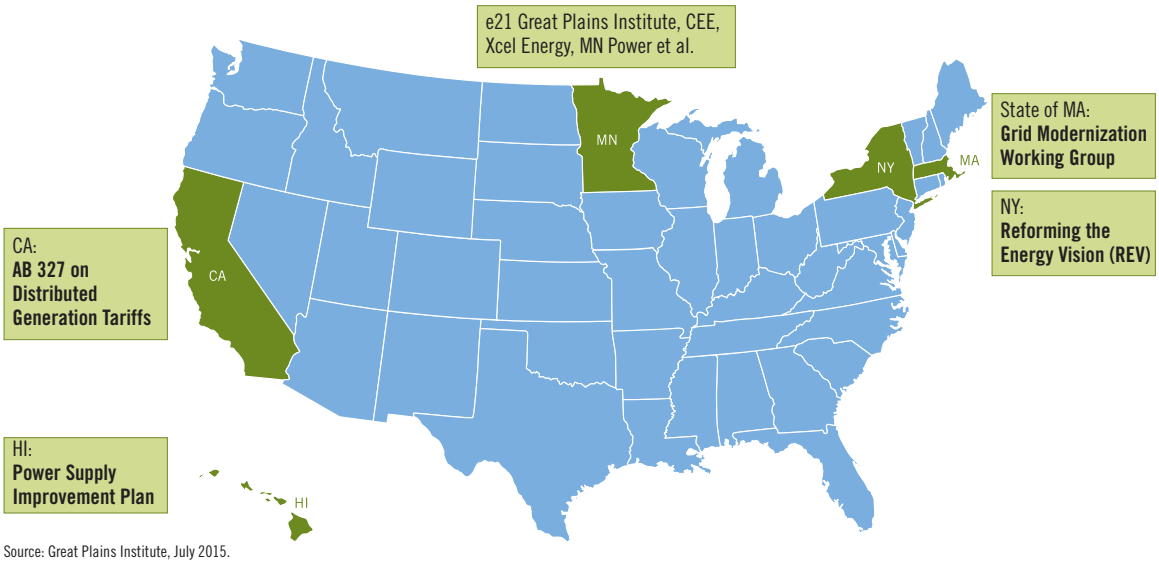
- State policymakers pursue legislation to outline the model for a 21st Century Utility, to include:
  - providing environmental, RPS, energy-efficiency, demand response and peak-load management objectives, including transitional targets;
  - refining building standards to address new construction and major modifications to support efficiency and environmental footprint goals (e.g., California Zero Net Energy Plan for new construction);
  - accountability metrics for managing the transition to the vision;
  - reform of the regulatory oversight approach to focus on planning and accountability oversight; and
  - outlining the role by which distribution utilities will be authorized to participate, including the potential for service revenue and behind-the-meter asset ownership.
- Regulatory reform is enacted to support efficient resource deployment and accountability:
  - multiyear integrated transmission and distribution system planning process, including defining the value and cost-effectiveness of renewable options;
  - transparent and sustainable accountability metrics to be set, based on customer and policymaker objectives;
  - transparent and sustainable incentives (and penalties) for accountability as to realization of policy objectives;
  - multiyear rate proceedings to target customer focus and shift of resources from regulatory administrative proceedings to planning and results accountability; and
  - structure of utility revenue potential for integrating new customer services and potential for ownership of DERs, including revenue requirement implications.
- Tariff structures are refined to support price signals and financial viability requirements, including:
  - inclining block rates to encourage efficiency and signal incremental cost of new resources;
  - bidirectional meters installed for all DER customers;
  - transition to highest economic value renewable rate:
    - most economical option to meet RPS, adjusted for transmission and distribution investment, line losses, system reliability and emissions avoidance value, and
    - timing of transition and grandfathering of existing DERs;
  - demand response to be bid into capacity planning to encourage load resource optimization; and
  - time-of-use rates to be implemented to manage peaks and enhance system optimization.
- Utilities are empowered and accountable for managing the transition, and are:
  - held accountable for controllable results in achieving a 21st Century Utility;
  - encouraged to lead the integration of new technologies and given incentives to achieve results, as deemed appropriate;
  - responsible for educating customers on new energy management alternatives; and
  - the potential owners of renewables, new technologies, or DERs, as addressed in statewide energy or 21st Century Utility plans.

Experiences in Selected States and the UK

States with high electric prices, locational DER opportunities or grid reliability challenges will likely take the lead in pursuing 21st Century Utility proceedings and, hopefully, implementation programs. Clearly, states will develop policies and strategies that reflect their unique circumstances regarding policy, system resource issues, locational opportunities and energy costs. Many states will learn from first-mover jurisdictions that are pursuing a 21st Century Utility model in a comprehensive manner.

While practically every state has addressed specific issues related to energy supply and efficiency programs, few have developed a comprehensive framework for engaging the utility of the future. California and New York have been the most proactive in leading change in their markets. Also worthy of note is the Revenue = Incentives + Innovation + Outputs (RIIO) model in the UK and how it has addressed the alignment of customer, policymaker and utility interests. In Minnesota, policy advocacy and utility interests have proposed an interesting paradigm to develop the electric utility model and are in the process of collaborating with state policymakers to discuss the proposed framework, referred to as the e21 Initiative.

