Opportunities for Governors to Align Electricity Markets with State Energy Goals

Executive Summary

Electric utilities are facing a fundamental challenge to their profitability and long-term viability as the business models shaped by state regulation and legislation have not kept pace with contemporary technologies, customer preferences and state policy goals. More than a century ago, states encouraged increased access to electricity by granting utilities profit opportunities tied to investing in new generation and wires prudently. That goal, of universal access in the United States, has, with limited exceptions, been achieved.[1] With more than 7,000 power plants and 5 million miles of wire in place, the U.S. electricity system provides safe, affordable and generally reliable power to 150 million customers. State and federal policy makers and consumer demands are now adding new goals for the electricity system, including that it be cleaner, more distributed and more resilient. While some states have made modest adjustments, most programs have yet to sufficiently align utility profit opportunities with that fuller set of energy goals. Governors can help guide the ongoing electric power sector transformation to better promote today's state energy goals by articulating a clear state vision and working with stakeholders to explore and implement updates.

This paper reviews the changes underway in the electricity industry and their implications for state policy and utility business models. It also suggests five opportunities for governors to help guide their states as they explore and adopt new approaches to shaping the electricity market. This paper is informed by the State Learning Network on New Utility Business Models and Electricity Market Structures of the Future, which the National Governors Association Center for Best Practices convenes to inform gubernatorial advisors, energy officials and public utility commissioners through workshops, webinars, technical assistance memos and in-state retreats.[2]

The transformation occurring in the electricity sector is significant and multifaceted. The electricity sales growth rate has been declining over the past 60 years due to the transition toward less energy-intensive industries, slowing population growth and increased deployment of energy efficiency technologies.[3] In addition, distributed energy resources and related technologies are becoming increasingly affordable. Those trends pose challenges for utilities that generally rely on growth in energy sales to maintain their financial viability. A recent survey found that 97 percent of utility executives believe that their utility's business model needs to evolve, and executives generally view the existing regulatory model as the main obstacle to that evolution.[4]

Complicating the situation for utilities is that much of the ongoing power sector transformation is being driven by market entrants deploying new technologies at increasing scale who are often treated differently than utilities in the state regulatory framework. Other regulated sectors have faced similar challenges—some successfully, some not. For instance, when the telecommunications sector was opened to competition, the industry successfully diversified its offerings. In contrast, the streetcar industry did not diversify and went out of business when people began buying cars.[5]

That is not to suggest that a new model would entail full and open competition across the utility sector—

some components of the electricity industry are natural monopolies that likely call for some protection. However, addressing the role for new technology providers, including utilities, is part of the challenge for developing a new regulatory model. For instance, utilities have been deploying renewable energy, such as wind and solar, at utility scale in the form of large installations (which currently dominate renewable installations) but are not part of the phenomenon of more distributed applications. One hybrid of this has been the emergence of utility engagement in community solar which allows consumers to support renewables consistent with their own usage levels but through aggregated installations, that has the additional feature of serving customers who may not have the option of rooftop solar due to geography, housing stock, ownership status or restrictive covenants.

Governors and other state officials are addressing discrete aspects of the push for a new regulatory model. This is happening primarily through the solar net metering debates underway in state legislatures or public utility commissions in more than 20 states as well as through efforts to promote emerging technologies, including energy storage and electric vehicles. Ongoing net metering reforms, most of which simply rebalance the payments between utilities and customers who have rooftop solar, represent adjustments to the business model, but they do not resolve the underlying challenge that utilities are confronting.[6] Those piecemeal adjustments reduce revenue loss but do not offer utilities profit opportunities from distributed clean energy. Therefore, policy battles are likely to continue unless states pursue a more fundamental realignment offering utilities new profit opportunities. Governors can advance the exploration of different compensation models by encouraging pilots and offering guidance to test new electricity compensation models that many believe are necessary to keep utilities viable into the future.

In general, utility business models fall into the following four categories. Those models are summarized in Table 1 on page 5 and described in further detail in the Categories of Utility Business Models section of this paper.

- Rate-of-return (ROR) regulation,
- Adjusted ROR to reduce utility revenue loss from pursing state energy goals,
- Added utility profit opportunities from pursuing state energy goals, and
- Transformative models.

