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Incentive Regulation, New Business Models, and the Transformation of the Electric Power Industry

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INCENTIVE REGULATION, NEW BUSINESS MODELS, AND THE TRANSFORMATION OF THE ELECTRIC POWER INDUSTRY

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The electric utility sector is in the midst of paradigmatic change. Market forces include decreased load growth, technological advances in distributed energy resources, pressures for decarbonization, and demands for increased efficiency and new utility services. Meanwhile, as the utility monopoly is undermined and profits slow, financial analysts signal increasing risk to potential utility investors.

Suggestions for transforming the existing regulatory structure abound. At the broadest level, such proposals reflect an established divide between energy policy, which traditionally focuses on economics and markets, and environmental law, which is based in the protection of natural resources and ecosystems. To marry the two camps and reach the desired end goals of both industry and environmental advocates, an integrated approach—merging economic, regulatory, and environmental perspectives—must be taken. A key aspect of the analysis must be the recognition that regulation creates incentives, and incentive-based regulation can and should be used to further goals for the new utility system.

This Article: (1) identifies regulatory and economic incentives embedded in the current utility system; (2) assesses current market trends and new utility goals; and (3) analyzes the intersection of embedded regulatory incentives and key proposals for regulatory changes in light of the new goals. It finds that proposals for regulatory change often fail to account for existing regulatory incentives, and ignore opportunities to use regulatory incentives to modify and encourage desired utility behavior. It concludes with recommendations for ways to incorporate incentive-based regulation in proposals for new utility regulatory structures.

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Introduction

"All regulation is incentive regulation."[1]

Much has been written recently about the need for significant change and evolution in the electric utility sector.[2] On the industry side, analysts

1. This quote is generally attributed to former New York Public Service Commission Chair Alfred Kahn. Gavin Purchas & Elizabeth B. Stein, *Utility 2.0: New York Draws Lessons on Utility Regulation from Across the Pond*, Envtl. Def. Fund Blog: Energy Exchange (Dec. 8, 2014), http://blogs.edf.org/energyexchange/2014/12/08/utility-2-0-new-york-draws-lessons-on-utility-regulation-from-across-the-pond/.

2. *See, e.g.*, Michael T. Burr, *Reinventing the Grid: How to Find a Future that Works*, Pub. Util. Fort., Mar. 2014, at 21 (presenting a variety of viewpoints regarding the future of the electric utility grid); Elisabeth Graffy & Steven Kihm, *Does Disruptive Competition Mean a Death Spiral for Electric Utilities?*, 35 Energy L.J. 1, 2 (2014) (discussing the impact of distributed generation on electric utilities); James M. Van Nostrand, *Getting to Utility 2.0: Rebooting the Retail Electric Utility in the U.S.*, 6 San Diego J. Climate & Energy L. 149, 164–71 (2015) (analyzing proposals for new utility models in several states); Advanced En-

focus on the threat posed by distributed generation and slowing growth, as well as the increasing need for capital investment in transmission and distribution infrastructure and looming concerns about rising prices and cybersecurity.[3] The environmental literature emphasizes the need for rapid decarbonization of the electric power system and development of distributed generation in order to reduce greenhouse gas emissions and address climate change.[4] Several state regulatory proceedings have outlined a new vision for the future of utility regulation in light of changing market conditions and new environmental pressures.[5]

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ergy Econ. Inst. (AEEI), Toward a 21st Century Electricity System in California: A Joint Utility and Advanced Energy Industry Working Group Position Paper 12–13 (2015) (working paper), http://info.aee.net/hubfs/PDF/aeei-toward-21ces-ca.pdf?t=1439494418628 (proposing long-term changes to California's utility system).

3. *See, e.g.*, Edison Elec. Inst., Actual and Planned Transmission Investment by Investor-Owned Utilities (2009–2018), at 1–2 (2015), http://www.eei.org/issuesandpolicy/transmission/documents/bar_transmission_investment.pdf (projecting approximately $65 billion in transmission investment from 2015–2017); Elec. Power Research Inst., The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources 32–33 (2014), http://tdworld.com/site-files/tdworld.com/files/uploads/2014/02/integratedgridepri.pdf (describing need for grid modernization to accommodate distributed resources); Greg Bolino, *Business Model Mashup: Three "Power Plays" for Utilities Seeking Growth*, Pub. Util. Fort., Sept. 2015, at 16 (describing "major threats" to the typical utility business model, including reduction in demand, competition from distributed generation, changing policy goals and changing customer demands); Fereidoon P. Sioshansi, *Why the Time Has Arrived to Rethink the Electric Business Model*, 25 Electricity J. 65, 66–67 (2012) (discussing market factors and new customer demands undermining the traditional electric utility business model).

4. *See, e.g.*, Jonathan H. Adler, *Eyes on a Climate Prize: Rewarding Energy Innovation to Achieve Climate Stabilization*, 35 Harv. Envtl. L. Rev. 1, 2–3 (2011) (arguing that innovation and technological advances to propel clean energy are essential to achieving emissions reduction targets); William Boyd, *Public Utility and the Low-Carbon Future*, 61 UCLA L. Rev. 1614, 1620 (2014) (arguing that "a broader notion of public utility offers a possible normative and conceptual frame . . . that will be necessary to realize a low-carbon future"); Howard A. Latin, *Climate Change Mitigation and Decarbonization*, 25 Vill. Envtl. L.J. 1, 8–10 (2014) (describing the need for decarbonization, which is defined as a process of replacing greenhouse gas- (GHG) emitting technology with GHG-free technology); Felix Mormann, *Requirements for a Renewables Revolution*, 38 Ecology L.Q. 903, 911–12 (2011) (describing the need for large-scale deployment of renewable resources for the generation of electricity).

5. *See generally* Investigation by the Department of Public Utilities on Its Own Motion into Modernization of the Electric Grid, Order No. 12-76-B, at 2 (Mass. Dep't of Pub. Utils. June 12, 2014) [hereinafter Investigation of Grid Modernization], http://www.mass.gov/eea/docs/dpu/orders/dpu-12-76-b-order-6-12-2014.pdf (official investigation focusing on grid modernization); e21 Initiative, Phase 1 Report: Charting a Path to a 21st Century Energy System in Minnesota 5 (2014), http://www.betterenergy.org/projects/e21-initiative (unofficial initiative including industry, consumer, environmental, academic, and government representatives); Energy Future Coal., Utility 2.0: Piloting the Future for Maryland's Electric Utilities and Their Customers (2013), http://cleanenergytransmission.org/uploads/Utility%202-0%20Pilot%20Project-reduced.pdf (Governor-sponsored coalition to examine grid resiliency and the future of the utility system); AEEI, *supra* note 2; N.Y. State

Suggestions for changes to the existing regulatory structure abound. When imagining the "utility of the future" or "Utility 2.0," industry analysts often propose shifting the value proposition of the utility away from commodity sales to the provision of utility services.[6] On the environmental side, scholars advocate for a transition to renewable resources, feed-in tariffs, increased reliance on microgrids, and the development of the smart grid.[7] Proponents of energy efficiency have written about the need for regulatory tools to reduce utility disincentives to engage in efficiency projects and reduce customer demand.[8] Proponents of solar power argue in favor of net metering and low fixed charges to create incentives for customers to invest in distributed generation and energy efficiency.[9]

At the broadest level, the proposed reforms reflect an established divide between energy policy, which traditionally focuses on economics and markets, and environmental law, which is based in the protection of natural resources and ecosystems.[10] Where energy policy historically sought to en-

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Dep't of Pub. Serv., *About the Initiative*, REFORMING THE ENERGY VISION, http://www3.dps.ny.gov/W/PSCWeb.nsf/All/CC4F2EFA3A23551585257DEA007DCFE2?OpenDocument (last visited Apr. 2, 2016) (describing the "*Reforming the Energy Vision*" (REV) proceeding initiated by New York's Public Service Commission and providing links to relevant documents).

6. *See infra* Subsection IV.B.2 and accompanying notes.

7. *See* PETER FOX-PENNER, SMART POWER: CLIMATE CHANGE, THE SMART GRID, AND THE FUTURE OF ELECTRIC UTILITIES 34–38 (2010) (describing the smart grid and its potential benefit to the utility system); JOSEPH P. TOMAIN, ENDING DIRTY ENERGY POLICY: PRELUDE TO CLIMATE CHANGE 168–70 (2011) (describing obligations for an imagined utility of the future, including feed-in tariffs and renewable resource portfolios); Nicholas Abi-Samra, *Toward a 21st Century Grid: Producing Value with Advanced Distribution Management Systems*, PUB. UTIL. FORT., Mar. 2014, at 44 (describing value of advanced distribution management systems); Michael Dorsi, *Clean Energy Pricing and Federalism: Legal Obstacles and Options for Feed-in Tariffs*, 35 ENVIRONS: ENVTL. L. & POL'Y J. 173, 183–85 (2012) (describing municipal and state feed-in tariff programs); Joseph Wiedman & Tom Beach, *Distributed Generation Policy: Encouraging Generation on Both Sides of the Meter*, 26 ELECTRICITY J. 88, 91–92 (2013) (describing the use of feed-in tariffs to encourage distributed generation); Kari Twaite, Note, *Monopoly Money: Reaping the Economic and Environmental Benefits of Microgrids in Exclusive Utility Service Territories*, 34 VT. L. REV. 975, 995–96 (2010) (offering a common statutory scheme for the implementation of microgrids in utility service territories).

8. *See, e.g.*, STEVEN NADEL & GARRETT HERNDON, AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., THE FUTURE OF THE UTILITY INDUSTRY AND THE ROLE OF ENERGY EFFICIENCY 24–33 (2014), http://aceee.org/research-report/u1404 (presenting variety of options for energy efficiency in future utility models); SETH NOWAK ET AL., AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., BEYOND CARROTS FOR UTILITIES: A NATIONAL REVIEW OF PERFORMANCE INCENTIVES FOR ENERGY EFFICIENCY 2–5 (2015), http://aceee.org/beyond-carrots-utilities-national-review (describing utility disincentives for energy efficiency and options for addressing those disincentives).

9. *See infra* notes 168–69 and accompanying text.

10. Lincoln L. Davies, *Alternative Energy and the Energy-Environment Disconnect*, 46 IDAHO L. REV. 473, 475–76 (2010) (describing differences in the initial intent behind energy

sure an adequate supply of low-cost energy in order to further economic growth, environmental policy sought to resolve market failures and to protect public goods from overuse or damage.[11]

This energy-environment divide is readily evident in discussions of the future of utility regulation. Environmental advocates exhort utilities to change, accusing them of dragging their feet and being unwilling to evolve their business to meet the times, or even suggesting that utilities are deliberately slowing the pace of a transition to a clean economy.[12] These proposals may contain a vision for the future, but often fail to identify the existing regulatory and economic incentives that propel utility behavior. Utility analysts and regulators propose changes in ratemaking and the utility business model to ensure utility financial stability and competitive advantage, but offer little in the way of a long-term vision for addressing climate change and decarbonization of the energy sector.[13] Their efforts to ensure financial

and environmental law); Douglas N. Jones & Richard A. Tybout, *Environmental Regulation and Electric Utility Regulation: Compatibility and Conflict*, 14 B.C. ENVTL. AFF. L. REV. 31, 31–32, 35 (1986) (contrasting the purpose of environmental laws and the economic regulation of utilities).

11. *See* Davies, *supra* note 10, at 475–76.

12. In a 2014 op-ed to the Salt Lake Tribune, the founders of Utah Citizens Advocating Renewable Energy accuse electric utility Rocky Mountain Power of being "stuck in a coal-centric mentality and actively discouraging private consumer investment in renewable energy." Michael Rossetti & Melanie Florence, Op-Ed., *Rocky Mountain Power Stuck in Coal-Centric Mentality*, SALT LAKE TRIB. (Apr. 5, 2014, 1:01 AM), http://www.sltrib.com/sltrib/opinion/57766018-82/energy-rmp-solar-coal.html.csp. Josh Voorhees suggests that the fight to increase monthly fixed charges to solar PV customers is an attempt by utilities to "snuff out residential rooftop solar and other renewable alternatives before they reach critical mass." Josh Voorhees, *We're Watching You, Wisconsin Public Service Commission*, SLATE (Sept. 24, 2014), http://www.slate.com/articles/business/moneybox/2014/09/alec_climate_change_a_fight_over_rooftop_solar_panels_could_decide_america.html. As Joseph Tomain writes, "[t]he country is making a *revolutionary* transition to a clean energy economy . . . . Quite simply, electric utilities should behave as key actors in that transition. Today, however, utility efforts have been lacking as they seek solace in old ways of doing business." Joseph P. Tomain, *Traditionally-Structured Electric Utilities in a Distributed Generation World*, 38 NOVA L. REV. 473, 475–76 (2014) (urging utilities to invest in new technologies and adopt new business models to address changing market conditions).

13. Joseph Wiedman and Tom Beach, for example, offer a compelling list of possible policy options to support distributed generation, such as net metering, feed-in tariffs, and value of solar tariffs. *See* Wiedman & Beach, *supra* note 7, at 90–92. However, as the authors point out, it is impossible to make specific policy recommendations as to how these measures can or should be implemented when certain outcomes—like cross-subsidization among customer classes—require policy trade-offs and prioritization of conflicting social aims. *Id.* at 93. In another example, when a collection of utility leaders were asked for their vision of the utility system of 2050, none mentioned climate change, a high level of renewable resources, or a decarbonized system. *See* Burr, *supra* note 2, at 22–23.

stability and consistent returns to investors without considering the long-term risks of carbon pollution strike many as painfully short-sighted.

Adapting a regulatory system is a bit like turning an ocean liner: change is more likely to come in increments than in a single, monumental thrust. Furthermore, it makes little sense to begin turning the ship before the destination has been identified. Proposing ways to change the utility business model before determining long-term goals and priorities for the system leaves one with a variety of options and no means for deciding between them. At the same time, without an understanding of the current regulatory structure and the economic incentives it creates, efforts to enact change will be delayed (at best) or roadblocked (at worst).

To marry the two camps and reach the desired end-goals of both industry and environmental advocates, an integrated approach, merging economic, regulatory, and environmental perspectives, must be taken. A key aspect of the analysis must be the recognition that regulation creates incentives, and incentive-based regulation[14] can and should be used to further the regulatory goals.

Accordingly, the purpose of this Article is threefold: (1) to identify regulatory and economic incentives embedded in the current utility system; (2) to assess current market trends and new goals for the utility system; and (3) to analyze the intersection of embedded regulatory incentives and key proposals for regulatory changes in order to determine whether the embedded incentives will accelerate or create an obstacle to the achievement of the new utility goals.

Part I begins with a historical view of the evolution of the utility system, including the development of the regulatory compact, the regulation of utility rates, and constitutional limits on rate regulation. Part I concludes with an explanation of the goals of the early utility system, the manner in which the regulatory structure supported those goals, and identification of the regulatory incentives embedded in the current system. Part II considers current market trends, including the changing nature of electric demand growth, the distributed energy revolution, and the need for decarbonization and modernization of generation and distribution systems.

Based on this analysis, Part III identifies current goals for the regulated utility sector and identifies areas of conflict between these objectives and embedded incentives. Part IV analyzes alternative regulatory structures that have been proposed in the environmental, legal, and industry literature to

14. *See* Sanford V. Berg, Pub. Util. Res. Ctr., Introductions to the Fundamentals of Incentive Regulation (2000), http://publicsde.regie-energie.qc.ca/projets/190/DocPrj/R-3842-2013-C-OC-0010-Audi-Argu-2013_09_13.pdf (providing an overview of basic theories of incentive regulation).

meet the new utility goals, then asks how these proposals conflict with or use regulatory incentives. Part V discusses the need for prioritization of conflicting objectives. Part VI concludes with recommendations for using incentive-based regulation to achieve the new goals for the utility sector.

I. Development of the Utility Regulatory System: Goals and Regulation in Alignment

The early development of the utility regulatory system was marked by a close alignment of regulatory goals and the structures and incentives designed to achieve those goals. This part describes the development of the utility regulatory structure, provides a brief overview of utility ratemaking and the economic incentives it creates, and discusses how early regulatory goals and incentives were aligned.

A. *Establishment of Regulation*

Though today we tend to think of electricity solely in terms of monopoly service, the system did not start out that way. In fact, the early years of the electric industry were fiercely competitive.[15] Cities and states granted utility charters and franchises, but they were not necessarily exclusive.[16] Competing providers strung wires haphazardly across cities without restriction and with seemingly little regard for safety or public welfare.[17]

As the market evolved, it became apparent that expansion of the electric system would require significant amounts of capital and could enjoy significant economies of scale.[18] Many began to argue that electric utilities were natural monopolies, and competitive market forces could actually result in higher, not lower, prices for customers.[19] To expand the electric power sys-

15. *See* William J. Hausman & John L. Neufeld, *The Market for Capital and the Origins of State Regulation of Electric Utilities in the United States*, 62 J. Econ. Hist. 1050, 1054–56 (2002) (describing early history of the electric system).

16. Denver, for example, granted an electric utility franchise "to all comers." Charles F. Phillips, The Regulation of Public Utilities 127 (1988).

17. *See* Ernest Freeberg, The Age of Edison 80–84 (2013). "For late-nineteenth-century city dwellers, the sky overhead became increasingly ominous, thick with wires that might pour down a man-made lightning bolt without warning . . . . Every week the papers ran stories of this very modern form of sudden death." *Id.* at 81.

18. *See* Leonard S. Hyman, America's Electric Utilities: Past, Present and Future 67–68 (1985) (describing the early development of the system as being plagued by high fixed costs and a need to increase usage and grow plants to build economies of scale); Phillips, *supra* note 16, at 71 ("For electric power generation . . . the economic justification for regulation was based on the existence of significant economies of scale.").

