Integrating Distributed Energy Resources: A State Regulatory Overview

TIRRILL MOORE*

ABSTRACT

The United States is currently undergoing an electricity revolution of a magnitude that hasn't been felt since the early twentieth century. Emerging awareness of the dangers of climate change, dwindling and inconsistent fossil fuel supplies, and the rise of new technologies are all leading to the increased adoption of distributed energy resources. Distributed energy resources include distributed generation—such as residential wind and solar—distributed residential storage, and advanced metering technologies, which provide real-time data about consumers' usage. These new technologies are clashing with traditional utilities, which are concerned with recovering their infrastructure investments and maintaining a role in the future of the electricity industry. This Note will examine what various state regulatory agencies are doing to approach this problem, and will analyze what techniques have been effective so far.

TABLE OF CONTENTS

* J.D. 2017, Georgetown University Law Center.

INTRODUCTION

Today's electricity regulators are faced with a multitude of new challenges and opportunities. These challenges and opportunities are arising from the emergence of new technologies—including the rapid growth of residential photovoltaic and advanced metering technologies—and new political pressures.[1]

On October 23, 2015, the Environmental Protection Agency ("EPA") released the Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units (commonly known as the "Clean Power Plan"), which called for significant carbon dioxide ("CO_2") reductions from the electricity industry.[2] These pressures have challenged regulators to reexamine how the electricity industry can be reformed to meet these requirements. Many have recognized that "[t]he introduction of [distributed energy resources ("DERs")], as well as intelligence on the grid, supports a much more dynamic and efficient system."[3] These challenges are also being recognized as an opportunity to structure a more efficient and "green" electric grid.[4]

As of the time of publication, the Clean Power Plan remains the law; however, the Trump Administration is taking steps to do away with the regulations. President Donald J. Trump issued an executive order requiring the EPA to review the Clean Power plan, and—"if appropriate"—withdraw or revise the regula-

1. *See* Chelsea Harvey, *The U.S. Solar Industry is Booming—And It Isn't Afraid of Trump*, WASH. POST (Dec. 14, 2016), https://www.washingtonpost.com/news/energy-environment/wp/2016/12/14/the-u-s-solar-industry-is-booming-and-it-isnt-afraid-of-trump.

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

3. Order Adopting Regulatory Policy Framework and Implementation Plan, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, No. 14-M-0101, 2015 WL 862119, at *32 (N.Y.P.S.C. Feb. 26, 2015) [hereinafter N.Y.P.S.C. Order].

4. Press Release, N.Y. Dep't of Pub. Serv., Report Recommends New Approaches to Determine the Full Value of Renewable Power & Money-Saving Technologies (Oct. 28, 2016), https://www3.dps.ny.gov/pscweb/WebFileRoom.nsf/Web/9E768D349F2CE14B8525805A005C8623/$File/pr16073.pdf?OpenElement.

tions.[5] Additionally, in his first several weeks in office, President Trump issued executive orders aimed at reducing regulatory burdens on businesses[6] and expediting environmental reviews for "high priority infrastructure projects," which include improvements to the electric grid.[7] These actions echo promises that then-candidate Trump made on the campaign trail to renew investment in fossil fuels and cut subsidies for renewable sources.[8] The Administration's plans would undoubtedly slow the adoption of DERs, but it is unlikely that the shift to renewables can truly be halted. Some estimates predict that the cost of solar energy will fall below that of coal within the next ten years.[9]

The push for a more efficient and clean electric grid is not only a federal concern. According to the Federal Energy Regulatory Commission ("FERC"), "37 states plus the District of Columbia have implemented renewable portfolio standards ("RPS") or goals ("RPG") calling for an average of about 20% energy delivered to be sourced from renewable resources by 2020."[10] Additionally, "43 states have net metering policies and 17 have added mandates or programs for solar and other distributed generation [("DG")]."[11] One of the primary means of accomplishing these goals is the integration of DERs, which include demand response programs, distributed storage, and DG.[12] Examples of DG include wind turbines, combined heat and power, and solar.[13]

Energy storage technologies are currently underdeveloped and underutilized in the United States; however, their adoption is critical for addressing the variability that comes with the widespread adoption of renewables. Currently, most energy

5. Executive Order No. 13783: Promoting Energy Independence and Economic Growth, 82 Fed. Reg. 16,093 (Mar. 31, 2017); *see also* Chelsea Harvey, *Trump has Vowed to Kill the Clean Power Plan. Here's how He Might—and Might Not—Succeed*, WASH. POST, (Nov. 11, 2016), https://www.washingtonpost.com/news/energy-environment/wp/2016/11/11/trump-has-vowed-to-kill-the-clean-power-plan-heres-how-he-might-and-might-not-succeed.

6. Executive Order No. 13771, Reducing Regulation and Controlling Regulatory Costs, 82 Fed. Reg. 9339 (Feb. 3, 2017).

7. Executive Order No. 13766, Expediting Environmental Reviews and Approvals for High Priority Infrastructure Projects, 82 Fed. Reg. 8657 (Jan. 30, 2017).

8. *An America First Energy Plan*, WHITEHOUSE.GOV, https://www.whitehouse.gov/america-first-energy (last visited Apr. 18, 2017).

9. Jess Shankleman & Chris Martin, *Solar Could Beat Coal to Become the Cheapest Power on Earth*, BLOOMBERG (Jan. 3, 2017, 7:16 AM), https://www.bloomberg.com/news/articles/2017-01-03/for-cheapest-power-on-earth-look-skyward-as-coal-falls-to-solar.

10. RESNICK INST., GRID 2020: TOWARDS A POLICY OF RENEWABLE AND DISTRIBUTED ENERGY RESOURCES 7 (Paul De Martini et al. eds., 2012).

11. *Id.* at 8. See section III.B, *infra*, for a discussion of net metering policies.

12. *See* DNV GL ENERGY, A REVIEW OF DISTRIBUTED ENERGY RESOURCES 1 (2014) [hereinafter DNV GL]; Instituting a Proceeding to Investigate Distributed Energy Resource Policies, Haw. P.U.C., Order No. 32269, Docket No. 2014-0192 (Aug. 21, 2014) (including electric vehicles); N.Y.P.S.C. Order, 2015 WL 862119, at *1 n.3.

13. DNV GL, *supra* note 12, at 16.

storage is done via pumped hydropower,[14] a system that pumps water into a holding tank at a higher elevation, and releases water into a lower holding tank—passing through turbines to generate electricity—at times when the electricity supply is insufficient.[15] Recently, the use of flywheels and lithium-ion batteries has increased as a method of energy storage.[16] Flywheels capture the potential energy of renewables by spinning a mass in a vacuum.[17] The low friction in the vacuum allows the mass to maintain its kinetic energy, which can then be harnessed when supply is low.[18]

"Demand Response" is a broad term that includes any activities that try to manipulate consumer demand to better align with supply.[19] Examples include advanced metering technologies that give consumers more information and control regarding their electricity usage,[20] pricing structures that encourage consumers to shift or decrease their demand,[21] and energy efficiency programs.[22]

This Note will examine various state regulatory proceedings and analyze their approaches to integrating DERs. The proceeding that has recently garnered the most attention is New York's Reforming the Energy Vision ("REV") plan;[23] however, California, Alaska, Illinois, Hawaii, Minnesota, Massachusetts, and the District of Columbia have begun proceedings of their own.[24] In 2014, the New York Public Service Commission instituted a proceeding to reexamine the state's electricity industry and create a system where customers and third parties can be active participants, pursuant to the REV strategy.[25] These reforms are not limited

---

14. BRAD ROBERTS & JESSICA HARRISON, ELEC. ADVISORY COMM., ENERGY STORAGE ACTIVITIES IN THE UNITED STATES ELECTRICITY GRID 2 (2011).