Figure 9: Responses to Evolving Electric Utility Models



Source: Great Plains Institute, July 2015.

California has led efforts to reform its utility model, dating back to an aggressive Public Utilities Regulatory Policy Act implementation program in the 1980s and its groundbreaking 1994 industry-restructuring docket. However, the California energy crisis of the summer of 2002 illustrated that not all that has been tried in California has met with success. Still, California has led with its aggressive implementation of renewables through its RPS (now seeking a 50 percent renewable mix by 2030), attracting both rooftop and utility-scale renewables, and energy-efficiency spending (about 30 percent of U.S. spending).[18] California also leads on incentive programs for utilities to achieve efficiency savings and programs to enhance energy-storage technologies, though the incentives for efficiency adoption are modest relative to the amount needed to drive significant organizational focus and strategy.

Currently, California is mandating that distribution resource plans be provided by each utility, with a focus on better integrating DERs into the grid. However, California has not gathered its array of programs into a comprehensive 21st Century Utility model, and is only beginning to unleash the full power of its nearly statewide advanced metering infrastructure, including meaningful residential customer application of time-of-use rates. Policymakers are facilitating change through mandates, due to California's high electric prices and their willingness to allow cross-subsidies among and between customer classes. Such mandates raise questions as to the fairness of benefits to all customers, given the small but growing percentage of customers who take advantage of market opportunities, such as rooftop solar rewarded with high net energy metering buy-back rates.

18 Edison Foundation Institute for Electric Innovation, "Summary of Electric Utility Customer-Funded Energy Efficiency Savings, Expenditures and Budgets", (2014).

New York has been the most active in pursuing a comprehensive solution to a reformed utility model. The New York state proceeding Reforming our Energy Vision (REV) intends to promote more efficient use of energy, including increased penetration of renewables and DERs. It also intends to promote markets to drive greater use of new technologies for energy management. The objective is to empower customers by providing more choices for managing their electric consumption. Utilities, under REV, will be tasked with operating the grid and acting as the distribution-service platform provider, integrating market solutions into the grid. The New York Public Service Commission (NYPSC) is considering tariffs and incentives to better align utility interests with achieving the commission's policy objectives. The Staff of the Department of Public Service issued a white paper[19] in July 2015 proposing future incentive opportunities for New York utilities, including market-based earning opportunities from new grid-related services and incentive mechanisms for performance consistent with goals. The REV initiative is a work in progress.

Neither California nor New York has yet created material, timely or transparent incentive frameworks to move utilities to revise their approach to customer engagement, or otherwise taken a leadership position to encourage large percentages of the customer base to more proactively optimize energy consumption. In New York, that is starting to change. Con Ed's BQDM Program, discussed earlier, is a recent example of the NYPSC approving an innovative solution that does provide for incentives to the utility.

In California, the incentives available two years after the reporting period yield less than 1.25 percent of utilities' operating income.[20] This level of incentive does not motivate major corporate strategic reassessment of operational, financial and compensation strategies. In addition, the programs in California and New York do not promote the most efficient use of DERs, but encourage the marketplace to adopt DERs, at the same time discouraging the utilities from investing in them by offering attractive net energy metering incentives.

Minnesota's e21 Initiative is an interesting and important collaborative effort to develop Minnesota's 21st Century Utility. The effort is led by the Great Plains Institute, an energy policy advocacy group, and involves Minnesota's investor-owned electric utilities and several national energy policy groups. The initiative proposes a comprehensive framework for a 21st Century Utility and regulatory oversight approach. The Phase I report, issued in December 2014, includes the following recommendations:

- reward utilities for delivering customer value with reduced reliance on a capital investment–driven model;
- align the utility model with state and federal policy goals;
- enable the delivery of services that customers value;
- fairly value grid and DER services;
- focus on economic and operational efficiency of the entire system;
- reduce regulatory oversight–related administrative costs; and
- facilitate innovation and implementation of new technologies.

e21 proposes performance-based ratemaking as an incentive to utility performance, consistent with multiyear integrated system plans that focus on DER deployment and reducing costs through system wide efficiency measures. The initiative seeks to establish multiyear rate programs to shift the regulatory oversight focus from rate-case preparation and deliberation to forward planning.

The e21 Initiative, while in its early stages, represents a comprehensive and collaborative approach to pursuing a 21st Century Utility model. Unlike New York's REV, this initiative is more robust in that it provides a larger role for utilities to engage with customers and it outlines how regulatory oversight should evolve. For the initiative to move forward, policymakers will need to endorse the framework outlined. How this initiative is ultimately received by Minnesota policymakers, and the full range of public process participants that engage in the discussion, will shed light on the prospects for policy-led collaboration toward a new utility model, in Minnesota and nationally.

If the system can benefit from efficiencies related to operating versus capital expenditures, the utility will earn a return on a component of such efficiency savings while the customer benefits from a lower cost.

