EASING THE TRANSITION
to a More Distributed Electricity System

IREC Interstate Renewable Energy Council, Inc.

The Changing Roles of Consumers, Utilities and Regulators within the Regulatory Compact

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TABLE OF CONTENTS

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EXECUTIVE SUMMARY

In recent years, new technologies have emerged on the customer side of the electric system, including distributed energy resources (DER) such as distributed generation, energy efficiency, electric vehicles, energy storage and demand response technologies, among others. These technologies are allowing growing numbers of energy consumers to decrease their electricity demand, act as energy producers and otherwise manage their energy usage. At the same time, the public has become increasingly concerned about the environmental impacts of electricity generation, especially its contribution to climate change, and negative air and water quality impacts. Consumers and regulators are also looking for ways to improve the resiliency of the electric system during severe weather events, which are becoming more common as a result of climate change.

Together, these compounding factors have driven the movement toward a more modern grid that enables significant increases in the amount of clean energy produced; universal consumer access and facilitation of consumer choice, including the adoption of DER; integrated resource planning; two-way flow of energy and information; and increased reliability, security and resiliency. Some of the changes necessary to achieve the visions of the future grid—including the development and adoption of new DER and energy services—will likely continue to happen on their own, due to market forces and increasing demand.

By reevaluating the regulatory compact and reconsidering their approach to overseeing it, regulators can help to ensure a smooth transition to a new, more modern grid and can help define the role for electric utilities in this new era.

The relative ease of transition for utilities and the electricity grid as a whole, however, will depend largely on the changes to the "regulatory compact," the concept that underlies the laws, regulations and rules that govern the entire electricity system and electric utilities. Realizing these ambitious goals holistically and expediently will require further revisions to the regulatory compact, to take into account the new roles for utilities and energy consumers going forward.

To this end, utility regulators will play a central role in moving toward this modern grid vision, where local, distributed resources will play a greater part. By reevaluating the regulatory compact and reconsidering their approach to overseeing it, regulators can help to ensure a smooth transition to a new, more modern grid and can help define the role for electric utilities in this new era.

The primary purpose of this paper is to outline the rationale for updating the regulatory compact, looking at its historic legal and economic roots, and the major shifts that have occurred in the electricity market that have impacted the roles of utilities and consumers. The authors offer five approaches for state utility regulators to consider as they evaluate and implement an updated regulatory compact. In alignment with the Interstate Renewable Energy Council's (IREC) emphasis on consumer empowerment and access to renewable energy generation, the paper concentrates on changes to the regulatory compact that respond to the increasing prevalence of DER and consumers' growing interest in energy management and energy impacts.

Specifically, this paper offers five practical paths through which regulators may implement reforms:

1. Cost Recovery: Adjusting traditional cost-of-service ratemaking affects which investments utilities have incentives to make. Regulators could consider a ratemaking framework that moves away from incentives primarily for large, capital investments, and toward incentives for investments that facilitate more distributed, dynamic, environmentally sustainable electricity systems. Two ratemaking mechanisms that could help regulators to achieve this goal are revenue decoupling and performance-based ratemaking.

2. Rate Design: Customer rate design reflects regulators' and utilities' judgment regarding the appropriate allocation of costs across customers. Rates can also serve to send price signals to customers to encourage desirable behaviors, such as using tiered rates to encourage energy efficiency and conservation. Rate design is a powerful tool and therefore should be based on a transparent and thorough evaluation of the desired functionalities of the products and services that utilities and customers are providing and using, respectively. One potential way to send clearer price signals to customers would be to break out the various components of rates and offer customers a menu of service options. Since many consumers are accustomed to paying for communications services in bundled packages, putting the unbundled rate elements and options in attractive, convenient packages might be of consumer interest.

3. Utility Strategic Planning: Generally speaking, utilities' strategic planning ought to evolve over time, as regulators use tools like ratemaking and rate design to better align utility incentives with the public interest. Even so, requiring more explicit strategic plans from utilities is another way for regulators to monitor and encourage the evolution of utilities to meet their customers' interests in a cost-effective way.

4. Access to Data: As the communications infrastructure associated with the electricity grid becomes increasingly sophisticated, utilities will collect more and more data, which has the potential to transform both management of their systems and their understanding of customer preferences and actions. These data can also be valuable to third-party providers interested in offering consumer and grid services, as well as regulators and other entities interested in monitoring grid operations and evolution. Therefore, it will be important for regulators to consider how to allow appropriate access to grid and consumer data, while also ensuring cybersecurity and protection of consumer privacy.

5. **Grid Access**: Many regulators are experienced with issues related to third party access to the electricity grid. As DER become increasingly prevalent, however, both regulators' understanding of these issues and policies addressing them will need to evolve. In particular, the effective integration of DER into the grid — so the benefits of these technologies are maximized — as well as the appropriate allocation of benefits and costs of DER and associated grid upgrades, will be important policy components. Similarly, expansion of access to the grid to a broader range of energy consumers, including renters and lower income consumers, will be a key equity consideration.

The issues discussed in this paper are merely a subset of the various forces currently affecting the electricity system and industry. For example, also putting pressure on the traditional regulatory compact, and utility regulation and business models, are restructuring and competitive wholesale markets, and policies that support carbon reduction and promote renewable energy more broadly.

Similarly, while the authors focus on investor-owned utilities and their regulators, municipal and cooperative utilities face their own distinct sets of opportunities and challenges in this arena, given their particular structures. Although some of the suggestions offered here may provide regulators with tools to address these concerns more comprehensively, this paper is intended to be a piece of what will ultimately be a larger conversation regarding the evolution of the regulatory compact.

1. INTRODUCTION

The guaranteed monopoly status afforded to electric utilities in the United States is premised upon a "regulatory compact" that is fundamental to the way electric utilities are overseen and operate today. The compact represents an agreement between a utility and its customers: in exchange for an exclusive geographic franchise, the utility offers certain monopoly services to its customers at just and reasonable rates. The services covered under the franchise vary among states, ranging from vertically integrated utilities that provide bundled electricity service to distribution-only utilities that provide unbundled distribution service. In all states, the regulatory compact requires a monopoly utility to offer universal and reliable service to all electricity users in its service territory. A utility's rates are intended to allow it to recover its costs and earn a reasonable return on its investments. Utility regulators — including commissions (investor-owned utilities), boards (cooperative utilities), and governmental or quasi-governmental entities (municipal utilities) — are the primary overseers of the regulatory compact. Regulators determine rates, and establish and enforce safety and reliability standards, service quality metrics, and other rules and standards.

> The regulatory compact is the theoretical concept that underlies the laws, regulations and rules that govern the entire electricity system.

The regulatory compact is the theoretical concept that underlies the laws, regulations and rules that govern the entire electricity system. The compact was established and evolved during a period of rapid industrial expansion in the United States, and it was effective in supporting energy-intensive industrial expansion during World War II and through the 1960s. Utilities built or marketed electricity from large, centralized generation, mostly powered by fossil fuels, nuclear and large hydroelectric dams, through their transmission and distribution systems, to meet customer demand. The compact worked relatively well to allow for the growth and maintenance of a robust electricity system during a period when large, central station technologies were the most efficient available and the public had fewer environmental concerns, in particular regarding carbon emissions.

In the 1970s, the formation of the Organization of the Petroleum Exporting Countries (OPEC) increased public concern over the price of electricity, which occurred simultaneous with growing public outcry about environmental issues and notable technological advancements. Changes in federal energy policy as well as progressive energy policies in some states began to reflect these new realities and impose increasing pressure on monopoly utilities, as well as the regulatory compact. Since the 1990s, the combination of information, communications and electric system control technologies, along with dramatic improvements in renewable energy and energy efficiency technologies, have caused basic changes in the electricity sector. In particular, in the last decade, central station and distributed renewable energy production has increased dramatically. The regulatory compact has changed in some ways, as well. For example, some states deregulated their markets in the 1990s, which removed electric utilities' traditional monopoly over generation.

In recent years, new technologies have emerged on customers' side of the electric system, including distributed energy resources (DER) such as distributed generation, energy efficiency, electric vehicles, energy storage and demand response technologies, among others.[1] These technologies are allowing growing numbers of energy consumers to decrease their electricity demand, act as energy producers and otherwise manage their energy usage. Meanwhile the public has become increasingly concerned about the environmental impacts of electricity generation, especially its contribution to climate change, and negative air and water quality impacts.[2] Consumers and regulators are also looking for ways to improve the resiliency of the electric system during severe weather events that are becoming more common as a result of climate change.

As articulated by the U.S. Department of Energy (DOE), the vision of the future grid is "[a] seamless, cost-effective electricity system, from generation to end-use, capable of meeting all clean energy demands and capacity requirements."[3] According to the U.S. DOE, this grid should permit: significant increases in the amount of clean energy produced; universal consumer access and facilitation of consumer choice, including the adoption of DER; integrated resource planning; two-way flows of energy and information; and increased reliability, security and resiliency. States and other entities have expressed similar aspirations for the electricity system.[4] Realizing these goals will require further rethinking and revising the regulatory compact to take into account the new roles for utilities and energy consumers going forward. To this end, utility regulators will play a central role in moving toward these visions of a modern grid where local, distributed resources will play a greater part.

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1 While definitions of DER vary, a broad definition of DER is employed throughout this paper, consistent with much of the recent literature on the subject. *See, e.g.*, America's Power Plan *Distributed Energy Resources: Policy Implications of Decentralization* (James Newcomb et al., Rocky Mountain Inst.) 4, *available at* http://americaspowerplan.com/site/wp-content/uploads/2013/09/APP-DER-PAPER.pdf.

2 *See, e.g.*, Stephen Ansolabehere & David M. Konisky, *Cheap and Clean: How Americans Think about Energy in the Age of Global Warming* 14 (MIT Press 2014) ("While people want energy that is both clean and cheap, most Americans want to push more strongly in the direction of cleaner energy.")

3 DOE Grid Tech Team (GTT), Vision of the Future Grid, http://energy.gov/oe/services/doe-grid-tech-team/vision-future-grid.