To move towards a new regulatory model, governors, regulators, utilities, third-party providers and other stakeholders should carefully evaluate options for how best to accommodate new technologies and market entrants and which reforms they believe are necessary for utilities to remain viable in the future and to meet their state energy goals. Those reforms can be considered in light of the current regulatory framework and take the shape of adjustments to minimize utility revenue losses and to create profit opportunities associated with new technologies or they can entail the adoption of new transformative models.

Governors can help their states explore and determine which type of utility business model best fits their policy goals through the following actions:

- Establish a task force to explore issues and make recommendations;
- Encourage utility innovation through guidance documents;
- Focus on fair market access for all businesses;
- Promote pilots for performance-based compensation; and
- Review stranded asset liability to establish strong consumer protection provisions.

A Changing Industry: Implications for State Policy

The electricity sector is confronting new technologies, policies and demands that are creating challenges for

the traditional utility business model and providing opportunities for new energy technologies and services. A primary challenge to utilities' business models is the declining growth of electricity sales. Electricity demand is projected to increase at a rate of 1 percent per year, which is roughly half the historical rate.[7] The U.S. Energy Information Administration has identified the main drivers for this reduced growth as higher energy efficiency standards, slowing population growth and structural changes in the economy.[8] At the same time, more and more corporations are seeking to purchase clean energy, with 60 percent of Fortune 100 companies setting clean energy purchasing commitments.[9] In a recent survey, 97 percent of utility executives said they believed that their utility's business model must evolve, and executives generally viewed the existing regulatory model as the main obstacle to that evolution.[10]

In both regulated and restructured markets, utility business models are based on a hundred-year-old model that was developed as the country was focused on promoting electrification. They concentrate on repaying investors for operating expenses and allowing investors to earn a return on prudent capital investments. In other words, the more power utilities sell and the more concrete they put in the ground, the more they earn. Some states have begun to change that model to reflect new goals and market developments, such as measures to decouple utilities' revenues from their sales volumes—but ratemaking continues to focus largely on incentives for utilities to invest capital in new transmission wires, distribution infrastructure or power plants. Flat consumer demand and the growth of distributed energy resources such as rooftop solar, storage and demand response may reduce the amount of power sold and the need for future utility capital investments, forcing a rethinking of current regulatory frameworks.

Most utilities have remained economically viable despite declining sales growth because capital expenses have increased to record high levels and costs of capital have declined more slowly than the state-allowed rate of return (ROR).[11] If state regulators eventually adjust the ROR to reflect the lower cost of capital, utilities will confront higher costs, declining sales and lower profit margins. If utilities compensate by significantly increasing electricity rates, customers would have a greater incentive to find alternative sources of supply or reduce their demand (see the "Game-Changing Technologies" box on page 4). That potential dynamic—declining sales leading to higher costs leading to further declining sales—is referred to as the utility death spiral.

Because utilities are state-regulated businesses that provide a basic necessity, state governments are being drawn into that issue, primarily through the debates underway in more than 20 state legislatures and public utility commissions (PUCs) about rates for distributed solar[12]—debates that have often become heated among solar customers, solar businesses, environmentalists, utilities and consumer advocates. Most of the responses states are pursuing—including value-of-solar tariffs, increased fixed charges and reduced rates for distributed solar—rebalance the payments between utilities and solar customers but do not resolve the more fundamental underlying challenge of reduced utility profit opportunities.

Some analysts say that no additional incentives are needed and that utilities can manage the reduced demand for electricity by improving their cost management, instead.[13] As economist Alfred Kahn observed, "All regulation is incentives," meaning that utilities are motivated to comply with state energy policies because otherwise they risk losing state regulatory protection. Other analysts say that the decoupling and solar net metering debates show that utilities may be willing to comply with state law but are also likely to oppose their expansion when those laws undermine their profitability.[14]

In states where policymakers choose to engage utilities as drivers of advanced technology,

Game-Changing Technologies

The following technologies are changing the economic landscape for utilities:

- **Distributed generation.** Electric power generation on the customer side of the electric meter, primarily rooftop solar;
- **Energy efficiency.** Technologies that use less energy to perform the same functions, such as LED lighting;
- **Demand response.** Reductions in electricity demand and usage relative to normal consumption patterns in response to price signals, incentive payments or information; and
- **Advanced metering infrastructure.** An integrated system of smart meters and data-management systems that enables two-way communication between customers and electric utilities (or third-party providers); the detailed data can be used to increase energy efficiency and conservation.

