POWERING THE FUTURE AND PROTECTING CONSUMERS
Ensuring Reliability, Resilience, and Quality of Electricity Service

Carl Vinson Institute of Government
UNIVERSITY OF GEORGIA
Authors
Shana Jones, JD, Public Service Faculty, Carl Vinson Institute of Government
Dr. Jessica Alcorn, Postdoctoral Fellow, Carl Vinson Institute of Government

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Powering the Future and Protecting Consumers:
Ensuring the Reliability, Resilience, and Quality of Electricity Service

Over the past century, reliable and universal access to electricity has served as the backbone of economic development and improved quality of life in the United States. This backbone exists in large part because of laws, regulations, and policies designed to ensure access to this essential service. Long-term commitments by utilities to maintain a complex web of transmission lines, invest in power generation plants and projects, and train and deploy a skilled workforce have contributed to dependable and affordable access to electricity.

The results of these tremendous policy, financial, and social investments are clear. Utilities consistently deliver reliable electricity service across the United States. Customers—even those living in rural and remote areas—have access to affordable electricity. Safeguards exist to support low-income and elderly customers. Recovery during weather-related disasters is expedient. Meanwhile, innovations such as smart grid technologies are reducing costs, increasing reliability, and promoting sustainability at record pace. The electric industry’s ability to continually innovate and adapt to changing circumstances offers important lessons for customers, local governments, and decisionmakers as we look to the future.

The purpose of this white paper is to provide a concise overview of how the structure of the electricity industry reflects many decades of careful policy-making, as well as intensive investment by energy providers. Understanding this history is important so that when proposals for change are considered, important values and lessons learned are not lost. Regulatory frameworks have ensured reliability, supported long-term planning, allowed for public participation, provided oversight, and resulted in cost savings and customer protections. These frameworks have played a crucial part in securing reliable and affordable electric service for residents, local governments, and businesses. Enthusiasm for quick or dramatic restructuring or “deregulation” of electricity markets, therefore, should be tempered with caution, as rolling blackouts, unexpected price spikes, bankruptcies, and other issues have accompanied efforts to restructure around the country.

This paper first surveys the historical policy rationale for regulating electricity providers. It then provides an overview of restructuring or deregulation, which involves the traditional incumbent utility most customers are familiar with—one that manages generation, transmission, and delivery of power—being required to compete against multiple market players to provide electricity services. The paper then examines three specific areas of consideration for how existing regulatory frameworks promote reliability, resilience, and quality of electricity services: 1) universal and affordable electricity, 2) robust baseload
resources, and 3) grid resilience. The paper also includes lessons learned from significant restructuring efforts that have occurred in the United States since the early 1990s.

This white paper covers the following key points:

• **Price volatility and immediate rate increases have been an all-too-frequent outcome when restructuring has occurred.** The California electricity crisis that occurred in 2001–2002 after restructuring resulted in blackouts, supply shortages, and high rates. Special consideration should be given to rural, low-income, and elderly customers. These are the populations least equipped to respond to surprise rate changes and price increases, and they have been protected under traditional regulatory frameworks.

• **Market restructuring has highlighted that the electricity industry’s unique technical requirements should take precedence over political or economic theories.** In achieving consensus on these highly technical details, traditionally regulated markets have an advantage because they typically require consensus between a smaller set of stakeholders, usually the incumbent utilities and the public service commission, and they provide relatively clear mechanisms for customer input and citizen engagement.

• **While numerous factors such as geography and fuel mix inform the average price of retail electricity, the region with the highest retail prices is New England, where five of the six states have restructured markets.** The lowest rates are in regions where none of the states have restructured markets: the East South Central, West North Central, and Mountain regions. A large body of scholarship involving sophisticated statistical analyses has come to mixed conclusions about the causes of these differences and their relationship to restructuring. Until these differences are more clearly understood, decisionmakers should exercise caution and consider restructuring proposals carefully.

• **Significant policy discussions at the federal level are currently focusing on what the future “mix” of baseload power should look like to maintain a reliable electric system.** One critical question is how consumers will be protected from unanticipated price increases and variability that may arise out of a changing baseload portfolio.¹ Deregulation or restructuring, particularly at the retail level, could add unnecessary uncertainty at a time when states are facing a rapidly changing environment with respect to traditional baseload power.

• **Electricity, as an “essential service,” must continue to be provided in an affordable and reliable way that promotes public safety and bolsters resilience to natural disasters.** Incumbent utilities, precisely because most of them generate, distribute, and transmit electricity to a specific territory, are often able to maintain a diverse set of generation assets,

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which can support grid reliability and resilience. One component of resilience that particularly affects preparedness for extreme weather events is the ability to cope with supply chain disruptions. Because most baseload capacity resources rely on fuel sources that can be stored on site, these power plants are less likely to experience disruptions in the event of a natural disaster. Calls for deregulation or restructuring could greatly disrupt increased efforts by regulatory bodies and incumbent utilities to invest in and maintain
disaster-resilient electricity systems.

**Reliable, Affordable, and Universal Service: The Historical Rationale for Regulating Electricity Providers**

**BACKGROUND**

### ELECTRICITY Deregulation: A Closer Look at State-Specific Experiences

Press accounts illustrate that deregulation of the electricity industry has led to mixed reactions by a variety of stakeholders. Below are a few examples from recent years:

- **A 2007 Associated Press analysis of federal data found that “consumers in the 17 deregulated areas paid an average of 30 percent more for power in 2006 than their counterparts in regulated states.”** Eight years later, this trend continues. Data from the Energy Information Administration indicate that in states that allow retail competition, retail rates for residential customers in 2016 were on average 22 percent higher.

- **Ohio:** Competitive wholesale markets have not developed as anticipated. Studies have shown that retail rates have increased, and one of Ohio’s largest utilities is on the brink of bankruptcy, as of 2017.

- **Connecticut:** In 2017, the Connecticut Public Utilities Regulatory Authority reached a $5 million settlement with an electricity retailer that was charging triple the standard service rate. Due to these predatory tactics, this retailer has also been banned from selling electricity in Connecticut until 2020.