4 *See, e.g.*, NY PSC, Order Instituting Proceeding, Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, at 5 (April 25, 2014), *available at* http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B9CF883CB-E8F1-4887-B218-99DC329DB311%7D ("With this Order we initiate a proceeding to consider a substantial transformation of electric utility practices to improve system efficiency, empower customer choice, and encourage greater penetration of clean generation and efficiency technologies.") [hereinafter NY REV Order]; MA DPU, Investigation by the Department of Public Utilities on its Own Motion into Modernization of the Electricity Grid, Order 12-76-B (June 12, 2014), *available at* www.mass.gov/eea/docs/dpu/orders/dpu-12-76-b-order-6-12-2014.pdf (outlining four objectives for grid modernization and stating: "We expect that grid modernization policies will provide electric distribution companies with the ability and guidance to take advantage of new technological developments and provide new customer service offerings.") [hereinafter MA Grid Mod. Order]; America's Power Plan, *Overview: Rethinking Policy to Deliver a Clean Energy Future* (Hal Harvey & Sonia Aggarwal) (Sept. 2013), *available at* http://americaspowerplan.com/site/wp-content/uploads/2013/10/APP-OVERVIEW.pdf (outlining policy recommendations for transforming the U.S. power system and stating: "New technologies offer great promise to increase reliability, reduce fuel costs, minimize capital investment, and reduce environmental damage. Capturing these benefits requires a new approach to utility regulation and business models . . . .").

Some of the changes necessary to achieve the visions of the future grid — including the development and adoption of new DER and energy services — will likely continue to happen on their own, due to market forces and increasing demand. The relative ease of the transition for utilities and the electricity grid as a whole, however, will depend largely on the changes to the regulatory framework, and whether or not those changes encourage or hinder the process. By reevaluating the regulatory compact and reconsidering their approach to overseeing it, regulators can help to ensure a smooth transition to a new, more modern grid and can help define the role for electric utilities in this new era.

This paper consists of four primary parts. First, it examines the idea of the regulatory compact, from a high level, including its economic and legal roots, as well as the traditional regulatory implementation tools associated with the compact. Next, the paper reviews the major shifts that have occurred in the electricity market since the 1970s that have impacted the roles of utilities and consumers, with a focus on policies encouraging DER as well as consumer engagement and energy management. It then outlines the rationale for updating the regulatory compact to accommodate these changing roles and the technological developments that are altering the way electricity is generated and consumed. Finally, the paper explores five practical approaches for state utility regulators to consider as they evaluate and implement an updated regulatory compact that is responsive to increasing consumer engagement and DER implementation.

The focus of this paper is on investor-owned utilities and their regulators in part because investor-owned utilities serve the majority of customers in the United States. In addition, municipal and cooperative utilities face a distinct set of opportunities and challenges in this arena given their particular structures, which involve more direct oversight by the public via governmental or quasi-governmental entities (municipal utilities) or consumers themselves (cooperative utilities). Nonetheless, several of the concepts introduced here, including the practical recommendations in the final section, could potentially translate to municipal and cooperative utilities.

In addition, in alignment with the Interstate Renewable Energy Council's emphasis on consumer empowerment and access to renewable energy generation, this paper concentrates on changes to the regulatory compact that stem from the increasing prevalence of DER and consumers' growing interest in energy management and energy impacts. The authors acknowledge that these issues are just a subset of the various forces currently affecting the electricity system and industry, however. For example, restructuring and competitive wholesale markets, and policies supporting carbon reduction and promote renewable energy more broadly, are also putting pressure on the traditional regulatory compact, and utility regulation and business models. While some of the suggestions offered in this paper may provide regulators with tools to address these concerns more comprehensively, this paper is ultimately a piece of a bigger conversation regarding the evolution of the regulatory compact.

2. THE REGULATORY COMPACT

For much of their history, beginning with their inception over a century ago, electric utilities have been considered natural monopolies. That is, it has been most efficient for their services — generation, transmission, distribution and retailing — to come from a single supplier; it would be economically inefficient to duplicate these services and facilities, such as by building multiple sets of transmission or distribution lines. In order to enjoy the benefits of government-authorized monopoly service, however, utilities have entered into a "regulatory compact" with their regulators and the public. Utilities receive an exclusive geographic franchise, which has historically protected them from competition. In exchange, regulators ensure that utilities offer universal, reliable electric service to the public at just and reasonable rates, which allow utilities to recover their costs and earn a return on their investment.

In addition to this economic justification, the regulatory compact is also legally rooted in a series of landmark cases addressing industries "clothed" or "affected" with the public interest. Beginning with *Munn v. Illinois*, 94 U.S. 113 (1877), the Supreme Court established that certain industries should be subject to regulation. In doing so, it "recognized also the long-accepted right of legislatures similarly to regulate the suppliers of gas, electricity, water, and transport services on the ground that these companies operated under governmental franchises . . . [and] these, being contracts freely entered into, could legitimately impose various regulatory conditions on the franchisee."[5] The Supreme Court later abandoned the distinction between industries "clothed with the public interest" and those that are not, and allowed for government regulation of any industry "to promote the public welfare."[6] Regardless, public utilities, including electric utilities, have remained a distinct class of entities, over which government control of price and conditions of service is well established.

Although utility regulators must establish and enforce reliability and other service quality requirements, ratemaking has traditionally demanded more of their attention, particularly given the relative frequency of rate cases.[7] Regulators typically set utilities' rates based on a cost-of-service model: the regulators determine the "revenue requirement" or "cost of service" that reflects the total amount to be collected in rates for utilities to recover their costs and earn a reasonable return on their "rate base" investments. At a high level, customers' rates are set according to how much it costs the utility to serve their rate class — residential, commercial, industrial, and so on — and according to the "cost causation" principle. That is, if costs generally result in benefits across the system, then they are allocated across customers. If a single customer or group of customers cause a particular cost, however, these costs can be reflected in more individualized charges. For example if a customer class requires a consistent level of service at all times, they may be subject to certain standby or demand charges to ensure such service. While there are exceptions to and variations from these principles in

5 Alfred E. Kahn, *The Economics of Regulation: Principles and Institutions*, at vol. I, 3 (1988) [hereinafter *Economics of Regulation*].

6 *Nebbia v. New York*, 291 U.S. 502, 536-37 (1934).

7 *See, e.g.*, *Economics of Regulation* at vol. I, 21-25 (discussing regulators' "limited attention to quality of service" as opposed to ratemaking).

practice, as well as disagreement regarding their application, ratemaking generally comports with this framework. In addition to adherence to the fundamental principle of cost causation, ratemaking also requires a balancing of various customer and policy interests, including the need to keep rates as understandable and administrable as possible.[8] Thus, "problems of practical rate design do not readily yield to 'scientific' principles of optimum pricing."[9] In other words, in practice, ratemaking can be more of an art than a science.

Rates are typically, although not always,[10] frozen between utility rate cases. During this interim period, utilities bear the risk of any excess costs and enjoy the benefit of any excess revenues. Thus, they are incentivized to minimize their costs and maximize their revenues.[11] When costs get too high or revenues too low, a utility typically files for a new rate cases to recalibrate its rates, although in some cases, a regulatory entity may open a rate case on its own initiative.

Fundamentally, the regulatory compact is intended to protect the interests of both utilities and energy consumers, and regulators are tasked with making sure that it is upheld in a balanced way.

To be part of a utility's "rate base" — the group of investments on which it can earn a return — an investment must be prudent[12] or "used and useful"[13] or both. Generally speaking, the prudency test examines the reasonableness of the investment at the time it was made, whereas the "used and useful test" examines whether or not the investment was actually used as expected and in a way useful to the customers paying for it. Ultimately, both of these tests are intended to protect customers from utilities making costly and unnecessary investments to increase their return at their customers' expense. At the same time, the cost-of-service model serves to ensure not only that utilities earn a reasonable rate of return, but also that they are able to attract investors and borrow money to make further necessary investments. This protection from certain risks and the associated stability helps utilities to keep customers' rates low.

8 *See* James C. Bonbright, *Principles of Public Utility Rates* 291 (1961) (listing eight criteria for a "sound rate structure") [hereinafter Bonbright, *Principles of Public Utility Rates*].

9 *Id.*

10 For example, some states employ a forward-looking test year where this is not the case. In addition, some states use an historic test year but also rely on deferred energy accounts or decoupling adjustments between rate cases. *See* Edison Electric Inst., *Alternative Regulation for Evolving Utility Challenges: An Updated Survey* (Jan. 2013), Table 1: Innovations to Reduce Regulatory Lag: An Overview of Current Precedent, at 2-3, *available at* www.eei.org/issuesandpolicy/stateregulation/Documents/innovative_regulation_survey.pdf. In all cases, one of the underlying goals of ratemaking remains utility cost-effectiveness.

11 *See* Regulatory Assistance Project (RAP), *Revenue Regulation and Decoupling: A Guide to Theory and Application* 7-8 (June 2011), *available at* www.raponline.org/docs/RAP_RevenueRegulationandDecoupling_2011_04.pdf.

12 *See Fed. Power Comm'n v. Natural Gas Pipeline Co.*, 315 U.S. 575, 606 (1942), *Federal Power Comm'n v. Hope Natural Gas Co.*, 320 U.S. 591, 602-603 (1944) (together considered to establish the prudent investment test).

13 *See Duquesne Light Co. v. Barasch*, 488 U.S. 299, 300 (1989), *Jersey Central Power & Light Co. v. Fed. Energy Reg. Comm'n*, 810 F.2d 1168, 1188-89 (D.C. Cir. 1987) (both address nuclear power plants and together two of the seminal cases establishing the modern "used and useful" test).

Fundamentally, the regulatory compact is intended to protect the interests of both utilities and energy consumers, and regulators are tasked with making sure that it is upheld in a balanced way. While the regulatory compact itself is typically not explicitly codified or binding, it serves as a guiding principle underlying the laws establishing regulatory commissions and governing utilities, and it has driven the formation of our modern electrical system. Similar to the physical system, however, the regulatory compact has had to and must continue to evolve to accommodate new public priorities, changing consumer interests, unforeseen economic and environmental risks, and transformative technologies — all of which are placing new demands on an aging system and regulatory framework. Taking a closer examination of the regulatory compact as it relates to these changes can provide critical insight into what modifications are needed to ensure its continued relevance in the 21st century.

3. A CHANGING WORLD

Up until the mid-1970s, the electricity industry looked much the same as it had since at least the 1940s. Large, centralized generation primarily powered by fossil fuels continued to improve technologically and experience the benefits of economies of scale. This expanding generation fleet was meeting a continuously increasing demand as more consumers received electricity service and all consumers' use of electricity generally grew. Power flowed in one direction, from utility-owned generation facilities, through utility-owned transmission and distribution networks, to consumers. Utilities, regulators and the public at large were largely unaware of or at least not attuned to the external costs associated with this system, including its negative environmental impacts. With the enactment of the Public Utility Regulatory Policies Act of 1978 (PURPA) and a series of other key policies, however, the paradigm began to change.