Technologies that may impact the system in the near future include:

- **Energy storage.** As technologies that can capture and store energy (such as batteries) become more affordable, they can store increasing amounts of energy from variable sources, such as wind and solar power, thereby dramatically increasing the functionality of those sources by allowing them to meet demand even when the wind is not blowing or the sun is not shining; and
- **The Internet of Things.** Increasing interconnectivity through the internet allows for more frequent control of appliances and therefore greater system efficiency. For example, a smart thermostat can learn from a smartphone location when the house is unoccupied and can manage the home appliances to reduce wasteful demand.

regulatory reforms are necessary. PUCs can pursue modest adjustments to utility business models, but commissioners typically interpret their statutory authority narrowly and are unlikely to pursue more fundamental reform without direction from governors and state legislatures. Governors can play a critical role in initiating conversations and providing policy direction for managing the rapid changes in this critical industry.

Markets and Monopolies: Lessons from the Streetcar and Other Transformed Industries

The electricity sector is not the first regulated industry to face competition from new technologies. The cable television industry, for example, was a regulated monopoly that faced dramatic declines in sales when satellite TV emerged. State regulators did not protect existing cable monopolies from the new technology, and some companies went out of business, but the sector as a whole successfully diversified its offerings to add valuable new services such as internet and phone, which now make up the majority of the industry's revenue.[15]

In contrast, when the streetcar industry faced rising competition from buses and cars, it did not innovate its services.[16] When a state commission declined to allow higher rates for one streetcar company, ensuring that the company would not recover some of its fixed costs, the company appealed the decision to the U.S. Supreme Court, arguing that public utilities had a constitutional right to recover the costs of the system they had built. The court, however, ruled that utility loses resulting from economic forces are not applicable to revenue recovery guarantees by state regulators.[17]

As states examine various potential changes, electric utilities may face adjustments to traditional regulatory structures that currently control the level of competition and, to ensure their own viability, utilities may need to develop new practices to innovate and compete with third parties to provide value to customers. Those practices will call for new types of effort, however, as historically, regulated monopolies in the electricity sector have invested very little in research and development compared to other industries.[18] Technological and business model innovation in the sector is now driven by third-party companies that do not own or operate the grid and must partner with utilities or gain regulatory permission to access the electricity market. Learning from the experiences of other sectors, regulators should set clear guidance to ensure that third parties can fairly access customers.[19] At the same time, states may want to consider the political and practical value of motivating utilities to pursue innovation as a way to achieve state energy goals. At the same time, because the distribution wires remain a natural monopoly, there are strong public-interest reasons to continue some aspects of traditional utility regulation.

Categories of Utility Business Models

Utility business models generally fall into four categories (see Table 1 below):

- **Rate of Return (ROR) regulation.** The basis of most regulatory systems used today, this model compensates utilities through rates set by a regulatory commission based on utilities' reasonable costs plus a return on their investments;

- **Adjusted ROR regulation to reduce utility revenue loss.** This category adjusts the traditional model to minimize utility revenue losses from declining sales. It is currently used by some 20 states, and includes ratemaking adjustments such as decoupling, increased fixed charges and value-of-solar tariffs;[20]

Table 1. Four Categories of Utility Business Models

Rate of Return (ROR) regulation	• Rates based on utilities' reasonable costs plus a return on investments. • Used under vertically integrated or restructured systems (with or without clean energy standards).
Adjusted ROR regulation to reduce utility revenue loss	• Decoupling or lost revenue adjustment mechanism • Increased fixed charges • Value-of-solar tariff • Time-of-use rates
Added utility profit opportunities	• Ownership of assets • Treat expense as assets (aka regulatory asset) • Partnerships with third-party providers • Performance-based compensation
Transformative models	• Performance-based regulation • Smart system integrator • Energy service utility

- **Added utility profit opportunities.** This category allows utilities to earn an equivalent profit from investing in clean energy (if they are in restructured states that do not typically allow utility ownership of assets) or to profit from the facilitation or allowance of third-party investments in clean energy (in both regulated and restructured states) through reforms such as performance-based compensation. At least 24 states have adopted one or more profit incentive; and

- **Transformative models.** This category captures business models that are dramatically different from U.S. regulatory systems and include the use of performance-based regulation, smart system integrators and energy service utilities.

ROR Regulation

The primary model today is called rate of return regulation because utilities are compensated through rates that a regulatory commission sets based on utilities' reasonable costs plus a return on equity (ROE) for investments in conventional generation, transmission and distribution assets.[21] That model applies to both vertically integrated utilities and restructured utilities, although the latter are generally forbidden from or severely limited in owning generation.