The **United Kingdom's RIIO** model is encouraging to consider for its impact on ratemaking solutions. The RIIO model builds on the UK's prior approach to determining revenue. It will create eight-year periods for price review, under which utilities have the opportunity to realize operational efficiencies, subject to accountability metrics, and given incentives to consider operating investments that replace or defer capital investment (known as Totex, or total expenditures). Totex was structured to address the inherent utility bias toward capital investment (rate base) by capitalizing and allowing a return on, and of, investment of certain operating expenditures that avoid or defer less economical capital investment. The concept is to focus on optimizing total system expenditures. If the system can benefit from efficiencies related to operating versus capital expenditures, the utility will earn a return on a component

19 State of New York Department of Public Service, "Staff White Paper on Ratemaking and Utility Business Models," July 28, 2015

20 SEC Form 10-K for Edison International and PG&E Corporation

of such efficiency savings while the customer benefits from a lower cost. The criticism of RIIO is that significant regulatory proceedings, costs and ongoing oversight are required to approve and execute on a RIIO planning period. So, while the RIIO model may not be appropriate for many U.S. states due to the significant administrative burdens created for policymakers and utilities, components of RIIO, such as multiyear regulatory review periods and Totex, are worthy of consideration for implementation.

Developing an Accountability and Incentive Framework

The utility model we operate within today is highly regulated and mostly backward looking in its approach to regulation. In an ideal world, policymakers would outline their policies and develop accountability metrics to monitor and evaluate utility performance. Instead of mandating and overseeing countless proceedings as to utility performance, a strategy could be employed by which reasonable accountability metrics were tied to meaningful incentives and penalties that would lead utilities to focus on achieving best-in-class performance. Since U.S. utilities for the most part already provide best-in-class reliability of service, new accountability metrics would focus on achieving performance toward a 21st Century Utility framework. Examples of potential accountability metrics, focusing on customer and policy goal realization and the transparency and sustainability of such goals, are as follows:

The utility would not be responsible for developing new technology, but for assessing and working with technology providers to bring best-in-class technologies to the customer base.

- **reliability**—percentage of hours of uninterrupted electric service and percentage and number of annual outages impacting customers;
- **service**—range of customer energy solutions offered, number of customer calls, call wait times and number of calls to resolve complaints;
- **efficiency**—weather-adjusted decline in energy usage due to efficiency adoption and peak load management and optimization;
- **clean energy mix**—increase in renewables and DERs and decline in carbon footprint relative to RPS standard transitional goals; and
- **investment**—capital and total spending below a predetermined rate, subject to carve-out for critical infrastructure investments.

To be effective in driving change, incentives and penalties must be transparent (i.e., easy to understand, calculate and report on in a timely manner). To drive and align behavior change, significant opportunity and dollars should be at risk for achieving on incentive performance, for example up to 10 to 20 percent of profits. A utility realizing a 10 percent ROE would be able to earn up to 12 percent for meeting its incentive targets. While there is no science behind that incentive number, it must be meaningful to encourage changes in behavior, and less than 10 percent is unlikely to achieve that goal. In order to encourage the behavior and innovative spirit that are essential to achieving continuous performance improvement, incentives must be durable. They must be available and achievable on an ongoing basis and subject to revisions as market conditions evolve. For capital markets to differentiate between those states that provide incentives and those that do not, durability will be an important component.

The benefit of a multiyear regulatory plan is that utilities can align their strategy with the implementation of their integrated distribution plan, which will free up resources that can be deployed in effective future planning because fewer resources will be required to process rate cases. Transparent accountability metrics and resulting incentives and penalties will provide ongoing oversight of utility performance and progress in reforming our energy future. Policymakers, through their regulatory oversight, can ensure that the integrated system plan responds to their stated objectives. In particular, agreement can be solidified on deploying and valuing renewables, such as community solar and rooftop solar. A robust integrated system plan would provide utilities with an effective roadmap for operating over the planning period with improved clarity as to the path of utility rates over that period. Each new integrated planning cycle would provide an opportunity to refine the next plan, so as to continuously improve the process and respond to customer and marketplace dynamics.

Engaging Utilities to Adopt a 21st Century Electric Utility Model

The pathway proposed in this paper looks to the utility as the facilitator, integrator and nonexclusive distribution channel to offer new products and services to its market. The utility would **not** be responsible for developing new technology, but for assessing and working with technology providers to bring best-in-class technologies to the customer base. With the support of policymakers, utilities may be allowed to own and operate (either through the regulated

entity or an unregulated affiliate) assets behind the meter, or at a minimum, could leverage competitive providers to offer the best price to customers. The advantage of utility ownership is scale and cost of capital benefits.

The following summarizes why utilities should be at the forefront of leading, integrating and accelerating the transition to a 21st Century Electric Utility, from the perspective of key stakeholder interests.

Benefits to Customers

- high level of recognized trust in utility providers versus a large group of unknown vendors of competitive energy services and technologies (including efficiency, demand response, load management and DER providers);
- access to customer and electric system information that supports a program for system optimization regarding future investment (subject to strong standards to protect consumer privacy);
- increased quality control oversight of third-party competitive energy service providers and products, given their scale, system knowledge, resources and lack of incentive to promote one new technology over another;
- enhanced information analytics based on customer usage experience to support customer decision making regarding innovative energy-optimization product alternatives; and
- lowest systemwide cost of deploying optimal located investments with scale technologies.