15. *Pumped Storage*, NAT'L HYDROPOWER ASS'N, http://www.hydro.org/policy/waterpower/pumped-storage/ (last visited May 24, 2017).

16. ROBERTS & HARRISON, *supra* note 14, at 2.

17. *Flywheels: Executive Summary*, ENERGY STORAGE ASS'N, http://energystorage.org/energy-storage/technologies/flywheels (last visited Mar. 27, 2017).

18. *Id.*

19. *See Reports on Demand Response & Advanced Metering*, FED. ENERGY REGULATORY COMM'N, https://www.ferc.gov/industries/electric/indus-act/demand-response/dem-res-adv-metering.asp (last visited Mar. 27, 2017); Policy Statement and Order Regarding Demand Response Programs, Haw. P.U.C., Order No. 32054, Docket No. 2007-0341, at 7 (Apr. 28, 2014).

20. FED. ENERGY REGULATORY COMM'N, ASSESSMENT OF DEMAND RESPONSE AND ADVANCED METERING 1 n.1 (2016).

21. *Id.* at 19 nn.85–86.

22. *See, e.g.*, *id.* at 23 (discussing the Energy Efficiency Improvement Act of 2015, which encourages the purchase of more efficient water heaters).

23. *See generally* N.Y.P.S.C. Order, 2015 WL 862119.

24. *See* Order Instituting Rulemaking to Examine the Commission's Post-2005 Energy Efficient Policies, Programs, Evaluation, Measurement, and Verification, and Related Issues, Cal. P.U.C., Decision 07-10-032 (Oct. 19, 2007); Instituting a Proceeding to Investigate Distributed Energy Resource Policies, Haw. P.U.C., Order No. 32269, Docket No. 2014-0192 (Aug. 21, 2014); MINN. P.U.C., STAFF REP. ON GRID MODERNIZATION (2016); Investigation by the Department of Public Utilities on its own Motion into Modernization of the Electric Grid, Mass. D.P.U. 12-76-B (June 12, 2014) [hereinafter Mass. D.P.U. 12-76-B]; *see also* Illinois Energy Infrastructure Modernization Act, 2011 Ill. Legis. Serv. Pub. Act No. 97-616 (West).

25. N.Y.P.S.C. Order, 2015 WL 862119, at *2.

to traditionally "blue" states; instead, this is a nationwide phenomenon. While the states above have instituted the most robust changes, states such as Georgia,[26] Mississippi,[27] and Texas[28] have each begun making incremental changes to allow and encourage the adoption of DERs.

Part I of this Note explores the policy objectives underlying the reforms. Part II examines the various changes state regulators are implementing. Part III will offer an analysis of the various plans—in light of the states' policy objectives—and opine on which strategies are likely to succeed.

I. POLICY OBJECTIVES IDENTIFIED IN STATE REGULATORY PROCEEDINGS

States that have initiated proceedings have identified a number of policy objectives, some of which are unique to a particular state. However, four common objectives have appeared throughout: increasing system efficiency, increasing fuel diversity, increasing system reliability and resiliency, and maintaining just and reasonable rates.[29] Through these key objectives, state regulators hope to harness the unique potential of DERs, while recognizing that they come with unavoidable risks.

A. INCREASING SYSTEM-WIDE EFFICIENCY

The first policy objective is the creation of a more efficient electricity system that fully utilizes infrastructure and inputs.[30] Regulators have noted that vast amounts of infrastructure remain underutilized or operate inefficiently.[31] As a result, regulators hope to create reforms that better align supply, demand, and potential capacity.[32] This will ensure minimal waste of fuels, infrastructure, and human resources. In addition to better aligning system output, regulators also hope to design rate structures and cost recovery mechanisms that encourage consumers and utilities to behave efficiently.[33] Efficiency in this context does not *necessarily* indicate decreasing energy usage, but instead means only generating the amount of electricity that is needed and only receiving electricity that will be put to beneficial use.

---

26. *See* Solar Power Free-Market Financing Act, 2015 Ga. Code Ann. Adv. Legis. Serv. 300 (West).

27. *See* Order Establishing Docket to Investigate the Development and Implementation of Net Metering Programs and Standards, Miss. P.S.C., Docket No. 2011-AD-2 (Jan. 6, 2011).

28. *See* Order Adopting New § 25.130 and Amendments to §§ 25.121, 25.123, 25.311, and 25.346 As Approved at the May 10, 2007 Open Meeting, Tex. P.U.C., Project No. 31418 (May 10, 2007).

29. *See* N.Y.P.S.C. Order, 2015 WL 862119, at *2–3 (also listing "enhanced customer knowledge," "market animation," and "reduction of carbon emissions" as objectives); HAWAIIAN ELECTRIC COMPANIES, 2013 INTEGRATED RESOURCE PLANNING REPORT, at ES-4 (2013) (also listing "Protect Hawaii's culture and communities" as an objective).

30. *See* Mass. D.P.U. 12-76-B, *supra* note 24, at 13.

31. *See id.* at 11.

32. *See, e.g.*, *id.* at 7–13.

33. *See* DEVI GLICK ET AL., ROCKY MOUNTAIN INST., RATE DESIGN FOR THE DISTRIBUTION EDGE 16 (2014).

B. INCREASING FUEL AND RESOURCE DIVERSITY, PARTICULARLY INCREASED USE OF RENEWABLE RESOURCES

One of the key drivers of the need to reform the electricity industry and modernize the electric grid is the increased adoption of renewable energy generators, particularly residential generators.[34] Rather than view these generators as a disruptive force, many regulators are recognizing that these generators play a critical role in combating climate change and present an economic opportunity.[35] Increasing fuel and resource diversity has the added effect of helping to insulate the electricity industry from price fluctuations and shortages that have occurred with fossil fuels in the past.[36]

C. INCREASING SYSTEM RELIABILITY AND RESILIENCY SO THAT OUTAGES OCCUR LESS FREQUENTLY AND IN SHORTER DURATION

Regulators are concerned that DG is less safe and less reliable than traditional centralized generation, and are being proactive to ensure that the advancement of DG does not come at the cost of decreased safety or reliability.[37] Electric companies share these concerns. The Hawaii Electric Companies ("HECO Companies"),[38] for example, noted that "[h]igh levels of DG penetration can create technical challenges at the distribution level and reliability risks for the overall power system."[39] Specifically, they are concerned that DG will force conventional generating facilities to go offline during the daytime, but then come back online quickly during peak evening hours.[40] The ability to quickly ramp up generation when DG goes offline is critical to minimizing outages. The desire to

---

34. *See, e.g.*, S. ENVTL. LAW CTR., A TROUBLING TREND IN RATE DESIGN: PROPOSED RATE DESIGN ALTERNATIVES TO HARMFUL FIXED CHARGES 1 (2015) (explaining the failure of utilities to respond to increased customer use of DERs).

35. *See* MASS. SEC'Y OF ENERGY & ENVTL. AFFAIRS, MASSACHUSETTS CLEAN ENERGY AND CLIMATE PLAN FOR 2020, at 3 (2010).