Many states have augmented that basic model with policies to support greater use of clean energy, typically in the form of renewable portfolio standards and energy efficiency portfolio standards. Clean energy standard expenses are typically recovered without an ROE, so utilities are not provided an incentive to go beyond the minimum standard.

Adjusted ROR Regulation to Reduce Utility Revenue Loss

As utilities have confronted declining sales growth, several methods have emerged to adjust the ROR model to allow utilities to recover their fixed costs, including decoupling, lost revenue adjustment mechanisms, increased fixed charges and value-of-solar tariffs. In general, such adjustments do not address the fundamental issue—namely, that utilities can earn greater profits from investing in traditional capital-intensive technologies than from investing in advanced technologies that require less capital and more operational and labor resources.

Added Utility Profit Opportunities

Regulators also can enable utilities to earn a profit from clean energy investments. One option is to allow utilities to own distributed clean energy generation assets and earn an ROR equal to or greater than what they would earn on traditional generation sources.[22] Another option is to allow utilities to treat nonphysical clean energy expenses as a long-term capital asset,

Colorado's Shared Earnings Model

Xcel Energy had more renewable energy credits than it needed to comply with **Colorado**'s renewable portfolio standards in 2009 largely because of the low cost of wind energy. The utility wanted to sell its excess credits to other utilities, but state regulations barred it from doing so. In response, Xcel proposed a new form of renewable energy credit that allowed it to share the proceeds of those sales with ratepayers. The Colorado Public Utility Commissions approved a plan that divided the earnings from sales of renewable energy credits to give 80 percent back to customers and 20 percent to utility shareholders. Thus, the state created an incentive for the utility to increase renewable energy production so that it could sell the excess credits and make additional profits, all while benefiting residents.[25]

known as a regulatory asset. For example, a utility investment in staff to implement efficiency upgrades could get an ROR even though it is a labor expense. Alternatively, regulators could let utilities invest in clean energy companies as nonregulated subsidiaries to diversify their revenue streams, which could help parent companies' profits but would not address regulated utilities' profits. Utilities could also implement joint ventures with clean energy firms to increase their capabilities in the clean energy sector and benefit from entrepreneurial approaches.

One emerging model is performance-based compensation (PBC), in which states compensate a utility for the quality of energy service it provides rather than the cost. PBC reorients utilities to focus on specific objectives rather than solely on encouraging investment in capital-intensive assets. A wide array of outcomes can be rewarded, including increased reliability, improved environmental performance, minimized costs and improved customer service.[23] Many states use some form of PBC for reliability performance, and about half of states partially use that approach for energy efficiency programs. States can use the model for renewable energy, as well.[24] Within PBC, utilities can be compensated in many ways, including as a percentage of spending on clean energy programs, as a percentage of savings created for customers, as an extra profit margin for specific clean energy expenses or as a bonus payment that seems fair. Determining a utility's authorized ROE is an art, not a science, and so regulators may end up deciding on a number that they feel would provide utilities with appropriate compensation for investing in clean energy and spur increased innovation from a historically risk-averse sector. Regulators concerned with cost containment can create a sliding scale that centers on the current ROE so that failing to meet performance expectations leads to lower than current ROE, while the higher ROE is paid only if the utility achieves higher performance. States that have employed some elements of PBC for energy efficiency include **Arizona**, **Arkansas**, **California**, **Colorado**, **Connecticut**, **Georgia**, **Hawaii**, **Indiana**, **Kentucky**, **Massachusetts**, **Michigan**, **Minnesota**, **Missouri**, **New Hampshire**, **New Mexico**, **New York**, **North Carolina**, **Ohio**, **Oklahoma**, **Rhode Island**, **South Carolina**, **Texas**, **Vermont** and **Wisconsin**.[25]

Transformative Models

Some thought leaders are exploring transformative models for utility profitability, totally rethinking what utilities are and how they earn profits. Those models include performance-based regulation (PBR), the

Arizona's Shared Earnings Model

Arizona allows its largest electricity utility, Arizona Public Service Company, to earn a performance incentive from its energy efficiency programs based on the success of the utility in meeting its annual energy savings targets. It is structured as a tiered incentive, with a higher dollar per unit of energy saved for high levels of achievement, capped at $0.0125 per kilowatt hour saved. No incentive is provided for achieving energy savings below a minimum threshold. The amount of the incentive is calculated as a percentage of the net benefits the energy efficiency programs produce for ratepayers. In 2015, the utility surpassed the savings goal by 5 percent, saving customers $60 million. The utility earned 7 percent of net benefits and was able to collect $5.3 million in shareholder profits for successfully achieving those energy savings goals.[27]

utility as smart system integrator and the utility as a provider of energy services.