Benefits to Policymakers

- acceleration of defined policy objectives (efficiency, system optimization, environmental) through properly structured incentives and accountability for realizing results;
- ability to enhance accountability via regulatory oversight of utilities; and
- opportunity to mitigate the level of utility rate increases required by allowing utilities to earn additional revenues related to facilitating, integrating or owning new services, including behind-the-meter assets.

Benefits to Competitive Marketplace Service Providers

- endorsement of best-in-class providers and technologies;
- partnering with utilities can facilitate increased adoption of new value-add technologies; and
- partnering with utilities can reduce customer acquisition costs and thus enhance profitability (through reduced cost and increased volumes).

Benefits to Utilities

- enhanced customer service by increasing interactions with customers;
- optimized investment and reduce costs and risks;
- enhanced regional economic growth through enhanced optimization of utility system and services;
- enhanced citizenship profile;
- potential to earn incentives for achieving accountability goals; and
- ability to earn additional revenues from participating in facilitating and integrating realization of a 21st Century Utility, thereby creating potential to offset rate-increase needs and earn incremental returns for investors.

Those opposed to utilities owning behind-the-meter assets within the regulated business fear that it could: (i) complicate the regulatory model and ratemaking, (ii) increase potential financial risk to customers for un-creditworthy decisions and (iii) freeze out competitive industry players. Policymakers/ stakeholders would have to evaluate these issues when considering whether and how to allow utilities or utility-affiliated entities to participate in behind-the-meter infrastructure.

We now have an array of competitive entities seeking to offer new electricity products and services to both residential and large commercial and industrial customers. This is a positive development, but there is little, if any, oversight of the quality of the services offered, including the economic efficiency of these new inputs to the energy delivery system. Third-party entities partnering with utilities should create the right type of checks and balances by which utilities can oversee the development of new technologies that impact their system, invest as appropriate to support the grid needs and enable best-in-class technologies, and act as a distribution channel to assist in deploying new technologies. However, competitive service providers may seek utility system data to support their initiatives, and policymakers will need to resolve issues regarding data control, sharing and privacy protection.

Regulators in this paradigm would be able to drive utility accountability through appropriate and transparent customer and policy performance standards, consistent with the objectives of economic provision of reliable, clean and affordable energy services. In addition, regulators would determine how utilities would be compensated for their role in facilitating change and customer adoption through incentives, as well as penalties when performance standards are not met. They could further offer commissions for utilities facilitating sales of new products offered by vendors, and structure compensation and returns allowed on utility (or utility affiliate) ownership to allow for behind-the-meter assets.

Utilities have been timid in claiming a role in accelerating and executing a 21st Century Utility model. Several factors

have likely caused a less than aggressive posture: skepticism on the part of regulators, who often suspect that utilities may earn outsized profits from future activities and, thus, have sought to encourage the competitive marketplace **without** providing rules for how utilities can participate; a strong lobbying effort by competitive market providers to prevent utilities from participating in new services; and utility compensation programs aligned with fiduciary duties that do not encourage development of new markets but focus on reliability and near-term financial performance.

Vertically Integrated vs. Restructured Utilities

Given the restructuring of U.S. electric utility markets and utilities' roles in 17 jurisdictions during the 1990–2005 period, the industry is no longer a homogeneous group of vertically integrated (distribution, transmission and generation) utilities. In most restructured markets, distribution utilities own no meaningful level of power generation and thus are less exposed to threats to the economics (and value) of the power markets. The volatility and profitability of power generation in restructured markets is borne by competitive generation companies (whether independent from utility ownership or in unregulated utility-affiliate entities). However, to the extent utilities in restructured markets collect tariffs based on energy usage, these transmission and distribution utilities remain exposed to fluctuations in customer energy usage. Thus, not all utilities will be impacted by the same set of factors in the transition to a 21st Century Utility sector.

Because vertically integrated utilities own power generation, they are more exposed than transmission ad distribution utilities to the electricity consumption impacts of DERs and various forms of energy efficiency. Declining consumption for these companies results in lower revenues to recover generation investment and the related adverse impact on market power prices (due to lower demand and increasing supply from DERs). Thus, all other factors aside, it is likely that electric generation owners, including vertically integrated utilities and competitive generators, will be less interested in moving toward a 21st Century Utility until the level of unrecovered investment in power-generation assets becomes less meaningful. This does not suggest that a transition may not occur prior to recovering greater levels of generation investment, since regulators can approve structures, such as transition charges, to accelerate change if they deem it appropriate. In fact, the e21 Initiative was developed for adoption in Minnesota, which is a vertically integrated utility market.

Utilities in restructured states have less at risk in moving forward with a 21st Century Utility sector. While these utilities may still be exposed to kWh consumption-based tariffs, the impact can be more easily managed by decoupling or other mechanisms to mitigate any drag on return on invested capital. Importantly, the highest-cost markets that are seeing the most interest in efficiency and new technologies tend to be in restructured regions. Thus, we expect that these markets will tend to be at the forefront of driving industry change.