- **Illinois:** In 2016, in reaction to previous restructuring efforts, the state legislature passed the Future Energy Jobs Bill, which was designed, in part, to ensure that two nuclear power plants remain operable. Nuclear power produces over 50 percent of all electricity in the state of Illinois, and retirement of these plants would have required sourcing a much larger share of electricity from outside the state. In addition to exposing the state to market volatility, these two nuclear retirements alone would have resulted in a loss of 4,200 jobs.

- **Maryland:** In 2013, the Maryland Public Service Commission allowed the Potomac Electric Power Company to implement a grid resilience charge to fund grid resilience investments. Consumer groups argued that the charges being imposed were exorbitant and not necessarily confined to storm-related expenditures. In response, the commission did not extend the surcharge in 2016.

The vast interconnected web of electricity infrastructure that exists today grew out of meager beginnings. In the late 1800s, Thomas Edison created the first central generating plant to provide a single light bulb’s worth of power to 60 customers in New York City’s financial district. Cities around the country soon began installing their own generating plants and putting up transmission infrastructure. At that point, the nascent technology for electricity transmission required customers to be within a one-mile radius of a generating plant, thus limiting the population that could feasibly access this service.

As technology improved, however, the industry exploded into what could fairly be described as chaos. Many cities granted franchises to every power company that applied. These power companies, in turn, duplicated power generation and wiring as they competed for the same affluent customers.\(^2\) In such a competitive and unregulated environment, the industry rapidly consolidated. The consolidated business model, while it gradually increased the percentage of the American public with access to electricity, came with its own problems, including accusations of corruption at the local level.\(^3\) Prominent utility leaders and reformers began to maintain that state-level oversight would provide the best route to addressing consolidation and ensuring that the public benefited from access to reliable and affordable electricity.\(^4\) By 1930, most states had established public service or public utility commissions authorized to regulate electric companies by setting their rates in order to ensure a more competitive price. Typically, state statutes required commissioners to ensure that “rates were just, reasonable, and nondiscriminatory in order to strike the appropriate balance between ratepayers and investors.”\(^5\) By the 1950s, almost every home, farm, and business in the United States had reliable and affordable electricity provided either by utilities or member-owned electricity cooperatives—a tremendous feat given the nation’s large and diverse geographic footprint.\(^6\)

As the industry rapidly expanded, the need for some regulations to protect consumers became paramount. The first regulation of the electricity industry began in 1920 with the establishment


\(^3\) Ibid.

\(^4\) In addition to addressing mounting corruption concerns that had arisen at the municipal level, a state-level approach also likely reflected the fact that utility networks were increasingly crossing city boundaries, and state regulation could minimize the transaction costs related to negotiating rates with multiple municipalities. J. Gregory Sidak and Daniel F. Spulber, “Deregulatory Takings and Breach of the Regulatory Contract,” *New York Law Review* 71, no. 851 (1996).


of the Federal Power Commission, which would later become the Federal Energy Regulatory Commission (FERC). This commission was granted the authority to ensure cost-of-service rates in wholesale markets. This was similar to cost-of-service ratemaking at the state-level. For most of the 20th century, state commissions oversaw rate-setting for incumbent utilities, also known as investor-owned utilities or IOUs. Incumbent utilities have been and remain the primary providers of electricity, serving 75 percent of the US population.\(^7\) In 1935, the Public Utility Holding Company Act required multistate companies to divest such that they were only operating in one state, segmenting the industry to prevent the exercise of market power. This wave of federal regulation was later followed by environmental legislation in the 1970s that required electricity generators to meet certain air quality, water quality, and waste disposal obligations.

In response to a variety of economic and political developments, in the 1990s, there was a push to move away from the traditional model in which state commissions were responsible for utility oversight in favor of more competition in generation and retailing. FERC used its authority to create markets for wholesale power—in other words, the buying and selling of power between generators and resellers.\(^8\) At the same time, more than half of states began to consider efforts to restructure retail electricity markets to allow individual customers to choose their electricity provider.\(^9\) California was an early leader in this area. However, as discussed in more detail below, the 2000–2001 electricity crisis in that state resulted in blackouts, supply shortages, high rates, and Pacific Gas & Electric’s bankruptcy. Consequently, many states retreated from introducing more competition, or deregulating, the electricity market.\(^10\)

Following the crisis, California itself suspended retail competition.\(^11\) Today, 22 states and the District of Columbia have competitive markets for the generation of electricity; 15 states—Texas and most of the northeastern and mid-Atlantic states—allow for retail competition.\(^12\) An additional eight states pursued retail competition but ultimately suspended these programs. In deregulated states, most residential consumers simply default to the incumbent utility.\(^13\) Out of


\(^8\) See Federal Register, “Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities” (1996). (to be codified at 18 C.F.R. pt. 35) (summarizing final rules designed to require open access nondiscriminatory transmission service in order to promote competitive wholesale power markets).

\(^9\) Ibid.


\(^12\) Ibid.

the 15 states that allow for retail competition, in all but Connecticut more than 75 percent of all customers are served by an incumbent utility.\textsuperscript{14}

\textbf{WHY REGULATE?}

Regulation of the electric industry was considered necessary for two fundamental reasons: 1) Electricity is deemed an essential service necessary for human health and safety and economic activity, and 2) electric utilities—like water and roads—naturally concentrate into single firms due to efficiencies and the technological and economic features of the industry.\textsuperscript{15} Electric utilities across the country provide access to heating and cooling, refrigeration, and lighting, which are “essential” to promote economic activity and human health and safety. In contrast, the absence of reliable power constrains economic activity and can be detrimental to human health and safety. Without reliable power, people cannot mitigate extreme temperature fluctuations, safely store food, or have safe and reliable lighting at night. Customers also have expectations about the quality of service provided by utilities. They expect utilities to ensure that electricity infrastructure is safe, does not damage property, and is available at all times and without interruptions.

The second fundamental reason electricity providers are regulated is that they naturally concentrate into single firms.\textsuperscript{16} An electric utility under this paradigm generates, distributes, and transmits electricity as a single firm to a specific geographic territory. Such utilities are often referred as incumbent utilities or vertically integrated utilities. A single provider is often able to meet the overall demand for a product at a lower total cost than would a number of smaller competing entities, making it more efficient.\textsuperscript{17} Providers in these situations, however, ultimately can charge higher prices for a product due to the lack of competition. In the United States, historically, utilities have been regulated as a way of ensuring that single providers are kept “in check.”