19. *See* Hyman, *supra* note 18, at 4 (defining natural monopoly and applying the term to electric utilities); James K. Hall, *Regulation of Public Utilities*, 206 Annals Am. Acad. Pol. & Soc. Sci. 92, 93–94 (1939) (describing monopolistic features of public utilities, including

tem and keep prices low, utility providers needed investors with deep pockets who wouldn't demand excessive returns, a difficult task in the early, chaotic days of the electric industry.[20] Along with regulators and politicians, many electric companies began to call for regulation in order to reduce the risks associated with investment in the electric power system.[21] In 1907, inspired in part by industry recommendations,[22] New York and Wisconsin passed landmark legislation, quickly replicated across the nation, giving utilities regulated monopolies in return for state regulatory commissions having control over electric rates and terms of service.[23]

In the end, the goals of regulation that emerged in the early twentieth century were trifold: reasonable rates, adequate service, and utilities' financial stability.[24] The regulatory incentive mechanism chosen to achieve those goals was cost-of-service regulation.[25]

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economies of scale); Hausman & Neufeld, *supra* note 15, at 1052 ("Electric power generation, transmission, and distribution have always been highly capital-intensive endeavors . . . . In the earliest days of the industry, the problem of raising capital was critical for success."); *cf.* JAMES C. BONBRIGHT, PRINCIPLES OF PUBLIC UTILITY RATES 10–13 (photo. reprint 2005) (1961) (suggesting flaws in the presumption that utilities constitute a natural monopoly).

20. *See* HYMAN, *supra* note 18, at 67–68; Hausman & Neufeld, *supra* note 15, at 1052.

21. *See* HYMAN, *supra* note 18, at 72–73 ("In other words, the utility management may have sought regulation to maintain profitability."); Hausman & Neufeld, *supra* note 15, at 1051. Industry father Samuel Insull campaigned heavily for regulation. *See* RICHARD MUNSON, FROM EDISON TO ENRON: THE BUSINESS OF POWER AND WHAT IT MEANS FOR THE FUTURE OF ELECTRICITY 55 (2005).

22. *See* Hausman & Neufeld, *supra* note 15, at 1058–59 (noting the influence of a seminal report by the National Civic Federation, co-authored by Samuel Insull and other industry representatives).

23. *See* WILLIAM E. MOSHER & FINLA G. CRAWFORD, PUBLIC UTILITY REGULATION 10, 22–25 (1933) (describing passage of laws in New York and Wisconsin and goal of regulated monopolies); PHILIPS, *supra* note 16, at 132–33 (describing history of passage of laws for utility regulation); William L. Crow, *Legislative Control of Public Utilities in Wisconsin*, 18 MARQ. L. REV. 80, 81 (1934) (suggesting that the passage of the 1907 Public Utility Law in Wisconsin illustrated "a legislative decision that . . . the theory of public utility competition was wrong and that regulated monopoly was right").

24. *See* JOHN BAUER, EFFECTIVE REGULATION OF PUBLIC UTILITIES 12 (1925) ("The principal purposes of regulation as expressed or implied in public utility laws are three-fold: (1) reasonable rates; (2) proper service; and (3) financial stability."); HYMAN, *supra* note 18, at 133 ("Regulators must assure that the customer receives reliable service[;] . . . fairly apportion the costs of service so that no group of customers is charged unduly[; and] set the overall level of revenues at a point where the utility can earn a return similar to that earned in competitive industries.").

25. For more on cost of service regulation see Timothy J. Brennan, *Is Cost-of-Service Regulation Worth the Cost?*, 3 INT'L J. ECON. BUS. 25, 25 (1996) (describing cost of service as the "traditional method of regulating public utilities in the United States") and Maria Kopsakangas-Savolainen & Rauli Svento, *Comparing Welfare Effects of Different Regulation Schemes: An Application to the Electricity Distribution Industry*, 38 ENERGY POL'Y 7370, 7370, 7371, 7377

B. *Regulatory Compact and Cost-of-Service Regulation*

The bargain that was struck between the state and utilities regarding regulation has been referred to as the "regulatory compact."[26] This concept was summarized in a 1937 opinion by the Minnesota District Court:

> The determination by the corporation to engage in the industry affected with a public interest is of course voluntary on its part. But, having engaged in such industry, the corporation is obligated to service all persons who apply for service without partiality or discrimination . . . , to render reasonably adequate service, to employ reasonably adequate facilities and to charge fair and reasonable rates. In return, the utility . . . is generally protected against unfair or unreasonable competition . . . and it is practically assured a fair return upon the fair value of its property used in the public service [among other benefits].[27]

The minimum constitutional standard for the "fair return" utilities were entitled to earn was established in *Bluefield Water Works and Improvement Co. v. Public Service Commission of West Virginia*,[28] where the Supreme Court held,

> A public utility is entitled to such rates as will permit it to earn a return on the value of the property which it employs for the convenience of the public equal to that generally being made at the same time and in the same general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties.[29]

In *Federal Power Commission v. Hope Natural Gas*,[30] the Court expanded on this definition of a fair and reasonable rate-setting process:

(2010) (describing basics of cost-of-service regulation and setting forth advantages and disadvantages, and concluding that cost-of-service regulation is best at reducing costs).

26. *See* PHILLIPS, *supra* note 16, at 21 (1988) (describing the "long-standing (but unwritten) 'regulatory compact' as having two parts: an obligation of the utility to serve all comers, and the assurance to the utility of an opportunity to earn a reasonable return on invested capital"); Hall, *supra* note 19, at 92–93 (describing the responsibilities and special privileges afforded public utilities as "offsetting compensation").

27. Minnesota v. Tri-State Telephone & Telegraph, No. 221210 (D. Minn. 1937), *excerpted in* LEADING JUDICIAL INTERPRETATIONS OF PUBLIC UTILITY REGULATION 96–97 (Floyd R. Simpson & Emerson P. Schmidt eds., 1940) (citations omitted).

28. Bluefield Waterworks & Improvements Co. v. Pub. Serv. Comm'n of W. Va., 262 U.S. 679, 690 (1923).

29. *Id.* at 692.

30. Fed. Power Comm'n v. Hope Gas Co., 320 U.S. 591 (1944).

> The rate-making process . . . involves a balancing of the investor and the consumer interests . . . . [T]he return to the equity owner . . . should be sufficient to assure confidence in the financial integrity of the enterprise, so as to maintain credit and attract capital.[31]

Thus, the constitutional standard explicitly requires a balancing of the interests of consumers and investors; one way to judge the constitutional validity of a regulatory scheme is to consider the impact it has on the market for utility securities, or the returns obtained by utility investors.

Although states are not uniform in their methods of determining utility rates, the majority of public utility commissions utilize cost-of-service, or "rate-of-return" ratemaking.[32] Under this system, the regulatory commission sets rates at a level to cover annual operating expenses and afford the utility a "reasonable" rate of return on its invested capital ("rate base").[33] Rate base is calculated based on utility investments deemed "prudent" by utility regulators.[34]

The regulated monopoly and cost-of-service ratemaking are elegantly designed to provide security and confidence to utilities and their investors.

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31. *Id.* at 603. Justice Holmes likened this balancing of the needs of investors and customers to

> steer[ing] between Scylla and Charybidis. On one side, if the franchise is taken to mean that the most profitable return that could be got, free of competition, is protected by the Fourteenth Amendment, then the power to regulate is null. On the other hand, if the power to regulate withdraws the protection of the Amendment all together, then the property is naught.

Cedar Rapids Gas Co. v. Cedar Rapids, 223 U.S. 655, 669–70 (1912). He goes on to reference the regulatory compact when he states that this balancing is not "a matter of economic theory, but of fair interpretation of a bargain." *Id.* at 670.

32. A thorough discussion of cost-of-service ratemaking is beyond the scope of this Article. For a general discussion of the process of rate setting, see Hyman, *supra* note 18, at 135–91 and Phillips, *supra* note 16, at 174–80, 243–443.

33. *See* P.R. Tel. Co. v. Telecomms. Regulatory Bd. of P.R., 665 F.3d 309, 316 (1st Cir. 2011) (describing the evolution of cost-of-service ratemaking); Phillips, *supra* note 16, at 315, 375–76. "The constant underlying those standards was the idea that calculating the utility's cost 'and then allowing a fair rate of return on it was a sensible way to identify a range of rates that would be just and reasonable to investors and ratepayers.'" *P.R. Tel. Co.*, 665 F.3d at 316.

34. Utility prudence is generally understood to mean that utility actions were reasonable given the information available to the company at the time the decision was made. *See* Gulf States Utils. Co. v. La. Pub. Serv. Comm'n, 689 So. 2d 1337, 1346 (La. 1997) ("[T]he proper standard for determining whether a utility was imprudent is whether objectively that utility acted reasonably under the circumstances."); Fitchburg Gas & Elec. Light Co. v. Dept. of Pub. Utils., 956 N.E.2d 213, 216 (Mass. 1997) ("When conducting a prudence review, the Department of Public Utilities determines whether a utility's actions, based on all that it knew or should have known at the time, were reasonable and prudent in light of the circumstances which then existed."); Phillips, *supra* note 16, at 340–41.

Although utility profits are not guaranteed, these regulatory structures eliminate two of the key risks to investors: competition and the recovery of invested capital.[35] Cost-of-service ratemaking also fosters another goal of the early utility system: growth.[36] Because utility profits are based on capital investment, the system directly rewards utilities for investing in and building out their systems. Indeed, the incentives produced by cost-based regulation are so strong they may encourage over-investment or inefficient investment.[37]

Thanks to expanding economies of scale and deliberate efforts by Samuel Insull and others to increase consumer usage and the overall load factor of electric demand,[38] this system also fostered a positive cycle of lower costs and declining rates.[39] "[T]he price for electricity . . . fell steadily from 1882 to 1969,"[40] while access to electricity grew rapidly.[41] Today, the United States has one of the most reliable, lowest-priced systems in the world, and

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35. Because utility rates are set on a prospective basis, and actual costs and expenses will vary, the utility has an *opportunity* to earn the rate of return set in the rate case, rather than a guaranteed return. *See* JONATHAN A. LESSER & LEONARDO R. GIACCHINO, FUNDAMENTALS OF ENERGY REGULATION 45 (2d ed. 2013). "[P]rivate companies receive no guaranty of their ability to enjoy a 'fair rate of return,' with the result that they may be under more or less severe pressure to practice operating economies and to stimulate growth of demand for service in order to earn the officially sanctioned rate." BONBRIGHT, *supra* note 19, at 53.

36. James Bonbright, in his seminal work on public utility rates, notes that "one of the most prominent and most widely recognized functions of public utility rates" was to attract capital and motivate production. BONBRIGHT, *supra* note 19, at 49. John Bauer emphasizes that the extension of service, and the requirement that utilities serve all customers ("must take the 'lean with the fat'"), were essential objects of early regulation. BAUER, *supra* note 24, at 12, 14–15, 17–19.

37. The tendency to over-invest is known as the "Averch-Johnson effect," after the widely cited article that described this behavior of rate-regulated entities. *See* Harvey Averch & Leland L. Johnson, *Behavior of the Firm Under Regulatory Constraint*, 52 AM. ECON. REV. 1052 (1962). The regulatory practice of disallowing imprudent investments may also encourage overinvestment by utilities in order to compensate for unrecoverable investments. Stratford Douglas et al., *Disallowances and Overcapitalization in the U.S. Electric Utility Industry*, 91 FED. RES. BANK ST. LOUIS REV. 23, 24 (2009).

38. *See* MUNSON, *supra* note 21, at 45–46 (describing Insull's efforts to increase load factor and efficiency by interconnecting and shifting load between plants and generators, and marketing special rates to banks and businesses). Load factor is a measure of efficiency that represents the ratio of the total amount of energy used over a given period divided by the total energy that could have been used.

39. *See* Charles G. Stalon & Reinier H. J. H. Lock, *State-Federal Relations in the Economic Regulation of Energy*, 7 YALE J. ON REG. 427, 445–46 (1990) (detailing growth in productivity of the utility sector and accompanying declining costs and increasing economies of scale from the 1930s to the 1960s).

40. *See* HYMAN, *supra* note 18, at 117.

41. *See id.* at 75–76, 91–92.

the population enjoys near universal access.[42] However, this structure also created embedded incentives that continue to plague the system today: the incentive to grow (even when it is not efficient), and a reliance on the regulated monopoly to protect the industry from competition and provide investors with the opportunity to earn a fair return.

II. Industry Disruption: Analysis of Market Trends

The early days of utility regulation married the goals of reasonable rates, financial security, and adequate service with a regulatory system that seemed to provide all of those things.[43] However, the alignment of goals and regulatory structures that characterized the early utility system did not last forever. In 1970, abrupt changes in the market led to falling demand and rising prices.[44] New environmental concerns thrust heretofore unfamiliar policy goals on the utility industry.[45] In the decades that followed, the utility industry was characterized by change: creation of long-term planning schemes to ensure prudent investment;[46] deregulation followed by re-regu-

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42. *See* John G. Kassakian et al., Mass. Inst. Tech. (MIT), The Future of the Electric Grid 236 (2011), http://web.mit.edu/mitei/research/studies/the-electric-grid-2011.shtml (noting that "virtually all homes" in the United States have access to grid electricity). For a survey of international rates for electricity, with the United States among the cheapest, see Lindsay Wilson, *The Average Price of Electricity, Country by Country*, The Energy Collective (Sept. 25, 2013), http://www.theenergycollective.com/lindsay-wilson/279126/average-electricity-prices-around-world-kwh.

43. *See supra* notes 24, 36–41 and accompanying text.

44. *See* Hyman, *supra* note 18, at 100–05, 113–16 (including Table 14-4 that shows a 204% increase in electricity prices from 1965–1983 and describing reasons for rising prices and falling demand, including increased capital spending, need for improved reliability after significant blackouts, the increasing cost of generation facilities, oil embargos, and the rise in fuel prices); Karl McDermott, Cost of Service Regulation in the Investor-Owned Electric Utility Industry: A History of Adaptation 20–23 (2012), http://www.eei.org/issuesandpolicy/stateregulation/documents/cosr_history_final.pdf (detailing dramatic drop in demand growth in utility industry, from approximately 7% in 1973 to 2.5% a year after 1973); Daniel Yergin, The Quest: Energy, Security, and the Remaking of the Modern World 380–81 (2011) (tying increasing prices, in part, to the passage of the 1978 Public Utility Regulatory Policies Act (PURPA)).

45. The Public Utility Regulatory Policies Act of 1978 (PURPA), 95 Pub. L. No. 617, 92 Stat. 3117 (1978) (codified as amended at 16 U.S.C. §§ 2601–2645 (2012)), which required utilities to purchase energy from non-utility "qualifying facilities," primarily small renewable energy projects, exemplified a new national desire to diversify the nation's energy supply away from fossil fuels. PURPA also demonstrated a growing national interest in conservation. 16 U.S.C. § 2621 (2012) (requiring state utility commissions to consider conservation in ratemaking); *see also* Charles F. Phillips, The Regulation of Public Utilities 588–90 tbl. 12-3, 594–95 (1993) (listing environmental statutes that affect utility operations and describing impact on utility planning).

46. Integrated resource plans (IRPs) project customer demand and supply options over an extended period of time, often 10–20 years, and are used by utility commissions to deter-

lation;[47] new environmentally-based targets for renewable energy[48] and energy efficiency;[49] and most recently, a sharp growth in distributed generation and grid modernization.[50]

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mine optimal portfolios of supply and demand resources. *See* Energy Policy Act of 1992, 16 U.S.C. § 2602(19) (2012) (defining integrated resource planning as "a planning and selection process for new energy resources that evaluates the full range of alternatives, including new generating capacity, power purchases, energy conservation and efficiency, cogeneration and district heating and cooling applications, and renewable energy resources, in order to provide adequate and reliable service to its electric customers at the lowest system cost"). Depending on the jurisdiction, IRPs might be used as advisory documents or as evidence in determining prudence during utility commission proceedings. *See generally* RACHEL WILSON & PAUL PETERSON, A BRIEF SURVEY OF STATE INTEGRATED RESOURCE PLANNING RULES AND REQUIREMENTS 3–13 (2011), http://www.cleanskies.org/wp-content/uploads/2011/05/ACSF_IRP-Survey_Final_2011-04-28.pdf (offering an overview of the IRP process and a survey of state regulations, including the 26 states that have a mandatory IRP process). *See also* Scott F. Bertschi, Comment, *Integrated Resource Planning and Demand-Side Management in Electric Utility Regulation: Public Utility Panacea or a Waste of Energy?*, 43 EMORY L.J. 815, 829–36 (1994) (detailing regulatory requirements of IRP processes).

47. For a history of deregulation in electric markets, see Jacqueline Lang Weaver, *Can Energy Markets Be Trusted? The Effect of the Rise and Fall of Enron on Energy Markets*, 4 HOUS. BUS. & TAX L.J. 1, 6–16 (2004). *See also* Joel B. Eisen, *Regulatory Linearity, Commerce Clause Brinkmanship, and Retrenchment in Electric Utility Deregulation*, 40 WAKE FOREST L. REV. 545 (2005) (describing deregulation at the federal and state level). Although 24 states initially passed some form of electric deregulation, as of 2010, only fifteen states had active deregulation at the retail level. *See* U.S. Energy Info. Admin., *Status of Electricity Restructuring by State*, ELECTRICITY, http://www.eia.gov/cneaf/electricity/page/restructuring/restructure_elect.html (last visited Apr. 2, 2016) (showing a state-by-state map of information about electric restructuring with links to individual state legislation). *See generally* TYSON SLOCUM, THE FAILURE OF ELECTRICITY DEREGULATION: HISTORY, STATUS AND NEEDED REFORMS (2007), https://www.ftc.gov/sites/default/files/documents/public_events/Energy%20Markets%20in%20the%2021st%20Century%3A%20Competition%20Policy%20in%20Perspective/slocum_dereg.pdf (describing the rush to deregulation and subsequent retrenchment).