Policies Inspiring Change

Public Utility Regulatory Policies Act of 1978 (PURPA)

Congress passed PURPA amidst an energy crisis and skyrocketing oil prices, with the intention of promoting energy conservation, and increasing the use of domestic energy and renewable energy resources.[14] PURPA introduced wholesale power competition by small independent power producers on the utilities' grids.[15] As modified today, PURPA requires a utility to purchase energy and capacity from "qualifying facilities" (QFs) at the utility's avoided cost of producing or purchasing the next

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14 *See American Paper Inst. v. Am. Elec. Power Serv. Corp.*, 461 U.S. 402, 405 (1983) (noting that Congress believed requiring purchases from qualifying cogeneration and small power production facilities would reduce demand for traditional fossil fuels).
15 16 U.S.C. §§ 2601–45.

incremental unit of electricity.[16] Historically, avoided cost rates have been set based on the cost of large, conventional generation — typically a natural gas combined-cycle turbine. Recent decisions from the Federal Energy Regulatory Commission (FERC) have clarified that differentiated QF avoided-cost rates based on different types of generation are permissible.[17] QFs are exempt from the burdensome requirements of the Public Utilities Holding Company Act of 1935 (PUHCA) and the Federal Power Act (FPA), which define federal electric utility regulation. By allowing generation from non-utility generators, PURPA broke utilities' longstanding monopoly over generation. At the same time, it introduced a new challenge: regulating utilities as monopsonies — single buyers in the market for electricity that continue to control access to the transmission and distribution grids over which that electricity is transmitted.[18]

Energy Policy Act of 1992 (EPACT '92)

The Energy Policy Act of 1992 (EPACT '92) moved the United States further down the road toward competitive generation. Like PURPA, EPACT '92 was motivated by an interest in increasing clean energy use, improving energy efficiency, and reducing dependence on foreign fuels.[19] Among other things, EPACT '92 encouraged wholesale power competition by creating "exempt wholesale generators" (EWGs), which are allowed to generate and sell electricity on the wholesale market but are exempt from regulation as utilities under PUHCA. In addition, in response to other requirements in EPACT '92, FERC issued two orders — Orders 888 and 889 — intended to prohibit discrimination with respect to access to transmission services and encourage competitive bulk power markets.[20] Around the same time that EPACT '92 and the FERC orders were opening up the wholesale generation market to competition, states began restructuring their retail markets to allow for retail competition, as well. As of 2010, 17 states and Washington, D.C. had allowed for

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16 *Id.* § 824a-3; 18 C.F.R. 292.101(b)(6).

17 *See* IREC, *Unlocking DG Value: A PURPA-Based Approach to Promoting DG Growth* (May 2013), *available at* www.irecusa.org/wp-content/uploads/2013/05/Unlocking-DG-Value.pdf (discussing differentiated PURPA avoided-cost rates and their potential to promote renewable DG).

18 Electric utilities' monopoly control over transmission, distribution, and sometimes generation, and their exclusive purchase power as monoposonies, may raise different issues and require distinct regulatory approaches in some cases. While fully exploring the nuances between monopoly and monopsony regulation is beyond the scope of this paper, it attempts to distinguish these circumstances as appropriate.

19 15 U.S.C § 79z-5a (adding section 32 to the Public Utility Holding Company Act of 1935); 16 U.S.C § 824(d) (adding section 214 to Part II of the Federal Power Act) (together allowing competition by wholesale power generators).

20 FERC Order No. 888, 75 FERC ¶ 61,080, Promoting Wholesale Competition Through Open Access Non-discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities (April 24, 1996); FERC Order No. 889, 75 FERC ¶ 61,078, Open Access Same-Time Information System (formerly Real-Time Information Networks) and Standards of Conduct (April 24, 1996); *see also* FERC Order No. 1000, 136 FERC ¶ 61,051, Transmission Planning and Cost Allocation by Transmission Owning and Operating Public Utilities (July 21, 2011) (". . . amending the transmission planning and cost allocation requirements established in Order No. 890 to ensure that Commission-jurisdictional services are provided at just and reasonable rates and on a basis that is just and reasonable and not unduly discriminatory or preferential."); FERC Order No. 2000, 89 FERC ¶ 61,285, Establishment of Regional Transmission Organizations proposals (Dec. 20, 1999) (" . . . amending its regulations under the Federal Power Act (FPA) to advance the formation of Regional Transmission Organizations (RTOs) . . . [with the goal] to promote efficiency in wholesale electricity markets and to ensure that electricity consumers pay the lowest price possible for reliable service."). All four FERC orders are available at http://www.ferc.gov/legal/maj-ord-reg.asp.

some form of retail choice, permitting end-use energy consumers to buy their electricity from competitive suppliers.[21]

While some of the competitive generation resulting from these various policies comes from large, fossil-fueled plants, some of it also comes from renewable resources, both large, centralized generators and small, distributed ones. State renewable portfolio standard (RPS) policies, state public purpose charges, and state and federal tax incentives have all also contributed significantly to the growth in renewable energy generation.

Net Metering and Third-Party Ownership

The policy of net metering has been especially effective in encouraging small-scale, renewable self-generation in the United States. As of 2013, over 95 percent of solar photovoltaic (PV) installations were net-metered, representing about half of the 11 gigawatts (GW) of cumulative solar capacity in the United States.[22] Today 43 states, Washington, D.C., and four territories have adopted net metering policies.[23] Similar to both PURPA and EPACT '92, net metering laws are frequently rooted, at least in part, in a legislative intent to promote conservation, efficiency and energy independence.[24] Net metering also meets the twin goals of simplicity and ease of administration, which regulators strive for in developing rates.[25] While other state policies, such as feed-in tariffs or market-based mechanisms, have similarly served to promote distributed generation, net metering has been the most widely adopted and utilized policy mechanism in the United States to date.[26] At the same time, because net metering facilitates self-generation and thereby allows customers to reduce their overall energy consumption and thus their utility bills, it poses a particular challenge to the traditional utility paradigm, as discussed in more detail below.

As net metering policies have proliferated, many states have also adopted policies to explicitly allow third-party ownership of self-generation. For the many energy consumers, third-party ownership can open up the possibility of self-generation, through leases or power purchase agreements (PPA), and

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21 U.S. Energy Info. Admin., Status of Restructuring by States, http://www.eia.gov/electricity/policies/restructuring/restructure_elect.html.

22 *See* Solar Electric Power Ass'n, *Solar Market Comes of Age in 2013: Utility Solar Market Snapshot* (June 2014) *available at* www.solarelectricpower.org/media/194339/Solar-Market-Snapshot-ver8-2-.pdf.

23 *See* Database of State Incentives for Renewables & Efficiency (DSIRE), Net Metering Map (March 2013), http://www.dsireusa.org/documents/summarymaps/net_metering_map.pdf.

24 *See, e.g.*, Cal. Pub. Util. Code § 2827(a) ("The Legislature finds and declares that a program to provide net energy metering . . . is one way to . . . help stabilize California's energy supply infrastructure, enhance the continued diversification of California's energy resource mix, . . and encourage conservation and efficiency."); Colo. Amendment 37 § 1 (2004) (adopting net metering in C.R.S. § 40-2-124 and stating: ". . . in order to . . . diversify Colorado's energy resources, reduce the impact of volatile fuel prices, and improve the natural environment of the state, it is in the best interests of the citizens of Colorado to develop and utilize renewable energy resources to the maximum practicable extent."); NY Laws 1997, ch. 399, § 1 (1997) (adopting net metering in NY CLS Pub. Ser. § 66-j and stating: "The legislature finds and declares that a program . . . to allow for net energy metering . . . would . . . enhance the continued diversification of the state's energy resources, and improve the state's environment.").

25 *See* Bonbright, *Principles of Public Utility Rates* at 291.

26 *See* IREC, Solar ABCs, *Sustainable, Multi-Segment Market Design for Distributed Solar Photovoltaics* (Oct. 2010), *available at* www.solarabcs.org/about/publications/reports/market-design (discussing retail and wholesale policies to encourage distributed PV, and in particular the benefits of net metering).

provide many attractive advantages over ownership, in particular the ability to pay for the system over time, as opposed to making a large up-front investment. As of 2013, at least 22 states, along with Washington, D.C., and Puerto Rico, expressly allow third-party ownership structures.[27] In states that do not permit third-party ownership, a third party provider may be considered to be a competitive "utility" illegally infringing on the existing utility's exclusive franchise. Even when third-party ownership is not allowed, however, low-interest loans for solar are becoming an increasingly common alternative option, making solar with low up-front cost available across the country.

Although most states have not restructured their markets and still regulate generation (or the utilities' procurement of generation) as if it were a monopoly, the economic justification for doing so has been substantially weakened by net metering and the other policies discussed above. These policies have encouraged the development of a competitive market for generation and other services that demonstrates that other entities besides utilities can provide these products and services in an economically beneficial way. In restructured states, this competitive market is even more robust. Today only the wires side of the utility business — that is, transmission and distribution — is typically considered a natural monopoly,[28] although in some instances competitive entities have begun to provide grid services, such as operational reliability, as well. In addition to their monopoly control over the transmission and distribution system, electric utilities have also retained their monopsony buying power over the electricity generated and any other associated grid services.

Policies addressing both the wholesale and retail electricity markets have facilitated a flourishing of new energy technologies, which are gradually changing the traditional one-way power flow model for the electricity system to a two-way flow of electricity and information.

New and Emerging Technologies

Policies addressing both the wholesale and retail electricity markets have facilitated a flourishing of new energy technologies, which are gradually changing the traditional one-way power flow model for the electricity system to a two-way flow of electricity and information.[29] These new technologies include not just distributed solar and other renewable generation, but also other DER, such as energy efficiency, demand response automation, electric vehicles and energy storage. New

27 *See* DSIRE, 3rd-Party Solar PV Power Purchase Agreements (PPAs) Summary Map (Feb. 2013), *available at* www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf.

28 *See* Peter Fox-Penner, *Smart Power: Climate Change, the Smart Grid, and the Future of Electric Utilities* 164 (2010) [hereinafter *Smart Power*].