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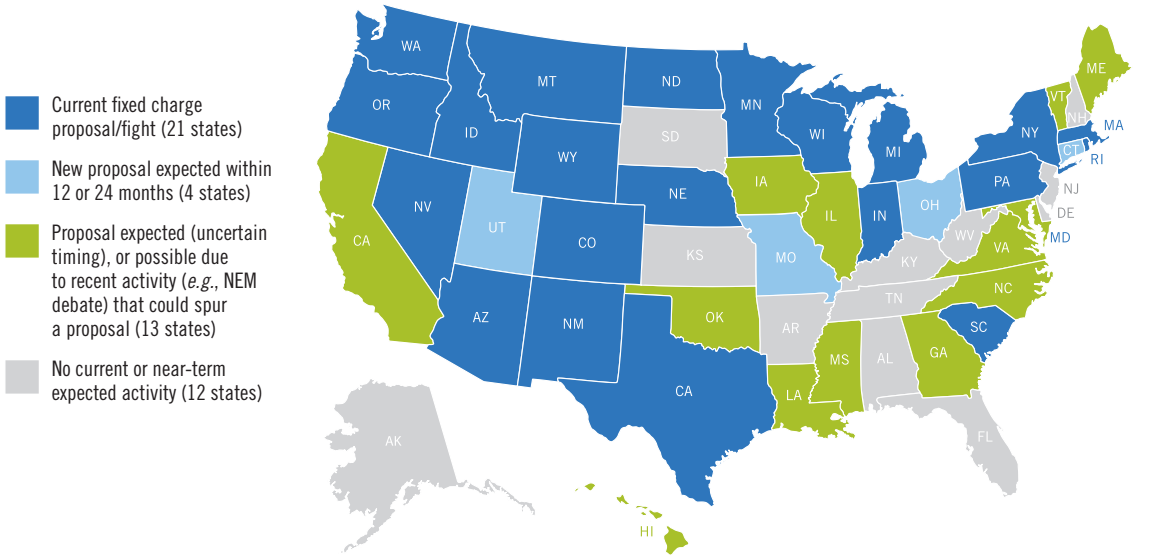
Ratemaking and Tariff Design

Important components of the evolution to a 21st Century Utility industry model are the topics of ratemaking and tariff design. For purposes of this paper, ratemaking is defined as the process by which regulators determine the appropriate aggregate annual revenue collection (or revenue requirement) utilities may recover from customers to cover costs and earn a fair return on invested capital. Tariff design refers to the structure of customer rates (or prices charged) to recover the revenue requirement allowed.

Ratemaking, which is grounded in legal precedent as to the utilities' right to recover prudent costs, is not a hotly contested issue in the 21st Century Utility debate. The ratemaking discussion has often focused on structuring a system whereby utilities have no incentive for (or are indifferent to) increased capital investment (aka rate base) to provide service, such as in the UK's RIIO model.

Tariff design is the tool that regulators use to promote policy objectives, such as equitable distribution of cost, customer usage and consumption behavior. "Disruptive Challenges" highlighted the confluence of factors challenging the long-term financial viability of our traditional utility regulatory model. The strategies proposed to address and mitigate the disruptive forces outlined were primarily regulatory solutions. Looking through an investor's lens, several tariff-restructuring alternatives were proposed. Those alternatives, which could be implemented individually or in combination, included increasing monthly fixed charges on all customers, monthly service charges for all distributed energy resource (DER) customers and/or

Figure 10: Mandatory Fee Proposals Timing Map



Source: NRDC, NCLC and Vote Solar.

revising the net metering buy-back rate to be based on the wholesale value of the energy provided by the DER customer to the utility (versus the retail rate, as reflected in the majority of net energy metering programs).

Marketplace dynamics since the release of "Disruptive Challenges" suggest that two important factors were missing from that 2013 assessment: (i) the customer and policymaker view that it is not in the best interest of customers or society overall to slow the pace of technology innovation or adoption (a likely result of increased customer fixed charges), and that over the long term, technology advancement cannot be deterred by regulatory rulemaking; and (ii) customer and policymaker actions through 2015 that have demonstrated a clear policy opposition to meaningful increases in fixed charges, as evidenced by low fixed charges in place throughout the investor-owned utility industry, as well as recent actions in several states that approved nonmaterial fixed charge tariffs (e.g., Arizona Corporation Commission adopting a $5/month charge, not the $50/month charge proposed by Arizona Public Service).

While the cost structure of distribution and transmission of electric utilities is predominantly of a fixed nature (i.e., not meaningfully impacted by volume variability or short-term business issues), utility rate structures have typically authorized a small fixed charge component. Increasing mandatory fixed charges (or demand charges), a solution proposed in *"Disruptive Challenges,"* is a tariff design tool that utilities have actively pursued since 2013 to mitigate revenue risk from disruptive forces. According to the Environmental Law and Policy Center, **24 utilities have recently proposed increases to their fixed fees.**[21] However, significant increases have met with strong opposition from customer interests and policymakers.

Adopting meaningful monthly fixed or demand charges system-wide will reduce financial risk for utility revenue collections for the immediate future, but this approach has several flaws that need to be considered when assessing alternatives through a win4 lens, by which all principal stakeholders benefit.