48. Currently, twenty-nine states and the District of Columbia have a Renewable Portfolio Standard (RPS), which sets hard targets for the percentage of electric generation from renewable resources; an additional eight have an RPS with soft targets. *See, e.g.*, DATABASE OF STATE INCENTIVES FOR RENEWABLES AND EFFICIENCY (DSIRE) ET AL., RENEWABLE PORTFOLIO STANDARD POLICIES (2015), http://www.dsireusa.org/resources/detailed-summary-maps/ (follow link to summary map of renewable portfolio standards); *see also* BARRY RABE, RACE TO THE TOP: THE EXPANDING ROLE OF U.S. STATE RENEWABLE PORTFOLIO STANDARDS 5–6 (2006), http://www.c2es.org/docUploads/RPSReportFinal.pdf (describing history and growth in renewable portfolio standards, and providing a chart of qualifying renewable energy sources by state).

49. For a description of the development of state utility energy efficiency programs, including energy efficiency budgets, spending, and scorecards rating individual state performance, see DAN YORK ET AL., THREE DECADES AND COUNTING: A HISTORICAL REVIEW AND CURRENT ASSESSMENT OF ELECTRIC UTILITY ENERGY EFFICIENCY ACTIVITY IN THE STATES 2–23 (2012), http://www.aceee.org/research-report/u123. For a current overview and assessment of state policies and programs, see ANNIE GILLEO ET AL., THE 2015 STATE ENERGY EFFICIENCY SCORECARD (2015), http://www.aceee.org/research-report/u123. *See also* Kenneth Gillingham et al., *Energy Efficiency Policies: A Retrospective Examination*, 31 ANN. REV. ENV'T & RESOURCES 161, 162

This Part analyzes current trends in the utility industry, including declining growth, increasing distributed resources, calls for decarbonization, and twenty-first century customer demands, such as data monitoring, cyber-security, and improved reliability.

A. *Market Trends*

Utilities today are bombarded by a multitude of changes. When looking at the markets in which utilities operate, two trends stand out as presenting particular challenges to the existing regulatory paradigm: declining growth rates and a demand for new products and services.

1. Declining Growth

In the early days of cost-of-service ratemaking, as economies of scale increased and costs declined, utilities relied upon growth in demand to fuel expansion and drive profits.[51] Regulators had few occasions to doubt the prudence of and need for capital expansion, as demand grew by nearly double-digit figures and the system capacity had to double approximately every 10 years.[52]

This rosy picture changed after 1970, when utilities lost two of the key elements of their financial success: growth and increasing economies of scale. Growth rates first began to slow as the United States experienced a series of oil embargos, declining oil production, and fuel price spikes.[53] These events drove fears that the world was fast approaching the tipping point toward the ultimate decline in energy resources, and prompted a national drive for energy conservation.[54] After a period of improvement in the

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(2006) (reviewing literature on both utility and non-utility energy efficiency programs, including financial incentives, appliance standards, and policies concerning government energy use).

50. *See infra* Section II.A.

51. *See* McDermott, *supra* note 44, at 21; Johannes P. Pfeifenberger & William B Tye, *Handle with Care: A Primer on Incentive Regulation*, 23 Energy Pol'y 769, 769 (1995) (noting that so-called "regulatory lag" can be beneficial in a time of decreasing costs). In contrast, during times of rising costs and declining growth, the lag between rate cases can significantly impede the utility's ability to earn the rate of return established during the previous rate case. *See* David Malkin & Paul A. Centolella, *Results-Based Regulation: A More Dynamic Approach to Grid Modernization*, Pub. Util. Fort., Mar. 2014, at 28, 33.

52. *See* McDermott, *supra* note 44, at 21–22 (stating the period after 1970 was the first in which utility investors became concerned with "regulatory risk," or the risk that regulators would not approve the recovery of certain capital investments); Sioshansi, *supra* note 3, at 65 (describing growth rates after World War II as the "golden age" of the industry).

53. *See* Yergin, *supra* note 44, at 234–35 (describing oil embargos and searches for new supplies).

54. *See id.* at 235. In 1977, President Jimmy Carter warned the United States that oil was running out, conditions were dire, and conservation was essential. "Now we have a

1990s, growth rates took a sharp dive during the Great Recession.[55] Today, the Energy Information Administration (EIA) estimates a less than 1% annual growth rate in demand until 2035 (the end of the forecast period), even without new mandates for additional efficiency or new regulatory policies encouraging conservation.[56] Analysts Black & Veatch estimate a slightly higher annual growth rate of 1% from 2014–2029, still well below the historical average.[57]

There are a multitude of reasons for this decline in growth, including the maturity of the industry, increasing efficiency by end users, and saturation of the market.[58] Remarkably, industry analyses suggest significant potential for *additional* efficiency gains and an accompanying additional drop in demand.[59]

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choice. But if we wait, we will live in fear of embargoes. We could endanger our freedom as a sovereign nation to act in foreign affairs. Within ten years we would not be able to import enough oil—from any country, at any acceptable price." Jimmy Carter, President of the U.S., The President's Proposed Energy Policy (April 18, 1977), *in* Vital Speeches of the Day, Vol. XXXXIII, No. 14, May 1, 1977, at 418–20. For a transcript of this speech, which may be best remembered for the statement that the effort to conserve will be the "moral equivalent of war," see Pub. Broad. Serv., *Primary Resources: Proposed Energy Policy*, AMERICAN EXPERIENCE, http://www.pbs.org/wgbh/americanexperience/features/primary-resources/carter-energy/ (last visited Apr. 2, 2016). *See also* TOMAIN, *supra* note 7, at 27 (describing the speech and the subsequent passage of the National Energy Act).

55. *See* U.S. DEPT. OF ENERGY, QUADRENNIAL ENERGY REVIEW app. C, EL-8 (2015), http://energy.gov/sites/prod/files/2015/09/f26/QER_AppendixC_Electricity.pdf (showing historic and future projected electric demand growth from 1950–2040, alongside U.S. GDP). The entire report is available at http://energy.gov/epsa/downloads/quadrennial-energy-review-full-report.

56. *See* U.S. Energy Info. Admin., *U.S. Economy and Electricity Demand Growth Are Linked but Relationship Is Changing*, TODAY IN ENERGY (Mar. 22, 2013), http://www.eia.gov/todayinenergy/detail.cfm?id=10491 (providing data suggesting that economic growth now outpaces electric demand growth, and predicting electric demand growth will not rebound with increased economic growth).

57. *See* BLACK & VEATCH, 2014 STRATEGIC DIRECTIONS: U.S. ELECTRIC INDUSTRY 26 (2014), http://bv.com/docs/default-source/reports-studies/14-sdr-electric-report (noting that slow growth comes despite retirement of coal-fired generation due to compliance with new air toxics regulations).

58. Sioshansi, *supra* note 3, at 66–67.

59. The American Council for an Energy-Efficient Economy (ACEEE) estimates that new cost effective energy efficiency programs could reduce U.S. energy requirements by 59% by 2050. *See* JOHN A. "SKIP" LAITNER ET AL., AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., THE LONG-TERM ENERGY EFFICIENCY POTENTIAL: WHAT THE EVIDENCE SUGGESTS, at v–vii (2012), http://www.aceee.org/research-report/e121 (referring to an aggressive scenario known as the "Phoenix case," which includes penetration of advanced technologies as well as new infrastructure improvements). The landmark 2009 McKinsey & Co. report, which analyzed cost effective energy efficiency and barriers to its adoption, estimated that energy efficiency programs could save more than $500 billion in energy savings by 2020 and reduce energy use by 23%. *See* HANNAH CHOI GRANADE ET AL., UNLOCKING ENERGY EFFICIENCY IN THE U.S. ECONOMY, at

While growth rates have significantly declined, this trend does not necessarily equate to a declining need for utility investment. Although minimal or flat growth may diminish the need for expanded generation capacity, the electric power system still requires significant investment in replacement generation capacity.[60] The Edison Electric Institute forecasts utility investments in transmission to be significantly higher in coming years, simply to alleviate existing transmission constraints and upgrade existing infrastructure.[61]

Compliance with environmental regulations, including the U.S. Environmental Protection Agency's (EPA) new Clean Power Plan,[62] as well as regulations regarding mercury and air toxics,[63] surface water intake,[64] and coal ash,[65] is also expected to require significant capital investment over the next five years.[66] Meeting the demands of distributed generation and decarbonization of the utility system, with a shift to renewable generation and

iii (2009), http://www.mckinsey.com/Client_Service/Electric_Power_and_Natural_Gas/Latest_thinking/~/media/204463A4D27A419BA8D05A6C280A97DC.ashx. Amory Lovins from the Rocky Mountain Institute estimated in 2011 that energy efficiency could reduce energy use by approximately 40% by 2050. *See* AMORY LOVINS, ROCKY MOUNTAIN INST., REINVENTING FIRE 11 (2011). Lovins further estimates that within the building industry, energy use savings of 38% to 69% are possible by 2050. *Id.* at 86.

60. *See* MARC W. CHUPKA ET AL., THE EDISON FOUND., TRANSFORMING AMERICA'S POWER INDUSTRY: THE INVESTMENT CHALLENGE 2010–2030, at 2 (2008), http://www.eei.org/ourissues/finance/Documents/Transforming_Americas_Power_Industry_Exec_Summary.pdf (estimating a need for $697 billion in new generation investments by 2030, under existing policies with no new carbon constraints).

61. *See id.* at 5 (estimating a need for $880 billion in transmission and distribution investment for the reference case); EDISON ELEC. INST., ACTUAL AND PLANNED TRANSMISSION INVESTMENT BY INVESTOR-OWNED UTILITIES 2009–2018, at 1 (2015), http://www.eei.org/issuesandpolicy/transmission/documents/bar_transmission_investment.pdf (depicting annual estimates of new transmission investments needed to ensure reliability and ease congestion).

62. The Clean Power Plan sets carbon and other greenhouse gas emission standards for power plants, while providing states with significant flexibility in meeting those standards. *See* U.S. Envtl. Prot. Agency, *Clean Power Plan for Existing Power Plants*, CLEAN POWER PLAN, http://www2.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants (last visited Apr. 2, 2016) (summarizing the rule and providing links to documents, including the regulatory impact analysis, rule history, and final rule). The U.S. Supreme Court stayed the Clean Power Plan on February 9, 2016, pending review. West Virginia v. EPA, 136 S. Ct. 1000 (Feb. 9, 2016) (mem.) (No. 15A773), http://www.supremecourt.gov/orders/courtorders/020916zr_21p3.pdf.

63. Standards of Performance for New Stationary Sources, 40 C.F.R. § 60.45Da (2015); 40 C.F.R. pt. 63 (2015).

64. EPA Administered Permit Programs: The National Pollutant Discharge Elimination System, 40 C.F.R. pt. 122 (2015); Criteria and Standards for the National Pollutant Discharge Elimination System, 40 C.F.R. pt. 125 (2015).

65. *See, e.g.*, Disposal of Coal Combustion Residuals from Electric Utilities, 40 C.F.R. pt. 257 (2015); Identification and Listing of Hazardous Waste, 40 C.F.R. pt. 261 (2015).

66. *See* BLACK & VEATCH, *supra* note 57, at 56–58.

more intermittent resources, will require still greater investments in distribution and transmission.[67]

The problem for utilities and their customers is that the drop in demand growth and potential for increased efficiency means significant new investments will be spread across a flat or even declining number of kilowatt hours, increasing per-unit costs and driving up rates.[68] If distributed generation allows certain customers to leave the system, this problem may create a negative cycle some have called the "death spiral," in which lost revenues lead to increasing rates, which drive additional customers to exit the system through alternative distributed generation systems.[69]

Although it seems hyperbolic to suggest a near-term demise of the regulated utility, there can be little doubt that utilities are facing significant pressures related to the need for new investment and declining growth, and these pressures are likely to compound over time.[70]

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67. *See* KASSAKIAN ET AL., *supra* note 42, at 175 (noting the necessary investments to replace aging facilities and expand transmission and distribution infrastructure could "easily double" to accommodate new technologies and new types of generation). A study by the Electric Power Research Institute in 2011 estimated that, omitting the costs for new generation, expanding transmission to add renewable resources and meet load growth would require net investments (less benefits) of $338–$476 billion over twenty years. ELEC. POWER RESEARCH INST., ESTIMATING THE COSTS AND BENEFITS OF THE SMART GRID: A PRELIMINARY ESTIMATE OF THE INVESTMENT REQUIREMENTS AND THE RESULTANT BENEFITS OF A FULLY FUNCTIONING SMART GRID 1–4 (2011), http://www.epri.com/abstracts/Pages/ProductAbstract.aspx?ProductId=000000000001022519.

68. *See* Liam Denning, *Lights Flicker for Utilities*, WALL ST. J. (Dec. 22, 2013), http://www.wsj.com/articles/SB10001424052702304773104579270362739732266 (describing the impact on utilities of declining growth and increasing distributed generation); Chris Martin et al., *Why the U.S. Power Grid's Days Are Numbered*, BUS. WK. (Aug. 22, 2013), http://www.bloomberg.com/bw/articles/2013-08-22/homegrown-green-energy-is-making-power-utilities-irrelevant (suggesting that an increase in distributed generation threatens utility financial stability).

69. *See, e.g.*, Burr, *supra* note 2, at 21 (defining death spiral); Denning, *supra* note 68 (suggesting that "death spiral" may be an overstatement, but that utilities are struggling financially under the impact of declining growth and increasing distributed generation); Jeff McMahon, *Utilities Want Regulatory Rescue from "Death Spiral"*, FORBES (Feb. 4, 2014), http://www.forbes.com/sites/jeffmcmahon/2014/02/04/utilities-want-regulatory-rescue-from-death-spiral/.

70. Commentators differ sharply as to whether the "death spiral" is a realistic threat to utilities. For a spirited point and counterpoint, see generally Graffy & Kihm, *supra* note 2 (arguing that utilities must develop new products and services in order to combat the threat of customer desertion to distributed generation systems) and David Raskin, *Getting Distributed Generation Right: A Response to "Does Disruptive Competition Mean a Death Spiral for Electric Utilities?"*, 35 ENERGY L.J. 263 (2014) (suggesting that, for technological and financial reasons, customers are unlikely to leave the utility system en masse and that suggestions otherwise inappropriately threaten necessary investment in the grid).

2. Demand for New Services

Today's utilities report increasing pressure to provide new services to customers and engage with them on a different level.[71] Instead of passively using electricity whenever and at whatever level they please, customers are increasingly seen as playing an active role in managing their demand.[72] Expanding customer engagement is possible through the use of smart meters, more granular analysis of the cost of service, and two-way communications between the utility and the consumer.[73] For the first time, consumers can access real-time data as to the cost of the energy they are consuming, allowing them to shift their usage to off-peak or lower peak periods.[74] For utilities and regulators, this new level of data creates the potential for targeted rate structures that can address system constraints and encourage efficiency, including time-of-use and real-time pricing.[75]

In a related manner, utilities today have access to an unprecedented amount of individual customer data.[76] Customers expect their utility to preserve this information with a high degree of privacy and security while

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71. *See, e.g.*, Fox-Penner, *supra* note 7, at 189–91 (describing "energy services utility"); Ronald Lehr, America's Power Plan, New Utility Business Models: Utility and Regulatory Models for the Modern Era 15–19 (2013), http://americaspowerplan.com/wp-content/uploads/2013/10/APP-UTILITIES.pdf (providing examples of new services utilities are offering); AEEI, *supra* note 2, at 14–16 (describing new products and services utilities may be expected to provide in coming years). A survey of vertically integrated electric utilities conducted by Black and Veatch in 2015 found that 69% planned to increase their investment in social media over the next three to five years. Black & Veatch, 2015 Strategic Directions: U.S. Electric Industry Report 51 (2015), http://bv.com/reports. For utility services, "prioritizing customer services is an especially important point given the resurgence of demand-side management measures being instituted that will require customer buy-in." *Id.* at 52.

72. Black & Veatch, *supra* note 71, at 53 ("Compelling customers to shift usage, rather than conserve it, in order to flatten peak demand is the prime goal."); Sioshansi, *supra* note 3, at 70.

73. Mark F. Ruth & Benjamin Kroposki, *Energy Systems Integration: An Evolving Energy Paradigm*, 27 Electricity J. 36, 40 (2014) (citing research finding that smart grid technologies have the capacity to deliver significant benefits, primarily from applications allowing customers to shift demand from high peak to lower peak periods).

74. Sioshansi, *supra* note 3, at 70. Black & Veatch reports that utilities are just beginning to work actively with customers to provide real time data and shift usage away from peak periods. Black & Veatch, *supra* note 71, at 44. The Advanced Energy Economy Institute (AEEI) describes innovation in electric products and services, including tools for managing usage and shifting demand away from peak periods, as one of the key elements of the future of the utility system. *See* AEEI, *supra* note 2, at 12–13.

75. *See* Rocky Mountain Inst. (RMI), Rate Design for the Distribution Edge: Electricity Pricing for a Distributed Resource Future 26–27 (2014), http://www.rmi.org/elab_rate_design.