36. *See, e.g.*, N.Y.P.S.C. Order, 2015 WL 862119, at *12–14 (discussing the impact of fuel diversity on price and reliability).

37. *See* Order on the Distribution Generation Working Group's Redlined Tariff and Non-Tariff Recommendations, Mass. D.P.U. 11-75-E, at 34 (Mar. 13, 2013); 220 ILL. COMP. STAT. ANN. 5/16-108.5(f) (LexisNexis 2017) (requiring utilities to aim for "[t]wenty percent improvement in the System Average Interruption Frequency Index . . . [and] [f]ifteen percent improvement in the system Customer Average Interruption Duration Index" over the next ten years). *But see* Steven Ferrey, *Corporate Governance and Rational Energy Choices*, 31 WM. & MARY ENVTL. L. & POL'Y REV. 113, 124 (2006) ("While experts worry about the security of large nuclear and fossil-fuel-fired power plants, they view on-site distributed energy sources as more secure, more predictable, and more reliable than for the conventional fossil fuel counterparts. While centralized generators shut down and trip off during system emergencies, most distributed generation resources remain fully operational.") (citations omitted).

38. The HECO Companies are Hawaiian Electric Company, Inc., Maui Electric Company, Ltd., and Hawaii Electric Light Company, Inc. HAWAIIAN ELEC. COS., DISTRIBUTED GENERATION INTERCONNECTION PLAN (DGIP), Docket No. 2011-0206, at A-xi (Aug. 24, 2014) [hereinafter HECO DGIP].

39. *See id.* at 1-5.

40. *See* HECO DGIP, *supra* note 38, at 2-3.

ensure system reliability and resiliency has also increased in the wake of extreme weather events, such as Hurricane Sandy, which put additional pressures on the electric grid.[41] States impacted most by these events, such as Massachusetts, have paid special attention to the effects that extreme weather events have on a modernized electric grid.[42]

D. KEEPING ELECTRICITY COSTS JUST AND REASONABLE

As more DERs are integrated into the electric grid, there is a possibility that prices will no longer accurately reflect the value that consumers are receiving. DERs are not only expensive to install,[43] but many consumers lack the ability to install them. For example, landlords of rental properties have less of an incentive to install solar panels because the energy savings are passed to the tenant.[44] This raises environmental justice concerns, as low-income communities will be asked to bear the cost of an ever-increasing share of traditional generation and transmission infrastructure.[45] As a result, regulators are looking at ways to reform rate structures and cost recovery mechanisms to ensure that service remains universally affordable, that prices reflect the efficiency added by DERs, and that consumers do not bear an unequal burden of modernizing the electric grid.[46]

II. WHAT STATES ARE CHANGING TO MEET THEIR GOALS

State public utility commissions have taken a variety of approaches to address the challenges and opportunities presented by integrating DERs. Some states, such as New York, have instituted comprehensive programs, which seek to address numerous issues at once.[47] Other states, such as Massachusetts, have instituted a number of smaller proceedings and stakeholder working groups aimed at addressing more granular issues.[48] However, states have recognized that

---

41. *See* EXEC. OFFICE OF THE PRESIDENT, ECONOMIC BENEFITS OF INCREASING ELECTRIC GRID RESILIENCE TO WEATHER OUTAGES 3 (2013) (finding that "weather-related [power] outages are estimated to have cost the U.S. economy an inflation-adjusted annual average of $18 billion to $33 billion" from 2003 to 2012).

42. *See* Mass. D.P.U. 12-76-B, *supra* note 24, at 10.

43. For example, solar installations can cost at least $20,000 to install. *See* Howard Crystal, *Fairly Compensating Sun Power: Challenges to Rooftop Solar Development*, GEO. ENVTL. L. REV. ONLINE (Sept. 20, 2016), https://gelr.org/2016/09/20/fairly-compensating-sun-power/.

44. *See* 2012 GREEN LEASE WORKGRP., BOS. BAR ASS'N, GREEN LEASE GUIDE: ISSUES, SAMPLE CLAUSES AND LEASES, AND LINKS 3 (2012).

45. *See* Desmond W.H. Cai et al., *Impact of Residential PV Adoption on Retail Electricity Rates*, 62 ENERGY POL'Y 13 (2013).

46. *See* E21 INITIATIVE, PHASE 1 REPORT: CHARTING A PATH TO A 21ST CENTURY ENERGY SYSTEM IN MINNESOTA 6 (2014).

47. *See* N.Y.P.S.C. Order, 2015 WL 862119, at *83.

48. *See* Mass. D.P.U. 12-76-B, *supra* note 24, at 6–7.

no single change will be sufficient to fully integrate DERs.[49] Instead, the commissions have looked at both demand-side changes, including rate changes and structures, and supply-side changes, including altering the generation portfolio.[50]

A. STATES ARE TRYING TO DECREASE OVERALL DEMAND AND PEAK-TO-AVERAGE RATIO THROUGH DEMAND RESPONSE

One issue with the widespread integration of DG is its effect on net load profiles. Net load profiles reflect the supply and demand entering and exiting an electric system at any given time.[51] Peak-to-average ratios compare the average load on the electricity system during peak hours with the load during off-peak hours.[52] The higher the ratio, the larger the difference in consumption between peak hours and off-peak hours.[53] An efficient system aligns supply with demand. Generation from most DG sources is not constant like traditional combustion or nuclear generation, and does not align with periods of peak demand.[54] In order to decrease overall demand and decrease peak-to-average ratios, state commissions are encouraging utilities to implement technologies that provide the customer with greater information about their electricity usage, and instituting rate structures that encourage customers to decrease their peak demand.[55] Lowering peak demand is crucial for decreasing the environmental impact of electric generation.[56] During peak hours, utilities are forced to activate short-term, high-emission sources to meet increased demand.[57]

---

49. *See* CAL. PUB. UTIL. CODE § 454.5(b)(9)(C)(i) (West 2017) ("The electrical corporation shall first meet its unmet resource needs through *all* available energy efficiency and demand reduction resources that are cost effective, reliable, and feasible.") (emphasis added); *see generally* Ill. Commerce Comm'n, Case No. 17-0142, Resolution Regarding Illinois' Consideration of the Utility of the Future: "NextGrid" Grid Modernization Study (Mar. 23, 2017) (initiating a collaborative process in which industry and stakeholders can share information and build consensus on the critical electric utility issues, including DERs).

50. *See, e.g.*, CAL. P.U.C., CALIFORNIA'S DISTRIBUTED ENERGY RESOURCES ACTION PLAN: ALIGNING VISION AND ACTION (2016).

51. PAUL ZUMMO, AM. PUB. POWER ASS'N, RATE DESIGN FOR DISTRIBUTED GENERATION 10 (2015).

52. *See Peak-to-Average Electricity Demand Ratio Rising in New England and Many other U.S. Regions*, U.S. ENERGY INFO. ADMIN. (Feb. 18, 2014), https://www.eia.gov/todayinenergy/detail.php?id=15051.

53. *Id.*

54. DNV GL, *supra* note 12, at 23 fig.3-3.

55. *See, e.g.*, Authorization of Advanced Metering Infrastructure Implementation (Smart Grid) and Cost Recovery, D.C. CODE § 34-1562 (2017).

56. *See* SWECO, STUDY ON THE EFFECTIVE INTEGRATION OF DISTRIBUTED ENERGY RESOURCES FOR PROVIDING FLEXIBILITY TO THE ELECTRICITY SYSTEM 20, 47–48 (2015).