Adopting meaningful monthly fixed or demand charges system-wide will reduce financial risk for utility revenue collections for the immediate future, but this approach has several flaws that need to be considered when assessing alternatives through a win4 lens, by which all principal stakeholders benefit. Fixed charges:

- do not promote efficiency of energy resource demand and capital investment;
- reduce customer control over energy costs;
- have a negative impact on low- or fixed-income customers; and
- impact all customers when select customers adopt DERs and potentially exit the system altogether, if high fixed charges are approved and the utility's cost of service increases.

While DER customer charges can be structured to reflect

21 Environmental Law and Policy Center Foundation, June 2015.

the value of the grid connection that is maintained by practically all DER customers, such charges will need to consider whether and at what level a DER buy-back rate (the price paid for energy by a utility to a DER supply customer) should be set. Through a win4 lens, it is clear from recent regulatory actions reconfirming support for DERs and net energy metering that policymakers are interested in DER development and customers want the option to choose their own energy supply.

It is therefore in the long-term best interests of utilities to support such choice, consistent with regulatory policies that support financial viability and avoid meaningful monthly fixed charges. By instituting monthly DER customer grid fees or reducing buy-back rates, it is likely that rooftop solar activity will be slowed, and this must be considered in the policy debate. This is consistent with the early experience of the Salt River Project (SRP), which is not regulated by the Arizona Corporation Commission and implemented a $50/month renewable customer grid charge for all new rooftop installations. Since that announcement, one major rooftop supplier reported a 96 percent decline in new solar applications in the SRP territory.

Besides the installed cost advantage of utility-scale solar versus rooftop solar and system optimization considerations, community or utility-scale solar brings the advantage of renewables to all customers without the potential cross-subsidy issues associated with rooftop solar.

Given the new tools available to enhance system wide efficiency, including peak load management, time-of-use rates can be an important tool in managing a dynamic optimization of resources as market demand and supply evolve in a technology-enhanced 21st Century Utility model.

Tariff Design Principles for a 21st Century Electric Utility

As we consider fairness to all customers, we should provide incentives to fund the most cost effective renewable options. In October 2015, the Hawaii PUC halted its net energy metering program for new systems due to penetration in excess of 20 percent. This is the first significant action to slow the growth of rooftop solar penetration due to the high cost that NEM programs shift to non-DER customers. In a recent study prepared by the Brattle Group entitled, "Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado's Service Area," the findings demonstrate that "utility-scale PV system is significantly more cost-effective than residential-scale PV systems when considered as a vehicle for achieving the economic and policy benefits commonly associated with PV solar. If, as the study shows, there are meaningful cost differentials between residential and utility-scale systems, it is important to recognize these differences, particularly if utilities and their regulators are looking to maximize the benefits of procuring solar capacity at the lowest overall system costs."[22]

Given the significant net cost benefit of approximately 45 percent for utility-scale solar (due to capacity costs and power output optimization), pricing of rooftop solar and related subsidies, and other energy technology alternatives, should be determined by the most efficient alternative opportunity, after factoring in grid-related costs and benefits. Tariff fairness can be structured, such as by adopting renewable grid charges or adjusting DER buy-back rates (i.e., net metering), in a way that factors in the economic value of adding renewables to the grid and creates an opportunity for all customers to benefit equally from the adoption of renewables, not just homeowners who can deploy solar on their rooftops.

Without increased demand for electricity sales, fixed charges to all customers, or DER grid charges, utilities will continue to be exposed to customer switching and under recovery of revenues. This is especially true for utilities with inclining block tariffs (i.e., the more you use, the higher the rate for incremental energy consumed) that are in excess of the cost of DER alternatives. The result of ongoing customer adoption of DERs in net energy metering states (43 of 50) is that future rate increases are required to offset the revenue lost from those customers adopting DERs. This scenario feeds a cycle of customer adoption of DERs and eventually results in increasing rates for non-DER customers. The advent of (i) bidirectional metering, (ii) most economical value of renewable buy-back rates and (iii) revenue-decoupling mechanisms can assist in mitigating this risk.

Time-of-use (or real-time) pricing has the potential to be an important tool in optimizing system capacity and moderating incremental capital investment in electric energy infrastructure. While this type of tariff design has been discussed for years and is supported by smart-meter technology investment, policymakers have generally not supported it. The lack of support from policymakers is a roadblock to moving forward on a 21st Century Utility model.

Time-of-use rates have not been widely implemented due to technical constraints—a lack of smart-meter

22 The Brattle Group, "Comparative Generation Costs of Utility-Scale and Residential-Scale PV in Xcel Energy Colorado's Service Area," Prepared for First Solar, July 2015.

infrastructure—and a lack of public interest. Customer concerns include lack of understanding, potential volatility of bills, and impact on low- and fixed-income customers. Given the new tools available to enhance system wide efficiency, including peak load management, time-of-use rates can be an important tool in managing a dynamic optimization of resources as market demand and supply evolve in a technology-enhanced 21st Century Utility model. Thus, we need to expand our efforts to educate and pilot these programs. While "opt-in" programs have often realized low adoption levels, another alternative to consider is selected "opt-out" programs, where appropriate, to encourage realization of policy objectives.