76. *See* Cheryl Dancey Balough, *Privacy Implications of Smart Meters*, 86 Chi.-Kent L. Rev. 161, 165–67 (2011) (detailing new data that utilities can or will be able to access through smart meters).

being prepared to share the information with the individual customer or with alternative providers of energy services.[77] Thus, the utility of today must become an expert in information management, data sharing, cyber security, and privacy. In addition, the system must be kept secure from attack—both physical and cyber—at a level of threat not previously experienced.[78] And finally, with an increasing number of extreme weather events, utility systems must become more resilient than before, less likely to fail during weather events, and faster to recover after outages.[79]

B. *Distributed Energy Resources*

Perhaps the most pressing technological issue facing utilities today is the expansion of distributed resources and concomitant need for new distribution infrastructure.[80] Where Samuel Insull once designed his utility around a large central generating facility, with a one-way grid that delivered electricity into his customers' businesses and homes, utilities today are increasingly asked to accommodate distributed generation sources, including residential solar, commercial solar and wind, and co-generation.[81] Electric

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77. *See* Samuel J. Harvey, *Smart Meters, Smarter Regulation: Balancing Privacy and Innovation in the Electric Grid*, 61 UCLA L. REV. 2068, 2084–86 (2014) (discussing how customer privacy concerns can impede adoption of automated meter infrastructure); Sonia K. McNeil, *Privacy and the Modern Grid*, 25 HARV. J.L. & TECH. 199, 215 (2011) (citing surveys finding that customers do not want their usage data shared outside the utility). For a discussion of non-utility service providers, particularly entities providing products and services related to the smart grid and energy efficiency, and privacy concerns related to their use of customer data, see Andreas S. V. Wokutch, *The Role of Non-Utility Service Providers in Smart Grid Development: Should They Be Regulated, and if So, Who Can Regulate Them?*, 9 J. TELECOMM. & HIGH TECH. L. 531, 535–38, 543–44 (2011).

78. *See* Roland L. Trope & Stephen J. Humes, *Before Rolling Blackouts Begin: Briefing Boards on Cyber Attacks that Target and Degrade the Grid*, 40 WM. MITCHELL L. REV. 647, 656 (2014) (identifying risks to the utility grid posed by cyber attack); Zhen Zhang, *Cybersecurity Policy for the Electricity Sector: The First Step to Protecting Our Critical Infrastructure*, 19 B.U. J. SCI. & TECH. L. 319, 326–31 (2013) (describing the need for cybersecurity in the electric sector and difficulty posed by technical and governance challenges).

79. *See* U.S. DEP'T OF ENERGY, U.S. ENERGY SECTOR VULNERABILITIES TO CLIMATE CHANGE AND EXTREME WEATHER 35–36 (2013), http://energy.gov/downloads/us-energy-sector-vulnerabilities-climate-change-and-extreme-weather (warning of the potential disruptions to U.S. energy supply and electric grid as a result of climate change and extreme weather events); Kevin B. Jones et al., *The Urban Microgrid: Smart Legal and Regulatory Policies to Support Electric Grid Resiliency and Climate Mitigation*, 41 FORDHAM URB. L.J. 1695, 1700–01 (2014) (describing the need for increased resilience and potential role for microgrids).

80. *See* LOVINS, *supra* note 59, at 206–09 (providing a definition, overview, and description of distributed resources).

81. *See* Rob Neumann & Ralph Zarumba, *Distributed Generation: Disruptive Technology or Regulatory Challenge*, PUB. UTIL. FORT., Aug. 2015, at 28, 29–30 (describing the growth of distributed generation and noting the variety of ways it may be integrated into a utility system); Ruth & Kroposki, *supra* note 73, at 44 (analyzing benefits of integrating distributed

demand in the future may be met by a traditional generating resource, but may also be met by demand response or energy efficiency programs.[82] Commercial installations or residential communities may opt for a microgrid that aggregates distributed resources and provides electric services that are either wholly or partially separate from the utility grid.[83]

Regulators and customers expect the distribution grid to evolve to meet this demand with two-way systems capable of balancing intermittent resources while still maintaining high levels of reliability. Yet in many areas, the grid is already strained by a relatively small number of distributed resources.[84] Meanwhile, most analysts agree that the grid will require significant investment before it can accommodate the penetration of distributed resources envisioned by clean energy proponents while also meeting modern demands for data processing, cybersecurity, and privacy.[85]

Although the costs are significant, the benefits of distributed generation for the future electric power system have the potential to be even greater. Renewable resources, including residential solar and community wind, can reduce greenhouse gas emissions and fossil fuel dependency.[86] Distribution

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resources across energy systems, including combined heat and power (CHP)); Gina S. Warren, *Vanishing Power Lines and Emerging Distributed Generation*, 4 Wake Forest J.L. & Pol'y 347, 352–64 (2014) (providing history of the development of the energy delivery system, including the vertically integrated system favored by Samuel Insull).

82. *See* Kenneth Gillingham et al., *Energy Efficiency Policies: A Retrospective Examination,* 31 Ann. Rev. Env't. & Resources 161, 162 (2006) (detailing a variety of energy efficiency programs, including utility incentives, building codes, and transportation policies). Demand response programs engage customers in modifying their load to reduce or shift peak demand, or to control load through the use of automatic programs or incentives. *See* U.S. Dep't of Energy, *Demand Response*, Energy.gov: Office of Electricity Delivery & Energy Reliability, http://energy.gov/oe/technology-development/smart-grid/demand-response (last visited Apr. 2, 2016).

83. *See* Twaite, *supra* note 7, at 976–78 (2010) (recommending a consistent statutory scheme to reduce barriers to microgrid adoption).

84. *See* Griselda Blackburn et al., *Solar Valuation and the Modern Utility's Expansion into Distributed Generation*, 27 Electricity J. 18, 19, 21 (2013) (citing the need for system upgrades due to distributed solar installations).

85. *See* N.Y. State Pub. Serv. Comm'n, Order Adopting Regulatory Policy Framework and Implementation Plan (Track One), Case 14-M-0101, at 16–17, 20, 25 (Feb. 26, 2015) [hereinafter REV Order] (describing a need to replace aging infrastructure, including distribution grid); Nadel & Herndon, *supra* note 8, at 42–43 (citing state reports on grid modernization); Ruth & Kroposki, *supra* note 73, at 36, 38 (estimating total investments in transmission and distribution necessary to modernize the grid ranging up to more than $1 trillion).

86. *See* 1 Nat'l Renewable Energy Lab. (NREL), 2012 Renewable Electricity Futures Study 2–9 (M.M. Hand et al. eds., 2012), http://www.nrel.gov/analysis/re_futures/ (finding increased renewable electricity supply reduced direct carbon emissions by up to 95% in a 90% renewable energy scenario); *see also* Ralph E.H. Sims et al., *Carbon Emission and Mitigation Cost Comparisons Between Fossil Fuel, Nuclear and Renewable Energy Resources for Electricity*

grid enhancements improve overall reliability by providing more granular outage data that assists in recovery efforts and allows the utility to manage local outages before they create system-wide disturbances.[87] Microgrids can also enhance resilience and enable quicker recovery after extreme weather events.[88]

For utilities, however, distributed resources create a number of challenges. At the most basic level, distributed generation owned by non-utility entities represents a disruption of the regulated monopoly concept.[89] The growth of distributed resources also forces utilities to develop new services to accommodate customer demand, such as load management and support for interconnection.[90]

Another challenge created by distributed generation is the technological difficulty of meeting new customer demands. Most existing distribution systems were not intended to provide the two-way grid access distributed resources require, and in areas of high renewable penetration, the grid is showing the strain.[91] Accommodating distributed generation will require new infrastructure, which means additional costs.[92] Distributed generation, when provided by renewable resources such as solar and wind, is also chal-

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Generation, 31 ENERGY POL'Y 1315, 1315 (2003) (finding that the global electric industry could reduce both generation costs and greenhouse gas emissions by increasing penetration of renewable resources, switching to lower carbon fuels, and sequestering carbon emissions).

87. *See generally* U.S. DEP'T OF ENERGY, SMART GRID INVESTMENTS IMPROVE GRID RELIABILITY, RESILIENCE, AND STORM RESPONSES (2014) http://energy.gov/sites/prod/files/2014/12/f19/SG-ImprovesRestoration-Nov2014.pdf (analyzing improvements in outage management at three smart grid projects and extrapolating findings).

88. *See* NADEL & HERNDON, *supra* note 8, at 979–82; Jones et al., *supra* note 79, at 1699–1701; James Newcomb et al., *Distributed Energy Resources: Policy Implications of Decentralization*, 26 ELECTRICITY J. 65, 71 (2013) (describing benefits of microgrids).

89. Black and Veatch's 2015 survey of utility sector participants, including publicly-owned utilities, investor-owned utilities, cooperatives, and independent power producers, found that 77% felt it was important to adjust the regulatory construct to recognize changes in the energy market, with 86.1% of investor-owned utilities rating a change in the regulatory construct as "important." BLACK & VEATCH, *supra* note 71, at 48–49.

90. *See* Tomain, *supra* note 12, at 516–18 (describing a variety of new energy products and services utilities are starting to offer); Wiedman & Beach, *supra* note 7, at 94–95, 102 (describing shared renewable programs and the potential for utilities to engage in "integrated distribution planning" to address interconnection issues). NY's REV proceeding envisions that utilities will someday provide a variety of grid services, including ancillary services and load management, "value-added electric services, such as fixed commodity pricing," and "alternative supply models such as community aggregation, microgrids and community based solar and/or storage." REV Order, *supra* note 85, at 33–34.

91. *See* Blackburn et al., *supra* note 84, at 21.

92. *See supra* note 85 and accompanying text.

lenging because it is intermittent, putting strain on the distribution grid to accommodate the variation in demand and supply.[93]

C. *Decarbonization*

Scientists agree that the earth is warming, the climate is becoming more volatile, and greenhouse gasses (GHGs), primarily carbon dioxide, are to blame.[94] Climate change is already occurring, with devastating effects.[95] In the U.S., wildfire and drought have ravaged the Northwest and California.[96] The fishing industry has lost billions of dollars from closed fisheries due to an abnormally large toxic algae bloom in the Pacific.[97] Military experts agree that climate change threatens national security and may lead to an increase in terrorism.[98] Extreme weather events are occurring with

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93. *See* KASSAKIAN ET AL., *supra* note 42, at 55–56 (describing the challenge of integrating distributed and renewable resources into the utility grid).

94. The Intergovernmental Panel on Climate Change (IPCC) is the leading international scientific organization in the field of climate change assessment. *See Organization*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), http://www.ipcc.ch/organization/organization.shtml#.UQxmXmfC5bI (last visited Apr. 2, 2016). For more information about the IPCC and recent publications, see INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), http://www.ipcc.ch/index.htm (last visited Apr. 2, 2016). As the most recent summary for policymakers states, "Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia." INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), SUMMARY FOR POLICYMAKERS: CLIMATE CHANGE 2014: SYNTHESIS REPORT 2 (2014), http://www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf.

95. *See* C.B. FIELD ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), SUMMARY FOR POLICYMAKERS: CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY, PART A: GLOBAL AND SECTORAL ASPECTS 4–8 (2014), http://ipcc wg2.gov/AR5/images/uploads/WG2AR5_SPM_FINAL.pdf (summarizing global impacts of climate change).

96. Ralph Ellis & Laura Smith-Spark, *Wildfires Threaten Homes in Idaho, Washington, California and Oregon*, CNN (Aug. 16, 2015, 10:06 PM), http://www.cnn.com/2015/08/16/us/western-states-wildfires/.

97. Tom Hallman, Jr., *Biggest-Ever Toxic Algal Bloom Hits West Coast, Shutting Down Shellfish Industries*, OREGONLIVE (June 17, 2015, 10:39 AM), http://www.oregonlive.com/pacific-northwest-news/index.ssf/2015/06/west_coast_shellfish_industrie.html.

98. The 2014 Quadrennial Defense Review, a public document released by the U.S. Department of Defense to describe current U.S. military policy, describes climate change as a "threat multiplier" that can "enable terrorist activity and other forms of violence." U.S. DEP'T OF DEFENSE, QUADRENNIAL DEFENSE REVIEW 2014, at 8 (2014), http://www.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf. A 2014 report by the CNA Military Advisory Board calls climate change a "catalyst for instability and conflict." MILITARY ADVISORY BOARD, THE CNA CORPORATION, NATIONAL SECURITY AND THE ACCELERATING RISKS OF CLIMATE CHANGE 2 (2014), https://s3.amazonaws.com/s3.documentcloud.org/documents/1180456/cna-military-advisory-board-report.pdf. "'In the past, the thinking was that climate change multiplied the significance of a situation,' said Gen. Charles F. Wald, who contributed to both reports and is retired from the Air Force. 'Now we're saying it's going to be a direct cause of instability.'" Coral Davenport, *Climate Change Deemed Growing Security Threat by Military Researchers*,

greater frequency and intensity,[99] and sea level rise is damaging roads, bridges, and commercial and residential developments.[100] Although some believe that the opportunity to limit warming to 2 degrees Celsius (the previously agreed-upon limit) has already passed,[101] most agree the opportunity to forestall worst-case scenarios of four degrees (or more) of warming still remain.[102]

The energy sector contributes the majority of U.S. GHG emissions and therefore holds important promise for mitigation.[103] The EPA has concluded that GHG emissions are air pollutants that threaten the health and safety of U.S. citizens and is taking steps to curb GHG emissions from power plants.[104] Meanwhile, international efforts to reach a new agreement to reduce GHG emissions globally culminated with the meeting of the UNFCCC parties (COP21) in Paris in December 2015, at which an historic

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N.Y. TIMES (May 14, 2014), http://www.nytimes.com/2014/05/14/us/politics/climate-change-deemed-growing-security-threat-by-military-researchers.html?_r=0; *see also* Arija Flowers, *National Security in the 21st Century: How the National Security Council Can Solve the President's Climate Change Problem*, 11 SUS. DEV. L. & POL'Y 50, 51–52 (2011) (describing indirect effects of climate change and international security challenges).

99. Sarah Lyall, *Heat, Flood or Icy Cold, Extreme Weather Rages Worldwide*, N.Y. TIMES (Jan. 10, 2013), http://www.nytimes.com/2013/01/11/science/earth/extreme-weather-grows-in-frequency-and-intensity-around-world.html.

100. *See* ERIKA SPANGER-SIEGFRIED ET AL., UNION OF CONCERNED SCIENTISTS, ENCROACHING TIDES: HOW SEA LEVEL RISE AND TIDAL FLOODING THREATEN U.S. EAST AND GULF COAST COMMUNITIES OVER THE NEXT 30 YEARS 1–2 (2014).

101. The current rate of emissions is estimated to bring global temperature increases in the range of 3.7 to 4.8 °C by 2100. O. EDENHOFER ET AL., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), SUMMARY FOR POLICYMAKERS: CLIMATE CHANGE 2014: MITIGATION OF CLIMATE CHANGE 10 (2014), https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf.

102. For a discussion of the devastating impacts of a four degree world, see FIELD ET AL., *supra* note 95, at 13 and HANS JOACHIM SCHELLNHUBER ET AL., WORLD BANK, EXECUTIVE SUMMARY, TURN DOWN THE HEAT: WHY A 4 DEGREE CELSIUS WARMER WORLD MUST BE AVOIDED (2014), http://documents.worldbank.org/curated/en/2012/11/17485703/turn-down-heat-4-degree-celsius-warmer-world-must-avoided-executive-summary.

103. *See* U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990 – 2010, at ES-12 (2012), www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2012-Main-Text.pdf ("Energy-related activities, primarily fossil fuel combustion, accounted for the vast majority of U.S. CO_2 emissions for the period of 1990 through 2010. . . . Overall, emission sources in the Energy chapter account for a combined 87.0[%] of total U.S. greenhouse gas emissions in 2010."). Electricity generation is the largest single source of carbon dioxide emissions in the United States, accounting for 42% of all carbon dioxide emissions. *Id.* at 3–11.

104. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,662, 64,664 (Oct. 23, 2015) (to be codified at 40 C.F.R. pt. 60).

agreement was reached to limit global warming to less than two degrees Celsius.[105]

For the U.S. to substantially lower GHG emissions from the energy sector, it will have to decarbonize the electric power system.[106] A recent study by the National Renewable Energy Lab (NREL) concludes that the U.S. can transition to producing 80% of its electricity from renewable resources by 2050 without significant new technological breakthroughs.[107] Such a transition would take political will—and a significant financial commitment.[108]

Aside from the necessity to address climate change, many other reasons exist to move the electric power sector away from fossil fuels. Analysts have long pointed to the financial and technological benefits of energy efficiency, which can cost-effectively reduce demand, lower consumer bills, and reduce the need for new transmission and distribution infrastructure.[109] In many regions, renewable resources have either reached financial parity with fossil fuel resources or are even cheaper.[110] Renewable resources and energy effi-

105. For a variety of resources describing the COP21 agreement and its implementation around the world, see United Nations Conference on Climate Change, *What Was COP21?*, LEARN, http://www.cop21.gouv.fr/en/ (last visited Apr. 2, 2016). *See also* Coral Davenport, *Nations Approve Landmark Climate Accord in Paris*, N.Y. TIMES (Dec. 12, 2015), http://www.nytimes.com/2015/12/13/world/europe/climate-change-accord-paris.html?_r=0.

106. *See* GRANGER MORGAN ET AL., PEW CENTER ON GLOBAL CLIMATE CHANGE, THE U.S. ELECTRIC POWER SECTOR AND CLIMATE CHANGE MITIGATION 1 (2005), http://www.c2es.org/docUploads/Electricity_Final.pdf.

107. *See* 1 NREL, *supra* note 86, at iii; *see also* Mark Jaffe, Op-Ed., *Renewable Energy Could Provide 80% of US Electricity – But at What Cost?*, DENVER POST (July 9, 2012, 12:20 PM), http://blogs.denverpost.com/thebalancesheet/2012/07/09/renewable-energy/5430/ ("The impact on electricity rates varies with the scenarios but the range is $130 to $161 a megawatt-hour compared with a average business-as-usual baseline rate of $111 – on the low end a 21 percent increase to transform the nation's electricity system.").

108. 1 NREL, *supra* note 86, at A-29 (estimating range of additional costs for a high renewable portfolio future varying according to level of penetration, with a potential cost differential of 29% in the highest penetration scenario).

109. *See* NADEL & HERNDON, *supra* note 8, at vii–viii. Nadel and Herndon have found that energy efficiency policies and programs have contributed significantly to slowing electric demand growth. *Id.* at 1. Energy efficiency remains the cheapest alternative to new generating resources, including natural gas, coal, and wind. *Id.* at 3.