\textsuperscript{15} Jim Lazar, “Electricity Regulation in the US: A Guide,” 2016, \url{http://books.google.co.uk/books/about/Electricity_Regulation_in_the_US.html?id=pAEkygAACAAM&pgis=1}.
\textsuperscript{16} John Stuart Mill famously referred to industries such as electricity, water supply, roads, and canals as “practical monopolies,” where “it is the part of the government, either to subject the business to reasonable conditions for the general advantage, or to retain such power over it, that the profits of the monopoly may at least be obtained for the public.” John Stuart Mill, \textit{Principles of Political Economy}, 1848.
\textsuperscript{17} Francisco Flores-Espino et al., “Competitive Electricity Market Regulation in the United States: A Primer,” 2016, \url{https://www.nrel.gov/docs/fy17osti/67106.pdf}. 
A primary role of regulation is to ensure that the quantity of the electricity produced by utilities meets demand with fair rates for consumers.\textsuperscript{18} This process is referred to as cost-of-service ratemaking. It has been a long-standing legal tenet that economic activities “affected with a public interest” are appropriate subjects for rate and other regulations.\textsuperscript{19} Government entities—typically some form of state-level public utility commission—have historically regulated the rates set by incumbent utilities. Typically, with respect to retail rates, incumbent utilities must provide universal service at a fixed price, regardless of the true cost of service. Regulators therefore set rates for these entities using what is known as a cost-of-service methodology. This allows the utility to cover all costs, recover its investments, and earn a fair rate of return while preventing the gouging of consumers. Cost-of-service regulation was originally developed from a 1944 Supreme Court case that recognized the policy necessity of balancing the utility’s financial requirements with the interests of consumers.\textsuperscript{20} Protecting consumers is a core component of this rate-setting methodology, one that has been upheld by US courts and regulatory institutions since the 19th century.

Importantly, the regulatory process also provides guarantees to both consumers and incumbent utilities in a way that increases reliability by ensuring what scholars refer to as “credible commitments.”\textsuperscript{21} Generating, transmitting, and delivering power requires a profoundly complicated and expensive infrastructure. Vast amounts of capital and significant long-term planning are needed. Few firms would have undertaken the level of investment required to build and maintain the existing electricity infrastructure unless a regulatory body guaranteed that the company would be compensated for its investments.\textsuperscript{22} Put another way, regulation ensures that the government will keep its side of the bargain with an electric utility that has taken on enormous costs to invest in and maintain a reliable and affordable electric infrastructure.\textsuperscript{23}

\textsuperscript{18} Munn v. Illinois, 58 94 U.S. 113, 133-36 (1876). See also Sidak and Spulber, “Deregulatory Takings and Breach of the Regulatory Contract.”
\textsuperscript{19} Munn v. Illinois, 58 94 U.S. 113, 133-36 (1876). Major federal legislation that resulted in regulation of the electric utility industry includes: 1) The 1920 Federal Power Act (while amended and updated many times, creating the Federal Power Commission to coordinate hydroelectric power); the 1935 Public Utility Act (providing for federal regulation of the interstate transmission and sale of electricity); the 1935 Public Utilities Holding Company Act “PUHCA” (creating limits to utility company structure and requiring registration with the Securities and Exchange Commission but repealed in 2005); the 1978 Public Utilities Regulatory Policy Act (promoting energy conservation as well as allowing competition in generation); the 1992 Energy Policy Act (permitting open access to the transmission grid); and the 2005 Energy Policy Act (repealing PUHCA and providing tax incentives).
\textsuperscript{21} Ibid.
\textsuperscript{22} Ibid.
\textsuperscript{23} Economists refer to these costs as “stranded costs.” “Stranded costs are the uncompensated expenses incurred by utilities to ensure compliance with statutory requirements to provide service to consumers within a service territory.
In addition to rate-setting, regulators often require utilities to serve larger social goals such as a cleaner environment or greater use of domestic energy. Further, regulation of utilities occurs through an agency process designed to require notice and allow for public comment and intervention. Decisions made by regulatory agencies are then subject to review by the courts. Judicial review often involves an examination of whether rulemaking procedures conform to democratic values such as citizen participation and openness. In all of these ways, the United States leads the world in allowing for public participation and transparency in its rulemaking processes, at both the state and federal levels. Some scholars maintain that this is an important reason why our electricity costs remain lower than in most other nations.

Finally, ensuring that this essential service is of high quality and reaches consumers at an affordable cost requires extensive coordination between functions within individual utilities and between power generators. The most obvious form of coordination involves ensuring that the amount of electricity in demand from consumers is matched by the amount produced by a power generator on a minute-to-minute basis. Important considerations also include frequency support, ramping and balancing, and voltage support—attributes of traditional


24 See, e.g., the Public Utility Regulatory Policies Act (PURPA), which was enacted in 1978. 16 U.S.C. § 24 (1994). Among other things, PURPA provided incentives for companies to produce renewable energy and hydropower.

25 Notice and comment processes can be cumbersome and do not necessarily result in mass participation in the administrative state, as some scholars have observed. Even so, as Professor Cuellar writes, Yet even skeptics occasionally concede that notice and comment is likely to serve at least a few valuable functions. It gives interested parties notice of official action, exposing the agency to the views of those parties, and creating a record for judicial review. Instead of thinking of notice and comment as an ideal means for advancing representative democracy, many observers instead take positions implying that the procedure represents a reasonable compromise for an imperfect world. Thus compromise acceptance emerges from commonly held views about notice and comment, simultaneously implying that the procedure is likely to function in a manner quite removed from an ideal of broad, equitable, mass participation in the regulatory state, and that such an ideal is incredibly difficult to realize in the real world.


28 Palast, MacGregor, and Oppenheim, Democracy and Regulation: How the Public Can Govern Essential Services.

29 Indeed, the North American Electric Reliability Corporation (NERC) exists as a regulatory authority precisely to ensure reliability of the power grid in North America by facilitating such coordination.
power generation sources that power the overall grid, serving as “reliability building blocks.” Regulatory bodies consider these services “essential reliability services.” In this and many other ways, regulatory frameworks have served to ensure the coordination necessary to provide this essential service to all Americans and to guarantee a certain minimum quality and reliability of service.