57. *Id.*

1. States are Encouraging Transmission and Distribution Grid Modernization to Provide Greater Customer Information and Control

One of the solutions states have highlighted is using advanced metering technologies to give consumers more control over their demand.[58] These advanced metering technologies allow consumers to visualize their electricity usage and rates, and some also allow consumers to feed electricity back into the grid through self-generation.[59] By giving consumers more control over their demand, states hope that consumers will decrease both overall and peak demand as they attempt to decrease their own electricity bills. Hawaii's Public Utilities Commission recognized that demand response programs were integral to creating the system flexibility necessary to integrate additional DERs.[60]

To incentivize the adoption of these technologies, states have taken various "technology neutral" approaches.[61] Massachusetts has decided that, for a company's incremental capital investments to be eligible for targeted cost recovery, it must commit to deploying advanced metering functionality within five years under the company's short-term investment plan.[62] Targeted cost recovery is a powerful financial incentive that allows utilities to build capital cost recovery into their rate designs.[63] California is requiring all electric utilities to provide for net energy metering, including the ability for customer-generators to sell electricity back to the utility, until those customer-generators' rated capacity exceeds five percent of the utility's aggregate customer peak demand.[64]

In addition to technologies that give consumers control over their usage and an opportunity to produce their own electricity, state commissions have looked into demand optimization opportunities on the distribution grid itself. For example,

---

58. *See, e.g.*, Mass. D.P.U. 12-76-B, *supra* note 24, at 11; Order Instituting Rulemaking to Examine the Commission's Post-2005 Energy Efficient Policies, Programs, Evaluation, Measurement, and Verification, and Related Issues, Cal. P.U.C., Decision 07-10-032, at 59–60 (Oct. 19, 2007).

59. *See* Mass. D.P.U. 12-76-B, *supra* note 24, at 3 (defining advanced metering functionality as "(1) the collection of customers' interval usage data, in near real time, usable for settlement in the ISO-NE energy and ancillary services markets; (2) automated outage and restoration notification; (3) two-way communication between customers and the electric distribution company; and (4) with a customer's permission, communication with and control of appliances"); CAL. PUB. UTIL. CODE § 2827(c)(1) (West 2017) ("Net energy metering shall be accomplished using a single meter capable of registering the flow of electricity in two directions."); *see also* Melissa Powers, *Small Is (Still) Beautiful: Designing U.S. Energy Policies to Increase Localized Renewable Energy Generation*, 30 WIS. INT'L L.J. 595, 662 (2012) ("For net metering and [feed-in tariffs] to incentivize meaningful investment in distributed generation, states should also expand eligibility to include commercial and industrial sources and raise the cap on allowable facility sizes.").

60. *See* Policy Statement and Order Regarding Demand Response Programs, Haw. P.U.C., Order No. 32054, Docket No. 2007-0341, at 6 (Apr. 28, 2014).

61. N.Y.P.S.C. Order, 2015 WL 862119, at *63 (favoring "advanced metering functionality" over the adoption of "advanced metering infrastructure", which is a specific set of technologies).

62. *See* Mass. D.P.U. 12-76-B, *supra* note 24, at 3–4.

63. *See generally* Severin Borenstein, *The Economics of Fixed Cost Recovery by Utilities*, 29 ELECTRICITY J. 5 (2016).

64. CAL. PUB. UTIL. CODE § 2827(c)(1).

Massachusetts has called on distribution companies to implement Volt/Volt-Ampere Reactive Optimization ("VVO").[65] VVO technologies allow utilities to monitor and adjust customers' voltage, which reduces peak demand and increases system efficiency.[66] A customer's voltage is the electrical force or potential required to meet their energy needs.[67]

2. Commissions are Reforming Rate Designs to Decrease Peak Demand and Ensure Equitable Pricing for All Customers

In addition to providing consumers with more information about their energy use through advanced metering, several states are implementing time-varying rate ("TVR") designs.[68] Time-varying rates alter the customer's per-kilowatt electricity charges based on a variety of factors, such as time of day, season, or other customers' usage.[69] These structures provide incentives for consumers to shift their energy usage to off-peak hours.[70] The Massachusetts Department of Public Utilities recognized that TVRs "are an essential component of grid modernization and they support the Commonwealth's energy and environmental policies."[71]

Under most current rate structures (i.e., those that do not use TVR), there is volatility in the wholesale market price depending on the season and time of day; however, consumers pay a flat rate, the same rate for every hour.[72] Commissions have recognized that, by shifting peak usage to off-peak usage, the capacity of the electric system can be better utilized.[73]

The California legislature clarified that "time-variant pricing" encompasses a number of rate structures, including time-of-use rates, critical-peak pricing, and real-time pricing.[74] Massachusetts is requiring distribution companies to offer both time-of-use and a flat rate with a peak-time rebate.[75] The time-of-use structure has two separate prices, on-peak and off-peak, which apply to all

65. *See* Mass. D.P.U. 12-76-B, *supra* note 24, at 11–12.

66. NAT'L ELEC. MFRS. ASS'N, VOLT/VAR OPTIMIZATION IMPROVES GRID EFFICIENCY 2 (2013), https://www.nema.org/Policy/Energy/Smartgrid/Documents/VoltVAR-Optimazation-Improves%20Grid-Efficiency.pdf.

67. *See* FABIAN WINKLER, PURDUE UNIV., BASICS OF ELECTRICITY/ELECTRONICS 3 (2009), https://www.cla.purdue.edu/academic/vpa/ad/act/resources/electronics_01.pdf.

68. AHMAD FARUQUI, RYAN HLEDIK & JENNIFER PALMER, TIME-VARYING AND DYNAMIC RATE DESIGN 9 (2012).

69. *Id.* at 7.

70. *See* HECO DGIP, *supra* note 38, at 5-15.

71. Anticipated Policy Framework for Time Varying Rates, Mass. D.P.U. 14-04-B, at 4 (June 12, 2014) [hereinafter Mass. D.P.U. 14-04-B].

72. *See* FARUQUI, HLEDIK & PALMER, *supra* note 68, at 9.

73. *See* Mass. D.P.U. 14-04-B, *supra* note 71, at 6; Instituting a Proceeding to Investigate Distributed Energy Resource Policies, Haw. P.U.C., Order No. 32269, Docket No. 2014-0192, at 3 (Aug. 21, 2014) ("Existing utility rate and pricing structures need to be reconsidered to better respond to customer and technological changes.").

74. *See* 2013 Cal. Legis. Serv. 611, A.B. 327, § 7 (West).