29 *See* Deloitte Center for Energy Solutions, *Beyond the Math: Preparing for Disruption and Innovation in the US Electric Power Industry* 5 (2013) [hereinafter *Beyond the Math*].

technologies also include "smart grid" technologies, such as advanced metering infrastructure (AMI) and grid monitoring equipment, which can both improve utility efficiency as well as facilitate DER integration and other innovation. For example, by July 2013, approximately 46 million AMI meters were installed and operational, covering nearly 40 percent of U.S. households, although penetrations vary significantly by state.[30] Over time, as adoption rates have grown, the costs of DER and other new technologies have been declining. In particular, the cost of distributed solar PV is close to or at parity with conventional fuels in an increasing percentage of the market.[31]

Reactions to Change

As consumers adopt DER technologies, their role in the electricity grid is shifting away from one of pure consumption. For example, today consumers may generate their own electricity and otherwise manage their demand through demand response or energy efficiency. While some of the benefits of these activities accrue to the consumer, some serve to lower utility costs of serving load and eventually flow through to all utility customers. These benefits include the reduction of peak load, reduction in line losses, provision of ancillary services, and others. With the rise of technologies like smart inverters, which can provide frequency support or other power quality features, customer-generators are poised to provide more benefits to the grid and further alter their relationship with their utilities. Put in another way, consumers are increasingly no longer just cost-causers, but also system-wide value-providers.

As consumers adopt DER technologies, their role in the electricity grid is shifting away from one of pure consumption.

Despite this reality, as more and more energy consumers are seeking to take advantage of increasingly affordable DER technologies, they are increasingly meeting resistance. For example, Arizona Public Service Company (APS) was recently in the news for its application to the Arizona Corporation Commission (ACC) to allow it to levy additional, significant fees on its net metering customers.[32] According to APS, net metering customers benefited from subsidies from non-net metering customers, who, APS argued, were left paying for the distribution system while net metering customers zeroed out their utility bills. Solar energy advocates and others countered by emphasizing the unaccounted-for benefits that net-metered solar systems were providing to all APS

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30 *See* IEE (An Institute of the Edison Foundation), *Utility-Scale Smart Meter Deployments: A Foundation for Expanded Grid Benefits* 1-2 (Aug. 2013), *available at* www.edisonfoundation.net/iee/Documents/IEE_SmartMeterUpdate_0813.pdf. According to the U.S. Energy Information Administration (EIA), as of 2012 89 percent of AMI installations were residential. www.eia.gov/tools/faqs/faq.cfm?id=108&t=3.

31 *See* Edison Electric Inst., *Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business* 4 (Jan. 2013) (referring to US EIA data) [hereinafter EEI *Disruptive Challenges*].

32 *See, e.g.*, Diane Cardwell, *Compromise in Arizona Defers a Solar Power Fight*, N.Y. Times (Nov. 15, 2013), *available at* www.nytimes.com/2013/11/16/business/energy-environment/compromise-in-arizona-defers-a-solar-power-fight.html; *see also* ACC Docket No. E-01345A-13-0248 (In the matter of the application of Arizona Public Service Company for approval of net metering cost shift solution), http://edocket.azcc.gov.

customers. In the end, although the ACC decided to levy a relatively low fee on net metering customers ($0.70 per kW monthly), it recognized that the debate hinged on APS's underlying rate structure and deferred a more in-depth discussion to a future rate case.

This tension between utilities and their customers has come to a head in another way in Hawaii, where the islands' high electricity rates have encouraged energy consumers to "go solar" at a faster rate than anywhere else in the United States.[33] The primary utility, Hawaiian Electric Co. (HECO), however, has had to close some circuits to further solar installations due to electrical limitations of the existing system, which may require expensive upgrades to accommodate more distributed generation. In turn, this has raised the difficult question of who pays for these upgrades, which arguably benefit both the net metering customers and all ratepayers to various degrees, and how such payments should be handled. In the meantime, installations have stalled, resulting in public outcry and state action.[34] Although Hawaii may be an outstanding example today, it is likely that other states will soon face similar dilemmas.

Although some utilities have largely focused on solar energy and, in particular, net metering, other DER have not been immune to this kind of resistance. For example, Ohio recently enacted legislation (SB 310) significantly weakening its energy efficiency resource standard (EERS), as well as its renewable portfolio standard (RPS). Originally enacted in 2008 by SB 221, the EERS has been quite successful, allowing the state to save over 1500 gigawatt-hours (GWh) of electricity since 2009, with net benefits of over $1 billion to Ohio energy consumers.[35] With the passage of SB 310, the EERS and RPS are suspended for two years while a legislative committee studies the standards, which is very likely to have a substantial, negative impact on energy efficiency and renewable energy in Ohio. Interestingly, a wide range of groups opposed the bill, including business interests such as the Ohio Manufacturers' Association, Honda and Anheuser-Busch.[36]

A growing number of energy consumers are increasingly viewing their utilities as non-responsive to their demands and priorities, not just their interest in self-generation and energy management, but also in a more environmentally friendly energy supply. As a result, some energy consumers are looking for new ways to meet their energy needs. In some cases, consumers are turning to municipalization, as in Boulder, Colorado, where the city is exploring carving out its own municipal utility from Xcel's service territory.[37] In other cases, consumers are joining together in Community

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33 *See, e.g.*, David Thompson, *Hawaii's Solar Energy Revolution*, Honolulu Magazine (Feb. 19, 2014), *available at* www.honolulumagazine.com/Honolulu-Magazine/February-2014/Hawaiis-Solar-Energy-Revolution.

34 *See, e.g.,* Haw. Pub. Utils. Comm'n, Order No. 32269, Instituting a Proceeding to Investigated Distributed Energy Resource Policies, Docket No. 2014-0192 (Aug. 21, 2014)*;* Haw. Pub. Utils. Comm'n, Order No. 32053, Ruling on RSWG Work Product, Docket No. 2011-0206 (April 28, 2014) [hereinafter Haw. RSWG Order]. Both documents can be found at http://dms.puc.hawaii.gov/dms/DocumentKeySearch.jsp.

35 Martin Kushler, American Council for an Energy-Efficient Economy (ACEEE), *Ohio SB 310 Post Mortem: Itergy-Efficient Economy* (June 23, 2014), http://aceee.org/blog/2014/06/ohio-sb-310-post-mortem-it-s-worse-yo.

36 *See* Jeremy Pelzer, *Ohio Legislature Approves Two-Year Freeze on Renewable Energy, Energy Efficiency Standards*, www.cleveland.com/open/index.ssf/2014/05/ohio_legislature_approves_two-.html.

37 City of Boulder Colorado: Energy Future, https://bouldercolorado.gov/energy-future.

Choice Aggregation (CCA), which allows communities to aggregate their energy load and choose their generation provider, while still using the utility's transmission and distribution network.[38]

Furthermore, as the prices of distributed energy generation and storage continue to plummet, it may become increasingly attractive to utility customers to leave the grid. As the Rocky Mountain Institute (RMI) explained in a recent report,[39] utilities must re-conceive their business models to view solar-plus-battery grid parity as an opportunity for value rather than a threat. If utility customers see that they can generate their own electricity using a combined solar-storage system at prices that match, or are even lower than, the rates that they pay to the utility, they may be enticed to leave the grid entirely. If a significant portion of customers choose this path then the pool of customers that remain on the grid will be forced to bear a greater proportional share of operational costs. While the currently high costs of energy storage and relatively low electricity rates in most markets make this more of a theoretical discussion today, failing to address this scenario now may have significant consequences down the line.

4. EASING THE TRANSITION

Today most utilities view DER as "disruptive challenges" rather than opportunities.[40] Few are effectively demonstrating that they can adapt to the changing desires of electricity consumers and adopt the associated technical grid modifications and policies necessary to meet consumers' interests. These include not only self-generation and implementation of other DER, but also the adaptation of the electricity grid to be more environmentally sustainable and resilient. Utility customers are not alone in wanting to see their utilities transform in these ways. Investors are also increasingly looking more closely at the risks utilities face, and utilities' ability to mitigate and adapt to those risks. It is incumbent on regulators to pave the way for utilities to evolve by reconsidering the regulatory compact and the role of the utility within it.

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38 *See, e.g.*, Marin Clean Energy, http://marincleanenergy.org; *see also* AB 117 (Midgen 2002) (establishing CCA program), *available at* www.leginfo.ca.gov/pub/01-02/bill/asm/ab_0101-0150/ab_117_bill_20020924_chaptered.pdf; Cal. Pub. Util. Comm. (CPUC), Community Choice Aggregation, www.cpuc.ca.gov/PUC/energy/Retail+Electric+Markets+and+Finance/070430_ccaggregation.htm (includes links to CPUC decisions implementing CCAs and other information). Illinois, Ohio, Massachusetts and New Jersey also allow CCA.

39 RMI, *The Economics of Grid Defection* (2013), *available at* www.rmi.org/electricity_grid_defection.

40 *See* EEI *Disruptive Challenges* at 3-4.

Exploring Utility Concerns

DER do not fit well within the historical framework in which utilities have operated for over a century, supplying power from centralized resources to an ever-growing customer base consuming steadily greater quantities of energy. More to the point, DER undermine utilities' traditional revenue source, their customers' electricity bills, since they ultimately allow customers to reduce their load through self-generation or other demand reduction and management. They also offer customers options for managing their electricity and fuel sources in a way that the traditional utility product does not offer.

Moreover, from many utilities' perspective, DER customers continue to rely on, and significantly benefit from, their continuing use of the electrical system, without paying their "fair share." Undeniably, the grid continues to provide these customers with reliable service when they need it, such as at night for a customer with on-site solar generation. When these DER customers offset their on-site load through such generation or lower their demand, for example through energy efficiency improvements, however, they not only decrease the amount they pay the utility for generation, but also decrease what they are paying for the utility's transmission, distribution and other services. This arrangement challenges the utilities long-established equation for recouping their costs and investments in their infrastructure. Moreover utilities and regulators have not historically accounted for any of the grid services and other benefits DER may be providing to them. Unsurprisingly, the continued growth in customers adopting DER, even though these customers still make up a small percentage of the total in most markets, is causing significant concern among utilities and their shareholders.