Factoring in financial viability considerations and customer and policy preferences, the following tariff principles are components of a tariff design that can contribute to the development of a 21st Century Utility model:

- introducing inclining block rates to promote efficiency of energy consumption;
- decoupling of revenues from volumetric usage charges to protect cost-recovery shortfalls in the short-term, for example due to customers switching to DERs or declining usage due to new technologies; however, decoupling does not reduce the long-term vicious cycle of increasing customer adoption of DERs created by increasing rates;
- providing bidirectional meters to all DER customers so that energy consumed from utilities would be charged based on utility tariff schedules, and buy-back rates for DER-produced energy at a value of renewable rates;
- setting the value of renewable rates at the higher of competitive wholesale energy prices or the levelized cost of the lowest incremental cost to deploy efficient renewables (e.g., lower of rooftop vs. utility scale, with adjustments based on evaluation of system costs and benefits); and
- establishing time-of-use rates to optimize system efficiency; time-of-use rates will enhance the value of new technology investment as customers optimize the value of this rate structure (e.g., using appliances with time-of-use controls).

With these principles in place, tariff economists can fine-tune potential tariff structures to support a 21st Century Utility model. Each jurisdiction will have its own unique issues and cost structures that will impact the ideal approach in its market. Since we are likely to grandfather existing DER customers during the transition period, we should address the tariff issue now to define the ultimate transition period, provide fairness to all customers and mitigate financial risk to customers and utility investors.

Financial Issues

The financial health of utilities has improved over the last several years, based on the support of regulators for allowing recovery of revenue shortfalls due to declining consumption and customer growth, with increased use of decoupling of revenues from consumption in some form now in over 28 jurisdictions. In addition, a decline in the cost of fuel to generate power, lower merchant power prices and lower interest rates have provided additional headroom for base utility rate increases. In this environment, and reflecting lower interest rates in the financial markets, utility credit ratings have stabilized from the continuous decline experienced from the 1960s through 2010, and utility equity prices have been at or near all-time highs on a dollar price and multiples-of-earnings basis. Investors are generally pleased with the utility sector's performance, and likely hope the current business model prevails for the foreseeable future. Unfortunately, hope is not a strategy.

However, below the surface, lie foundational shifts that suggest the steady period of utility performance will be challenged by customer choice, the adoption of new customer-driven technologies and customer behavior changes driven by social and economic forces

However, below the surface, as described in countless industry trade articles and in "Disruptive Challenges," lie foundational shifts that suggest the steady period of utility performance will be challenged by customer choice, the adoption of new customer-driven technologies (e.g., Nest) and customer behavior changes driven by social and economic forces (e.g., smaller homes). Investors have shown from prior experiences in other industries that they become noticeably concerned about disruptive challenges when the loss of sales and revenues is reflected in financial results. For utilities, this can happen when serious rate-increase opposition accelerates due to the impact of increasing penetration of DER technologies.

Although these disruptive challenges are well outlined in utilities' SEC filings, utility managements are managing their businesses based on the current framework and their fiduciary duty to focus on quality service for customers and growth in near-term earnings and investment value for investors. As long as investment spending supports growth through increased rate needs, the problems lurking in the future are kicked down the road, although one could argue that the problems are amplified by increasing utility

rates in the short term. In addition, utility management compensation is focused on near-term reliability and financial goals, creating a fiduciary obligation and compensation incentive for management to focus on the near term.

For the time being, all may appear well, but if one believes that risks are at play, when these threats become a financially reality, investment values will be impacted. Capital availability will decline as investors focus on the potential for declining profitability and the risk of stranded assets or cost levels that the remaining customer base may be unwilling to bear. Given the importance of utility access to capital to support the grid, this is not an acceptable scenario.

The objective is not to create fear or call for a death spiral, but to commence the transition now to a future that customers support and in which utilities can play a constructive role and access the capital required to build this future. As a point of reference, who would have thought that essential service industries in a growing economy such as the airlines and the landline phone business would not support investment-grade quality ratings as stand-alone entities?

The New 21st Century Electric Utility

The current transition of the electric utility framework into a new model is being led by economic and technological forces that will ultimately drive change. This is particularly true given the support of policymakers for customer choice of electric supply and new technologies to drive efficiency, system optimization and the reduction of our environmental footprint through expanding our mix of clean energy sources.

The actions by states to date in considering meaningful regulatory change have been predominantly in support of a free marketplace for competitive providers to offer their new services to customers directly or through utility-run efficiency programs. In that environment, the utility is relegated to grid provider, and policymakers have few levers to oversee or influence the marketplace to achieve their vision.

The environment that this paper proposes is one in which the utility is responsible for the development and operation of the grid, but is also encouraged and accountable for accelerating our progress toward a 21st Century Utility model. The utility will be encouraged and accountable for promoting the adoption of new technologies, and for developing a cost-effective plan to deploy technology in the most efficient way to control customer costs. In this scenario, cost of capital on new investments might consider returns on selected operational spending (similar to the UK Totex model) that mitigates less-than-optimal capital investment. Utilities would also play a traffic cop role by allowing only proven technologies or vendors entry to their application store.