75. Mass. D.P.U. 14-04-B, *supra* note 71, at 8.

consumers based on the time of day.[76] A peak-time rebate provides a rebate to customers who lower their peak use to a pre-established baseline.[77] A critical-peak pricing system raises the price of electricity during extreme conditions, and consumers are alerted through various forms of communication that their rates are going to be higher for several hours.[78] Under real-time pricing, prices change frequently depending on a variety of factors.[79]

California's Commission can require electric companies to use time-of-use pricing beginning in 2018.[80] The California legislature saw potential danger in implementing time-varying rates, and clarified that rates must "not cause unreasonable hardship for senior citizens or economically vulnerable customers . . . ."[81] Additionally, "a residential customer shall not be subject to a default time-of-use rate schedule unless that residential customer has been provided with not less than one year of interval usage data from an advanced meter" and "is provided with no less than one year of bill protection during which the total amount paid by the residential customer for electric service shall not exceed the amount that would have been payable by the residential customer under that customer's previous rate schedule."[82] Massachusetts noted that low-income customers are actually better off under a time-varying rate structure, as they tend to have flatter load profiles.[83]

In addition to using rates to shift customer demand to off-peak hours, regulators recognize some potential negative effects that widespread DG currently causes. Under the current rate structure, many fixed costs are being shifted to customers that do not have DG capabilities.[84] The HECO Companies found that, during 2013, $38.5 million was shifted from generating customers to non-generating customers, across all of the Hawaiian islands.[85] This problem will only be exacerbated as DG grows. Commissions have examined a variety of solutions, including fixed-charge increases, "buy all/sell all" provisions, and unbundled rates.[86]

76. *See* PETER CAPPERS ET AL., BERKELEY NAT'L LAB., MASS MARKET DEMAND RESPONSE AND VARIABLE GENERATION INTEGRATION ISSUES: A SCOPING STUDY 15 (2011); Mass. D.P.U. 14-04-B, *supra* note 71, at 8.

77. *See* CAPPERS ET AL., *supra* note 76, at 15; Mass. D.P.U. 14-04-B, *supra* note 71, at 10.

78. *See* CAPPERS ET AL., *supra* note 76, at 15; Mass. D.P.U. 14-04-B, *supra* note 71, at 9.

79. *See* Time-of-Use Rates for Rate-Regulated Utilities in Minnesota, Minn. P.U.C., Docket No. 08-948, at 16 (Apr. 5, 2013), https://mn.gov/puc/assets/014314_tcm14-5558.pdf.

80. 2013 Cal. Legis. Serv. 611, A.B. 327, § 7.

81. *Id.*

82. *Id.*

83. Mass. D.P.U. 14-04-B, *supra* note 71, at 11.

84. *See* S. ENVTL. LAW CTR., *supra* note 34, at 2–3.

85. HECO DGIP, *supra* note 38, at 1-2.

86. *See id.* at 6-14. Fixed-charge increases would be an additional fee to self-generating customers in order to cover fixed costs. *Id.* "Buy all/sell all" provisions would credit customers for their entire output at wholesale rates, and then require customers to purchase their entire usage at retail rates. *Id.* Unbundled rates would charge consumers at a more granular level for the services they use and separate consumption, potential demands, and fixed costs. *Id.*

Commissions also recognize that the traditional rate structure does not allow recovery for "standby" power.[87] Unless adequate standby power is maintained, consumers will be without power when DG is insufficient. Minnesota decided to give customers the right to not buy standby power; however, customers that do not buy standby power are not guaranteed power by other means.[88]

B. STATES ARE DIVERSIFYING SUPPLY AND RESTRUCTURING ELECTRICITY DISTRIBUTION

In addition to addressing demand problems, state regulators also aim to diversify and bolster supply.[89] Utilities, however, have resisted the adoption of DG, as it competes directly with their products.[90] State regulators need to decide how to not only encourage widespread adoption of DG and storage, but also reform the role of the utility to encourage its active support of DG.

1. Regulators are Implementing Incentives for Developing and Installing Distributed Generation and Distributed Storage

In order to increase the adoption of DERs, it is critical to encourage research into new technologies. Grid operators have unique capabilities to research, develop, test, and analyze new technologies because they have fewer informational costs and greater customer access. Because most states employ a "used and useful"[91] standard for cost recovery to be incorporated into rates, utilities are hesitant to undertake risky projects.[92] Massachusetts has considered altering the standard, observing that "some [research, development, and deployment] efforts will fail to produce results, or may indicate that other pathways are more appropriate. In those situations we will not deny cost recovery merely because of a lack of success, and recognize that the Department's 'used and useful' standard does not apply to such efforts."[93] These types of policies allow utilities to undertake risky research and development efforts without fear that they will be

---

87. TOM STANTON, NAT'L REGULATORY RESEARCH INST., ELECTRIC UTILITY STANDBY RATES: UPDATES FOR TODAY AND TOMORROW 9 (2012).

88. Order Establishing Generic Standards for Utility Tariffs for Interconnection and Operation of Distributed Generation Facilities, Minn. P.U.C., Docket No. E-999/CI-01-1023, at 16 (Sept. 28, 2004).

89. *See, e.g.*, Mass. D.P.U. 12-76-B, *supra* note 24, at 12.

90. *See* David J. Hess, *The Politics of Niche-Regime Conflicts: Distributed Solar Energy in the United States*, 19 ENVTL. INNOVATION & SOC. TRANSITIONS 42, 45 (2016).

91. *See* Petition of Boston Gas Company, Essex Gas Company and Colonial Gas Company, each d/b/a National Grid, pursuant to G.L. c. 164, § 94 and 220 C.M.R. § 5.00 et seq., for Approval of a General Increase in Gas Distribution Rates, a Targeted Infrastructure Recovery Factor, and a Revenue Decoupling Mechanism, Mass. D.P.U. 10-55, at 174 (Nov. 2, 2010) ("For costs to be included in rate base the expenditures must be prudently incurred and the resulting plant must be used and useful to ratepayers.").

92. *See, e.g.*, *id.* at 151–58 (rejecting a proposed surcharge that had been sought by a utility in order to pass the cost of proposed technology and infrastructure programs onto its customers).

93. Mass. D.P.U. 12-76-B, *supra* note 24, at 29.

unable to recover costs.[94]

State legislatures have been proactive in spurring the adoption of DG. Numerous states have instituted funding programs for both large and small-scale DG projects; funded projects have included solar, wind, biogas, biomass, and combined heat and power facilities.[95] The California Solar Initiative ("CSI") had a budget of $2.167 billion between 2007 and 2016, and a goal of installing 1940 megawatts of new solar generation capacity, while the CSI-Thermal program aims to install 200,000 solar hot water systems.[96] Pacific Gas and Electric's Self-Generation Incentive Program ("PG&E SGIP") provides incentives for both small and large scale DG.[97] Some states have started to allow owners of renewable generators to receive additional credits from the utilities, to the extent that the renewable generators help utilities meet their renewable obligations or stay within greenhouse gas limits.[98] These types of "carve-outs" benefit both utilities and consumers alike, by giving utilities the ability to avoid investing in new infrastructure.[99]

Regulators have also recognized the need for distributed storage as part of comprehensive reform. Robust storage capacity is useful for increasing grid flexibility and reliability by allowing consumers and utilities to react quickly to generation shortages.[100] Storage can be either customer-owned and located on their premises, or part of the distribution system.[101] Today, the most effective and widespread means for customer-owned storage is lead-acid batteries; however, electricity companies have also highlighted the merits of thermal storage for water.[102] PG&E SGIP provides an up-front grant for sixty percent of a distributed storage facility's cost.[103] On the utility side, regulators are promulgating larger storage requirements. For example, California requires utilities to procure 1.3

94. It's important to note, however, that these cost-recovery changes are inadequate without additional changes. Current cost-recovery mechanisms create incentives for utilities to view DERs with hostility.