Restructuring and Deregulation: A Brief Overview

Over the past 30 years, extensive debate has occurred about whether deregulating or restructuring electricity markets could be beneficial for consumers. In the 1970s, customer rates began to increase in large part due to the high cost of fuels. Successful deregulatory efforts in other industries, such as railroads, airlines, and telecommunications, also took place.

Restructuring debates during the late 1990s and early 2000s considered deregulatory activities in one or more of the four stages of power production and delivery:

1. **Generation of electricity**, which is production of electricity through technologies that convert fuel resources;
2. **Long-distance transmission**, which is movement of electricity from the production site through a series of interconnected transmission lines at a high voltage;
3. **Distribution**, which is delivery of electric power from the transmission system to individual consumers at an appropriate voltage for utilization; and
4. **Retailing to end-use customers**, which is the sale of electricity to the end consumer.

The wave of deregulation or restructuring that occurred around the turn of the century largely resulted in a change in ownership of generation assets and the creation of wholesale markets. Local utilities remain the primary entities responsible for distribution—moving electricity from

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32 Restructuring necessitates the creation of new entities—inddependent system operators/regional transmission operators—to ensure the coordination necessary to reliably meet power demands. These entities were created based on FERC Order Nos. 888/889.
33 The US Energy Information Agency defines restructuring as “the process of replacing a monopoly system of electric utilities with competing sellers, allowing individual retail customers to choose their electricity supplier but still receive delivery over the power lines of the local utility.”
35 Flores-Espino et al., “Competitive Electricity Market Regulation in the United States: A Primer.”
transmission infrastructure to individual consumers—often referred to as the “last mile” of wire service.

When FERC created markets for wholesale power, the federal agency essentially mandated open access to transmission.36 This restructuring led to the creation of regional entities known as independent system operators (ISOs) or regional transmission organizations (RTOs) to coordinate and monitor the electric grid (see the map on page 11). States could choose whether they wanted to participate in these wholesale markets.37 A patchwork has resulted, with southeastern and western states primarily operating in traditional markets outside of the RTO/ISO markets.38 In some states, retailing was also restructured, allowing individual customers to choose their electricity provider.39 Fifteen states—Texas and most of the northeastern and mid-Atlantic states—have competitive retail electricity markets today.86

36 See Federal Register, Promoting Wholesale Competition Through Open Access Non-Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities (summarizing final rules designed to require open-access, nondiscriminatory transmission service in order to promote competitive wholesale power markets).
38 Ibid. In these states with traditional markets, the majority of incumbent utilities conduct wholesale market transactions through bilateral agreements between utilities. In states that underwent restructuring, generation assets transitioned from being utility-owned—in which cost-of-service regulation applied—to being independent power producers—in which all generation assets compete. In this paper, references to wholesale markets pertain to competitive regional markets created by restructuring, not bilateral agreements that occur in traditional markets.
39 Ibid.
Of course, how the details of restructuring fit into the individual context of each state and region are extremely relevant.\textsuperscript{40} Previously tested market designs offer many lessons for decisionmakers, and the implications of faulty market design are most evident in the California electricity crisis of 2000 and 2001.

In the 1990s, California had the highest retail rates for electricity in the western United States. In 1996, state legislators passed AB 1890, which introduced competition in the generation and retailing of electricity. While the market operated fairly effectively for the first two years, in 2000 and 2001, crisis struck California, with many areas experiencing rolling blackouts that adversely impacted businesses and citizens.

At the time of the California electricity crisis, the state was seeing rising natural gas prices, increased costs of pollution control, and a drought that decreased the output of hydro plants in

\textsuperscript{40} Paul L. Joskow and Richard Schmalensee, \textit{Markets for Power: An Analysis of Electrical Utility Deregulation} (MIT Press, 1983).
the Pacific Northwest. In addition, California experienced a surge in demand through the 1990s, resulting in a shortage of power supply (i.e., generation capacity). In addition, policymakers were also still changing aspects of the newly created markets, resulting in a great deal of uncertainty.

With fledgling wholesale markets, California’s electricity structure was in a tentative position to address these challenges. Due to the shortage of supply, generators who had capacity were able to use the newly competitive market environment to their advantage. Generators could manipulate the market and charge exorbitant prices, and many did. In 2001, wholesale prices topped $375 per a megawatt hour, which was more than 11 times higher than the price from one year earlier.41 This steep price increase can be partially attributed to the mismatch between supply and demand, as incumbent utilities had no alternative but to purchase electricity in the wholesale market at exorbitant rates. Within the span of about six months, utilities accumulated an enormous amount of debt, placing them in financial peril. The most notable example is Pacific Gas & Electric, which filed for bankruptcy in 2001.

Another lesson that has emerged from market restructuring is that the electricity industry’s unique technical requirements should take precedence over political or economic theories. The electricity sector is abundant with unique technical concerns due to the economic and physical properties of electricity that add complexity to market restructuring (i.e., electricity cannot economically be stored in large quantities, coordination is required for effective grid operation, etc.).42 In achieving consensus on these highly technical details, traditionally regulated markets have some advantage because they typically involve a smaller set of stakeholders, usually the incumbent utilities and the public service commission, and provide relatively clear mechanisms for customer input and citizen engagement.

Transition charges are one example of a policy mechanism that has commonly been implemented for theoretical or political reasons. These have been introduced in numerous states that have undergone restructuring, such as California, Pennsylvania, and Ohio. Before moving to a completely competitive market, transition charges allow the utility to add a new charge to the consumer’s bill to address “stranded cost recovery.” Recall that electricity infrastructure is incredibly expensive. Stranded costs are the investments that the utility made in the existing infrastructure under the assumption that the traditional regulated single-provider model would continue. When competitive conditions are introduced in a deregulated market, the utility must have a way of recovering these previous investments. While transition mechanisms are viewed

42 James M. Griffin and Steven L. Puller, eds., Electricity Deregulation: Choices and Challenges (University of Chicago Press, 2005).
as a way to allow for market development and prevent a “rate sticker shock,” they do not always work as anticipated.