Some see this decreasing customer base as leading to the utility "death spiral" — as costs must be spread across a stagnant or shrinking customer base, utilities' ability to attract investment capital declines and their costs go up. In this vision, the result is a vicious cycle that harms the utility and its ratepayers, especially those that cannot or do not want to take advantage of DER. Although the inevitability of this "death spiral" has been questioned — for example, by pointing out that a "high-change scenario" would entail a decline in electricity sales of only 10% over 30 years, which would not result in industry "death" — the concerns underlying it are real, especially for an industry that has historically relied on load growth for its profits.[41]

In response, many utilities have begun to criticize DER and the policies supporting them. Nowhere has this been more evident than in the growing battle over net metering, which has pitted the utilities against the renewable energy industry, in particular the solar industry. The debate about the APS net metering application at the ACC, described above, is one example, but similar discussions are occurring in states across the country. These include not only states with strong solar and other

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41 *See* Steven Nadel & Garrett Herndon (ACEEE), *The Future of the Utility Industry and the Role of Energy Efficiency* 11 (June 2014), *available at* www.aceee.org/research-report/u1404 [hereinafter ACEEE, *Future of the Utility Industry*].

DER markets, such as California,[42] but also states whose markets are still in earlier stages of development, such as Oklahoma, Minnesota, Wisconsin, and North Carolina.[43]

Finding a Way Forward

Regulators now have the opportunity to reconsider the regulatory compact, and modify it to rebalance the interests of energy consumers and utilities in the context of our quickly changing electricity system. Moreover, in a world increasingly threatened by climate change and other environmental and economic risks, it is essential to realign utilities' incentives with the public interest in a more sustainable energy future. Some utilities are already making changes, such as Vermont's largest utility, Green Mountain Power, which has recognized its customers' strong interest in solar energy and actively supported their ability to self-generate various ways.[44] In other countries with strong consumer interest in renewable energy and the environment, utilities have also begun to rethink how they do business. For example, German utility RWE is making headlines as it transitions from its old business model, which largely relied on its coal-fired and nuclear power production, to a new role as Germany's "holistic energy manager of the future" and key enabler of Europe's renewable energy sector.[45]

Regulators now have the opportunity to reconsider the regulatory compact, and modify it to rebalance the interests of energy consumers and utilities in the context of our quickly changing electricity system.

To make this shift more broadly in the United States, however, regulators must play the critical role of redefining what is required of utilities in order to maintain their exclusive franchise and receive compensation. While universal, reliable service at reasonable rates unquestionably remains essential, many consumers have increasingly indicated their interest in having a choice in and control over

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42 AB 327 (Perea 2013), *available at* https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140AB327# (requiring a re-assessment of net metering in California).

43 *See* SB 1456 (Griffin 2014), *available at* http://webserver1.lsb.state.ok.us/cf_pdf/2013-14%20ENR/SB/SB1456%20ENR.PDF (Oklahoma bill likely to result in a docket on benefits and costs of net metering and solar DG); Minn. Pub. Util. Comm., Docket No. M-14-65 (In the Matter of Establishing a Distributed Solar Value Methodology under Minn. Stat. § 216B.164, subd. 10 (e) and (f)); Wis. Pub. Serv. Comm., Docket No. 5-UR-107, Joint Application of Wisconsin Electric Power Company and Wisconsin Gas LLC, both d/b/a We Energies, for Authority to Adjust Electric, Natural Gas, and Steam Rates; NC Util. Comm., Docket No. E-100, Sub 140 (Biennial Determination of Avoided Cost Rates for Electric Utility Purchases from Qualifying Facilities-2014).

44 *See* Rosalind Jackson, The Vote Solar Initiative, *Meet Our 2014 Utility Solar Champion: Vermontle of Energy Efficiency* (March 25, 2014), http://votesolar.org/2014/03/25/meet-our-2014-utility-solar-champion-vts-green-mountain-power; Green Mountain Power, About Solar Power, www.greenmountainpower.com/innovative/solar/about-solar-power.

45 *See* Sophie Vorrath, RenewEconomy, *RWE and Conergy Partner Up to Bring Solar Leases to Commercial Customers in Europe*, Greentech Media (July 9, 2014), www.greentechmedia.com/articles/read/solar-leasing-boosted-in-europe-with-rwe-conergy-deal; *see also* Peter F. Varadi, *The Future of Large German Utilities: It's Already Here*, Renewable Energy World (March 11, 2014), www.renewableenergyworld.com/rea/news/article/2014/03/the-future-of-large-german-utilities-its-already-here.

their energy.[46] These interested consumers include not only residential consumers but also commercial, governmental and other entities.[47] In addition, there is growing public interest in decreasing environmental impacts of energy generation, as evidenced in part in a variety of public policies, such as state renewable portfolio standards and carbon-reduction policies.[48] Customers also want to see increased reliability and resiliency from their electrical service, including increased likelihood that their lights will remain on, or be restored quickly, during growing numbers of severe weather events.[49] Although pricing and rates undoubtedly should play roles in regulating the provision of electricity, other attributes of utility service must be considered and incorporated as well.

Alfred Kahn, sometimes called the "father of deregulation" and a renowned expert in regulatory economics, anticipated this perspective in the early 1970s in his seminal *Economics of Regulation*. "Price regulation alone is economically meaningless. Moreover, the nature of our dependence on public utility services is typically such that customers may correctly be *more* interested in the denominator than in the numerator—in the reliability, continuity, and safety of the service than in the price they have to pay. This relatively greater concentration on price than on quality of service is one reflection of the severe limitations of regulation as an institution of social control of the industry."[50] Although Kahn focused on traditional concepts of reliability, continuity and safety of service, this idea could just as easily be applied to other aspects of utility service that have grown in importance in more recent years, such as customer empowerment and environmental impact. Regulators should make clear that, under the regulatory compact, utilities are not merely expected to keep costs low, but also to provide the quality and diversity of service required to meet the public interest. Where they cannot provide those services in a high-quality and cost-effective manner, and where there exists a market for those services, the regulatory framework should allow for others to provide them. State-level utility regulators have already begun this process in different ways and to various degrees.

Massachusetts Grid Modernization Proceeding

Some states have engaged in smart grid or grid modernization proceedings to bring their utilities' grids up-to-date to accommodate the growing array of DER and associated services, among other

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46 *See, e.g.*, Accenture, *Actionable Insights for the New Energy Consumer: Accenture End-Consumer Observatory 2012* 3 (2012), *available at* www.accenture.com/SiteCollectionDocuments/PDF/Accenture-Actionable-Insights-New-Energy-Consumer.PDF ("More than ever, consumers are seeking added value, personal connection and products and services that align with their lifestyles—all of which go beyond the traditional energy experience.").

47 *See, e.g.,* Walmart's Renewable Energy Commitment, http://corporate.walmart.com/global-responsibility/environment-sustainability/energy (describing its onsite solar projects, which as of the end of 2013 provided more than 2.2 billion kWh of renewable electricity to Walmart annually); Department of Defense Energy Programs: Energy Projects, www.nrel.gov/defense/projects.html (describing U.S. Dept. of Defense solar and other renewable energy projects).

48 *See, e.g.*, DSIRE, Renewable Portfolio Standard Policies Summary Map (March 2013), www.dsireusa.org/documents/summarymaps/RPS_map.pdf (showing that 29 states, Washington, D.C., and 2 territories have an RPS).

49 *See, e.g.*, Michael J. Sullivan et al., *Estimated Value of Service Reliability for Electric Utility Customers in the United States* (June 2009), *available at* http://emp.lbl.gov/sites/all/files/REPORT%20lbnl-2132e.pdf (estimating costs of service interruptions).

50 *Economics of Regulation* at vol. 1, 21.

goals. These proceedings are well timed, as much of utilities' aging infrastructure nationwide will require upgrades or replacement in the coming years. For example, the Massachusetts Department of Public Utilities (DPU) recently released a comprehensive framework to guide its utilities in implementing grid modernization plans to accomplish four objectives: (1) to reduce the effect of outages; (2) optimize demand, which includes reducing system and customer costs; (3) to integrate DER, including energy efficiency, demand response, distributed generation, energy storage, electric vehicles, and "innovations that we have yet to imagine"; and (4) to improve workforce and asset management.[51] In its Order initially proposing its grid modernization framework, the DPU explicitly recognized that, "while we expect grid modernization to be part of the normal course of business for electric distribution companies, we recognize that, initially, it will involve some changes to their traditional planning and practices."[52] In other words, utilities are going to have to view a modern grid and its participants in a new way.

New York Reforming the Energy Vision (REV) Proceeding

Most recently, and perhaps most ambitiously, the New York Public Service Commission (PSC) kicked off a proceeding in April 2014 called "Reforming the Energy Vision" (REV). In its opening order, the PSC stated that it intends to "align electric utility practices and our regulatory paradigm with technological advances in information management and power generation and distribution."[53] The REV proceeding is also partially a response to Hurricane Sandy and the subsequent increased and more urgent interest in the Northeast to improve grid resiliency and storm response.[54] Specifically the PSC is looking at the role for utilities, and the changes it must make in regulatory, tariff, and market design and incentive structures to accomplish this goal. The PSC has identified the following policy objectives, all of which DER can support in various ways: (1) enhanced customer knowledge and tools that will support effective total energy bill management; (2) market animation and leverage of ratepayer contribution; (3) system-wide efficiency; (4) fuel and resource diversity; (5) system reliability and resiliency; and (6) reduction of carbon emissions.[55] More than any other state to date, New York has acknowledged that the arrangement of our electricity system is fundamentally shifting. This necessitates revisiting the regulatory compact, and reassessing the appropriate role for regulators and utilities today and going forward.

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51 *See* MA Grid Mod. Order, *supra* note 4.

52 D.P.U. 12-76-A at 9 (Dec. 23, 2013), *available at* www.env.state.ma.us/dpu/docs/electric/12-76/12-76-Order-7382.pdf.

53 NY REV Order, *supra* note 4, at 2. More information at: www3.dps.ny.gov/W/PSCWeb.nsf/All/26BE8A93967E604785257CC40066B91A?OpenDocument

54 *See, e.g.*, *id.* at 13 ("The spectrum of DER . . . could provide critical distribution system resiliency during widespread outages caused by extreme weather events.").

55 *Id.* at 2.

California Proceedings

In other states, regulators have approached these issues in a more piecemeal fashion. In California, for example, the Public Utilities Commission (PUC) has a number of open dockets and other efforts touching on various pieces of revisiting the role of the utility in response to technological change. These include proceedings examining net metering policy, residential rate design, utility distribution planning and the integration of DER, regulatory and utility treatment of electric vehicles, the interconnection of storage to the grid, and the treatment and availability of customer data collected by smart meters.[56] Together these proceedings reflect an evolving view of the roles and expectations of consumers and utilities within our electrical system, as well as regulators' role in overseeing the utilities' relationship with the public.