Note that "performance-based regulation" is not the same as performance-based compensation (although the terms often are used interchangeably). This paper applies the term performance-based regulation to a dramatically altered approach that affects the ROE for the entire utility enterprise, not just for a specific set of functions such as reliability or clean energy.[28] The United Kingdom is pursuing a PBR model under its Revenues = Incentives + Innovation + Outputs approach, in which a regulatory staff of around 800 oversee the complex development and monitoring of progress across a range of innovative performance incentive mechanisms.

Another transformative business model is the smart system integrator approach, which envisions a restructured utility that balances supply and demand with small-scale distributed resources, such as rooftop solar, combined heat and power and demand response. Large-scale generators continue to be major energy suppliers, but the smart system integrator focuses on incorporating technologies at the edge of the distribution grid located close to the point of consumption. In some formulations of the model, energy efficiency is left to the market or to nonutility program operators. This model could put the utility directly into competition with third parties that are not regulated and lack both public interest responsibility and public interest protections. **New York**'s Reforming the Energy Vision (REV) process is one example of a public policy driving new transformative business models in the clean energy economy (see the "New York's REV Model as a Transformative Smart System Integrator" box below for more information).

Another potential type of transformative business model is referred to as an energy service provider. In that model, the utility is compensated based on both the quantity and the quality of service it provides, such as lighting and heating, rather than on just the quantity of product it delivers. That model is more akin to the current telecom business model, where customers pay for services rather than for commodities. In the electricity sector, that means paying for lighting services rather than for kilowatt-hours. The model guarantees the utility a monopoly on the distribution portion of its business only, forcing the utility to compete on all other services, including generation of conventional and clean energy.[30]

New York's REV Model as a Transformative Smart System Integrator

In 2014, New York Governor Andrew Cuomo launched a process of transitioning the state's utilities from their traditional role as providers of electricity transmission and distribution services to a new role as distribution system platform providers in the county's first transformation of utilities into smart system integrators. In these new roles, the utilities will become grid managers, coordinating and facilitating the increased use of distributed energy resources to create a cleaner, more reliable and more resilient grid. The state's public service commission is developing performance-based metrics tied to earnings mechanisms for achieving smart system integration goals. It is encouraging utilities to be innovative and proactive by allowing them to propose new pilot programs and incentive structures to test different ideas. The result will be a gradual shift by utilities toward a performance-based structure that encourages distributed resource adoption in a manner that is profitable for utilities.[29]

Role for Governors

Governors can play a critical part in describing and promoting a vision for the role of utilities in advancing state policy goals and customer interests, including cleaner generation, more reliable power delivery and lower bills. There is no clear single solution to the complex set of market challenges, and so a variety of state innovations may need exploration. Actions that governors could consider include establishing a task force, encouraging innovation through guidance, focusing on fair market access, promoting PBC pilots, and protecting consumers by clarifying stranded asset liability.

Establish a Task Force to Explore Issues and Make Recommendations

Governors can establish a task force to explore a series of issues, including the current electricity system limitations; misaligned utility incentives; and recommendations for regulation, executive action and legislation. Task force members can include state energy officials, public utility commissioners, utilities, clean energy companies, consumer advocates, environmental organizations, business and industry, technical experts and legislative representatives. **Nevada** Governor Brian Sandoval issued an executive order in early 2016 creating a task force to provide recommendations on policies that will encourage clean energy development, advance grid modernization and grid resiliency, and support distributed generation and energy storage. The task force, which includes utility, environmental, industry and legislative stakeholders, will deliver a report with recommendations to the governor.[31]

Encourage Utility Innovation Through Guidance Documents

The consensus of the academic literature on the role of government in addressing rapid technological and scientific advancement is that guidance is more appropriate than rulemaking.[32] Guidance documents are a low-cost mechanism for small PUCs. Governors can set policy goals on energy, environment and economic development, and the PUCs can provide guidance to utilities on how to achieve those goals without advocating particular technologies or business models. PUCs can also open exploratory dockets to solicit input from utilities and other stakeholders. **New York** has provided guidance to utilities on the outcomes desired and asked the utilities to propose the business models and compensation mechanisms they needed to achieve those outcomes. **New Jersey**'s PUC has encouraged utilities to pilot the use of energy storage by partnering with third parties.