110. *See* RON BINZ ET AL., CERES, PRACTICING RISK-AWARE ELECTRICITY REGULATION: 2014 UPDATE 8–10, 15 (2014), http://www.ceres.org/resources/reports/practicing-risk-aware-electricity-regulation-2014-update. Deutsche Bank has concluded that solar PV is below the retail price for electricity in many markets globally, and the price is expected to drop another 40% in the next 4–5 years. DEUTSCHE BANK, SOLAR GRID PARITY IN A LOW OIL PRICE ERA 1, 9–10 (2015), https://www.db.com/cr/en/concrete-deutsche-bank-report-solar-grid-parity-in-a-low-oil-price-era.htm; *see also* BINZ ET AL., *supra*, at 8–10 (discussing falling prices for renewable resources, particularly solar); NADEL & HERNDON, *supra* note 8, at 3 (illustrating the range of costs per lifetime kWh for various generating resources, with energy efficiency as the lowest

ciency also entail lower financial risk because they do not require ongoing access to fuel, which may vary in price and availability over the life of a resource.[111]

Another reason to shift to clean energy is that dependence on fossil fuel puts U.S. military personnel in harm's way and restricts strategic initiatives and opportunities.[112] For this reason, the U.S. military has made significant and unprecedented investments in renewable energy.[113]

The move to decarbonize the electric power system will require work on a number of fronts. Over time, fossil fuel resources will be retired and new renewable resources added to the generation mix.[114] New demand can be met in part with cost-effective demand response and energy efficiency.[115]

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cost resource, and wind and natural gas as the next lowest, depending on the point in the range considered).

111. For a complete analysis of the cost/risk profile of various electric generation resources, see BINZ ET AL., *supra* note 110, at 14–17.

112. A 2008 report by the Government Accountability Office states, "DOD's high fuel requirements on the battlefield can place a significant logistics burden on military forces, limit the range and pace of operations, and add to mission risks." U.S. GOV'T ACCOUNTABILITY OFFICE, DEFENSE MANAGEMENT: OVERARCHING ORGANIZATIONAL FRAMEWORK COULD IMPROVE DOD'S MANAGEMENT OF ENERGY REDUCTION EFFORTS FOR MILITARY OPERATION 5 (2008), http://www.gao.gov/assets/120/119405.pdf (statement of William M. Solis, Director Defense Capabilities and Management). Estimates suggest that of the casualties in Afghanistan caused by improvised explosive devices, 10% occur on roads during resupply missions. Siddhartha M. Velandy, *The Green Arms Race: Reorienting the Discussions on Climate Change, Energy Policy, and National Security*, 3 HARV. NAT'L SECURITY J. 309, 328 (2012).

113. *See* AM. COUNCIL ON RENEWABLE ENERGY, 2014 INDUSTRY REVIEW: RENEWABLE ENERGY FOR MILITARY INSTALLATIONS 4 (2014), http://acore.org/files/pdfs/Renewable-Energy-for-Military-Installations.pdf.

114. *See* 1 NREL, *supra* note 86, at xxxiv ("[A]chieving high renewable electricity futures would require a sustained increase in renewable capacity additions."); Nils Johnson et al., *Stranded on a Low-Carbon Planet: Implications of Climate Policy for the Phase-Out of Coal-Based Power Plants*, 90 TECH. FORECASTING & SOC. CHANGE 89, 89 (2015) (noting that transforming the electric power system to one fueled by 80% renewable resources is dependent on phasing out fossil-fuel based electric generation). The NREL study found that the role of fossil-fuel fired plants in a high-renewable future is highly uncertain, due to a variety of factors, including the impact of new regulations, which may require the phase-out of coal-fired plants for other reasons. *See* 1 NREL, *supra* note 86, at 1-14 to 1-15. However, even absent new carbon policies, coal-fired power plants are expected to retire at increasing rates due to fuel costs, competition with cheap natural gas, and the cost of compliance with environmental regulations. *See* U.S. Energy Info. Admin., *Scheduled 2015 Capacity Additions Mostly Wind and Natural Gas; Retirements Mostly Coal*, TODAY IN ENERGY (Mar. 10, 2015), http://www.eia.gov/todayinenergy/detail.cfm?id=20292.

115. *See generally* AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., CHANGE IS IN THE AIR: HOW STATES CAN HARNESS ENERGY EFFICIENCY TO STRENGTHEN THE ECONOMY AND REDUCE POLLUTION (2014), http://aceee.org/files/pdf/summary/e1401-summary.pdf. In 2010, the Northwest Public Power Planning Council estimated that 85% of load growth in the Pacific Northwest could be met with cost effective energy efficiency through 2030. NW. POWER & CONSERVATION

To accommodate these new resources, the distribution and transmission grids will have to be significantly upgraded and expanded.[116] New technologies for controlling load will have to be implemented.[117] Instead of focusing on new supply resources, a paradigm shift will have to occur in which demand response programs and storage enable utilities to shift load.[118] All of these efforts will require commitment from regulators and utilities.

D. *Does Financial Stability Still Matter?*

Financial stability and investor confidence were once considered basic regulatory goals, and they still appear, at least at a basic level, in many discussions of the future of the electric industry. The Advanced Energy Economy Institute's (AEEI) working group on the future of California's electric system holds as a guiding principle that "regulatory and market certainty will accelerate progress" and notes that "greater market certainty will be important to help attract needed financing and investment."[119] Minnesota's "e21 Initiative," an unofficial, stakeholder-driven process to develop a new regulatory framework for utilities, concludes that two of its primary intended outcomes are "an economically viable utility" and "timely and predictable recovery of utilities' fixed costs."[120]

On the other hand, some analyses of the evolution of the utility pay little attention to this formerly important goal. For example, New York's Reforming the Energy Vision (REV) proceeding, which was intended to "reorient both the electric industry and ratemaking paradigm . . . [and achieve] the development of a resilient, climate-friendly energy system," adopted six key objectives, none of which concern utility financial stability.[121] In the midst of fights over residential solar and fixed energy charges, some commentators have decried utility attempts to raise fixed charges and offered alternatives such as "better management" to address lost revenues,

Council, Council Document 2010-09, Sixth Northwest Conservation and Electric Power Plan 1 (2010), http://www.nwcouncil.org/energy/powerplan/6/default.htm.

116. *See supra* note 85 and accompanying text.

117. 1 NREL, *supra* note 86, at xviii (noting that a more flexible system and new technology would be required to accommodate increasing levels of renewable resources).

118. Sioshansi, *supra* note 3, at 72 (discussing the shift to viewing demand as flexible, rather than just supply).

119. AEEI, *supra* note 2, at 6.

120. e21 Initiative, *supra* note 5, at 5 (identifying issues, challenges, and desired outcomes related to the utility business model).

121. REV Order, *supra* note 85, at 3–4 (noting that the six key objective are: enhanced customer engagement, market animation, system-wide efficiency, fuel and resource diversity, system reliability and resiliency, and reduction of carbon emissions).

without offering ways for utilities to recover lost revenue and maintain current levels of financial stability.[122]

Recent financial metrics suggest that utilities are no longer providing the same level of confidence to investors as they have in past decades. In recent years, financial analysts have repeatedly downgraded recommendations for utility securities.[123] Utility bond ratings have shown marked declines since 1970.[124] Barclays made headlines in 2014 when it downgraded the entire utility sector based on threats from residential solar, storage, and the potential failure of the regulatory compact.[125] The language in the Barclays report is instructive: "While the regulator/utility construct has usually resulted in low-risk returns to credit in the past, technological change creates precisely the environment where slower-moving incumbents and their regulators can fall behind the curve, risking credit volatility, or disrupt the regulatory compact, possibly leading to unexpected losses for bondholders."[126]

What does this increasing strain on utility financial security mean for regulatory goals? At a minimum, it suggests that regulators must continue to monitor and be responsive to investor concerns, particularly in light of today's changing market conditions. Increased renewable capacity and dis-

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122. *See* Seth Nowak, *Some Utilities Are Rushing to Raise Fixed Charges. That Would Be Bad for the Economy and Your Utility Bill*, AM. COUNCIL FOR ENERGY-EFFICIENT ECON. (Dec. 5, 2014, 3:08 PM), http://aceee.org/blog/2014/12/some-utilities-are-rushing-raise-fixe (urging against increasing fixed charges and "Utilities shouldn't take away customers' ability to control their electricity bills or dilute the benefits that energy efficiency brings to the nation"); NADEL & HERNDON, *supra* note 8, at 22–24 (offering recommendations for better management techniques at utilities).

123. *See* Michael Aneiro, *Barclays Downgrades Electric Utility Bonds, Sees Viable Solar Competition*, BARRON'S (May 23, 2014, 11:45 AM), http://blogs.barrons.com/incomeinvesting/2014/05/23/barclays-downgrades-electric-utility-bonds-sees-viable-solar-competition; *Morgan Stanley Sees 10% Upside in 2015; Downgrades (Healthcare, Tech, Utilities, Ind.), Upgrades (Financials, Energy)*, STREETINSIDER.COM (Dec. 1, 2014, 9:17 AM), http://www.streetinsider.com/Analyst+Comments/Morgan+Stanley+Sees+10%25+Upside+in+2015%3B‡owngrades+%28Healthcare,+Tech,+Utilities,+Ind.%29,+Upgrades+%28Financials,+Energy%29/10056765.html.

124. *See* MCDERMOTT, *supra* note 44, at 20 (showing the percent of electric utility bond ratings at A- or higher drop from over 90% in 1970 to approximately 20% in 2009). A recent industry analysis suggests that the credit markets for utilities bottomed out in 2003, with an average credit rating of BBB-. *See* EDISON ELEC. INST., 2014 FINANCIAL REVIEW: ANNUAL REPORT OF THE U.S. INVESTOR-OWNED ELECTRIC UTILITY INDUSTRY 1 (2014), http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/finreview/Pages/default.aspx. The average credit rating in 2014 was BBB+, and rating agency reports suggest the market has stabilized. *Id.* at 72–74.

125. *See* Rob Wile, *Barclays Has the Best Explanation Yet of How Solar Will Destroy America's Electric Utilities*, BUS. INSIDER (May 28, 2014, 9:51 AM), http://www.businessinsider.com/barclays-downgrades-utilities-on-solar-threat-2014-5#ixzz3kR5iR215.

126. Aneiro, *supra* note 123 (citing Barclays report).

tributed generation require significant investment in transmission and distribution infrastructure, and if recovery of the cost of these projects becomes uncertain, the cost of capital for these investments will increase.[127] In addition, regulators must be cognizant of the constitutional limits established in the *Hope* and *Bluefield* cases.[128] Utility investors are entitled to a return commensurate with the risks of similarly situated industries; if regulatory risk increases, investors will be entitled to higher rates of return.[129] While utilities are currently still able to attract capital and ensure financial viability, regulators must ensure that this remains the case going forward.

III. New Utility Goals and Priorities

Regulators, industry insiders, and environmentalists are by no means united in their vision for the reimagined electric power system. However, based on the foregoing analysis of current market trends and the literature regarding the future of the utility system, this Part identifies key goals and priorities for the new utility system and considers whether the new goals and incentives created by the current regulatory structure remain in alignment.

A. *New Utility Goals*

The prioritization and magnitude of the goals for the electric industry shift according to the perspective of the goal-setter, but certain commonalities emerge from an analysis of the literature. This Section presents key trends identified at the federal, state, and local level.

1. Decarbonization

The Intergovernmental Panel on Climate Change (IPCC) has stated that decarbonizing electric generation is a "key measure" for mitigating climate change.[130] The U.S. EPA asserts, "Reducing CO_2 emissions from power plants, and driving investment in clean energy technologies strategies that do so, is an essential step in lessening the impacts of climate change

127. *See* Kassakian et al., *supra* note 42, at 184 ("If utilities make investments in an environment of substantial uncertain cost recovery, their cost of capital may rise, exacerbating cost-recovery challenges.").

128. *See supra* notes 28–31 and accompanying text.

129. *See* Edison Elec. Inst., Electric Utilities and Risk Compensation 2 (2006), http://www.eei.org/resourcesandmedia/industrydataanalysis/industryfinancialanalysis/QtrlyFinancialUpdates/Documents/QFU_Credit/2014_Q2_Credit_Ratings.pdf (setting forth five fundamental postulates for defining utility risk); *see also* Lesser & Giacchino, *supra* note 35, at 139–42 (describing the fundamental process of defining the fair rate of return for utility investment and defining the cost of capital).

130. IPCC, *supra* note 94, at 28.

and providing a more certain future for our health, our environment, and future generations."[131]

While the level of commitment to decarbonization by policymakers and the public varies,[132] utilities are increasingly reducing the carbon footprint of their systems.[133] Whether it is because of EPA's Clean Power Plan, the threat of future regulation, or simple economics, fossil fuel generating resources are increasingly being replaced by renewable ones, and the system is likely to see more pressure in this direction in the future.[134]

2. Distributed Energy Resources

Utilities and regulators agree that the future electric system will include more distributed generating resources, which will have the benefits of increasing resilience, reliability, and efficiency.[135] On the generation side, a transition to distributed renewables has the potential to mitigate or shift peak demand, obviate the need for additional transmission infrastructure, and address areas of transmission or generation constraint, as well as decrease carbon emissions.[136] Modernized grid facilities will also facilitate the collection and dissemination of granular usage data, allowing for development of differentiated rates and high levels of personalized information for customers.[137]

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131. U.S. ENVTL. PROTECTION AGENCY, FACT SHEET: OVERVIEW OF THE CLEAN POWER PLAN 2 (2015), http://www2.epa.gov/cleanpowerplan/fact-sheet-overview-clean-power-plan (describing why the Clean Power Plan is needed).

132. At the state level, renewable resource portfolio targets vary from zero (no defined renewable resource portfolio standards) to 75% by 2032 (Vermont) and 100% by 2045 (Hawaii). *See* DSIRE, *supra* note 48.

133. *See* U.S. ENERGY INFO. ADMIN., U.S. ENERGY-RELATED CARBON DIOXIDE EMISSIONS 2013, at 8 (2014), http://www.eia.gov/environment/emissions/carbon/pdf/2013_co2analysis.pdf (attributing the decline in electric sector carbon intensity to an increase in renewable resources, decline in coal-fired generation, and substitution of natural gas for coal).

134. *See supra* notes 106, 108, 112–14 and accompanying text; *see also* Commission's Inclinations on the Future of Hawaii's Electric Utilities, at 5, Exhibit A to Decision and Order, *In re* Integrated Res. Planning, Docket No. 2012-0036, Order No. 32052 (Haw. Pub. Utils. Comm'n Apr. 28, 2014), http://puc.hawaii.gov/wp-content/uploads/2014/04/Decision-and-Order-No.-32052.pdf ("[P]ursing a diverse portfolio of renewable energy resources provides the best long-term strategy."); REV Order, *supra* note 85, at 24 (stating a need to reduce carbon emissions of electric generation, transportation, and building heating); AEEI, *supra* note 2, at 3 (describing California's "path to significant de-carbonization").

135. *See, e.g.*, E21 INITIATIVE, *supra* note 5, at 4 ("The rapidly emerging modern grid looks much more distributed and decentralized."); RMI, *supra* note 75, at 6 ("[T]he electricity system is shifting toward a future in which the deployment and operation of distributed energy resources (DERs) will have far-reaching implications for grid operation, investment, and security.").

136. *See* Wiedman & Beach, *supra* note 7, at 89.

137. *See supra* notes 73–75 and accompanying text.

The Massachusetts Department of Public Utilities (DPU), for example, has instituted a proceeding devoted to creating a vision for a "modern electric system" that is primarily focused on planning for new grid technologies.[138] Maryland's Utility 2.0 Report concludes that "smart grid information, analysis, control and savings" is a key category in which progress should occur.[139] New York's REV proceeding, a state initiative focused on transforming the New York electric system to become more efficient, less dependent on fossil fuels, and more responsive to customer needs, has also focused heavily on distributed resources.[140]

3. Provision of New Customer Services

Customers, regulators, and utilities also agree that the utility of the future will need to be more responsive to customer demands for alternative services.[141] Where in the past the utility sold kilowatt hours and provided basic customer service related to that commodity, in the future utilities will be asked to offer a variety of alternative services, including maintaining customers' privacy, and ensuring the security of customer and utility data.[142]

4. Financial Stability

While it may be hyperbole to suggest that the financial stability of utilities is in jeopardy, protection of the financial health and stability of utilities must remain a central goal of the regulatory system. Beyond constitutional requirements, the financial health of utilities directly impacts their ability to accomplish the other goals on this list, particularly the transition to a decarbonized generation portfolio and increased investment in distribution infrastructure.[143] While financial stability does not always feature prominently

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138. Investigation of Grid Modernization, *supra* note 5, at 2.

139. Energy Future Coal., *supra* note 5, at 1.

140. *See* REV Order, *supra* note 85, at 11 (noting that distributed resources will become "integral tools" in the new electric system).

141. *See supra* Subsection II.A.2.

142. *See id*; *see also* Energy Future Coal., *supra* note 5, at 2–3, 21 (forecasting a need for increased responsiveness to customer demands, new demands for utility services, and a need to adjust ratemaking accordingly); Nadel & Herndon, *supra* note 8, at 48 (discussing calls for new utility services).

143. *See* Cal. Pub. Utils. Comm'n., Electric Utility Business and Regulatory Models 11 (Jun. 8, 2015), http://cpuc.ca.gov/uploadedFiles/CPUC_Public_Website/Content/About_Us/Organization/Divisions/Policy_and_Planning/PPD_Work/PPDElectricUtilityBusinessModels.pdf ("The ability of the utilities to invest significant capital in the distribution grid is in part a function of their ability to attract investors . . . . In turn, their ability to attract investors is a function of their ability to provide a profit for shareholders.").

in the "utility of the future" discussions,[144] it is an essential element of the list of goals for the utility of the future.