Regardless of the approach state regulators choose, it is clear that they will play a central role in re-envisioning the regulatory compact, and the roles of consumers and utilities within it. Updating the regulatory compact would benefit not only consumers but also utilities. It would allow utilities to rethink and revamp their business models within a new framework that aligns their incentives with consumer interests, public interest, and policy. Much has already been written about the "utility 2.0" or "utility of the future";[57] an updated understanding of the regulatory compact should allow these innovative ideas to flourish as viable alternatives to the utility "death spiral" by reinvigorating their businesses to accommodate technological innovation and modern policy goals. Although the generation component of utilities' business is increasingly subject to competition, the wires and the services associated with them, such as maintaining system operational reliability, largely remain natural monopolies and fundamental to the provision of electricity. Even with the emergence of off-grid solutions, such as the combination of solar and energy storage, the grid, due to its scale, will remain the most economically efficient solution for the vast majority of consumers for the foreseeable future. With more than one hundred years of experience, utilities are well positioned to continue to play an important role in the construction and management of the nation's transmission and distribution system. An effective utility of the future may serve as more of an enabler of other technologies and services than a provider of them. To the

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56 CPUC Rulemaking (R.) 14-08-013 (distribution resource plans); R.14-02-007 (net metering policy); R.12-06-013 (residential rate design); R.13-11-007 (electric vehicles); R.11-09-011 (interconnection of small generation and storage); R.08-12-009 (customer data).

57 *See e.g.,* Steve Kihm & Elisabeth Craffy, "Does Disruptive Competition Mean a Death Spiral for Electric Utilities?," *Energy Law Journal,* Vol. 35, No. 1, 2014, *available at* www.felj.org/sites/default/files/docs/elj351/13-1-Graffy-Kihm_Final%205.13.14.pdf; America's Power Plan, *New Utility Business Models: Utility and Regulatory Models for the Modern Era* (Ronald Lehr) (Sept. 2013), *available at* americaspowerplan.com/the-plan/utility-business-models; Michael T. Burr, "Industry in Transition," *Public Utilities Fortnightly* (June 2013), www.fortnightly.com/fortnightly/2013/06/industry-transition; RMI, *New Business Models for the Distribution Edge* (April 2013), *available at* www.rmi.org/New_Business_Models.

extent a utility is permitted to continue to provide products and services in a competitive context, however, regulators will have to ensure fair competition. This will require consideration of utilities' both monopoly and monopsony power, and regulating them in the public interest

5. PRACTICAL CONSIDERATIONS FOR REGULATORS

From a practical standpoint, re-envisioning the regulatory compact will mean reconsidering regulators' various tools and rules for utilities in the context of the technological innovation, changing roles of energy consumers, and evolving public interests as embodied in public policies. Focusing on state-level regulators, five of these areas are highlighted below.

Transition Toward Alternative Ratemaking Approaches

Traditional ratemaking and cost recovery have historically worked well to incentivize utility investment, mainly in capital-intensive generation, and to a lesser extent in transmission and distribution. For most regulated utilities, their generation investments dominate as their largest capital investments. For restructured utilities, where generation has been spun off, transmission and distribution, or "wires," investments are the largest remaining investments. Utilities typically have been able to recover these rate-based costs from growing customer bases. In turn, new facilities allowed utilities to serve more customer demand as load continued to increase over most utilities' history.

Keeping utilities' incentives aligned with public policy priorities challenges regulators to identify outcomes they want and provide incentives for utilities to pursue them.

These traditional ratemaking approaches will not suffice to facilitate appropriate utility investments, especially given new technologies available, changing roles for consumers, and increasing two-way flows of electricity and information on grids. Utilities now have a broader array of options for managing transmission, distribution and generation, but many of them are not as familiar. Some approaches may require relying on energy consumers or third parties to provide certain services, such as demand reduction or ancillary services, such as voltage control. These options are not immediately appealing to utilities, which are very risk-averse under existing ratemaking paradigms. Utilities face ever more difficult "make or buy" decisions — whether to provide some investments and services themselves, or to source these from other providers. Given utilities' status as both monopoly and monopsony entities, regulating these decisions so they are fair to all involved and in the public interest will be of critical importance in the coming years.

In addition, under traditional cost-of-service ratemaking, utilities earn their profits from returns on the equity portions of their capital investments, so there is a major disincentive for them to shift to a scenario where other parties make these investments and utilities simply pay for the resulting service. Keeping utilities' incentives aligned with public policy priorities challenges regulators to identify outcomes they want and provide incentives for utilities to pursue them. Moreover new investments that customers are demanding today to facilitate their ability to use DER and manage their energy demand will reduce customer bills. This could negatively impact utilities' ability to recover their costs if system-wide benefits of DER, such as lowering needs for energy, capacity and infrastructure investments are not valued and monetized, which further disincentivizes utilities from engaging in these investments. It also impacts non-DER customers who could be shouldering a greater portion of system costs if DER investments do not offer equal system value in return. Various ratemaking approaches are being suggested to overcome this tension between traditional cost-of-service ratemaking, and realities of today's modern grid and public interest.

Rather than the backward-looking approach embodied in cost-of-service ratemaking, and the associated prudency and used and useful tests, performance-based ratemaking takes a more forward-looking approach.

Revenue Decoupling

Some have pointed to revenue decoupling, which changes the relationship between utility profits and sales, to remove disincentives for utilities to engage in efforts that would decrease their sales, such as encouraging energy efficiency, demand response and self-generation.[58] Decoupling can be especially effective when combined with shareholder incentives for achieving performance in these areas, such that utilities are financially incentivized to pursue these goals along with traditional capital investments. Decoupling, however, does not reduce the utility's potentially overriding interest to grow its rate base via capital investments in generation and its distribution system, which DER may undermine.

Performance-Based Ratemaking

Many have also focused on performance-based rates as holding significant promise, although more fully revamping the ratemaking process is a resource-intensive undertaking.[59] While performance-based rates can be implemented in various ways, at a high level this type of ratemaking follows the same framework: it allows a utility's revenue to be increased or decreased based on the utility's performance on defined functions or outcomes, according to defined metrics and measurements.

58 *See, e.g.*, ACEEE, *Future of the Utility Industry* at 26-28.

59 *See, e.g.*, Sonia Aggarwal & Eddie Burgess, *New Regulatory Models* (March 2014), *available at* http://americaspowerplan.com/site/wp-content/uploads/2014/03/NewRegulatoryModels.pdf.

Traditionally these performance outcomes have included reliability and customer service, but they could include other policy goals such as diversification of generation, potentially by incorporating DER, carbon or other pollution reductions, and third-party provider satisfaction. When the utility does better than expected, it may receive monetary incentives; if it does worse, it may be penalized. Often the utility commits to a performance-based rate plan for some period of time, such as five or ten years, during which it agrees not to bring a new rate case. Such longer-term commitments can incentivize a utility to keep its costs low in order to maximize its profits.

Rather than the backward-looking approach embodied in cost-of-service ratemaking, and the associated prudency and used and useful tests, performance-based ratemaking takes a more forward-looking approach. It focuses on delivering value to customers based on pre-determined benchmarks and depends less on costs already incurred, which are the focus of the cost-of-service paradigm. Cost-of-service ratemaking may encourage over-investment in, or at least a misplaced preference for, expensive, fixed, utility-owned assets.[60] To the extent customer-sited DER or third-party services allow the utility to achieve regulator-determined goals at lower costs, performance-based rates can incentivize utilities to support and leverage these new approaches. The main downsides of performance-based rates from the utility perspective are that they are hard to put in place and administratively challenging, and encourage utilities to take on new risks using non-traditional options to achieve performance and returns. Utilities may also be hesitant to agree not to initiate new rate cases for a defined period of time. In addition, designing performance goals and associated metrics so that utilities are effectively encouraged to achieve them without unintended negative consequences can be challenging for regulators and raise hotly disputed issues. Nonetheless, states such as Illinois have begun to pursue performance-based ratemaking,[61] and performance-based rates are also a primary feature of the United Kingdom's Revenue using Incentives to deliver Innovation and Outputs (RIIO) paradigm.[62]

Rate design is a powerful tool and therefore should be based on a transparent and thorough evaluation of the desired functionalities of the products and services that utilities and customers are providing and using.

While a complete transition to performance-based ratemaking may require significant effort, it may be necessary for regulators wishing to usher utilities toward a new role as enablers and integrators.

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60 *See* H. Averch & L. Johnson, "Behavior of the Firm Under Regulatory Constraint," *American Economic Review*, Vol. 52, No. 5, at 52 (Dec. 1962) (describing the "Averch-Johnson Effect," the tendency of regulated companies to engage in excessive capital investment to increase their profits).

61 *See* SB 1652, Energy Infrastructure Modernization Act (2011), 220 ILCS 5/16-108.5 (Infrastructure investment and modernization; regulatory reform).

62 For more information, see www.ofgem.gov.uk/network-regulation-%E2%80%93-riio-model.

Even so, such a transition will not happen overnight. Depending on the circumstances, transitioning to performance-based rates could require careful treatment of legacy capital investments. These investments may need to be refinanced, particularly where new resources could be added at lower costs, with lower risks, than continuing to rely on old ones. One option for regulators could be to create "regulatory asset" accounts, which would continue the return of capital invested in obsolete investments until these investments are fully amortized. Decisions related to the treatment of legacy investments would likely need to be made on a case-by-case basis, taking into account relevant circumstances. Future capital investments could be recovered and profits provided through achievement of performance goals, possibly with added incentives provided for outstanding performance.

In other cases, overlaying performance goals, with associated penalties and incentives, on the existing cost-of-service paradigm may be a less intensive but still effective modification. Similarly, to the extent cost-of-service ratemaking is retained, it is important to ensure that utilities can recover costs of investments that facilitate consumer engagement and other public policy goals, such as investments in communications infrastructure to enable DER integration, so long these investments meet prudency and used and useful tests. In other words, the driving goal in reimagining ratemaking should be to align utilities' incentives with customers' priorities and the public interest to the maximum extent possible, providing better "value for money" for consumers.