Focus on Fair Market Access for All Businesses

Much of the innovation in the electricity sector is being driven by new market entrants that are seeking access to existing infrastructure and to ratepayers. Utilities may try to limit new players accessing the market, for instance by supporting rules to limit the size of resources that third parties can provide or limit third-party access to customers or customer data. Learning from other sectors in which monopolists faced technological innovation, regulators should ensure that entrants have fair access to the market.[33]

One guiding principle is the longstanding prohibition on undue discrimination in utility rates. That prohibition is rooted in preventing anticompetitive practices, such as a utility favoring a particular ratepayer with a special rate. State regulators may be able to use that existing prohibition in state laws to correct unfair procedures that block new entrants from participating in regulatory proceedings and to open utility infrastructure to third-party service providers.[34] Governors can help regulators by publicizing the public benefits of fair market access and can direct executive branch staff to intervene in regulatory dockets to encourage PUCs to consider that principle.

Promote Pilots for Performance-Based Compensation

As noted on page 7, PBC can help utilities meet specific performance objectives, adapt to new market conditions and earn additional revenue. There is a bipartisan interest in this model that shifts the focus away from costs and

toward outcomes. Governors can ask PUCs to help utilities develop PBC pilot programs, potentially even specifying the objectives to prioritize. A body of literature is emerging on how to design PBC targets, and governors can encourage utilities and PUCs to explore those insights. States are exploring a similar effort in the health care field as they develop value-based purchasing pilots and metrics. Governors can encourage conversations between health and energy officials in their states to share lessons on piloting PBC models.

Review Stranded Asset Liability to Establish Strong Consumer Protection Provisions

States can adjust utilities' incentives to align with state energy goals, but they should do so with an eye toward consumer protection. For example, there is a risk that fossil-based resources could become underutilized assets, given the significant technology and policy changes underway in the sector. Historically, PUCs have passed most utilities' underutilized asset costs on to consumers because they felt that the utilities had made investment decisions that were initially prudent but because of the changing market, economic or technological circumstances ultimately became uneconomic. However, given the Supreme Court ruling on streetcar utilities, the precedent exists for states to no longer grant regulated utilities confronting economic competition the same level of economic guarantees they had previously received. The current rapid pace of technological change in the electricity sector makes the risk of stranded assets greater than in the past. Governors and PUCs may want to review and update state laws and regulations on used and useful to account for the pace of change. In proceedings to review utility investments in new generation infrastructure, governors could request that PUCs assess the risk that the assets will not be beneficial in the long run. PUCs could also review and update their regulatory guidelines on utilities' and consumers' shares of the costs for underutilized assets, such as by updating integrated resource planning guidance or modifying depreciation rates.

Conclusion

Utilities are facing a perfect storm of declining growth in electricity sales, growing competition and customers' increasing use of distributed energy. The current utility regulatory model may need to adapt to meet today's realities. Because investor-owned utilities are state-regulated entities, the state is critical in managing those adjustments. A range of ideas, both evolutionary and revolutionary, can reorient utility revenue streams and business models. Governors can play an important role by convening stakeholders and encouraging thoughtful conversations and pilot programs to assess the options for managing the transitions underway in the electricity sector.