95. *See, e.g.*, *Solar and Wind Energy Rebate Program*, ILL. DEP'T OF COMMERCE & ECON. OPPORTUNITY, https://www.illinois.gov/dceo/whyillinois/TargetIndustries/Energy/Pages/01-RERP.aspx (last visited May 23, 2017); *see also* DNV GL, *supra* note 12, at 91 (stating that, in addition to grants and rebates, many states offer tax incentives); Public Utility Regulatory Policies Act of 1978 ("PURPA"), 16 U.S.C. § 2601(2) (West 2017) (establishing a program to "improve the wholesale distribution of electric energy"); 18 C.F.R. § 292.101 (West 2017) (defining a "qualifying facility," for the purposes of PURPA, as a "cogeneration facility" or a "small power production facility").

96. *About the California Solar Initiative (CSI)*, GO SOLAR CAL., http://www.gosolarcalifornia.ca.gov/about/csi.php (last visited Mar. 28, 2017).

97. PAC. GAS & ELEC. CO. ET AL., 2015 SELF-GENERATION INCENTIVE PROGRAM HANDBOOK 36 (2015).

98. *See* Powers, *supra* note 59, at 661–62; *see also* COLO. REV. STAT. ANN. § 40-2-124(1)(c)(II)(A) (West 2017) (mandating that half of a utility's required renewable energy come from retail distributed generation).

99. *See* Powers, *supra* note 59, at 662–63.

100. HECO DGIP, *supra* note 38, at 4-29.

101. N.Y.P.S.C. Order, 2015 WL 862119, at *14.

102. *See, e.g.*, HECO DGIP, *supra* note 38, at 4-29–4-30.

103. PAC. GAS & ELEC. CO., ELECTRIC DISTRIBUTION RESOURCES PLAN 97 (2015).

gigawatts of energy storage by the year 2020.[104]

Under the current regulatory framework, it is time consuming and costly for new DG to be interconnected with the grid. Streamlining the permitting and interconnection processes, while maintaining strict safety and reliability standards, is critical to the ongoing regulatory reforms.[105] As part of its Distributed Generation Working Group, the Massachusetts Department of Public Utilities called on distribution utilities to create an expedited process for interconnecting DG.[106] New York has already instituted such a provision, and distributed generators below fifty kilowatts are placed on a "fast track" application process.[107]

2. Traditional Utilities are Being Replaced or Given Duties as Independent Systems Operators ("ISOs") or Regional Transmission Operators ("RTOs")

Perhaps the most seismic shift in the regulatory proceedings is the reimagining of the role of the traditional utility. Regulators are beginning to question whether the traditional, vertically-integrated monopoly can continue to exist within the new regulatory scheme. The New York Commission recognized that the traditional monopoly may be incompatible with the widespread deployment of DERs, stating that "[u]nder the current regulatory regime, the deployment of DER can be viewed as intermodal competition to the grid itself, threatening to undermine and strand investments made in the traditional system."[108] Regulators have looked at a variety of ways to shift incentives so that utilities no longer view DERs as competitors.[109]

While regulators are wary of maintaining the traditional utility model, there is widespread recognition that central planning and coordination remains critical. The New York Commission noted that "[t]he most efficient way to execute a dynamic system is to have a single entity oversee planning, grid operations and market operations."[110] To reconcile these two ideas, Commissions are reimagin-

---

104. 2010 Cal. Legis. Serv. 469, A.B. 2514, § 2 (West) (requiring the commission to determine targets for energy storage to be achieved by 2020); Decision Adopting Energy Storage Procurement Framework and Design Program, Cal. P.U.C., Decision 13-10-040 (Oct. 17, 2013) (setting 1.3 gigawatt energy storage target for 2020).

105. Dennis L. Arfmann et al., *The Regulatory Future of Clean, Reliable Energy: Increasing Distributed Generation*, 40 COLO. L. 31, 36 (2011) ("Well-designed interconnection standards facilitate the integration of renewables by standardizing and simplifying the technical and regulatory requirements, as well as the commercial terms by which utilities and DG system owners must abide in the context of state regulation.").

106. *See* Order on the Distribution Generation Working Group's Redlined Tariff and Non-Tariff Recommendations, Mass. D.P.U. 11-75-E, at 10–11 (Mar. 13, 2013).

107. DNV GL, *supra* note 12, at 6.

108. N.Y.P.S.C. Order, 2015 WL 862119, at *27.

109. *Id.*

110. *Id.* at *32; *see also* Decision and Order Regarding Integrated Resource Planning, Haw. P.U.C., Order No. 32052, Docket No. 2012-0036, Exhibit A, at 19 (Apr. 28, 2014) [hereinafter Haw. Comm'n Inclinations] (including exhibit entitled "Commission's Inclinations on the Future of Hawaii's Electric Utilities, recognizing

ing the role of utilities as ISOs or RTOs.[111] In this role, the organization would act as a neutral "balancing authority" that manages and coordinates the energy market, but does not participate.[112]

Even in states that favor the "balancing authority" approach, there are questions as to whether the utility should be able to continue to own energy generation.[113] New York views the ownership of generation and the role of the distributed system platform provider as conflicting, stating that, "[a]s a general rule, utility ownership of DER will not be allowed unless markets have had an opportunity to provide a service and have failed to do so in a cost-effective manner."[114] The New York REV plan creates exceptions for storage, DER programs for low-income and rental customers, and demonstration projects.[115]

Other commissions have chosen to allow utilities to remain vertically integrated, but have recognized the need to reform the financial incentives so that non-utility DERs are not prejudiced.[116] Two commonly used methods are (1) decoupling and (2) lost revenue adjustment mechanisms.[117]

Decoupling separates a utility's revenue and profits from how much electricity it sells.[118] This approach provides rates of return for things other than number of kilowatt-hours sold, such as revenues per customer,[119] so that the utility's revenues are no longer tied directly to sales volume.[120] This removes disincentives for utilities to assist DG adoption, while maintaining the utility's financial health.[121] Under the traditional utility model, utilities worry about losing kilowatt-hours to the installation of DG, because they fear that their investments will be

---

that "[t]he HECO Companies uniquely possess the institutional expertise and knowledge of the current generation portfolio and operation of the bulk power grid").

111. *Cf.* Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, No. 14-M-0101, 2014 WL 1713082, at *2 (N.Y.P.S.C. Apr. 25, 2014) (explaining the Commission's vision for utilities to function as distributed system platform providers, "actively managing and coordinating distributed resources"). An ISO or RTO is "an independent, federally regulated entity that is a Transmission System Operator, a wholesale market operator, a Balancing Authority and a Planning Authority." PAUL DE MARTINI & LORENZO KRISTOV, BERKELEY NAT'L LAB, REP. NO. 2: DISTRIBUTION SYSTEMS IN A HIGH DISTRIBUTED ENERGY RESOURCES FUTURE, at vii (2015).

112. *See* DE MARTINI & KRISTOV, *supra* note 111, at 28; *see also* Haw. Comm'n Inclinations, *supra* note 110, at 11.

113. *See, e.g.*, D.C. CODE § 34-1513(a) (2017) ("Other than its provision of standard offer service, the electric company shall not engage in the business of an electricity supplier in the District of Columbia except through an affiliate.").

114. N.Y.P.S.C. Order, 2015 WL 862119, at *45.

115. *Id.* at *45–46.

116. *See* Haw. Comm'n Inclinations, *supra* note 110, at 23.

117. *See* DAVID MOSKOVITZ ET AL., REGULATORY ASSISTANCE PROJECT, DECOUPLING VS. LOST REVENUES: REGULATORY CONSIDERATIONS 1 (1992).

118. *Id.* at 3.

119. *Id.* at 7.

120. *Id.* at 4.