Align Rate Design with Customer Value

Regulators will also need to revisit cost allocations among consumers and across customer classes in rates as part of updating the regulatory compact. When utilities invest in traditional transmission, distribution and generation facilities that benefit all customer rate classes, regulators must allocate these costs across all customers pursuant to traditional ratemaking principles.[63] Likewise regulators must determine when particular costs should be allocated to specific customers, such as for new service facilities. To enable DER, however, utilities are beginning to undertake investments that directly benefit a subset of their customers, such as grid upgrades to accommodate the installation of distributed solar generation, and that may also more indirectly benefit all ratepayers. To date, utilities have generally treated these investments according to the cost-causation principle: the entity directly causing the investment paid for it in its entirety.[64] As many DER begin to offer value back to the grid, however, utilities and regulators will need to revisit how these costs are allocated and also figure out how to incorporate the value provided by these resources into the equation. When costs are fairly allocated, and benefits fairly valued and monetized, this improved fairness and transparency should further facilitate the installation of DER.

63 *See generally* Bonbright, *Principles of Public Utility Rates* at Part III: The Rate Structure.

64 There are some exceptions to this general case. For example, net-metering customers in California are exempt from any costs associated with interconnection. Cal. Pub. Util. Code § 2827(g). In addition, as discussed below in Section IV.E, Hawaii has begun to explore alternative cost allocation methods through its Proactive Approach.

Much attention has already been paid to valuing demand-side management and energy efficiency programs.[65] In more recent years, there has been increasing discussion regarding valuing distributed solar generation.[66] Work remains to be done with respect to the array of other DER technologies, both alone and when deployed in a coordinated fashion, such as the combination of energy storage and distributed solar generation.

Beyond the valuation of DER, it will be equally critical to reconsider how benefits and costs are flowing in the new two-way grid, and how to allocate costs within customer rates and charges.

Beyond the valuation of DER, it will be equally critical to reconsider how benefits and costs are flowing in the new two-way grid, and how to allocate costs within customer rates and charges. Specifically, when a customer invests in DER and provides value to herself (e.g., offsetting her demand) and to the grid (e.g., ancillary services or peak shaving), but requires grid upgrades to install or use this DER, who should pay these costs? Can the all of the associated costs be identified, accounted for, and allocated to all who benefit from the required investments? How should compensation for the value of that DER to the grid be transferred to that customer? These are precisely the types of questions with which Hawaii is already struggling today, as discussed above. Answering them will require regulators to rebalance the various ratemaking criteria, including fairness, avoiding "undue discrimination," and practicality,[67] as well as state policy goals, including environmental protection, consumer empowerment, and encouragement of renewable energy and DER.

One way to approach these issues may be through unbundling rate components, that is, breaking out the pieces of rates associated with various products and services. Doing so could give utility customers the ability to assemble service bundles that meet their needs, whether these services include just basic service, or other components such as enhanced reliability, interconnection of distributed generation, electric vehicle charging, and so on. These unbundled rates would reflect both the cost and value of customers' choices. Such rates could become excessively complex, however, and regulators will continue to face the challenge of ensuring that rates are not only just and reasonable, but also practical and understandable for consumers.[68]

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65 *See, e.g.*, "Integrated Demand Side Management Cost-Effectiveness: Is Valuation the Major Barrier to New "Smart Grid" Opportunities?" ACEEE Summer Study on Energy Efficiency in Buildings (Aug. 2012), *available at* www.aceee.org/files/proceedings/2012/data/papers/0193-000165.pdf (providing an overview of demand-side management valuation and discussing challenges today).

66 *See, e.g.*, IREC, *A Regulator's Guidebook: Calculating the Benefits and Costs of Distributed Solar Generation* (Oct. 2013), *available at* www.irecusa.org/wp-content/uploads/2013/10/IREC_Rabago_Regulators-Guidebook-to-Assessing-Benefits-and-Costs-of-DSG.pdf.

67 Bonbright, *Principles of Public Utility Rates* at 291.

68 *See id.* 291 (including the "related, 'practical' attributes of simplicity, certainty, convenience of payment, economy in collection, understandability, public acceptability, and feasibility of application" in its eight criteria for a sound rate structure).

Make Utility Distribution Planning More Transparent and Proactive

Incentives both explicitly and implicitly inherent in ratemaking will necessarily impact how utilities develop their strategic plans going forward. For example, if performance-based ratemaking is deployed effectively to encourage utility investments in facilitating DER installation to accomplish certain distribution system goals, utility distribution system planning will necessarily evolve. While realigning incentives to encourage desired utility investments will be critical, it may also be useful to regulators to have some insight into utilities' strategic planning in the face of market transformation.

Many regulators already require utilities to submit plans identifying each utility's approach to achieving particular objectives, such as the renewable portfolio standard plans required in many states. More recently, we have seen regulators require utilities to file plans explaining their approaches toward some of the particular goals addressed in this paper, such as the distribution resource plans being developed by California utilities or the grid modernization plans required by the Massachusetts DPU. We have also seen non-utility entities put forth ideas on how utilities might modify their business models and planning processes to achieve these updated goals.[69]

> Requiring more explicit strategic plans from utilities is another way for regulators to monitor and encourage the evolution of utilities to meet their customers' interests in a cost-effective way.

In the interest of transparency and ensuring effectiveness, regulators may wish to require utilities to articulate in public filings the ways in which they are changing to accommodate a modified vision for the regulatory compact. Regulators could provide a framework for these plans and identify particular goals for utilities to address, such as integrating DER or improving grid resiliency, similar to the Massachusetts DPU's requirement of grid modernization plans. It could also be an opportunity for regulators to articulate their own understanding of the updated regulatory compact and what will be expected of utilities in the future, much like the New York PSC has done in its Reforming the Energy Vision proceeding discussed above. Ultimately, however, utilities would have the opportunity to use their expertise and familiarity with their systems to set forth a plan for change that leverages their strengths.

Regulators could consider more specific requirements for utilities with respect to distribution planning, as well. For example, utilities facing the need for infrastructure upgrades could be required to put the necessary functionalities out to bid to third parties to determine whether there are cost-effective non-wires solutions available, for example targeted DER deployment. Such a bidding process would require regulatory oversight to ensure that it is fair and designed to achieve the best

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69 *See, e.g.*, America's Power Plan, *New Utility Business Models: Utility and Regulatory Models for the Modern Era* (Ronald Lehr) (Sept. 2013), *available at* americaspowerplan.com/the-plan/utility-business-models.

outcome for ratepayers. While the long-term goal may be for utilities to integrate DER more fully into their distribution planning without needing these kinds of mandates to do so, in the shorter term such requirements may be necessary to instigate change in utilities' processes. In addition, after-the-fact reporting on the process can be instructive for utilities, regulators and third-party providers alike.

Importantly, requiring these types of plans and reporting would help to ensure that regulators are able to exert effective oversight over utilities' investments, and their associated monopoly and monopsony control in the market. Public plans and reports can be a transparent window into whether utilities are changing or still conducting business as usual. They can help regulators understand the benefits and costs of utilities' investments, and help them to evaluate whether those benefits have been achieved cost-effectively. Similarly, they can help regulators to determine which investments are appropriate revenue sources for utilities, for which they should recover their costs.

> While the cybersecurity and privacy concerns that utilities and consumer advocates raise should be addressed carefully, regulators must remain cognizant that use of this data can help to achieve goals that serve consumer interests.

Empower Energy Consumers with Access to Data

For most of their history, utilities gathered little to no data beyond the simple consumption data produced by customers' meters in order to calculate customers' bills. As grids have become "smarter" with the installation of AMI and other tools for collecting customer and grid data, some utilities have begun to collect significantly more information about both their grids and their customers. While AMI has proven attractive to many utilities, at least in part because it can serve as a major capital investment and thus a profit center, utilities have generally lagged in their ability to process and use resulting data effectively to achieve all of the benefits motivating its adoption, including integration of DER. Moreover, due to the proprietary nature of individual customer data, it is currently not possible for outside parties to utilize the data to suggest means of increasing overall efficiency. As a result, some have argued that utilities have not fully justified this major investment because so many of its purported benefits have not yet been realized.[70] In recent years, however, regulators are beginning to consider how to make use of this data, including the implementation of appropriate data-sharing policies.

70 *See, e.g.*, Katherine Tweed, *Smart Grid Cost Recovery: Make the Consumer Care*, Greentech Media (Sept. 20, 2010), www.greentechmedia.com/articles/read/smart-grid-cost-recovery-make-the-consumer-care; Rebecca Smith, *Smart Meter, Dumb Idea?*, Wall St. Journal (Apr. 27, 2009), http://online.wsj.com/news/articles/SB124050416142448555.

While there remains much to be done on this front, it is already apparent that this data has the potential to be immensely valuable not just to utilities but to third-party entities as well.[71] Right now, utilities typically have complete control over access to this data and have been reluctant to share it with third parties. In part, this reluctance is rooted in valid concerns related to cybersecurity and protecting consumer privacy. However, many of the third parties interested in this data are also utilities' competitors or entities that may otherwise undermine utilities' current business models, such as by helping customers to shift or reduce their demand, or offering other targeted energy services. In other words, utilities may have other motivations for arguing for restricting access to grid and customer data. While the cybersecurity and privacy concerns that utilities and consumer advocates raise should be addressed carefully, regulators must remain cognizant that use of this data can help to achieve goals that serve consumer interests.

A few regulators have begun to deal with this issue of data access, including the California PUC,[72] although current rules in that state regarding third-party data access are relatively restrictive. Specifically they do not allow access to anonymized 15-minute interval data to non-profits and industry, which severely limits these entities' abilities to conduct meaningful analyses. Data access remains an open issue in most states and is likely to receive increasing attention in the coming years as the electricity system continues to transform. In developing rules for access to data, regulators will need to balance the importance of ensuring cybersecurity and protecting consumer privacy with potential consumer benefits of permitting third-party access to such data, many of which have been used to justify investments in AMI and other technologies in the first place. These rules should reflect regulators' modern conception of utilities' role and the public interest within the updated regulatory compact.

Ensure Open Access to the Distribution System

Although not a novel concept, utilities' policies and procedures facilitating third parties' physical access to the grid will also continue to be critical. Today most states have interconnection procedures that clarify how distributed generators and sometimes other DER can connect with the utility grid. As DER technologies continue to diversify and their penetrations on the grid increase, these interconnection procedures will need to be revisited and updated. Moreover, as utilities' role within the regulatory compact and their relationship with their customers continues to shift, the way in which utilities approach integrating DER onto the grid may also shift. As the Electric Power Research Institute stated in a recent report, "[t]o realize fully the value of distributed resources and to

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71 *See* McKinsey & Co., *The Smart Grid and the Promise of Demand-Side Management* and *The Smart Grid Opportunity for Solutions Providers*, McKinsey on Smart Grid, 38-52 (2010), *available at* www.mckinsey.com/client_service/electric_power_and_natural_gas/latest_thinking/mckinsey_on_smart_grid.