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Endnotes

[1] For the purposes of this paper, "utilities" refers to investor-owned utilities that are traded on the stock market and regulated primarily through state public utility commissions. Municipal utilities and electric utility cooperatives are also experiencing changes but are regulated mainly at the local level.
[2] The agendas and presentations for the workshops, retreats and webinars are available on the National Governors Association website at http://www.nga.org/cms/home/nga-center-for-best-practices/meeting--webcast-materials/page-eet-meetings-webcasts/col2-content/main-content-list/learning-lab-on-new-utility-busi.html.
[3] U.S. Energy Information Administration, "U.S. Economy and Electricity Demand Growth Are Linked, but Relationship Is Changing," Today in Energy (Washington, DC: Energy Information Administration, March 22, 2013), https://www.eia.gov/todayinenergy/detail.cfm?id=10491 (accessed July 29, 2016).
[4] Utility Dive, 2016 State of the Electric Utility Survey, http://app.assetdl.com/landingpage/state-of-the-utility-survey-2016 (accessed April 15, 2016).
[5] Elizabeth Graffy and Steve Kihm, "Does Disruptive Competition Mean a Death Spiral for Electric Utilities?," Energy Law Journal 35, no. 1 (Spring 2014): 1–4, http://www.seventhwave.org/sites/default/files/elj-article-summary2.pdf (accessed September 14, 2016).
[6] For resources on this issue, see Lisa Wood et al., Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives, Future Electric Energy Regulation Report No. 5 (Berkeley, CA: Lawrence Berkeley National Laboratory, 2016), https://emp.lbl.gov/sites/all/files/lbnl-1005742_1.pdf (accessed September 14, 2016); and Tom Stanton, Distributed Energy Resources: Status Report on Evaluating Proposals and Practices for Electric Utility Rate Design (Silver Spring, MD: National Regulatory Research Institute, 2015), http://nrri.org/download/nrri-15-08-rate-design-for-der/ (accessed September 14, 2016).
[7] U.S. Energy Information Administration, "Annual Energy Outlook 2013," Today in Energy, https://www.eia.gov/todayinenergy/index.cfm?tg=aeo2013%20(annual%20energy%20outlook%202013) (accessed June 13, 2016).
[8] U.S. Energy Information Administration, "U.S. Economy and https://www.eia.gov/todayinenergy/detail.cfm?id=10491 Electricity Demand Growth."
[9] For information about corporate interest in and principles concerning clean energy purchasing, see the Corporate Renewable Energy Buyers' Principles website at http://buyersprinciples.org/about-us/.
[10] Utility Dive, 2016 State of the Electric Utility Survey.
[11] Data on the utility industry capital trends can be found in Edison Electric Institute, Financial Review 2016—Industry Financial Performance (Washington, DC: Edison Electric Institute, 2016). An overview of general trends was presented at a state retreat by Dr. Mark Lowry, "Performance-Based Regulation: Can 'the Other PBR' Make Sense for Wisconsin?" (slides presented at the Wisconsin Retreat on New Utility Business Models, Madison, Wisconsin, March 29, 2016).
[12] Benjamin Innskeep et al., The 50 States of Solar: Q1 2016 Quarterly Report (Raleigh, NC: Clean Energy Technology Center, 2016), https://nccleantech.ncsu.edu/n-c-clean-energy-technology-center-releases-q1-solar-policy-update-to-the-50-states-of-solar-2 (accessed September 14, 2016).
[13] For instance, cost savings can be achieved by (1) raising the productivity at the front line (for example, optimized communications), (2) reducing external spending (for example, taking advantage of purchasing power across divisions), (3) restructuring and streamlining organizations and (4) pruning assets through periodic portfolio reviews (for example, shifting to low-cost fuels, locking in long-term fuel contracts). Utilities can take those steps on their own, or utility regulators can encourage them. In addition, utility regulators can encourage steps to optimize the larger grid with efforts that reduce costs for utilities. Examples of grid-wide efficiency improvements are listed in Steven Nadel and Garrett Herndon, "The Future of the Utility Industry and the Role of Energy Efficiency," American Council for an Energy-Efficient Economy Summer Study on Energy Efficiency in Buildings (2014), p. 22–24, http://aceee.org/files/proceedings/2014/data/papers/8-138.pdf (accessed September 14, 2016).
[14] Ron Binz and Ron Lehr, "Utilities 2020: Exploring Utility Business Models and the Regulatory Changes Needed to Transform Them," http://www.rbinz.com/Utilities%202020.pdf (accessed September 14, 2016).
[15] E. Graffy, "Disruptive Competition http://www.seventhwave.org/sites/default/files/elj-article-summary2.pdf."
[16] Ibid.
[17] Market Street Railroad Co. v. Railroad Commission, 324 U.S. 548 (1945).
[18] Ken Costello, A Primer on R&D in the Energy Utility Sector (Silver Spring, MD: National Regulatory Research Institute, 2016), http://nrri.org/download/nrri-16-05-rd-in-energy-utility-sector/ (accessed September 14, 2016).
[19] John E. Kwoka Jr., "Twenty-Five Years of Deregulation: Lessons for Electric Power," Loyola University of Chicago Law Journal 33, no. 885 (2002: 885), http://lawecommons.luc.edu/luclj/vol33/iss4/11 (accessed September 14, 2016).
[20] Annie Gilleo et. al., Valuing Efficiency: A Review of Lost Revenue Adjustment Mechanisms, (Washington, D.C.: American Council for an Energy-Efficient Economy, 2015), 3-5.
[21] Andrew Satchwell et al., A Framework for Organizing Current and Future Electric Utility Regulatory and Business Models (Berkeley, CA: Lawrence Berkeley National Laboratory, 2015), https://emp.lbl.gov/sites/all/files/lbnl-181246_0.pdf (accessed September 14, 2016).
[22] Steve Kihm et al., You Get What You Pay For: Moving Toward Value in Utility Compensation. Part 1—Revenue and Profit (San Francisco: America's Power Plan, 2015), http://americaspowerplan.com/wp-content/uploads/2014/10/CostValue-Part1-Revenue.pdf (accessed September 14, 2016).
[23] For more information about designing incentive mechanisms, see Energy Innovation Policy & Technology, "Going Deep on Performance-Based Regulation," http://energyinnovation.org/resources/our-publications/going-deep-performance-based-regulation (accessed August 5, 2016).
[24] For further information about principles of designing performance-based compensation structures, see Sonia Aggarwal and Eddie Burgess, New Regulatory Models (San Francisco: America's Power Plan, 2014), http://westernenergyboard.org/wp-content/uploads/2014/03/SPSC-CREPC_NewRegulatoryModels.pdf (accessed September 14, 2016); and Melissa Whited, Tim Woolf, and Alice Napoleon, "Utility Performance Incentive Mechanisms: A Handbook for Regulators," Synapse Energy Economics Blog, entry posted March 12, 2015, http://www.synapse-energy.com/about-us/blog/synapse-handbook-provides-guidance-designing-implementing-utility-performance (accessed September 14, 2016).