121. *See* Instituting an Investigation to Reexamine the Existing Decoupling Mechanisms for Hawaiian Electric Company, Inc., Hawaiian Electric Light Company, Inc., and Maui Electric Company, Limited, Haw. P.U.C., Order No. 31289, Docket No. 2013-0141, at 2–3 (May 13, 2013).

unrecovered and their infrastructure underutilized.[122] Decoupling has already been widely used in the natural gas industry, but its use has thus far remained limited in the electricity industry.[123]

Some states that have instituted revenue-decoupling mechanisms have also encountered opposition from state courts.[124] In *Detroit Edison Co.*, the utility requested permission from the Michigan Public Service Commission ("PSC") to institute a series of rate changes.[125] When the PSC approved the rate changes, including revenue-decoupling mechanisms, ratepayers sued.[126] In reversing the PSC's decision, the court did not examine the merits of decoupling; rather, it simply held that the PSC's statutory authority did not encompass decoupling for electric providers.[127]

Lost revenue adjustment mechanisms allow the utility to calculate its lost profits and adjust revenues accordingly.[128] Under this approach, the utility is required to estimate the amount of revenue lost due to energy efficiency programs or DERs.[129] Currently, fifteen states have adopted some sort of lost revenue adjustment mechanism.[130] Some scholars view this mechanism as inadequate, as it compensates utilities for revenues lost, but does not encourage further investment in the programs that led to those losses.[131] So far, studies have shown that states with decoupling have greater energy savings than those with lost revenue adjustment mechanisms.[132]

III. ANALYSIS OF STATE PLANS

As more states begin to adopt regulatory reforms to try to encourage DERs, it is crucial that state utility commissions are able to make informed decisions. Unfortunately, many of the enacted reforms are in their infancy, so their effects

122. *See* MOSKOVITZ ET AL., *supra* note 117, at 1 n.1.

123. *See* PAMELA MORGAN, GRACEFUL SYSTEMS LLC, A DECADE OF DECOUPLING FOR US ENERGY UTILITIES: RATE IMPACTS, DESIGNS, AND OBSERVATIONS 2–3 (2013). *But see* Vote and Order Opening Investigation by the Department of Public Utilities on its own Motion into Rate Structures that will Promote Efficient Deployment of Demand Resources, Mass. D.P.U. 07-50, at 3 (June 22, 2007) (opening an inquiry into electricity rate changes that will address the "inherent conflict between the incentive to increase sales promoted by current revenue-collection mechanisms and the reduced consumption resulting from the use of demand resources").

124. *See, e.g.*, *In re* Applications of Detroit Edison Co., 817 N.W.2d 630, 633 (Mich. Ct. App. 2012) (holding that "the PSC has authority to direct or approve the use of [revenue-decoupling mechanisms] only in connection with gas utilities, not electric"). *But see* People *ex rel.* Madigan v. Ill. Commerce Comm'n, 988 N.E.2d 146 (Ill. App. Ct. 2013) (holding that decoupling mechanisms did not constitute retroactive ratemaking).

125. 817 N.W.2d at 632.

126. *Id.*

127. *Id.* at 633–34.

128. *See* MOSKOVITZ ET AL., *supra* note 117, at 1.

129. *Id.* at 5.

130. *See* ANNIE GILLEO ET AL., AM. COUNCIL FOR AN ENERGY-EFFICIENT ECON., VALUING EFFICIENCY: A REVIEW OF LOST REVENUE ADJUSTMENT MECHANISMS 24–27 (2015).

131. *See id.* at vi.

132. *See id.* at 13–17.

are unlikely to be cognizable for some time. It is possible, however, to make predictive guesses based on successful reforms in the past. By examining the states' policy objectives through the lens of past regulations, regulators may be able to make more accurate decisions.

A. INCREASING SYSTEM-WIDE EFFICIENCY

To create a more efficient electricity industry, it is important for regulators to recognize that utilities will continue to play a vital role in the process. The New York Commission noted that, "[f]or competition to flourish, the market must be transparent and provide DER providers and end use consumers with the system need and price information as well as sufficient regulatory certainty so that all may invest and participate with confidence."[133] The Commission recognized that the utilities were best positioned to provide that service.[134] While this might not be the complete "grid democratization" that many advocates are looking for, leveraging utilities' vast institutional knowledge and infrastructure is critical to meeting these new challenges.[135] This does not mean, however, that a business-as-usual approach will be satisfactory to handle the vast complexities that come with the integration of DERs.[136] In a future with widespread DER adoption, the utilities should have less power to control access to the grid; otherwise, the incentives will remain to favor their own generation over that of competitors.

Introducing new pricing models is also vital to increasing the system's economic efficiency. Utilities must avoid the temptation to raise fixed costs to account for the decrease in income due to DG adoption, as this will cause a disproportionate impact on low-use customers.[137] Instead, time-varying rates will ensure that consumers behave in a way that reflects their true cost to the system. In the past, regulators have noticed that less stable prices are often met with public backlash, but are necessary to ensure that behaviors are efficient.[138] Well-designed time-varying prices are stable enough that consumers can tailor their behavior accordingly, yet flexible enough to reflect the realities of the market.[139]

---

133. N.Y.P.S.C. Order, 2015 WL 862119, at *27.

134. *See id.*

135. *See* Powers, *supra* note 59, at 667.

136. N.Y.P.S.C. Order, 2015 WL 862119, at *9.

137. Studies have shown that low-use customers also tend to be low-income customers. *See* S. ENVTL. LAW CTR., *supra* note 34, at 2.

138. *See* SCOTT HEMPLING, REGULATING PUBLIC UTILITY PERFORMANCE: THE LAW OF MARKET STRUCTURE, PRICING AND JURISDICTION 88–89 (2013).

139. There are fears that introduction of time-of-use rates will disincentivize the adoption of solar, as prices will be higher for those customers at times when solar output decreases. *See* Crystal, *supra* note 43; Diane Cardwell, *Why Home Solar Panels No Longer Pay in Some States*, N.Y. TIMES (July 26, 2016), https://www.nytimes.com/2016/07/27/business/energy-environment/why-home-solar-panels-no-longer-pay-in-some-states.html?mcubz=0.

B. INCREASING FUEL AND RESOURCE DIVERSITY, PARTICULARLY INCREASED USE OF RENEWABLE RESOURCES

Increasing fuel and resource diversity is critical to protecting against price fluctuations, demand shortages, and natural disasters. Because most of the growth in the use of renewables has historically been through customer-sited DG rather than utility-scale generation,[140] utilities should focus on enabling and incentivizing the adoption of DG. Two effective ways to encourage the adoption of DG are net metering policies and robust incentives for adopting DERs.

Net metering gives DG customers a credit on their utility bill in exchange for selling their excess electricity to the utility at a retail rate.[141] The majority of states have already enacted some form of net metering.[142] Some scholars feel, however, that net metering alone is not enough to incentivize investment in renewable resources because it is not affected by the method of electricity production.[143] Instead, they argue that there should be some additional value placed on renewable sources.[144] An example of this is the "Value of Solar" rate that has been used in Minnesota.[145] Value of Solar rates attempt to provide additional returns in order to account for the additional benefits that come with installing solar over other types of DG.[146] This critique of net metering ignores the fact that the majority of installed DG uses some form of renewable energy.[147] However, those scholars' fears may come to fruition if the proper incentive programs for renewable energy are not maintained.