72 *See* CPUC, D.14-05-16, Decision Adopting Rules to Provide Access to Energy Usage and Usage-Related Data While Protecting Privacy of Personal Data, R.08-12-009 (May 5, 2014), *available at* http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M090/K845/90845985.PDF; CPUC, D.11-07-056, Decision Adopting Rules to Protect the Privacy and Security of the Electricity Usage Data of the Customers of Pacific Gas and Electric Company, Southern California Edison Company, and San Diego Gas & Electric Company, R.08-12-009 (July 29, 2011), *available at* http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/140369.PDF.

serve all consumers at established standards of quality and reliability, the need has arisen to integrate DER in the planning and operation of the electricity grid and to expand its scope to include DER operation," which EPRI calls "the integrated grid."[73] This vision of moving from "interconnection" to "integration" ties back to the idea of an essential shift in utility strategic planning discussed above.

> As DER technologies continue to diversify and their penetrations on the grid increase, these interconnection procedures will need to be revisited and updated.

DER interconnection also presents a specific instance of the cost allocation issue discussed above. While some DER are able to interconnect to the grid without requiring any infrastructure investments, in other instances DER do require various kinds of grid upgrades, which can prove very expensive. Traditionally the DER interconnection applicant that triggers a specific upgrade must pay for its full cost, even if future DER (and non-DER) customers use or otherwise benefit from that upgrade. There is typically no mechanism for cost-sharing among DER applicants or with non-DER customers. Instead, projects either drop out if costs are too high or, more troubling, simply sit on their application and wait, causing a bottleneck in the process and delays for other applicants. Where significant upgrades are triggered by small DER applicants this can, in effect, result in a circuit being "closed" as no one applicant can afford to bear the entire cost of the upgrade. As a result, current interconnection procedures can fail to allow for grid access, especially as DER penetrations increase and expensive upgrades become increasingly necessary.

Distribution Group Studies

Fortunately, creative solutions to this problem have begun to emerge. In California, the interconnection procedures have been revised to incorporate a distribution-level "group study" process,[74] and Massachusetts recently implemented a similar procedure.[75] In both cases, projects are able to be studied for interconnection as a group if they are electrically related and, if the utility determines that upgrades are necessary, they are able to split their cost. While group study processes have pitfalls, such as dealing with restudy and cost reallocation when one project in the group drops out, they offer a promising way to address this grid access barrier.

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73 EPRI, *The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources* 3 (Feb. 2014), *available at* www.epri.com/Our-Work/Pages/Integrated-Grid.aspx.

74 D.14-04-003, Decision Adopting Revisions to Electric Tariff Rule 21 to Include a Distribution Group Study Process and Additional Tariff Forms, R.11-09-011 (April 16, 2014), *available at* http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M090/K001/90001430.PDF. The distribution group study process shares some characteristics with the FERC-approved cluster study process, but the two are distinct. *See* WDAT.

75 Mass. Standard for Interconnection of Distributed Generation § 3.4.1, Docket No. DPU 11-75.

Integrated Distribution Planning and Proactive Approach

In addition, Hawaii developed a more forwarding-looking approach to distribution system upgrades, called the Proactive Approach.[76] Together with Sandia National Laboratories, IREC incorporated the Proactive Approach into a more generalized framework for Integrated Distribution Planning.[77] Under this framework, the utility determines the likely DER growth on its distribution system over one year, based on its interconnection queue and other data. By studying the aggregate capacity of existing facilities and the hosting capacity of existing equipment, it also determines its available hosting capacity for additional DER. Using this information, the utility assesses whether its existing equipment can accommodate anticipated DER installations and then plans for upgrades in areas where growth outpaces hosting capacity. The utility can also direct interconnection applicants to areas of the system that can accommodate them at no or low cost. The Proactive Approach and Integrated Distribution Planning open the door to modifications to the cost allocation process for these upgrades. For example, a utility could build upgrades in advance to meet an anticipated need. It could then rate base part of this cost, accounting for the value that the upgrades and associated DER provide to the grid, and charge DER customers portions of the remaining cost as they apply to interconnect to that area of the grid. Like group studies, this approach could allow for expensive upgrade costs to be shared across several DER customers, as well as non-DER customers as appropriate. It could also alleviate a major roadblock to grid access.

Within an updated, more appropriate regulatory framework, utilities will have the flexibility they need to modify their business models and internal processes accordingly.

Likewise, regulators will need to consider policies beyond interconnection that can expand access to consumer groups historically excluded from using DER to manage their energy use, including in particular renters and lower-income consumers. These policies could include virtual net metering and shared renewable energy, which expand access to distributed generation to those that cannot self-generate and can take advantage of economies of scale to lower prices. Although these policies have traditionally focused on solar distributed generation, they could be expanded to incorporate other DER.

Regardless of the approach taken, the changing relationship between utilities and their customers in the face of emerging and future technologies will necessitate reconsideration of how consumers connect to and otherwise interact with the electricity grid. As with the other topics addressed in this

76 *See* Haw. RSWG Order, at 33, 49-57 (requiring HECO to implement a DG Interconnection Plan (DGIP) consistent with the Proactive Approach and describing the details of that approach).

77 IREC & Sandia Natl. Labs., *Integrated Distribution Planning (IDP) Concept Paper, A Proactive Approach for Accommodating High Penetrations of Distributed Generation* (May 2013), *available at* www.irecusa.org/wp-content/uploads/2013/05/Integrated-Distribution-Planning-May-2013.pdf.

section — cost recovery, rate design, utility strategic planning, and data access — regulators will play a central role in facilitating and overseeing the changes in how utilities manage physical access to their systems. While the regulatory compact must evolve to reflect all of the various changes discussed above, the regulator's obligation to ensure that the benefits of utility service are universally available remains essential.

6. CONCLUSION

As utilities have demonstrated over the past century or so, they can be very effective at meeting industry standards. When the aim of the regulatory compact was to electrify the country while keeping rates low, utilities were quite successful. We are seeing the addition of new public policy goals, however, accompanied by major technological changes and accompanying cost reductions. Utilities and energy consumers are taking on new roles forcing changes in utilities' grids, requiring utilities to reconsider their planning processes, and encouraging new investment patterns by consumers and utilities. Going forward, many more energy consumers will take stronger interests in the sources of their energy and their associated impacts. The regulatory compact must evolve to accommodate these changes and regulators have a major role in making this happen. Within an updated, more appropriate regulatory framework, utilities will have the flexibility they need to modify their business models and internal processes accordingly. Utility investors and the finance community will also have key roles to play in driving and responding to utilities' evolution.

In addition to considering the future of the regulatory compact, and the roles of utilities and energy consumers within it, from a more theoretical perspective, this paper offers five practical paths through which regulators may implement reforms:

1. Cost Recovery: Adjusting traditional cost-of-service ratemaking affects which investments utilities have incentives to make. Regulators could consider a ratemaking framework that moves away from incentives primarily for large, capital investments, and towards incentives for investments that facilitate more distributed, dynamic, environmentally sustainable electricity systems. Two ratemaking mechanisms that could help regulators to achieve this goal are revenue decoupling and performance-based ratemaking.

2. Rate Design: Customer rate design reflects regulators' and utilities' judgment regarding the appropriate allocation of costs across customers. Rates can also serve to send price signals to customers to encourage desirable behaviors, such as using tiered rates to encourage energy efficiency and conservation. Rate design is a powerful tool and therefore should be based on a transparent and thorough evaluation of the desired functionalities of the products and services that utilities and customers are providing and using. One potential way to send clearer price signals to customers could be to break out the various components of rates and offer customers a menu of service options. Since many consumers are accustomed to paying

for communication services in bundled packages, putting the unbundled rate elements and options in attractive packages might meet consumers' interest in this type of convenience.

3. **Utility Strategic Planning**: Generally speaking, utilities' strategic planning should evolve over time as regulators use tools like ratemaking and rate design to better align utility incentives with the public interest. Even so, requiring more explicit strategic plans from utilities is another way for regulators to monitor and encourage the evolution of utilities to meet their customers' interests in a cost-effective way.

4. **Access to Data**: As the communications infrastructure associated with the electricity grid becomes increasingly sophisticated, utilities will collect more and more data, which has the potential to transform both their management of their systems and their understanding of customer preferences and actions. These data can also be valuable to third-party providers interested in offering consumer and grid services, as well as regulators and other entities interested in monitoring grid operations and evolution. Therefore, it will be important for regulators to consider how to allow appropriate access to grid and consumer data, while also ensuring cybersecurity and protection of consumer privacy.

5. **Grid Access**: Many regulators are fairly experienced with issues related to third parties' access to the electricity grid. As DER become increasingly prevalent, however, regulators' understanding of these issues and policies addressing them will need to evolve. In particular, the effective integration of DER into the grid so the benefits of these technologies are maximized, as well as the appropriate allocation of benefits and costs of DER and associated grid upgrades, will be important policy components. Similarly, expansion of access to the grid to a broader range of energy consumers, including renters and lower-income consumers, will be a key equity consideration.

In addition, as states and their utilities make various changes in response to their particular situations, it will be important for regulators to continue to share their experiences and lessons learned. Although there may not be a one-size-fits-all approach to making this transition, many of the same issues and concerns will arise across the board.

As a Peter Fox-Penner, an electricity industry expert, stated, "[t]he question is not whether we make these changes, but whether we make them well or poorly, costly or cost-effectively, quickly or at a tortured, halting pace."[78] Although these tasks may seem daunting, the price of inaction may be just as costly for ratepayers, if not more so. Regulators have an exciting opportunity to adjust their regulatory frameworks for the electricity industry to allow utilities to transition to the future as cost-effectively and quickly as possible.

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78 *Smart Power* at 211.

About IREC

The Interstate Renewable Energy Council, Inc. (IREC) is a non-profit organization accelerating the use of renewable energy since 1982. Today, IREC is a nationally recognized thought leader, stakeholder coordinator, independent expert resource and facilitator of regulatory reform. Our work expands consumer access to clean energy; generates information and objective analysis grounded in best practices and standards; and leads national efforts to build a quality-trained clean energy workforce, including a unique credentialing program for training programs and instructors. IREC is an accredited American National Standards Developer.

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