[25] S. Aggarwal, New Regulatory Models, (San Francisco: America's Power Plan, March 2014), http://westernenergyboard.org/wp-content/uploads/2014/03/SPSC-CREPC_NewRegulatoryModels.pdf, 10.
[26] Seth Nowak et al., Beyond Carrots for Utilities: A National Review of Performance Incentives for Energy Efficiency (Washington, DC: American Council for an Energy-Efficient Economy, 2015), http://aceee.org/beyond-carrots-utilities-national-review (accessed September 14, 2016).
[27] The original performance incentive structure was established in 2005, and the Arizona Corporation Commission modified it in 2014 to change the cap from a percentage of spending on energy efficiency programs to a dollar-per-kilowatt-hour-saved cap. By summer 2016, the Arizona public utility commission was evaluating a proposal to change the incentive from a percentage of shared savings to a return on program spending on energy efficiency (Arizona Corporation Commission Docket No. E-00000XX-13-0214).
[28] Mark Newton Lowry and Tim Woolf, Performance-Based Regulation in a High Distributed Energy Resources Future (Berkeley, CA: Lawrence Berkeley National Laboratory, 2016), https://emp.lbl.gov/sites/all/files/lbnl-1004130_0.pdfhttps://emp.lbl.gov/sites/all/files/lbnl-1004130_0.pdf (accessed September 14, 2016).
[29] State of New York, REV: Reforming the Energy Vision (Albany: State of New York, 2016), https://www.ny.gov/sites/ny.gov/files/atoms/files/WhitePaperREVMarch2016.pdf (accessed August 30, 2016).
[30] For more information on energy service provider models, see James Newcomb, Virginia Lacy, and Lena Hansen, New Business Models for the Distribution Edge: The Transition From the transition from Value Chain to Value Constellation (Denver: Rocky Mountain Institute, 2013), 16, http://www.rmi.org/New_Business_Models (accessed September 14, 2016).
[31] Nevada Governor's Office of Energy, "New Energy Industry Task Force," http://energy.nv.gov/Programs/New_Energy_Industry_Task_Force/ (accessed June 14, 2016).
[32] Nathan Cortez, "Regulating Disruptive Innovation," Berkeley Technology Law Journal 29, no. 1 (2014): 175–228, http://scholarship.law.berkeley.edu/cgi/viewcontent.cgi?article=2021&context=btlj (accessed September 14, 2016).
[33] J.E. Kwoka Jr., "Twenty-Five Years."
[34] Ari Peskoe, "Ratemaking and the Campaign Against Rooftop Solar," Fortnightly Magazine (July 2016).