---

140. While utility-scale renewable projects have thus far been outpaced by customer-cited projects, analysts have projected that utility-scale solar capacity will continue to increase. *See Short-Term Energy and Winter Fuels Outlook (STEO): October 2015*, U.S. ENERGY INFO. ADMIN. (Oct. 6, 2015), https://www.eia.gov/outlooks/steo/archives/oct15.pdf; *see also Short-Term Energy and Winter Fuels Outlook (STEO): March 2017*, U.S. ENERGY INFO. ADMIN. (Mar. 7, 2017), https://www.eia.gov/outlooks/steo/archives/mar17.pdf ("On a percentage basis, solar power is expected to be the fastest growing renewable energy source in the forecast period . . . .").

141. *See State Net Metering Policies*, NAT'L CONFERENCE OF STATE LEGISLATURES (Nov. 3, 2016), http://www.ncsl.org/research/energy/net-metering-policy-overview-and-state-legislative-updates.aspx [hereinafter NCSL].

142. *See id*. In recent years, there has actually been a scaling back of these net metering programs, as states begin to reach their RPSs and utilities begin to feel the pressures of increased DG adoption. *Id.*; *see also* Richard Martin, *Battles Over Net Metering Cloud the Future of Rooftop Solar*, MIT TECH. REV. (Jan. 5, 2016), https://www.technologyreview.com/s/545146/battles-over-net-metering-cloud-the-future-of-rooftop-solar/. There are many ways that net metering programs can be structured. Some programs pay the customer the retail electricity rate, others pay the wholesale electricity rate, while a few simply pay the utilities avoided costs. *See* NCSL, *supra* note 141.

143. *See* Frank Jossi, *Q&A: Minnesota as a Leader in the 'Utility Of The Future'*, MIDWEST ENERGY NEWS (Feb. 3, 2015), http://midwestenergynews.com/2015/02/03/qa-minnesota-as-a-leader-in-the-utility-of-the-future/; N.Y.P.S.C. Order, 2015 WL 862119, at *17.

144. *See* AM. PUB. POWER ASS'N, DISTRIBUTED GENERATION: AN OVERVIEW OF RECENT POLICY AND MARKET DEVELOPMENTS 15 (2013).

145. *See* NCSL, *supra* note 141.

146. *Id.*

147. *See* AM. PUB. POWER ASS'N, *supra* note 144, at 3 (noting that solar comprised more than ninety percent of installed DG in the United States).

C. INCREASING SYSTEM RELIABILITY AND RESILIENCY SO THAT OUTAGES OCCUR LESS FREQUENTLY AND IN SHORTER DURATION

The keys to ensuring that the electric grid remains reliable, despite the widespread use of highly variable DG, are the introduction of increased storage capacity, time-variant pricing, and a state policy on "standby" power.[148] These three techniques all help minimize the effects of variability by helping to align demand with supply, and ensuring that adequate power remains when supply and demand do not align.[149] It is important to note that, while DG presents challenges to reliability, DERs as a whole enable a more resilient electric grid.[150] Having numerous redundant generators means that there is less susceptibility to extreme weather events. Demand response programs and distributed storage also enable the system to be more flexible in response to weather events and outages. The major obstacle to implementation is the affordability and availability of utility-scale storage. Tesla's 2015 announcement that it would mass produce a large-scale home battery may ease this transition and speed the adoption of DG.[151]

D. MAINTAINING JUST AND REASONABLE ELECTRICITY COSTS

The most practical way to ensure that electricity costs remain just and reasonable is to create a marketplace in which barriers for DG producers are low. This will require allowing utilities and affiliates to participate as generators so they can leverage economies of scale, offset potential earning impacts, and remain active and enthusiastic partners in the reforms.[152] Another key aspect to removing barriers for generators is a focus on lowering the soft costs of installations, and creating incentives for purchasing distributed resources. Widespread adoption of DERs presents a unique opportunity to prevent a single entity from gaining market power.

It may not be enough to merely create a market in which DERs can participate freely. Commissions will still play a vital oversight role, ensuring that no

---

148. Note that state regulators will have an increased responsibility to monitor and enforce reliability standards. Section 215(a)(1) of the Federal Power Act grants FERC jurisdiction over reliability of the "bulk power system," which only includes generators over 100 kV, much larger than most distributed generation systems. *See* HEMPLING, *supra* note 138, at 396.

149. *Cf.* N.Y.P.S.C. Order, 2015 WL 862119, at *10–12 (describing the challenges of the existing electric system, including that—for much of the year—large portions of the system are not used to meet consumer demand).

150. *See* Mass. D.P.U. 12-76-B, *supra* note 24, at 12; N.Y.P.S.C. Order, 2015 WL 862119, at *7.

151. *See* Matthew DeBord, *Elon Musk's Big Announcement: It's Called 'Tesla Energy'*, BUS. INSIDER (May 1, 2015, 12:16 AM), http://www.businessinsider.com/here-comes-teslas-missing-piece-battery-announcement-2015-4.

152. *See* NAT'L REGULATORY RESEARCH INST., UTILITY INVOLVEMENT IN DISTRIBUTED GENERATION: REGULATORY CONSIDERATIONS WHITE PAPER 42 (2015).

generator obtains excessive market power and unduly discriminates.[153] To ensure that low-income consumers are not overcharged for generators' fixed costs, regulators need to design a system in which both generators and their customers contribute toward fixed costs. California's Multifamily Affordable Solar Housing ("MASH") program is an example of a state proactively ensuring that the benefits of DG are shared broadly.[154] The program provides incentives for affordable-housing buildings to install solar generation equipment, and gives tenants a discount on their electricity bills.[155]

CONCLUSION

State regulators should look at the growth of DERs as an opportunity, but should be wary of the potential resistance from utilities, disparate impacts on low-income customers, and system-performance effects. State regulators that are proactive and comprehensive in their reforms will be rewarded with a more efficient, reliable, and "green" electricity system, whose costs accurately reflect the values received by DG. The ideal reforms will not only spur the development and adoption of DERs, but will also address the practical, economic, and social realities that are intertwined with them.

As outlined above, the most effective reforms will be multifaceted, wide-spread, and unafraid to challenge the traditional functions of utilities. That means designing rates that incentivize efficient behavior and accurately reflect the values consumed and added. Regulators should ensure that customer-friendly policies like net metering should be maintained, but they should also enact time-varying rates that encourage customers to behave more efficiently. Effective reforms will also require a role for utilities that leverages their immense capabilities, yet gives consumers flexibility to produce and consume electricity efficiently. In order to do so, regulators must lower the barriers to entry for DERs, including implementing incentives that reflect the true value of renewable energy. These will not be easy challenges, but today's regulators are gifted with a wealth of historical precedent and knowledge with which to make their decisions.

---

153. *See* Mont. Consumer Counsel v. FERC, 659 F.3d 910, 919–20 (9th Cir. 2011) (quoting California *ex rel*. Lockyer v. FERC, 383 F.3d 1006, 1013 (9th Cir. 2004)) ("[T]he crucial difference between previous market-based regulatory policies rejected by the courts . . . and [FERC's current approach is] the dual requirement of an ex ante finding of the absence of market power *and* sufficient post-approval reporting requirements.").

154. *Multifamily Affordable Solar Housing (MASH)*, GO SOLAR CAL., http://www.gosolarcalifornia.ca.gov/affordable/mash.php (last visited Mar. 29, 2017).

155. *Id.*