As an example, Ohio’s deregulatory effort provided a five-year window for cost recovery and development of competitive markets. However, at the end of this time period, Ohio delayed the transition to competition because well-functioning competitive markets did not develop as anticipated, and there was concern that wholesale prices would skyrocket. Ultimately, through a series of efforts, Ohio’s market is now fully deregulated, but many policymakers, utilities, and customers have not seen the anticipated benefits. Some studies have found that retail rates have increased as a result of this restructuring. Since restructuring, one of the nation’s largest investor-owned utilities that operates in Ohio, First Energy, is at risk of going bankrupt. Throughout the state, a large number of nuclear and coal plants will likely be retired in the absence of state subsidies. In response to these shortfalls, policymakers are now considering additional changes to Ohio’s electricity market, ranging from further restructuring efforts to re-regulation.

In addition, the US electricity system’s transmission infrastructure is not designed with vast interconnections that support a robust, well-functioning competitive market. As noted earlier, competition between firms was rampant in the early days of electricity provision. Over time, smaller firms merged, resulting in the structure that was the norm for the electricity industry in the 20th century. Transmission infrastructure therefore was developed with the intent of creating interconnections with other power suppliers primarily for reliability, not cost, reasons. Overall, the preexisting design elements of the electricity market were not necessarily conducive to restructuring in many states, and some of the restructuring reforms that were implemented did not ultimately result in well-functioning competitive markets, particularly in the short term.

Finally, comparing the price of retail electricity in regions of the country that have more traditional or more restructured state electricity markets is revealing. Of course, numerous

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44 Ibid.
48 Borenstein and Bushnell, “The U.S. Electricity Industry after 20 Years of Restructuring.”
factors such as geography, fuel mix, weather, natural gas supply, additional fees, and environmental regulations inform both the average price of retail electricity and the total consumer bill, but the comparison is stark. The table on page 15 shows the annual average price of retail electricity (cents per kilowatt hour) by region over a 16-year period, from 2001 to 2016. Specifically, the table reveals the following trends:

- The region with the highest retail prices is New England, where five of the six states have restructured markets. The average retail price over the 16 years for residential customers is 15.52 cents per kilowatt hour.
- The second-highest region for retail prices is the Mid-Atlantic, where all three of the states in the region have restructured markets. The average retail price over 16 years is 14.15 cents per kilowatt hour.
- The lowest rates over the 16-year period are in regions where none of the states have restructured markets.
  - The East South Central region has the lowest annual average residential price at 8.92 cents per kilowatt hour.
  - The West North Central region has the second-lowest annual average residential price at 9.21 cents per kilowatt hour.
  - The Mountain region has the third-lowest annual average price for residential customers at 9.84 cents per kilowatt hour.

A large body of scholarship involving sophisticated statistical analyses has come to mixed conclusions about the causes of these differences and their relationship to restructuring. Until these differences are more clearly understood, decisionmakers should exercise caution and consider restructuring proposals carefully.

49 Retail sales for electricity are “sales made directly to the customer that consumes the energy product.” US Energy Information Administration, glossary, https://www.eia.gov/tools/glossary/?id=electricity.
Underlined states = restructured electricity markets.

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AVG = Average Retail Price of Electricity by Region in the Continental United States 2001–2016
Cents per Kilowatt Hour
Source: US Energy Information Administration

Underlined states = restructured electricity markets.
Promoting the Reliability, Resilience, and Quality of Electricity Services: Considerations

This section examines how existing regulatory frameworks can promote the reliability, resilience, and quality of electricity service by providing universal and affordable electricity, maintaining baseload power, and investing in grid resilience.

PROVIDING UNIVERSAL AND AFFORDABLE ELECTRICITY

In the United States, decisionmakers have historically supported efforts to build and advance the electricity system in the public interest. A platform for economic growth and social equity, electricity has been described as a “public obligation” that should be ensured by government institutions. Incumbent utilities have the responsibility to support the public interest by providing universal and affordable access to electricity service. The regulatory frameworks supporting the vertically integrated industry structure that dominated the electricity sector for most of the 20th century prior to restructuring were markedly productive and generally efficient.

The provision of universal and affordable electric service to customers has been a critical element of regulatory efforts historically. Restructuring or deregulation, however, has the potential to disrupt a foundational aspect of the electricity system that customers have relied upon for years. Price volatility and increased rates have been an all-too-frequent outcome when restructuring has occurred. While all customers could pay higher prices under restructuring, special consideration should be given to rural and low-income consumers, as these are the populations least equipped to respond to sudden rate changes and price increases.

While rising rates are a concern for all customers, elderly and low-income customers may be particularly vulnerable. As of 2015, low-income households (those making less than $30,000 per year) spend approximately 23 percent of their after-tax income on energy costs. Households earning less than $50,000 per year, which constitutes slightly less than half of the US population, spent approximately 17 percent of their after-tax income on energy costs. Low-income electricity programs continue to be supported by a combination of federal, state, and local funding and utilities.

51 Griffin and Puller, Electricity Deregulation: Choices and Challenges.
53 Ibid.
Currently, the largest federal support for low-income residents in regard to electricity services is the Low-Income Home Energy Assistance Program, which dates back to 1980. This program is a block grant, and some level of funding was provided to all 50 states in 2016. Many states also provide assistance for low-income customers that augments federal programs. Such programs may use donated funds, shareholder funds, ratepayer funds, and/or dedicated utility deposits abandoned by customers. Many utilities currently have some form of a “lifeline rate,” which is essentially a discounted rate for consumers who qualify based on income. Many states also have discounted rates for seniors. Energy service discounts for low-income consumers can be incorporated into utility rates as a part of cost-of-service ratemaking. Advocates for low-income populations often intervene on behalf of their constituents in ratemaking cases before regulatory commissions.

Other supports and protections for customers are required from utilities as well. Utilities may eventually disconnect service for nonpaying customers, but only according to policies and processes established by regulatory authorities. Lack of access to affordable and reliable electricity service can result in serious health problems for some customers, such as those that rely on electricity for medical devices, especially seniors. Because disconnecting service during winter months can also create health risks, many states prohibit disconnection during this time. Additional customer protections often required by regulators include credit terms, contract terms, parameters for late fees, and security deposits.