Utility revenues will be determined by regulators to encourage a return on invested capital, particularly for the legacy system in place, and transparent incentives to encourage accountability for accelerating change and policy realization. It may be a challenge to develop tariff mechanisms and incentives, since there exists a distrust of providing utilities an opportunity to increase their returns above currently allowed levels. But common sense and economic theory demonstrate that the best way to achieve results is to provide economic incentives. Regulators will continue to regulate, and thus any midcourse correction deemed necessary can be implemented. The objective is to develop a formula by which customers are served, policy is realized, technology adoption and product offerings by competitive entities is accelerated, and utilities are motivated to achieve the objectives of customers and policy while maintaining financial viability to support the grid.

Concluding Comments: Transitioning to the New Utility Model

The transition to a new industry paradigm will require the proactive support of customers, policymakers and utility regulators, competitive-market service providers, and utilities. In the ideal world this would be a collaborative process, driven by policymakers who understand that the industry model needs to be refined in order to promote the full suite of opportunities that can be created by a 21st Century Utility. A mutual understanding of the benefits of collaboration and economic benefits to all parties is key to a productive process and for defining a clear transition and end state.

Figure 10: The Pathway to a 21st Century Utility Model Vision

Vision:

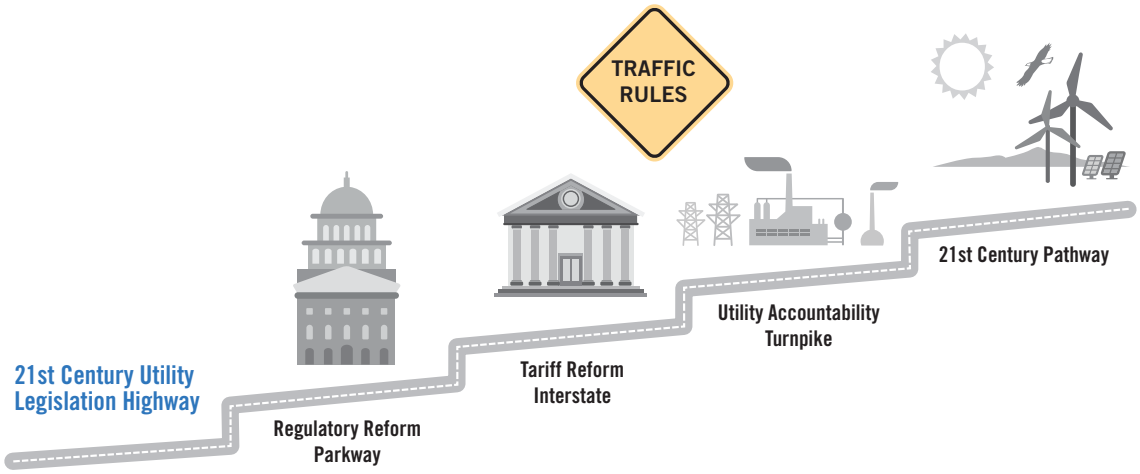
- Enhanced reliability and resilience of the electric grid while retaining affordability;
- An increase in cleaner energy to protect our environment and global strategic interests;
- Optimized system energy loads and electric-system efficiency to enhance cost efficiency and sustainability; and
- A focus on customer value, including service choices and ease of adoption.

Foundational Principles:

- Financially viable utilities essential to fund and support an enhanced electric grid;
- Policymakers must promote clear policy goals as part of a comprehensive, integrated 21st Century Utility Model;
- Commitment to engaging and empowering customers to make intelligent energy choices; and
- Equitable tariff structures that promote fairness and economic and environmental policy goals.

Pathway:

- State policymakers pursue legislation to outline the model for a 21st Century Utility;
- Regulatory reform to support efficient resource deployment and accountability;
- Tariff structures refined to support price signals and financial viability requirements;
- Utilities empowered and accountable for managing the Transition.



To make progress, it is important to begin this transition soon and oversee its continual evolution. The process to accomplish this transition is not regimented, but should include the following steps:

- define the objectives, vision and foundational principles for a 21st century electricity market;
- identify the transitional constraints and roadblocks to navigate to the end-state market;
- consider the roles and interactions of key market participants, including utilities and competitive service providers;
- define utility tariff structure objectives and approaches to realizing objectives;
- identify alternative incentives and hold utilities accountable for accelerating and integrating system optimization;
- define a timeline for commencing the study process and transition to the end state;
- identify a process to revise the utility model through the transition, as appropriate; and
- define the impact of the new model on the regulatory oversight process.

The policies set forth for a 21st Century Utility model and the pathway for achieving results will create a significant opportunity for economic growth and regional competitiveness.

No two states will apply the same approach, but the goal is to develop several robust models that can be tested and compared against each other to refine into best-in-class models over time. The policies set forth for a 21st Century Utility model and the pathway for achieving results will create a significant opportunity for economic growth and regional competitiveness. Over the long term, these proactive solutions will create shared benefits for customers, utility investors and society as a whole.

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