5. Safe and Adequate Service at Reasonable Rates

The underlying mission of all utility regulation has always been the provision of safe and adequate service at just and reasonable rates,[145] and this guideline principle is likely to remain a goal for the new utility system.[146]

B. *Establishing Priorities Among Competing Alternatives*

In the past, key regulatory goals of low prices and adequate service remained basically in alignment, thanks to increasing economies of scale.[147] Today, however, the new utility goals may directly conflict with each other, requiring an unfamiliar exercise in prioritization. Upgrading the utility grid to allow for greater penetration of distributed resources may lead to increased rates of decarbonization and greater resilience,[148] but is likely to also require significant investment that may drive up rates.[149] How should utility regulators view a choice between lower rates and more distributed resources? If investment in renewable resources will drive up utility rates but increase decarbonization, which is more important?

Currently, some jurisdictions use long-term planning processes to weigh the costs and risks of new resources over an extended planning horizon,[150] and some include the potential cost of carbon and impact of new environmental regulations in this analysis.[151] But the utility planning pro-

144. Some of the new utility discussions do include some mention or discussion of the financial health of the modern utility. For example, the Maryland proceeding has noted that changes to the utility business model are necessary to keep the utility "financially viable" even as it delivers less energy to customers. *See* ENERGY FUTURE COAL., *supra* note 5, at 1.

145. *See supra* note 24 and accompanying text.

146. *See* Investigation of Grid Modernization, *supra* note 5 (describing one goal of the modernized grid as providing customers with the ability to decrease bills); REV Order, *supra* note 85, at 14 (noting that the New York Public Service Commission must meet existing regulatory expectations as well as new environmental goals); E21 INITIATIVE, *supra* note 5, at 2 (including the guiding principles of providing "just, reasonable, and competitive rates"); Sioshansi, *supra* note 3, at 73–74 (describing the pressures of current market trends and how they are likely to compel new utility business models).

147. *See supra* notes 18, 38–39, 51–53 and accompanying text.

148. *See supra* notes 87–88 and accompanying text.

149. *See supra* note 92 and accompanying text.

150. These long-term planning processes generally produce what is known as an Integrated Resource Plan (IRP). For a summary of state IRP rules, see WILSON & PETERSON, *supra* note 46, at 2. *See also* Bertschi, *supra* note 46, at 832–34 (describing components of an IRP).

151. *See* Galen Barbose et al., *Managing Carbon Regulatory Risk in Utility Resource Planning: Current Practices in the Western United States*, 36 ENERGY POL'Y 3300, 3301–03 (2008)

cess will only become more complicated as new policy goals are created, with benefits accruing to not just utility ratepayers, but to the entire planet.

In the absence of specific legislation prioritizing or requiring environmental initiatives, utility regulators generally prioritize low rates and cost-based benefits to ratepayers over attenuated benefits like reduced GHG emissions.[152] Without new legislation, economic concerns are likely to take priority over new environmental goals, including decarbonizations and a growth in distributed energy resources.

C. *Cost-of-Service Ratemaking Meets the New Utility Goals*

The utility regulatory system no longer enjoys the perfect confluence of goals and incentives that it did prior to 1970.[153] However, the lack of perfect alignment does not necessarily signal an end to cost-based ratemaking. The question is whether the incentives built into the current cost-based structure work *toward*, or in *opposition to*, the evolving goals for the system.

Though one might expect this to be a complicated question, when it comes to items one and two on the list of utility goals, it is actually rather simple. The current cost-based regulatory system ties utility profits to capital investment.[154] The growth of non-utility distributed generation resources explicitly undermines the regulated monopoly enjoyed by the utility and asks the utility to work against its own self-interest by helping to grow its competitors.

To the extent that decarbonization includes an expansion of efficiency and demand response programs (which detract from utility sales), or an expansion of non-utility distributed generation, seeking these goals also runs counter to embedded regulatory incentives.[155] On the other hand, if utilities are able to invest in distributed generation resources and earn a

(assessing and analyzing modeling of carbon regulations and emission pricing in selected IRPs); Karl Bokenkamp et al., *Hedging Carbon Risk: Protecting Customers and Shareholders from the Financial Risk Associated with Carbon Dioxide Emissions*, 18 Electricity J., July 2005, at 11, 15–17 (describing use of proxy cost for GHG emissions in planning processes).

152. *See* Inara Scott, *Teaching an Old Dog New Tricks: Adapting Public Utility Commissions to Meet Twenty-First Century Climate Challenges*, 38 Harv. Envtl. L. Rev. 371, 400 (2014) ("[T]he economic foundation of the regulatory structure demands that utilities demonstrate customer-specific economic benefits for programs. . . . Because of this regulatory necessity, public utility commissions simply cannot be expected to drive energy policy changes, encourage reductions in GHG emissions, or even drive significant technological evolution in the utility system.").

153. *See supra* notes 51–53 and accompanying text.

154. *See supra* notes 37–39 and accompanying text.

155. For a discussion of the disincentives to utilities engaging in energy efficiency activities, see Inara Scott, *"Dancing Backward in High Heels": Examining and Addressing the Disparate Treatment of Energy Efficiency and Renewable Resources*, 43 Envtl. L. 255, 277–78 (2013).

return on that investment, they would indeed have an incentive to build distributed generation.

Goal three, the provision of new services, is new territory for utilities. Historically, they have sold a commodity, and investor returns have come from investing in the infrastructure that provides that commodity.[156] To the extent that new services are billed at cost-based rates, they do not *contravene* existing regulatory incentives, but utilities have no incentive to build capacity to provide such services.

Goal four is not new to the regulatory system, and utilities clearly have an incentive to maintain their own financial stability. The question will be whether new regulatory models will undermine this important goal for the utility system by creating new regulatory risk for utility investors. Utilities will seek to minimize regulatory risk, which may undermine new goals for the extension of distributed resource infrastructure. Regulators will have to balance the goal of keeping rates low with the constitutional requirement that utilities have an opportunity to earn a fair return, consistent with the level of risk in the industry.

Goal five, regarding rates and service, does not create any conflicting incentives in and of itself. Given new market entrants, increasing competition, and the threat of the so-called death spiral, utilities today have a strong interest in keeping rates reasonable.[157] However, like regulators, utilities are likely to find themselves torn between competing priorities for financial returns to investors, low rates, and expansion of services.

In sum, the new utility goals either conflict with existing regulations, or existing regulations make the utility indifferent to accomplishing the new goals. The current regulatory structure provides no clear incentives for utilities to accomplish the new goals. For a system that has long used regulatory incentives to accomplish significant milestones in the growth of access to utility services, this should be a sobering realization. The next obvious question is: will proposals for a new regulatory structure create these incentives? Part IV examines this question.

IV. Analyzing Alternative Regulatory Structures and Setting Priorities

The potential conflict between the new utility goals and the existing cost-based regulatory structure is not a surprise to anyone in the industry. A number of independent and state-sponsored proceedings are currently investigating how to reshape utility regulation, either in a holistic way or in a

156. *See supra* notes 37–39 and accompanying text.
157. *See supra* notes 68–70 and accompanying text.

targeted fashion to address distributed resource challenges and the need for greater utility resilience.[158] Think tanks and scholars have also offered prescriptions for new utility regulation.[159] However, not all of these suggestions are equally well poised to address regulatory incentives embedded in the existing model, and few appear to deliberately use regulatory incentives to achieve the stated goals of the system. This Part reviews the most prominent recommendations for new regulatory structures, and asks if they create incentives for utilities to work toward the new goals of the regulatory system, or if not, how to bring alignment to competing incentives. This Part also considers whether any of the options provide a means for setting priorities between competing goals.

158. *See* REV Order, *supra* note 85, at 3 (stating an overall objective of "ensuring that New York meets and exceeds its targeted goals to reduce carbon emissions through energy efficiency and clean power development in a manner that ensures grid reliability and resilience while enhancing the value of the system for consumers"); E21 INITIATIVE, *supra* note 5, at ii (aiming to "develop a more customer-centric and sustainable framework for utility regulation in Minnesota that better aligns how utilities earn revenue with public policy goals, new customer expectations, and the changing technology landscape"); RMI, *supra* note 75, at 4 (a discussion paper intended to "support discussion and dialogue about next-generation retail electricity pricing approaches"); AEEI, *supra* note 2 (exploring the future of the electric system in California). Hawaii's PUC began a conversation about the future of its electric utility system in a document it titled *Inclinations on the Future of Hawaii's Electric Utilities*, which is now playing out in the context of a proposed merger between NextEra Energy, a Florida-based company, and the Hawaiian Electric Company. *See Gov. Ige Explains Opposition To Proposed Nextera-HECO Merger*, KHON2 NEWS (July 21, 2015), http://khon2.com/2015/07/21/gov-ige-explains-opposition-to-proposed-nextera-heco-merger/ (noting Governor Ige's opposition to the merger on the grounds that it would conflict with a 100% renewable energy future). *See generally* Commission's Inclinations on the Future of Hawaii's Electric Utilities, at 5, Exhibit A to Decision and Order, *In re* Integrated Res. Planning, Docket No. 2012-0036, Order No. 32052 (Haw. Pub. Utils. Comm'n Apr. 28, 2014), http://puc.hawaii.gov/wp-content/uploads/2014/04/Decision-and-Order-No.-32052.pdf ("[P]ursing a diverse portfolio of renewable energy resources provides the best long-term strategy."). Meanwhile, California, Massachusetts, and Maryland PUCs are all currently holding proceedings focused on the evolution of the state's grid and ability to accommodate distributed generation. *See* Van Nostrand, *supra* note 2, at 164–70.

159. *See generally* CHARLES GOLDMAN ET AL., LAWRENCE BERKELEY NAT'L LAB., UTILITY BUSINESS MODELS IN A LOW LOAD GROWTH/HIGH DG FUTURE: GAZING INTO THE CRYSTAL BALL? (2013) (powerpoint slides); LEHR, *supra* note 71; NADEL & HERNDON, *supra* note 8; Sonia Aggarwal & Hal Harvey, *Rethinking Policy to Deliver a Clean Energy Future*, 26 ELECTRICITY J. 7, 11–12 (2013) (discussing high-level system goals and recommending the use of markets and performance based regulation); Newcomb et al., *supra* note 88 (emphasizing a need for greater cost-benefit analysis to level the playing field for new distributed generation resources); Wiedman & Beach, *supra* note 7 (offering a variety of ratemaking tools to encourage the growth of distributed generation).

A. *Status Quo with Targeted "Fixes"*

For those who do not want to radically change the existing regulatory structure, a number of short-term adjustments to the current cost-based ratemaking system have been suggested. While each attempts to address some of the flaws of the current regulatory system, they are not generally intended to create incentives for utilities to accomplish key goals. Rather, they are intended to remove utility disincentives, and to create incentives for *customers* to take actions.

1. Decoupling

Decoupling is a term given to mechanisms that address the sales-throughput problem in utility regulation by compensating utilities for revenues lost to energy conservation or efficiency programs.[160] The sales-throughput problem is created by the manner in which utility rates are calculated. In a rate case, a cost of utility service is divided into fixed and volumetric (per kilowatt-hour) charges, with a portion of the utility's fixed costs embedded in the volumetric charges.[161] This practice drives up per-unit charges, making the total bill more sensitive to conservation.[162] However, it also means if the customer uses less energy than forecast, the utility will under-recover its fixed charges, and vice versa, creating a clear incentive for the utility to drive up sales.[163]

While decoupling is an important mechanism for mitigating the utility's incentive to increase sales, it is by no means perfect. One of the criticisms of decoupling is that it creates a highly complex mechanism that can be difficult for customers to understand.[164] When one of the goals of the

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160. *See* U.S. ENVTL. PROT. AGENCY (EPA), NAT'L ACTION PLAN FOR ENERGY EFFICIENCY, ALIGNING UTILITY INCENTIVES WITH INVESTMENT IN ENERGY EFFICIENCY 2-2 (2007), http://www2.epa.gov/sites/production/files/2015-08/documents/napee_report.pdf (discussing the throughput incentive). As of October 2013, 16 states had some form of decoupling mechanism in place for electric utilities. *See* NADEL & HERNDON, *supra* note 8, at 26; *see also* *Decoupling in Detail*, CENTER FOR CLIMATE & ENERGY SOLUTIONS, http://www.c2es.org/us-states-regions/policy-maps/decoupling/detail (last visited Apr. 2, 2016) (providing a description of decoupling and link to maps showing states that have implemented decoupling policies).

161. *See* EPA, *supra* note 160, at 2-4 (suggesting increasing fixed charges to diminish throughput incentive); Pamela G. Lesh, *Rate Impacts and Key Design Elements of Gas and Electric Utility Decoupling: A Comprehensive Review*, 22 ELECTRICITY J. 65, 66–67 (describing the manner of recovery for utility fixed charges).

162. *See* Lesh, *supra* note 161, at 66 (noting that changes to traditional rate design can diminish conservation incentives and shift costs to different customer classes).

163. *See* EPA, *supra* note 160.

164. *See* REGULATORY ASSISTANCE PROJECT, REVENUE REGULATION AND DECOUPLING: A GUIDE TO THEORY AND APPLICATION 51 (2011), www.raponline.org/docs/RAP_RevenueRegulationandDecoupling_2011_04.pdf (describing the complexity of utility bills and the challenges of

new utility system is to encourage greater customer engagement and transparency, this is a significant concern.

The other problem with decoupling is that it, at best, only removes the *disincentive* for the utility to engage in energy efficiency. It does nothing to mitigate the utility's incentive to invest in new generation facilities.[165] While the utility may become indifferent to losses associated with efficiency, it retains a strong incentive to *add* generation facilities in order to increase rate base. Thus, decoupling does not level the playing field between efficiency and new generation, let alone create any kind of incentive for utilities to engage in energy efficiency programs.

2. Net Metering and Increased Fixed Charges

Net metering programs are widely used to compensate distributed generation customers for the amount of electricity they generate.[166] Net metering works by offsetting the customer's bill based on the amount of energy the customer generates[167] and is generally considered a strong incentive for household solar installations.[168] One problem created by net metering is

communicating about decoupling); Lesh, *supra* note 161, at 70–71 (listing different features of decoupling mechanisms and noting the complexity and difficulty of identifying decoupling policies).

165. *See* Sara Hayes et al., Am. Council for an Energy-Efficient Econ., Carrots for Utilities: Providing Financial Returns for Utility Investments in Energy Efficiency 1–2 (2011), http://www.aceee.org/sites/default/files/publications/researchreports/U111.pdf (identifying both the disincentive to investment and the lack of a positive incentive to engage in energy efficiency programming).

166. *See* Database of State Incentives for Renewables and Efficiency (DSIRE) et al., Net Metering (2015), http://www.dsireusa.org/resources/detailed-summary-maps/net-metering-policies/ (showing that 44 states plus the District of Columbia had net metering policies in place as of March 2015); *see also* N.C. Clean Energy Tech. Ctr. & Meister Consultants Grp., The 50 States of Solar: A Quarterly Look at America's Fast-Evolving Distributed Solar Policy Conversation 8–15 (2015), http://nccleantech.ncsu.edu/wp-content/uploads/50-States-of-Solar-Issue2-Q2-2015-FINAL3.pdf (providing detailed updates to net metering policies on a state-by-state basis).

167. *See* Vaughn Nelson, Introduction to Renewable Energy 305 (2011) (briefly describing net metering); Pub. Util. Comm'n of Or., Investigation into the Effectiveness of Solar Programs in Oregon 5–6 (2014), http://www.puc.state.or.us/electric_gas/Investigation%20into%20the%20Effectiveness%20of%20Solar%20Programs%20in%20Oregon%20 2014.pdf (describing Oregon's net metering program).

168. Andrew Satchwell et al, Financial Impacts of Net-Metered PV on Utilities and Ratepayers: A Scoping Study of Two Prototypical U.S. Utilities 1 (2014), https://emp.lbl.gov/sites/all/files/lbnl-6913e.pdf (noting that net metering has been a "critical element in the value proposition" of residential solar PV systems). For a copy of the report, as well as links to a presentation, webinar, and national news coverage, see Lawrence Berkeley Nat'l Lab., *Financial Impacts of Net-Metered PV on Utilities and Ratepayers: A Scoping Study of Two Prototypical U.S. Utilities*, Electricity Markets and Policy Group, https://emp.lbl.gov/publications/financial-impacts-net-metered-pv (last visited Apr. 2, 2016).

similar to that created by energy efficiency: utilities recover a portion of their fixed charges in volumetric rates, so when distributed generation customers offset their usage, they also offset a portion of their fixed charges, leading to a decline in the returns earned by utilities[169] and a shifting of those costs to other utility customers.[170]

A final problem is that customers are compensated by offsetting a portion of their usage, which is charged at a retail rate, with energy that would more appropriately be classified as wholesale energy.[171] Thus, the customer is arguably compensated in excess of the value of the energy they generate.[172] An additional problem, of course, is that distributed generation facilities owned by customers present a competitive threat to utilities.[173]

To address these concerns and account for lost revenues, a number of utilities have suggested increasing fixed charges, either to all customers or only to net metering customers. However, complicating matters is the fact that actual fixed costs incurred in serving residential utility customers has always been in some dispute.[174] Things get even more complicated when assessing fixed charges for owners of distributed generation resources. Residential solar customers require access to utility grid management services, which creates new costs, while still needing access to the standard distribu-

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169. The extent to which utility revenues decline due to net metering and solar penetration has been the subject of increasing attention by policy analysts and PUCs. A 2014 study conducted at the Lawrence Berkeley National Laboratory found that impact to shareholder earnings ranged from 4% to 15%, depending on the total penetration of solar into the market, and the utility studied (either a prototypical southwestern utility or prototypical northeastern utility). *See* SATCHWELL ET AL., *supra* note 168, at ix (summarizing impact on achieved earnings); *see also* Blackburn, *supra* note 84, at 20 (describing under-recovery of fixed costs due to net metering).

170. PUB. UTIL. COMM'N OF OR., *supra* note 167, at iv ("Under net metering programs, solar users may not pay for their share of fixed costs of the generation, transmission, and distribution services embedded in electricity rates.").