Retail restructuring without regulatory safeguards may run counter to this traditional commitment to ensuring universal, reliable, and affordable electric service to the most vulnerable. Retail restructuring allows consumers to choose, out of a competitive pool, their electricity provider. While customers, in theory, could shop for the best deal, retail suppliers can

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55 Ibid.
56 As a part of the Public Utility and Regulatory Policies Act of 1978, state regulatory commissions were required to consider the development of “lifeline” rates.
57 See, e.g., Georgia Public Service Commission, Georgia’s Senior Citizen Discount Program (applies to “customers of Georgia Power Company who are 65 years of age or older with a total household income of $23,540, or less, per year” and provides a monthly discount of $18.00 and up to a $6.00 per month fuel credit).
also screen out customers considered risky or high cost. Moreover, retail suppliers can—and do—go out of business.

Even in states that have deregulated, concerns about protecting consumers has spurred, in essence, a need to return to traditional regulatory approaches. In 2016, for example, the New York Public Service Commission took action to prohibit energy service companies (ESCOs) from selling retail power to low-income customers. In recent years, such companies have been targeting low-income customers by bringing them in with low introductory rates that then escalate. According to the New York Public Service Commission, overcharges averaged $30 per month.

**Rural areas could also face instability and rising prices under restructuring.** Despite early rapid growth in electricity provision in cities, America’s rural areas were often the last to receive electricity service. Due to lower population density in rural areas, expansion of electricity infrastructure in rural areas was cost prohibitive. The passage of the Rural Electrification Act in 1935 sought to bring electricity to rural areas. Electricity service was not only a convenience, but was critical in encouraging businesses to locate in rural areas. Farmer-owned electric cooperatives emerged. By 1953, more than 90 percent of US farms had access to electricity. Today, electric cooperatives (“co-ops”) continue to provide the majority of electricity in rural areas.

**In states where electricity market restructuring included electric co-ops, many were concerned that electricity rates would rise in rural areas because co-ops would be subject to wholesale market volatility.** Even though co-ops serve approximately 13 percent of the US population, they only generate about 5 percent of the total electricity. Because this amount of generation is not sufficient to serve all of their customers, many co-ops must purchase generation from other power producers in wholesale markets. When the transition from a vertically integrated to a restructured market is completed, many expect co-op prices to spike due to dependence on new competitive wholesale markets. These price spikes would be particularly acutely felt by co-ops because rural customers tend to have lower incomes.

In addition, as electricity infrastructure is rapidly aging around the country, particularly in rural areas, it is critical for utilities to have consistent revenue streams to pay for infrastructure repair

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62 Welton, “Clean Electrification.”
and replacement. Rural electricity infrastructure is more geographically dispersed due to lower population density. Further, funding electricity infrastructure is more challenging in rural areas due to the lower number of customers served, and thus, smaller rate base. Whereas incumbent utilities receive annual revenue of more than $75,000 per mile of transmission and distribution line, co-ops only receive $16,000 per mile. Thus, changes to the electricity market structure pose two primary concerns to electricity cooperatives: wholesale market volatility, which could lead to price increases, and rising infrastructure costs.

**BASELOAD POWER: REGULATORY FRAMEWORKS PROMOTE RELIABILITY**

Baseload power resources fulfill the minimum level of demand on an electric grid at any point in time. Historically, baseload power resources have included coal and nuclear plants because they have high availability rates, rarely have unanticipated breakdowns, and have a lower likelihood of supply chain disruptions due to the ability to store fuel onsite. Certain types of hydroelectric and natural gas plants are also sometimes considered baseload capacity assets. Even though baseload assets are expensive to “turn on” (i.e., start time), the fuel costs (i.e., marginal cost) required for the production of each additional unit of power for nuclear and coal is relatively low. When demand for electricity peaks, natural gas plants, often called “peaker plants,” provide additional capacity.

Recent trends suggest that the fuel mix used to generate America’s electricity is rapidly changing, which affects what resources comprise baseload power and how much baseload capacity exists. Between 2010 and 2015, coal plants made up the bulk of power plant retirements (52 percent), a trend that is expected to continue over the next five years. Similarly, nuclear power plants will constitute 15 percent of the share of retirements over the next five years. Many of these assets will be retired before the end of their intended service life. These retirements have been largely driven by a shift in the economics of natural gas, with a smaller share from renewables (wind and solar) and hydropower.

As a result, many researchers and policymakers are currently considering what the future mix of baseload power should look like. Indeed, the US Department of Energy released a report in 2017 addressing important questions related to the diversity of the US power generation portfolio. One critical question relates to how utilities will be able to manage unanticipated

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66 Ibid.
69 Ibid.
price increases and variability that may arise out of a changing baseload portfolio.\textsuperscript{70} In such a time of change, regulatory frameworks that provide crucial consumer safeguards are needed more than ever. Deregulation or restructuring could add unnecessary uncertainty at a time when states are facing rapid changes in traditional baseload power.

In addition, baseload power is considered essential to ensuring the reliability and the resilience of the grid, particularly in the event of human or natural disasters.\textsuperscript{71} Indeed, this discussion is occurring right now at the federal level. Concerned about the implications for grid resilience, the US Department of Energy has requested that the Federal Energy Regulatory Commission take action to prevent further baseload asset retirements on the grounds that previous natural disasters have demonstrated that the electric grid is more resilient when baseload assets are kept operational.\textsuperscript{72} In the event of a natural disaster, fuel supply disruptions are more likely. During the “Polar Vortex” in 2014, for example, the Southern Company reported using 75 percent of its coal units that were scheduled for retirement, in part due to disruptions in natural gas supply.\textsuperscript{73} Hurricanes in the Gulf of Mexico also pose another primary concern, as these events can cause offshore natural gas production platforms to shut down for significant periods of time.\textsuperscript{74} For states that do not have production facilities and rely on natural gas transported through pipelines, supply can be disrupted if the pipelines are damaged during floods. In this way, as the frequency and severity of low-probability but high-impact weather events increase, it is critical for utilities and regulators to prepare for and mitigate the impacts of electricity disruptions. One way to do so might hinge on enhancing grid reliability by ensuring a diversity of generation assets.

Importantly, in order to bolster resilience to natural disasters, the long-standing historical rationale for regulating incumbent utilities must also remain firmly intact: electricity, as an “essential service,” must continue to be provided in an affordable and reliable way that promotes public safety. Again, vertically integrated markets rely on cost-of-service ratemaking in which the utility regulator (typically a public service commission) determines rates that allow the utility to recover its full costs and earn a reasonable rate of return. Vertically integrated markets have more flexibility in valuing the noneconomic attributes of baseload power assets, such as resilience and reliability. In restructured markets, wholesale pricing does not necessarily reflect the resilience or reliability benefits of certain types of generation. The

\textsuperscript{70} Makovich and Richards, “Ensuring Resilient and Efficient Electricity Generation.”
\textsuperscript{71} US Department of Energy, “Staff Report to the Secretary on Electricity Markets and Reliability.”
\textsuperscript{73} Ibid.
traditional regulatory framework, on the other hand, allows for the consideration of the affordability of rates, reliability, and quality of service—as well as directing incumbent utilities to undertake long-term planning that promotes disaster resilience.

Moreover, incumbent utilities, because they are vertically integrated, can “self-supply” reliability resources. They also have more incentives to value the attributes of baseload power assets beyond short-term economic gain, such as resilience and reliability. In restructured or deregulated markets, pricing does not necessarily reflect the resilience or reliability benefits of certain types of generation. In the meantime, the transaction costs for utilities in restructured markets to procure baseload capacity resources externally can be high.

As a result of the reliability issues many restructured or deregulated markets are facing, some states have proposed re-regulation or other “around market” mechanisms that involve some form of regulatory oversight or state subsidy (i.e., backdoor capacity payments). States that have implemented such approaches suggest that they are necessary to ensure robust baseload capacity. Although still under legal challenge, in 2016, the Public Utilities Commission of Ohio passed the “distribution modernization rider,” which will support aging coal and nuclear plants at its two largest investor-owned utilities. Utility commissions in New York, Rhode Island,


77 Stein, “Distributed Reliability.” Professor Stein provides a compelling example of this problem in Texas, which restructured its electricity market:

Oncor, the distribution utility for Texas, provides an example of the relative efficiencies of a utility-owned energy storage project void of any separation between ownership and control. Oncor recently announced its intent to pursue the largest single energy storage proposal to date, proposing to install 5,000 megawatts of battery energy storage on the Texas grid, which would provide a seven percent increase in the capacity of the Texas grid. In yet another fascinating example of the “make or buy” phenomenon, Oncor’s research demonstrated that such storage would not be cost effective if purchased by an independent power producer participating in Texas's market but that by owning the storage itself, it would be able to capitalize on the multi-functional nature of the storage (e.g., include the benefits of deferrals in transmission line investment), as opposed to the narrower benefits recognized in markets alone. As a result of such “benefit[s]-stacking,” the utility claims it is able to absorb the massive $5.2 billion investment at a savings to Texas ratepayers.

78 Bade, “Re-Regulation on the Horizon? State Plant Subsidies Point to Looming ‘Crisis’ in Organized Power Markets.”

Maryland, New Jersey, and Michigan, all of which have undergone restructuring, have faced similar pressures to either vertically reintegrate or support baseload capacity through other mechanisms. Given these trends, concerns about the ability of restructured markets to ensure reliable baseload capacity will likely increase.

PROMOTION OF GRID RESILIENCE

In the coming decades, the electricity grid will face new challenges. In 2017 alone, significant electricity outages occurred in many states and territories as a result of Hurricanes Harvey, Irma, and Maria, resulting in severe economic losses and threats to human health and safety. These hurricanes are just a few of the many natural disasters to impact the electricity grid over the past several years. Major outages also occurred during Hurricanes Sandy and Katrina and the Polar Vortex. Natural disasters will only pose a larger threat to grid resilience in the future, as they increase in frequency and severity. The electricity grid also faces increasing threats from malicious human activities, such as cyber attacks or physical attacks to infrastructure. While a significant cyber attack has yet to strike the United States, the electricity grids of other countries, such as Ukraine, have been impacted, and experts have urged that the US electricity grid has vulnerabilities.

Addressing grid resilience is challenging for a number of reasons. The United States has a synchronous electricity system that requires a great deal of coordination, yet no single entity is responsible for coordination or oversight. Effective operation of the grid has always relied on coordination of a variety of state, federal, private, and public entities. As restructuring has occurred in many areas of the country and consumers begin to generate electricity on their own premises through distributed generation (i.e., solar panels), even more institutions now play a role in grid operation. As of now, none of the grid’s regulatory oversight entities are distinctly responsible for grid resilience investments. Further, grid resilience investments are often costly, and the time frame in which or likelihood that they will be needed is unclear.

It is important to distinguish grid resilience from grid reliability. The North American Electric Reliability Corporation defines “reliability” as the ability of the electricity system to meet aggregate demand at any point and time and to withstand sudden system disruptions. The term “resilience,” on the other hand, refers to the ability of the electricity system to “reduce the

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80 Bade, “Re-Regulation on the Horizon? State Plant Subsidies Point to Looming ‘Crisis’ in Organized Power Markets.”
magnitude and/or duration of disruptive events.” 

Resilience typically refers to prevention or response to large-area, long-duration outages. These events are typically not a routine circumstance for a utility.

Addressing grid resilience will be a necessity in both traditional and restructured markets. For example, utilities across the country are currently investing in infrastructure modernization and “hardening,” which is the process of making physical or cyber security improvements to decrease infrastructure vulnerability to disasters. The importance of infrastructure hardening is nowhere more evident than in Puerto Rico following Hurricane Maria in 2017. Six weeks following the hurricane event, nearly half of Puerto Ricans still lacked electricity service. This is an example where infrastructure modernization and hardening could have greatly decreased the size of the population affected and the time required to restore service.

Restructured markets face several unique challenges in enhancing grid resilience, namely the exit of baseload power resources and the lack of incorporation of resilience attributes into wholesale pricing. First, the exit of baseload resources poses threats not just to reliability but also to resilience. One component of resilience is the ability to cope with supply chain disruptions, such as being prepared for extreme weather events. Because most baseload capacity resources rely on fuel sources that can be stored on site, or must be stored on site in the case of nuclear, these power plants are less likely to experience disruptions in the event of a natural disaster. In September 2017, Secretary of Energy Rick Perry issued a letter to FERC proposing a rule that would provide a special rate for generators that maintain a 90-day fuel supply on site and meet other select qualifications. 