171. *See* EDISON ELEC. INST., STRAIGHT TALK ABOUT NET METERING 2–3 (2013) (explaining difference between wholesale and retail rates).

172. *See id.*

173. *See, e.g.*, Graffy & Kihm, *supra* note 2, at 12 (arguing that distributed solar is illustrative of innovations that will "catalyze unpredictable forms of disruptive competition for utilities"); Jeff McMahon, *Four Ways The Solar Boom Has Rattled Utilities*, FORBES (Sept. 23, 2013), http://www.forbes.com/sites/jeffmcmahon/2013/09/23/four-ways-the-solar-boom-has-rattled-utilities/ (describing the competitive threat posed by solar). *But see* Raskin, *supra* note 70, at 266–67 (arguing that distributed generation does not present a realistic competitive threat to regulated utility service).

174. While meter reading and billing are generally agreed upon as fixed charges, the extent to which customers should be billed a fixed charge for, *inter alia*, basic distribution facilities remains in significant debate. *See* JIM LAZAR, ELECTRIC UTILITY RESIDENTIAL CUSTOMER CHARGES AND MINIMUM BILLS: ALTERNATIVE APPROACHES FOR RECOVERING BASIC DISTRIBUTION COSTS 1 (2014), www.raponline.org/document/download/id/7361.

tion infrastructure, billing, and customer service.[175] On the other hand, distributed resources may allow utilities to delay adding new generation, reduce transmission losses, avoid adding new transmission, and hedge against variable fuel costs associated with fossil fuel resources.[176]

Contentious proceedings over raising fixed charges have also focused on (1) the need for more accurate valuation of the costs and benefits of residential solar resources; (2) the burden rate increases place on lower income customers; (3) the equity of raising fixed charges *after* customers have invested in a solar photovoltaic (PV) installation; and (4) the potential softening of incentives for customers to invest in distributed resources and energy efficiency.[177] Others have worried that increasing fixed charges will exacerbate the utility "death cycle" by increasing the incentive for customers with distributed generation resources to leave the system.[178]

Some jurisdictions have been trying to sort out these issues by developing an alternative to net metering that would compensate residential solar owners based on the value of the energy they generate.[179] These "value of

175. *See* CAL. PUB. UTILS. COMM'N, CALIFORNIA NET ENERGY METERING RATEPAYER IMPACTS EVALUATION 86 (2013), https://www.nrel.gov/tech_deployment/state_local_governments/blog/weighing-the-costs-and-benefits-of-net-metering-and-distributed-solar.

176. *See* ROCKY MOUNTAIN INSTITUTE (RMI), A REVIEW OF SOLAR PV BENEFIT & COST STUDIES 12–18 (2013), http://www.rmi.org/Knowledge-Center%2FLibrary%2F2013-13_eLabDERCostValue (summarizing cost and benefit categories, but noting that an individual factor may be a cost or a benefit, depending on the perspective of the stakeholder in question); *see also* PUB. UTIL. COMM'N OF OR., *supra* note 167, at 19–22.

177. *See* Blackburn, *supra* note 84, at 20–22 (discussing controversy over the costs and benefits of net metering); Thomas Content, *State Regulators Approve 83% Increase in Green Bay Utility's Fixed Charge*, MILWAUKEE WIS. J. SENTINEL (Nov. 6, 2014), http://www.jsonline.com/business/state-regulators-approve-83-in-green-bay-utilitys-fixed-charge-b99385986z1-281824701.html (noting that increased fixed charges would hurt low income residents and negatively impact small business' conservation efforts); Ian Clover, *Utah Rejects Net Metering Charge*, PV MAG. (Sept. 4, 2014), http://www.pv-magazine.com/news/details/beitrag/utah-rejects-net-metering-fee_100016309/#axzz3ESovBLJm (quoting advocates of renewable energy who argued that increasing the fixed charge would punish individuals who had already invested in solar); *see, e.g.*, Order Instituting Rulemaking Regarding Policies, Procedures & Rules for the California Solar Initiative, the Self-Generation Incentive Program & Other Distributed Generation Issues, No. 12-11-005, 2014 WL 1390905, at *1 (Cal. P.U.C. Mar. 27, 2014) (discussing the costs of residential solar and imposing a tariff); *In re* Idaho Power Co.'s Application for Auth. to Modify Its Net Metering Serv. & to Increase the Generation Capacity Limit, No. IPC-E-12-27, 2013 WL 3377126, at *2 (Idaho P.U.C. July 3, 2013).

178. *See* Blackburn, *supra* note 84, at 20.

179. *See, e.g.*, *In re* Establishing a Distributed Solar Value Methodology Under Minn. Stat. § 216b.164, Subd. 10 (e) & (f), Order Approving Distributed Solar Value Methodology, No. E-999/M-14-65, 2014 WL 1347985, at *1 (Minn. P.U.C. Apr. 1, 2014) (implementing a value of solar methodology that "should compensate solar PV customers in a way that does not advantage or disadvantage them relative to other customers or other forms of generation").

solar" proceedings would leave intact current volumetric rate structures and fixed charges in an effort not to dull conservation incentives but would more accurately calculate the cost of providing grid services to distributed generation customers and the benefits of the energy they provide to the utility.[180] When distributed generation customers offset their consumption, they would do so at this separately calculated rate, rather than the standard retail rate.[181]

However, even when using a value of solar approach, if existing utility incentives for investment in generation facilities are left intact—as they usually are—the utility still suffers a lost opportunity to earn profits when non-utility distributed generation facilities are built.

This fact has not been lost on the public, which has accused utilities of trying to block the growth of residential solar.[182] Utilities have pointed to the loss of fixed charges to explain their concerns, noting that the current system socializes costs from residential solar owners to those for whom solar is not practical, feasible, or affordable.[183] While net metering may have precisely this effect, the problem of competition, regulatory incentives, and the loss of status as monopoly provider is just as, if not more, important to understanding the utility's actions. Until this issue is resolved, utilities will continue to stand as an obstacle to the growth of distributed generation and rooftop solar—not because they are populated by bad actors who want to perpetuate climate change, but because they are for-profit entities and cannot be expected to operate against their own self-interest.

3. Differentiated Rates

Another regulatory mechanism that has been proposed is the creation of differentiated rates, which attempt to more closely track the charges associated with the provision of electricity at specific times or in specific locations.[184] These programs are primarily intended to give customers more

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180. *See id.* at *6–7.

181. *See id.* at *17.

182. *See* Elizabeth Daigneau, *Renewable Energy's Rise Hurting Utilities*, Governing the States & Localities (Nov. 2014), http://www.governing.com/topics/transportation-infrastructure/gov-renewable-energy-rise-hurts-utilities.html (arguing that net metering is "eating into" utility profits, and as a result, utilities are pushing back); *see also* Clover, *supra* note 177; Rossetti & Florence, *supra* note 12; Voorhees, *supra* note 12.

183. *See, e.g.*, Order Instituting Rulemaking Regarding Policies, Procedures & Rules for the California Solar Initiative, the Self-Generation Incentive Program & Other Distributed Generation Issues, No. 12-11-005, 2014 WL 1390905, at *1, *6 (Cal. P.U.C. Mar. 27, 2014).

184. A variety of differentiated rate proposals were presented in a 2014 report by the Rocky Mountain Institute (RMI). *See* RMI, *supra* note 75, at 20–29.

accurate price signals and allow them to benefit from shifting their usage,[185] a goal that is consistent with efforts to strengthen customer engagement, provide more transparency in ratemaking, and create incentives to shift customer demand.[186] Differentiated rates are also intended to support the growth of distributed generation.[187]

It is important to note that differentiated rate schedules would provide incentives for *customers* to pursue distributed generation and shift demand. As with other targeted "fixes," however, none of these differentiated rates provide incentives for *utilities* to pursue the new goals for the electric power system.

B. *Shifting the Value Proposition*

A number of proceedings have suggested fundamental changes to the basic value proposition of the electric utility in light of current market trends and changes to the utility sector. Two such proposals are discussed below: a move away from the traditionally vertically integrated utility to a distribution system platform, and a change from the utility as a commodity provider to that of a service provider.

1. Utility as Distributed System Platform

One significant regulatory change proposed in several of the major proceedings around the future of the utility system is to shift the utility's value proposition from providing vertically integrated sales of an electric commodity to becoming the manager for an upgraded distribution system that will include significant new distributed resources, including storage, electric vehicles, microgrids, and renewable resources.[188]

New York's REV proceeding recently reached this conclusion, ordering that in the future the utility would play the role of a Distributed System

185. *Id.* at 7–8, 10, 26 (setting forth benefits to customers and ways to engage customers in shifting use).

186. *See supra* Subsections III.A.1–3.

187. RMI, *supra* note 75, at 10, 15–18 (describing how differentiated rates are both necessary for and supportive of distributed energy resource development); *see also* Jim Lazar & Wilson Gonzalez, Smart Rate Design for a Smart Future 61 (2015), www.raponline.org/document/download/id/7680 ("Realization of the potential benefits of DER [distributed energy resources] requires TOU/CPP [time of use/critical peak pricing] or PTR [peak time rebate] rate design.").

188. Investigation of Grid Modernization, *supra* note 5 (holding that electric distribution companies have the responsibility for certain aspects of grid modernization, including integrating distributed resources and optimizing demand); REV Order, *supra* note 85, at 12; Energy Future Coal., *supra* note 5, at 2–3 (describing functions for the electric utility of the future, which include assisting customers in optimizing use, access to alternative energy suppliers, and system optimization).

Platform (DSP), which would be responsible for the reliability of the grid, but would also integrate distributed energy resources from a variety of market players, including energy service companies and retail suppliers; act as the interface between customers and service providers; and optimize the system components from transmission to central generation or large-scale renewable resources.[189]

Jon Wellinghoff, former chair of the Federal Energy Regulatory Commission (FERC), has proposed to take the DSP plan a step further.[190] He advocates turning utility distribution assets over to an independent distribution system operator (IDSO) in order to ensure that utility ownership of distribution resources does not create a conflict of interest in the operation of the system.[191] Wellinghoff further suggests that the IDSO model offers greater integration of resources across utility service territories and greater efficiency.[192]

The primary benefit of an IDSO or DSP model is that it would focus utility attention on managing an advanced grid focused around distributed resources and clarify the utility's role in advancing distributed infrastructure.[193] Given the new goals for decarbonization and the growth of distributed resources, this seems like a necessary step in the evolution of the utility system. However, neither the IDSO nor DSP mechanism, *on its own*, will create utility incentives to further these goals.

As the New York PSC itself notes,

> Reforming the Commission's current ratemaking practices will be critical to the success of the REV vision. Under current ratemaking, utilities have little or no incentive to enable markets and third parties in creating value for customers. Rather, utilities' earnings are tied primarily to their ability to increase their own capital investments, and secondarily to their ability to cut operating costs, even at the expense of creating value.[194]

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189. REV Order, *supra* note 85, at 12.

190. *See* James Tong & Jon Wellinghoff, *Rooftop Parity: Solar for Everyone, Including Utilities*, Pub. Util. Fort., Aug. 2014, at 18, 19 (arguing on behalf of an independent distribution operator); Herman K. Trabish, *Jon Wellinghoff: Utilities Should Not Operate the Distribution Grid*, UtilityDive (Aug. 15, 2014), http://www.utilitydive.com/news/jon-wellinghoff-utilities-should-not-operate-the-distribution-grid/298286/.

191. Tong & Wellinghoff, *supra* note 190, at 20.

192. *Id.*

193. "Under the construct we are establishing . . . the development and support of [distributed energy resources] becomes a core component of traditional utility service. Indeed, one of the foundational elements of REV is to make clean energy and energy efficiency integral rather than ancillary to basic system planning and operations." *Id.* at 48.

194. REV Order, *supra* note 85, at 12–13.

The PSC has stated an intention to address these issues in a second track of the REV proceeding.[195]

Some proponents of a DSP or IDSO model have also called for restrictions on the utility's ability to own distributed resources.[196] The argument is that as long as the utility is able to invest in distributed resources, it will use its market power to block the development of non-utility resources, which will ultimately slow the development of the market and transition to a distributed resource future.[197]

While this argument is reasonable, it ignores a few key points. First, preventing the utility from owning distributed generation doesn't solve the conflict of interest problem—as long as the utility owns any form of generation, it will have an incentive to block the development of non-utility resources, distributed or central plant. Second, this desire to block the utility from the distributed generation market may actually slow the transition to a distributed generation future by making distributed resources more expensive.

Utilities have access to low-cost capital precisely because of the low risk profile of their investments and their position as monopoly providers under the regulatory compact.[198] Allowing utilities to aggregate and invest in distributed resources could lower the cost of these resources to participants. Utilities may also be able to utilize owned resources more efficiently. For example, if a utility funds a solar or storage application, it can develop those resources in a manner that meets existing demand, reduces hot spots, and shaves peak loads, something an individual customer may not be able or incentivized to do.[199]

Another solution to this problem would be a modification of the generally accepted method of calculating the utility's rate base. One approach,

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195. *Id.*

196. As the New York PSC noted in its REV Order, "[Distributed energy resource] ownership is one of the most contentious issues in the REV proceeding." *Id.* at 66.

197. For this reason, the New York PSC concluded that utility ownership of distributed energy resources would be, "the exception rather than the rule." *Id.*

198. CAL PUB. UTILS. COMM'N., ELECTRIC UTILITY BUSINESS AND REGULATORY MODELS 7 (2015), http://www.cpuc.ca.gov/NR/rdonlyres/929E2B29-F72F-4BBD-9CD1-2C06DF249785/0/PPDElectricUtilityBusinessModels.pdf (noting that a smaller sales base due to attrition to alternative generation sources, "may increase the investment risk profile of the utility . . . . While many argue that risk is not inherently bad, a higher risk profile may lead to higher costs of capital and may be seen as a deterrent to the traditional low-risk seeking utility investor"); Clive J. Stones, *Risk Sharing, the Cost of Equity, and the Optimal Capital Structure of the Regulated Firm*, 30 REV. INDUS. ORG. 139, 140 (2007) (asserting that rate-of-return regulation implies lower risk to the utility, which in turn leads to a lower cost of capital).

199. RMI, *supra* note 75, at 15 (contrasting the customer individual interest in rooftop solar orientation, which is to maximize total production, and the utility's interest, which is to maximize system value).

known as total expenditure accounting (TOTEX)[200] includes both traditional invested capital and certain long-term operating expenses, such as long-term contracts, in rate base.[201] Another option, similar to TOTEX, would allow the utility to earn a rate of return on assets that it *manages*. This way, a utility DSP or services utility could establish long-term contracts for distributed energy resources or distribution infrastructure (for example, a microgrid) that the utility would manage as part of the system, while ownership of the asset would be retained by a private party.[202] The benefit of these accounting mechanisms is that they would remove the incentive for the utility to favor its own generation or distribution facilities, but would retain the overall incentive for utility investment in its system.

Ultimately, the DSP model, which offers a truly different model for the "utility of the future," does not provide any direct incentive for utilities to work toward the transition to a renewable, energy efficient, distributed resource future. As the New York PSC recognized, key ratemaking structures must be reconsidered in order to build the kind of regulatory incentives that will make this transition a reality.

2. Utility as Service Provider

Another popular option for the structure of the "utility of the future" is the utility as a service provider.[203] In this structure, the utility is seen as providing services, such as lighting, heating, electric car charging, or microgrid support, rather than a commodity.

There are significant benefits to this type of proposal, the first being that the utility would see a clear incentive to create efficiencies. For example, imagine that a homeowner using traditional incandescent lightbulbs pays $10 per month for lighting services. If the utility provided the homeowner with high-efficiency LED bulbs, so the customer used less energy but was charged the same rate, the utility could earn an additional profit—at least until the next rate case, when the rate would presumably be adjusted. To increase the conservation incentive, the utility might also be allowed to earn a return on the investment of purchasing thousands of LED lightbulbs

200. TOTEX, which is used in the United Kingdom for electric and gas distribution companies, stands for total expenditure accounting. *See* AEEI, *supra* note 2, at 32.

201. *See id.*

202. *Id.*

203. *See* FOX-PENNER, *supra* note 7, at 189–202 (proposing the mission of the energy services utility as "provid[ing] lowest-cost energy services to its customers—light, heat, cooling, computer-hours, and the dozens of other things we get from power every day"); LEHR, *supra* note 71, at 18–19 (presenting the "energy services utility" as the maximum role for the utility of the future); NADEL & HERNDON, *supra* note 8, at 55–56 (describing a variety of proposals for the utility as service provider).

for its customers, while incurring fewer costs because of the long-term efficiencies of the LED bulbs.

Another benefit of this structure is that it would be explicitly organized around one of the new goals of the utility system—providing customers with services beyond the provision of kWh. A model for lighting and heating service could easily be expanded to create new services, such as individual data access, or grid services to stabilize distributed resources.

The appropriate ratemaking structure for the services utility is not generally discussed alongside proposals to transform the utility into a service provider. However, if the system was to remain cost-based, utility profits would, in some way, have to follow from the provision of services. For example, investments used to serve customers might be valued in a rate case and rates calculated as a percentage of total system load dedicated to a particular service.

While a service-based structure could incentivize utilities to seek efficiencies between rate cases, it could also create an uneasy mixed incentive for managers. Peter Fox-Penner characterizes the predicament as putting utilities into "two diametrically opposed businesses, one selling their traditional product and one helping customers buy *less* of it."[204] A solution to this problem would be to use a cost-based rate system for some utility services (like distribution services and grid access) and a performance-based rate system for others (such as lighting and heating).

The utility as service provider, like the utility as DSP or IDSO, is an intriguing model for a distributed, decarbonized future. It also disrupts the sales-throughput incentive and has potential to disrupt utility incentives for investing in new generation resources. However, the extent to which it leverages regulatory incentives depends on the ratemaking structures that are developed to support it.

C. *Performance Incentives*

Performance incentives tie utility compensation to the achievement of certain performance-related metrics.[205] For example, a utility might receive

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204. Fox-Penner, *supra* note 7, at 198.

205. *See* Sonia Aggarwal & Eddie Burgess, New Regulatory Models 4 (2014), http://americaspowerplan.com/wp-content/uploads/2014/03/NewRegulatoryModels.pdf (defining performance-based ratemaking and contrasting it with traditional ratemaking); Melissa Whited et al., Utility Performance Incentive Mechanisms: A Handbook for Regulators 1–2 (2015), http://www.synapse-energy.com/sites/default/files/Utility%20Performance%20Incentive%20Mechanisms%2014-098_0.pdf (listing advantages and potential pitfalls of performance incentive mechanisms). For an overview of incentive regulation, see generally Paul L. Joskow & Richard Schmalensee, *Incentive Regulation for Electric Utilities*, 4 Yale J. on Reg. 1 (1986).

an incentive for achievement of a particular reliability standard or amount of energy efficiency obtained.[206] The incentives this system creates are relatively transparent as they are directly tied to the metric, the level of reward, and the manner in which the utility achieves the reward.[207]

Performance-based ratemaking (PBR), a form of performance incentive, was initially introduced to U.S. utilities in the 1980s as a means of limiting costs and incentives for "gold plating"[208] utility systems, and to integrate with efforts at deregulation.[209] PBR, also called "alternative regulation" is often implemented as a replacement for traditional cost-of-service ratemaking[210] and may be paired with price caps, rate freezes, and cost trackers between rate cases.[211]

Performance incentives may be calculated in a number of ways. In the area of energy efficiency, utilities may be compensated through a share of the net benefits achieved by efficiency programs or by fixed dollar amounts related to the amount of energy savings achieved.[212] To ensure efficient overall operation of the utility system, some have proposed a model in which compensation is tied to effective utilization of capital investments.[213]

A number of challenges threaten the straightforward effectiveness of performance incentives and PBR. First, regulators must design achievable metrics that are objective, clearly defined, and within the utility's control. A poorly designed performance incentive may be worse than no incentive at all, as it could have the result of driving up costs without improved results.[214] Moreover, until utility investors gain certainty in the method of assessment and the utility's ability to meet the metrics is established, the perceived risk related to utility investments may rise, driving up the utility's cost of capital.[215]

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206. Twenty-seven states currently have performance incentives for energy efficiency programs at electric utilities. NOWAK ET AL., *supra* note 8, at 7.

207. *See* WHITED ET AL., *supra* note 205, at 1.

208. Gold plating is a term commonly used in the utility industry to refer to a practice of over-investment in capital assets in order to increase a utility's rate base.

209. WHITED ET AL., *supra* note 205, at 12; *see also* Peter Navarro, *The Simple Analytics of Performance-Based Ratemaking: A Guide for the PBR Regulator*, 13 YALE J. ON REG. 105, 107–09 (1996) (discussing early history and goals of PBR).

210. WHITED ET AL., *supra* note 205, at 12–13.

211. *Id.*

212. *See* NOWAK ET AL., *supra* note 8, at 4–5.

213. AEEI, *supra* note 2, at 33 (proposing a model in which an index of capital utilization would be developed to measure the utility's overall performance at providing services relative to the utility's overall investment related to those services).

214. *See* WHITED ET AL., *supra* note 205, at 2.

215. *See* Aggarwal & Harvey, *supra* note 159, at 19.

While a number of jurisdictions experimented with PBR in the 1990s, just as they experimented with deregulation, many ultimately returned to cost-based rates as a primary ratemaking structure, just as they backed away from deregulation. Performance incentives are still widely used for energy efficiency programs.[216] At a minimum, performance-based goals for efficiency or distributed resource growth could be paired with decoupling, differentiated cost-of-service rates, and/or a transition to a DSP system in order to provide the incentives lacking in these other structures.

V. Prioritization and Utility Goals

When it comes to prioritizing the new utility goals, many would prefer to assume that regulators can "do it all"—decarbonize the system, shift to new distributed resources and infrastructure, and enhance individual access to data, all while keeping the system reliable and rates low.[217]

In some cases, this may be true. Estimates of available cost-effective energy efficiency suggest that rates need not increase to reduce the need for new supply-side resources.[218] The costs for storage, renewable, and distributed resources continue to fall, reaching parity in many instances with fossil fuel alternatives.[219] Investing in smart grid and distributed infrastructure has been shown to have significant cost benefits and can improve reliability.[220]

However, to be clear, there are other costs that rarely make the headlines, including the trillions of dollars of investment in transmission and distribution that are necessary in order to make the distributed resource transition.[221] The U.S. utility system is in serious need of investment, even in the absence of any new goals for decarbonization, and the possibility that these investments can be absorbed without any new rate increases is unlikely, at best.[222]

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216. Nowak et al., *supra* note 8, at 7 (reporting 27 states have performance incentives for electric energy efficiency and 16 for natural gas efficiency).

217. President Obama calls his energy policy an "all-of-the-above" strategy that includes renewable energy, economic growth, and a continued role for fossil fuels. *See* Jason Furman & Jim Stock, *New Report: The All-of-the-Above Energy Strategy as a Path to Sustainable Economic Growth*, The White House Blog (May 29, 2014, 11:30 AM), https://www.whitehouse.gov/blog/2014/05/29/new-report-all-above-energy-strategy-path-sustainable-economic-growth. For a critique of this approach, see Trip Van Noppen, *The Problem With an All of the Above Energy Policy*, Earthjustice Blog (Jan. 16, 2014), http://earthjustice.org/blog/2014-january/the-problem-with-an-all-of-the-above-energy-policy.

218. *See supra* notes 49, 109–10 and accompanying text.

219. *See supra* note 110 and accompanying text.

220. *See supra* note 87 and accompanying text.

221. *See* 1 NREL, *supra* note 86, at xl.

222. *See supra* note 85 and accompanying text.

There are several ways for regulators and policymakers to prioritize utility goals.[223] The most straightforward is to pair new regulatory initiatives with legislation that provides explicit targets for the utility system, such as a renewable portfolio standard.[224] A legislative directive avoids the need for prioritization, forcing utilities and regulators to accomplish the mandate regardless of any unintended consequences that may arise. A key drawback of this system is the lack of flexibility. Utilities and regulators cannot consider the utility system as a whole or trade off competing interests for the sake of overall efficiency or carbon reduction.[225]

Another option is for regulators to adopt comprehensive, long-term resource planning processes that include an analysis of cost and risk over an extended time horizon (20–30 years). This type of process can steer utilities and regulators away from short-term solutions and highlight risks related to carbon regulation, resilience and reliability, and long-term fuel costs.[226] However, it is important to understand that long-term planning processes still require a policy determination of the goals the portfolio is intended to meet.

In New York State, the REV process has offered an alternative model for a comprehensive energy planning process. The REV proceeding, which was launched by Governor Andrew Cuomo, integrates a number of different legislative and regulatory initiatives, including resilience planning to address the effects of climate change, the multistate Regional Greenhouse Gas Initiative (RGGI), and state efforts to reduce carbon emissions.[227] The New York Public Service Commission (PSC) has also been found by its state courts to have wide discretion to enact regulatory programs that encourage "economy, efficiency, and care for the public safety, the preservation of environmental values and the conservation of natural resources."[228]

223. *See* Scott, *supra* note 152, at 400–12.

224. For a basic description of renewable portfolio standards and helpful links, see generally *Renewable Energy Portfolio Standards*, NAT'L RENEWABLE ENERGY LAB., http://www.nrel.gov/tech_deployment/state_local_governments/basics_portfolio_standards.html (last visited Apr. 2, 2016).

225. Scott, *supra* note 152, at 405.

226. BINZ ET AL., *supra* note 110, at 14–17 (ranking electric generation resources on the basis of cost and risk).

227. *See* REV Order, *supra* note 85, at 2–3.

228. N.Y. Pub. Serv. Law § 5(2) (McKinney 2011); *see, e.g.*, Multiple Intervenors v. Pub. Serv. Comm'n of N.Y., 154 A.D.2d 76, 79–80 (N.Y. App. Div. 1990) ("In determining rate design, as in other ratemaking decisions, respondent's expertise requires judicial deference to the weight the agency assigns to any given factor in the evidence before it."); Abrams v. Public Service Commission of New York, 492 N.E.2d 1193, 1196 (N.Y. 1986) ("[U]nless it is shown that the judgment of the PSC was exercised 'without any rational basis or without any reasonable support in the record', [sic] its determination is not to be set aside.").

The overall goal of REV thus combines environmental and energy goals, and allows regulators discretion in the goals they pursue.[229]

Although the REV Order articulates a number of priorities—including universal, affordable service[230]—it does not attempt to order them. Nor has the PSC bowed to pressure from various groups to engage in an explicit, quantified benefit-costs analysis as part of the adoption of the REV framework.[231] Instead, the PSC suggests a sort of retroactive, or perhaps even circular, benefit-cost assessment of the REV framework, based on the success in achieving the (unordered) REV priorities and based on achievement of performance-based ratemaking metrics yet to be established.[232] In sum, the PSC appears to be giving itself plenty of leeway to forge its own path, and this may be essential to addressing the complex and shifting markets forces and technological changes in the electric power sector. On the other hand, the total discretion enjoyed by the PUC and the lack of any explicit prioritization in the proceedings makes it difficult to know how the vision will be implemented. New York's unique statutory scheme, including existing efficiency and decarbonization programs, and the precedent allowing the PUC to act outside of the traditional utility space make it difficult to use the REV as a model for other proceedings.

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229. REV Order, *supra* note 85, at 11. While some have argued that public utility commissions have implied authority to address environmental impacts as part of a general duty to regulate in the "public interest," I have argued in a previous article that both legal precedent and tradition have left the majority of commissions to conclude that they lack the authority to enact policies for environmental purposes. *See* Scott, *supra* note 152, at 400; *c.f.* Jeremy Knee, *Rational Electricity Regulation: Environmental Impacts and the 'Public Interest'*, 113 W. VA. L. REV. 739, 744 (2011) (arguing that public utility commissions must consider environmental impacts as part of their duty to regulate in the public interest). As of 2006, only fifteen state commissions had explicit authority to consider environmental impacts in their decisionmaking. Michael Dworkin et al., *Revisiting the Environmental Duties of Public Utility Commissions*, 7 VT. J. ENVTL. L. 1, 3–19 (2006). Even when the commission does have such explicit authority, it may be discretionary, and may be interpreted as a lower-priority consideration that must yield to issues of cost or reliability. *See* Scott, *supra* note 152, at 407–08.

230. REV Order, *supra* note 85, at 29.

231. REV is a long-term, far-reaching initiative that will eventually touch most parts of the utilities' infrastructure and business practices. An attempt to project a quantified analysis onto the wide-ranging set of potential benefits in a REV approach, against hypothetical future cost scenarios under both REV and conventional approaches, would be artificial and counter-productive. *Id.* at 120.

232. Although a predetermined BCA for the entire REV framework is not practical, active monitoring and review will be performed. Ongoing evaluation of the progress in achieving REV priorities will be important in guiding implementation decisions and measuring success. Metrics for evaluating REV in general will be closely related to metrics used for performance-based ratemaking of utilities, which will be developed in subsequent phases of this proceeding as well as in rate proceedings. *Id.*

VI. Conclusions and Recommendations

This review of the most popular regulatory alternatives for Utility 2.0 reveals that few of the options utilize regulatory incentives to encourage utilities to pursue the key goals for the modernized system. Differentiated rate structures and targeted fixes such as decoupling provide some incentives for customers to pursue goals that will benefit the utility system, and can make utilities indifferent to customers engaging in efficiency or demand response programs, but the utilities themselves gain little incentive to pursue the new utility goals. Proposals to shift the value proposition of the utility hold promise as a means of more efficiently managing demands for new services and distributed resources, but still fail to provide utilities with incentives for pursuing the new goals.

If old regulatory incentives are left intact, utilities in these new systems may actually be saddled with conflicting incentives to seek profits based on the addition of conventional generation and high usage rates and meet policy goals calling for new distributed resources and increased conservation. None of the proposals examined provide any clear regulatory incentive for utilities to pursue decarbonization, despite the significant need for investment in renewable generation and distributed resource infrastructure to support this systemic transformation. In addition, many of the new proposals fail to directly address the need for financial security, leaving utilities vulnerable to financial stress and potentially undermining goals for decarbonization and distributed resources.

After considering these potential areas of conflict, or missed opportunities for incentivizing utilities to meet policy goals, I conclude with the following recommendations for change to the utility regulatory structure:

First: Consider Retaining Cost-of-Service Ratemaking to Incentivize Utility Investment in Distributed Energy Resources.

Cost-of-service ratemaking creates a powerful incentive for utilities to engage in capital investment and provides significant reassurance to investors that they will receive a fair return on their investment. While a fee-for-services or performance-based model could create the proper incentives for effective operation and management of a distribution grid, it may be difficult to structure such a model in a way that also provides significant incentives for capital investment. It therefore appears premature to turn away completely from a cost-based system at this time, particularly with regard to distribution infrastructure.

For this reason, I would recommend retaining cost-of-service ratemaking, in order to incentivize utility investment in the infrastructure necessary to support distributed resources. However, I would also recommend that the method of calculating rate base be modified to allow the utility to include long-term operating expenses and assets under long-term management. This modification would create an incentive for utilities to engage in creative projects that further the new utility goals, including the growth of energy efficiency and non-utility distributed resources.

The incentives created by cost-of-service ratemaking can work in opposition to goals for conservation and efficiency, and therefore need to be carefully examined in a holistic fashion. Cost-of-service ratemaking must also be supported by regulatory tools such as mandatory efficiency and renewable energy targets, long-term resource planning, and performance-based incentives in order to ensure that traditional fossil-fuel generating projects do not take the place of efficiency or decarbonized, distributed resources. In addition, it is important to recognize that the utility's market power may have the negative effect of decreasing the ability of new market players to enter the distributed resource space. For example, imagine that a utility is able to build community solar projects that compete directly with rooftop solar installations. The market power of the utility may make it impossible for smaller providers to compete directly. Here, it is important to openly and transparently balance competing goals and to establish priorities. If the priority is to grow a non-utility distributed resource market, then it may be important to protect nascent industries by restricting utility ownership of assets or providing subsidies to non-utility providers. However, it must be acknowledged that this strategy may result in lower rates of decarbonization and/or higher rates for customers. Explicitly prioritizing goals and forecasting the impact of policies in a transparent way should be a key part of developing this aspect of any new regulatory structure.

Second: Changes to the Utility Value Proposition Must Address the Utility's Financial Stability.

While reimagining the utility as a service (non-commodity) provider or a DSP holds promise as a means of transitioning to a distributed energy future, any such changes will have to be undertaken carefully to ensure that (1) an incentive for investment in the system remains; (2) investors are rewarded for capital investments at a level commensurate with the risks; and (3) new risks to investors do not drive up the cost of capital so far as to be counterproductive to reform efforts. That is, if the cost-of-service model is replaced with some other creative ratemaking structure, there must be some alternative means of assurance to investors that the cost of mulit-million or billion dollar projects will nonetheless be recovered through rates. There must also be a way to reassure investors that utilities will remain a stable investment with reliable returns. If the utility becomes a risky investment, without a predictable structure for cost recovery and earnings, investors will demand higher interest rates and therefore drive up costs to customers.

Third: Disincentives to Efficiency and Conservation Should Be Replaced with Incentives, Not Indifference.

Importantly, the existing cost-of-service model creates disincentives for utilities to engage in conservation and efficiency, which are key to the decarbonization of the utility system. New regulatory incentives should be designed to amplify utility investments in these areas and use the power of incentives to increase energy efficiency, just as cost-of-service ratemaking used the power of incentives to grow the utility system. Utilities could be highly effective as aggregators for energy efficiency and distributed generation projects, particularly for projects that are currently not being completed by individuals. Utilities could be allowed to earn a return on aggregated energy efficiency investments, or a performance incentive could be tied to achievement of efficiency or distributed generation projects. These options must be considered in any discussion of the utility of the future.

Fourth: Regulatory Priorities Must Be Addressed Explicitly.

Changes in ratemaking and soft policy goals will not change established regulatory priorities for low rates, reliability, and economic benefits to current ratepayers. In order for utilities to effectively pursue decarbonization and distributed generation, in most states new legislation will be needed to explicitly prioritize these achievements *above* other goals, or to set hard targets or specific milestones toward this end. Alternatively, legislation that explicitly allows utility regulators to trade off lower rates in favor of new distributed infrastructure or decarbonized resources, including energy efficiency, would create a path toward the achievement of these key goals. However, I would not suggest that regulation provide limitless discretion for utility regulators. NY's REV process, which leaves the PSC almost limitless flexibility, is doubtless appealing to many who share the PSC's vision, but may be impossible to replicate outside the state. The same discretion currently fueling extensive changes to New York's regulatory future could be used to shut down a similar process in a state with different laws, politics, and regulatory precedent. Instead, legislation should create specific policy goals and be explicit about the hierarchy of goals regulators should pursue.

Fifth: Changes to Ratemaking and Regulatory Incentives Cannot Be an Afterthought.

Utilities and regulators alike recognize a need for systemic change to address current market forces, including low growth, the rise of distributed generation, and a desire for new services and increasing customer engagement. But utilities cannot change the regulatory model, and as for-profit entities, they can only be expected to act in their self-interest. It is unproductive to criticize utility management without putting a burden on regulators and legislatures to provide a mechanism to change the existing structure.

There is a great deal of interest right now in "the utility of the future," but to reach a new paradigm, we cannot ignore the utility of the present, which is facing financial concerns due to low growth and new competition, is undercapitalized in the areas of distribution and transmission infrastructure, and is seeking to offer new services to customers. We will not be able to accomplish significant new goals for decarbonization and distributed generation without addressing the regulatory incentives that have been driving the system for over a century.