Second, competitive wholesale electricity markets provide some mechanisms for compensation of reliability; however, they provide no form of compensation for resilience-enhancing activities. While ancillary markets exist to compensate providers of essential

84 The North American Electric Reliability Corporation (NERC) is a not-for-profit international regulatory authority that includes the continental United States, Canada, and the northern portion of Mexico. It assures the reliability and security of the bulk power system in North America. Subject to oversight by the Federal Energy Regulatory Commission, NERC “develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel.” NERC’s “jurisdiction includes users, owners, and operators of the bulk power system, which serves more than 334 million people.” See NERC, About, http://www.nerc.com/Pages/default.aspx NERC, “Severe Impact Resilience: Considerations and Recommendations,” 2012.


reliability services such as frequency support, ramping and balancing, and voltage support, concern remains that the flow of electricity in restructured markets is vulnerable to market forces. FERC is currently considering whether additional financial incentives should be offered for reliability. In contrast, competitive wholesale markets do not inherently provide any compensation for resilience-enhancing activities and resource attributes. Currently, resilience investments in competitive markets are typically valued as contributions to reliability. The National Academies of Sciences issued a 2017 report that discusses the challenge in promoting resilience without adequate metrics for measuring resilience, incentives (or disincentives) for utilities to invest in resilience, and an understanding of the public’s willingness to pay for greater levels of resilience.

The traditional cost-of-service model may make it challenging for incumbent utilities to recover their long-term investments to make the grid more resilient and may need more “advanced forms of cost recovery.” However, depending on markets to provide adequate compensation to recover costs is a nonstarter. This is so because, even in the fully restructured states, distribution systems have historically been managed by distribution utilities and regulated under traditional cost-of-service principles. Incumbent utilities, on the other hand, are better positioned to make grid resilience investments guided by traditional regulatory frameworks. While, historically, cost-of-service ratemaking has been focused exclusively on charging consumers for the costs borne by the utility for electricity service provision, considerable policy discussion has focused on including factors such as resilience and grid modernization within the traditional cost-of-service framework. Several studies have proposed reevaluating the traditional cost-benefit methodology used in cost-of-service ratemaking.

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87 Board on Energy and Environmental Systems, Division on Engineering and Physical Sciences, and Committee on Enhancing the Resilience of the Nation’s Electric Power Transmission and Distribution System, Enhancing the Resilience of the Nation’s Electricity System.

88 US Department of Energy, “Staff Report to the Secretary on Electricity Markets and Reliability.”


90 Board on Energy and Environmental Systems, Division on Engineering and Physical Sciences, and Committee on Enhancing the Resilience of the Nation’s Electric Power Transmission and Distribution System, Enhancing the Resilience of the Nation’s Electricity System.


92 Ibid.

93 US Department of Energy, “Transforming the Nation’s Electricity System the Second.”

ratemaking to incorporate the costs and benefits of resiliency and the willingness of customers to pay to prevent longer duration outages.\textsuperscript{95}

\textbf{Current regulatory institutions, working with existing incumbent utilities, are prepared to address resilience concerns in a robust and comprehensive way.} Florida provides an example of how resilience efforts such as hurricane preparedness can be incorporated into cost-of-service ratemaking. Following major hurricanes in 2004 and 2005, the Florida Public Service Commission began convening an annual meeting to address the degree of hurricane preparedness of incumbent utilities and identify needed improvements.\textsuperscript{96} As a result, all incumbent utilities are now required to file an annual report detailing compliance with certain standards for electricity pole strength and integrity. All incumbent utilities have also submitted hurricane preparedness plans that include other storm-hardening approaches, including creation of geographic information system (GIS) files of all distribution and transmission infrastructure, plans for coordination with local governments, and vegetation management plans. Over the past 10 years, Florida Power and Light has invested more than $2 billion in initiatives to increase storm preparedness and decrease recovery time.\textsuperscript{97}

In contrast, mechanisms for cost recovery for investment in resilience-enhancing activities in restructured states are typically more limited outside of the traditional ratemaking model. One approach that has been employed in a number of states operating in restructured markets is a “resilience surcharge.” In 2013, the Maryland Public Service Commission, which operates in a restructured electricity market, allowed the Potomac Electric Power Company to implement a grid resilience charge to fund grid resilience investments.\textsuperscript{98} Consumer groups asserted that the necessity of this charge was unsubstantiated and filed a case appealing this decision.\textsuperscript{99} This case argued that the charges being imposed were exorbitant and not necessarily confined to storm-related expenditures. In 2016, the commission did not extend the surcharge. This is just one example that indicates that additional surcharges to fund investments that ratepayers do not perceive as exclusively resilience-related may not be viable. In this way, restructured states are grappling with which mechanisms can be effectively used to address grid resilience concerns.

\textsuperscript{97} Ibid.
\textsuperscript{99} Ibid.
While much refinement is still needed, cost-of-service ratemaking in traditional markets offers a well-understood process for recovering grid resilience investments.

**Conclusion**

Regulatory frameworks have played a crucial part in securing reliable and affordable electric service across the nation. These frameworks reflect careful planning and tremendous policy, financial, and social investments—and they have worked remarkably well. Recent efforts to restructure or deregulate electricity markets, on the other hand, have had mixed results. Price volatility and immediate rate increases have been an all-too-frequent outcome when restructuring has occurred. Meanwhile, it is unclear if restructuring is worthwhile in the first place. While numerous factors such as geography and fuel mix inform the average price of retail electricity, the region with the highest retail prices is New England, where five of the six states have restructured markets. The lowest rates are in regions where none of the states have restructured markets: the East South Central, West North Central, and Mountain regions.

Restructuring should be approached with caution, not only because of lessons learned from the past, but also because the future holds a rapidly changing environment, especially with respect to traditional baseload power. Restructuring necessarily adds increased uncertainty. Furthermore, electricity, as an essential service, must continue to be provided in an affordable and reliable way that promotes public safety and bolsters resilience to natural disasters. Calls for restructuring could greatly disrupt increased efforts by regulatory bodies and incumbent utilities to invest in and maintain disaster-resilient electricity systems. In short, affordable, universal, reliable, and quality electric service has been the hallmark of traditional regulatory frameworks. Restructuring proposals should be considered carefully so that these key values are not lost. Our electricity infrastructure must retain its ability to serve customers fairly and well.